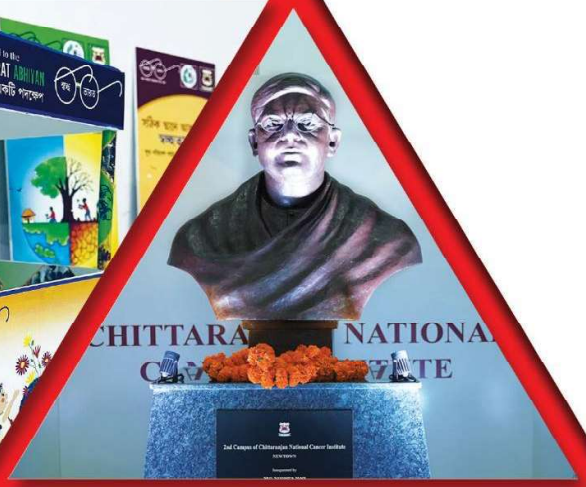


Chittaranjan National Cancer Institute
Kolkata

चित्तरंजन राष्ट्रीय कैंसर संस्थान
कोलकाता

ANNUAL REPORT
वार्षिक प्रतिवेदन
2021-22

CNCI


Dedication to the Nation
of
Chittaranjan National Cancer Institute (CNCI)
Second Campus, Newtown, Kolkata
By
ndra Modi
inister
Azadi Ka
Amrit Mahotsav
Prime Minister
CNCI
HITTARA
NATIONAL
CNCI


SWACHH BHARAT ABHIYAN
RESTRICTED AREA
ANI

ANNUAL REPORT

2021-2022

Chittaranjan National Cancer Institute

37, S P Mukherjee Road Kolkata700026

&

Street Number 299, DJ Block, Action Area I,
Newtown, West Bengal 700160

Table of Contents

Governing Body

Chittaranjan National Cancer Institute, Kolkata

Chairman	Union Minister of Health & Family Welfare
Alternate Chairman	Minister of Health & Family Welfare, Govt. of West Bengal
Member	Secretary, Ministry of Health & Family Welfare, Govt. of India or his Nominee
Member	Director General of Health Services, Directorate General of Health Services, Govt. of India, New Delhi
Member	Financial Adviser, Ministry of Health & Family Welfare, Govt. of India, New Delhi
Member	Secretary, Department of Health & Family Welfare, Govt. of West Bengal, Kolkata
Member	Secretary, Finance Department, Govt. of West Bengal, Kolkata
Member	Director of Health Services, Govt. of West Bengal, Kolkata
Member	Director General or his Nominee, Indian Council of Medical Research, New Delhi
Member	Director or his Nominee, Post Graduate Institute of Medical Education & Research, Chandigarh
Member	Director or his Nominee, Institute of Post Graduate Medical Education & Research, Kolkata
Member	Director, Saha Institute of Nuclear Physics, Kolkata
Member	Director, School of Tropical Medicine, Kolkata
Member	Nominee of the Department of Atomic Energy
Member	Director, All India Institute of Hygiene & Public Health, Kolkata

Amendment

Member	Vice-Chancellor, West Bengal University of Health Services (11th Meeting of the Governing Body, held on 26.04.2005)
Special Invitee	Vice-Chancellor, University of Calcutta, (12th Meeting of the Governing Body, held on 21.08.2010)
Member	Chairman, Standing Finance Committee (10th Meeting of the Governing Body, held on 02.08.2003)
Member	Two Experts in Biological Sciences related to Oncology - one to be nominated by the union Health minister and the other by the State Health Minister
Member	Two Faculty Members of Chittaranjan National Cancer Institute
Member	By rotation to be nominated by the Standing Academic Committee
Member	Director, Chittaranjan National Cancer Institute

Chittaranjan National Cancer Institute

DIRECTOR
Dr. Jayanta Chakrabarti

RESEARCH WING
O.I.C.(R)

HOSPITAL WING
M.S., OIC (H)& A.M.O.

Ruplal Nandy Memorial Cancer Research Centre, Chandannagar

Scientific Departments

- Anticancer Drug Development
  (In-Charge: Dr. R Baral)
- Cancer Chemoprevention
  (HoD: Dr. P. Saha)
- Clinical and Translational Research
  (Dr. K K Mukherjee)
- Environmental Carcinogenesis & Toxicology
  (HoD: Dr. M Roy01.4.2021 – 30.11.2021
  Dr. S. Mukherjee
- Epidemiology & Biostatistics
  (HoD: Dr.J. Chakrabarti)
- Immunoregulation & Immunodiagnostics
  (HoD: Dr. R Baral)
- In Vitro Carcinogenesis & Cellular Chemotherapy
  (In-Charge: Dr. R Baral)
- NeuroendocrinologyExperimental Hematology
  (In-Charge: Dr. R. Baral)
- Oncogene Regulation
  (HoD: Dr. J. Chakrabarti)
- Pathology & Cancer Screening
  (HoD: Dr. P Nath)
- Receptor Biology & Tumor Metastasis
  (HoD: Dr. D Sinha)
- Signal Transduction & Biogenic Amines
  (HoD: Dr. N Murmu)
- Viral Associated Human Cancer

Ancillary Depts./ Units/Sections

- Central Research Instrumentation Facility
  In-Charge: Dr. M. Ray01.4.2021 – 30.11.2021
  Dr. S. Ghosh
- Academic Cell & Coordinator:
  Dr. S Mukherjee
- Animal Care & Maintenance
  HoD: Dr. A Rakshit
- Library ALIO
  Mr. S Chakraborty & Mr. G Gorai.
- Computer Section
  In-Charge: Mr. K S Roy Chowdhury
  (Retired on 28/02/2022)
  G. Gorai
- Maintenance Department
  In-Charge: Dr. A Rakshit

Major Departments

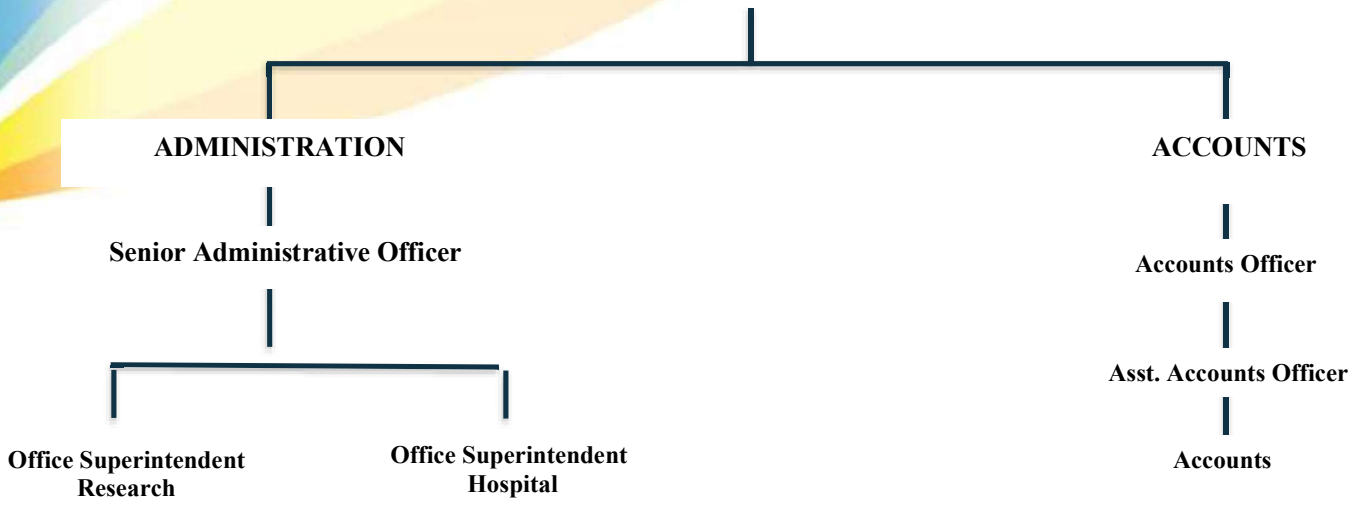
- Anesthesiology
  HoD: Dr. S Ray
- ENT-Head & Neck Oncology
  HoD: Dr. A Dam
- Gynaecological Oncology
  HoD: R K Mandal
- Medical Oncology
  HoD: Dr. K K Mukherjee
- Paediatric Oncology Section
  Section In-Charge: Dr. K K Mukherjee
- Medical Physics
  HoD: Dr. D K Ray
- Pathology
  HoD: Dr. S Hazra
- Radiation Oncology
  HoD: Dr. T Maji
- Radiodiagnosis
  HoD: Dr. S Mazumder
- Surgical Oncology
  HoD: Dr. J Chakrabarti
- Division of Preventive Oncology
  HoD: R K Mandal

Ancillary Depts./ Units/Sections

- Pain & Palliative Care Unit
  HoD: Dr. R K Mandal
- Medical Records
  In-Charge: Mr. S Chakraborty
- Dietetics
  Dietitian: Ms. P Das Dutta
- Nursing Services
  Asst. Nursing Superintendent
  Ms. M Barui (Mukherjee)
- Rehabilitation Services

Chittaranjan National Cancer Institute

Administrative Set-up



Message from the Desk of the Director, CNCI

It is my privilege as the Director of the Institute to present the Annual report of Chittaranjan National Cancer Institute for the year 2021-22. Our Institute is a pioneer in the field of Cancer care and research in this region and the country at large. It has slowly evolved itself to this position with the unrelenting effort of the Doctors, Scientists and other supportive staff of this Institute and with matching grant in aid from both Central and State Government. The last few years were full of activities as we were enhancing the quality and standard of our services in our Hazra Campus and simultaneously setting up the Laboratory and clinical services in the New Campus at Newtown, Kolkata. It was a daunting task with the limited resources in terms of Manpower, but we finally succeeded to establish the indoor services and the official inauguration of the Campus by our Honourable Prime Minister on the 7th of January,2022 was the crowning Glory of this whole effort.

We have established most of the disciplines of Cancer Care in the New Campus and have envisaged remodeling of some crucial areas of the existing campus to make it more lively and comfortable for the attending patients. The existing Campus has a rich inheritance which should be upheld by our undying effort.

We are constantly guided by our mission and vision of a comprehensive cancer care for all sections of society with the best Infrastructure and human resources at our disposal. It is also our objective to give new dimension to our Cancer research activities by focusing more on translational research, collaborations, goal-oriented projects etc.

We have identified numerous channels of upgradation and development for the coming year. A few like, a) creation of more posts, b) starting NMC recognized courses for major disciplines) starting more paramedical training program, d) setting up cabins for isolated treatment, e) commissioning and starting of both the LINAC machines at the New Campus
are worth mentioning.

In this age of constant shift of treatment paradigm and adoption of new principles and technique to achieve excellence, Chittaranjan National Cancer Institute will play an active part in the field of Cancer care and research.

Dr. Jayanta Chakrabarti
Director, Chittaranjan National Cancer Institute

From the Desk of Medical Superintendent, CNCI

Dear Friends,

Greetings from the Chittaranjan National Cancer Institute (CNCI), Kolkata which is one of the 27 regional cancer centres in India.

We had indeed a rich history of being formally inaugurated by Prof. Madam I. Curie on 2 January 1950, as Chittaranjan Cancer Hospital, named after Chittaranjan Das, the famous Freedom Fighter who donated land and property for the cause.

The 7th January 2022 will also be considered as a landmark day for the entire nation when Shri Narendra Modi Ji, Honourable Prime Minister of India in the august presence of Smt. Mamata Banerjee, Honourable Chief Minister of West Bengal & Dr. Mansukh Mandaviya, Honourable Union Minister for Health & Family Welfare and Chemicals & Fertilizers dedicated the new campus in Rajarhat for catering world class patient service to the entire East of India & other neighbouring SAARC Countries like Bangladesh & Myanmar.

Keeping in view the burden of cancers and need for more facilities for affordable and quality cancer care services, it was decided to set up a much bigger facility in the form of second campus of CNCI at Rajarhat in Kolkata, jointly funded by the Government of India and Government of West Bengal.

The fully functional, second campus of CNCI is a state-of-the-art, 460-bed cancer treatment centre, offering high quality and affordable treatment options to the people in various specialties of oncology.

CNCI has also been successfully participating in Swachh Bharat Mission and Kayakalp audit for the hospital and has come out with flying colours.

We are in the process of implementing Quality system audit for our hospital and clinical laboratory where we have already received NABL entry level certification for Laboratory in the 2nd campus. We are now eyeing for NABH entry level program.

Our pledge is to serve the mankind as government servant and we are vowed to do so under our able leadership.

CNCI is an well-known teaching institution for Doctors and allied Health care workers. The major achievement came in through the permission to start National Medical Commission recognized Superspeciality Post Graduate course like Mch (Surgical Oncology) and Speciality Graduate Courses like MD (Laboratory Medicine) and MD (Radiation oncology) for the academic session of 2022-2023.

The institute has already got permission for DMLT, DCCT and DOTT courses in the new 2nd campus which are recognized by state medical faculty of West Bengal.

We believe strongly that together we can achieve our vision successfully i.e.

"To be a coveted destination Centre for comprehensive and affordable cancer treatment for all sections of our society with an integrated approach of early Detection, Prevention, Research and Innovation"

On the auspicious year of 75th Anniversary of India's freedom, hoping for the better future.

Jai Hind

Dr Sankar Sengupta,

Medical Superintendent, Chittaranjan National Cancer Institute

HOSPITAL WING

HOSPITAL AT A GLANCE

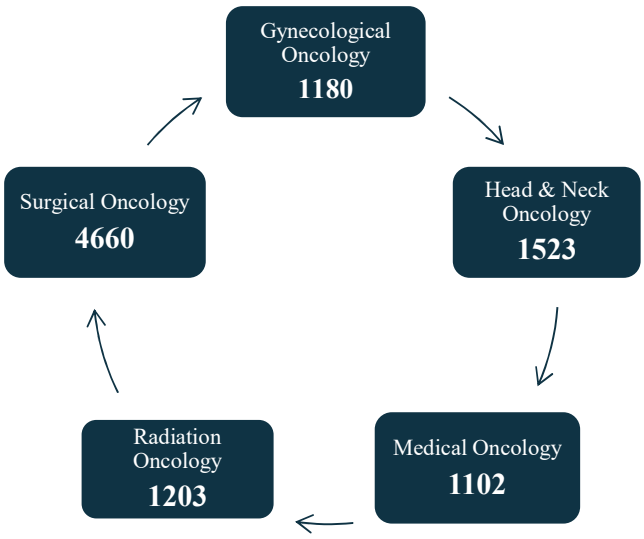
1st April 2021 to 31st March 2022

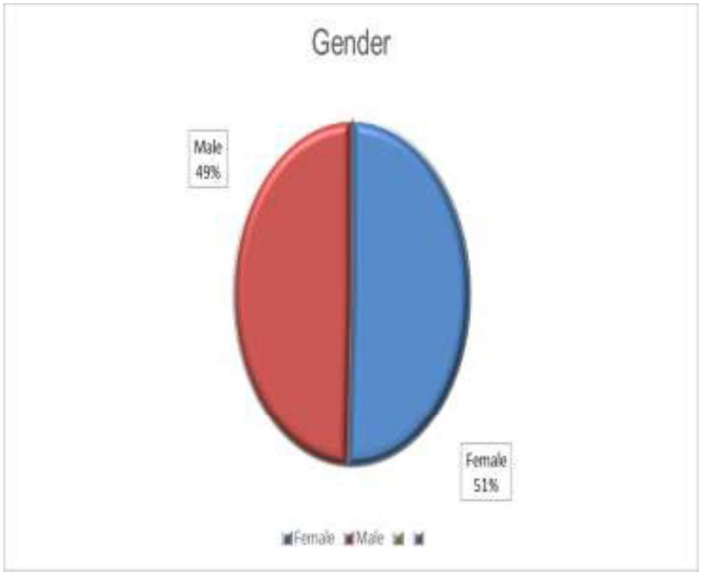
CLINICAL DATA FROM HOSPITAL MANAGEMENT SYSTEM

OPD REGISTRATION

Total (7610+2060) 9670 nos. of new cancer patients registered and (43493+ 17378) 60871 nos. old patients follow up for treatment during April 2021 to March 2022.

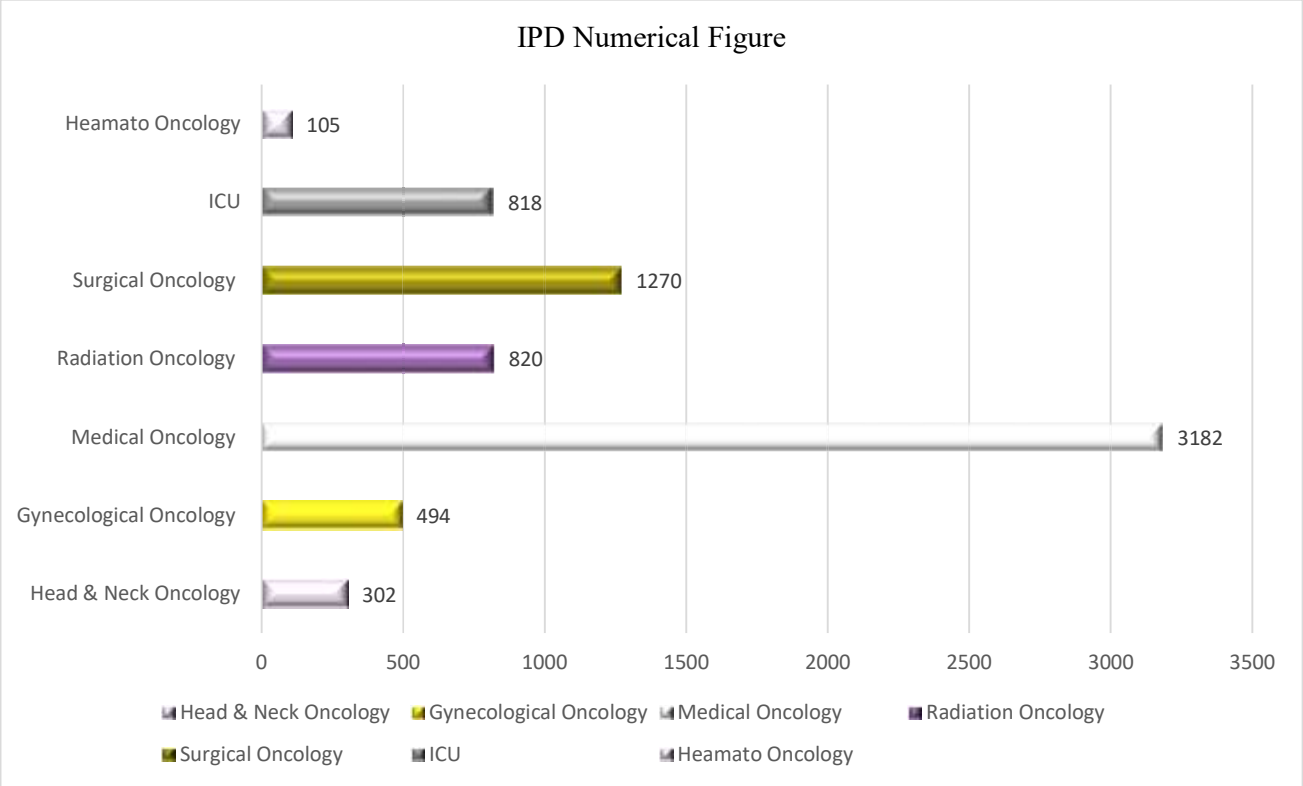
New OPD Nos. and Percentage are as follows:

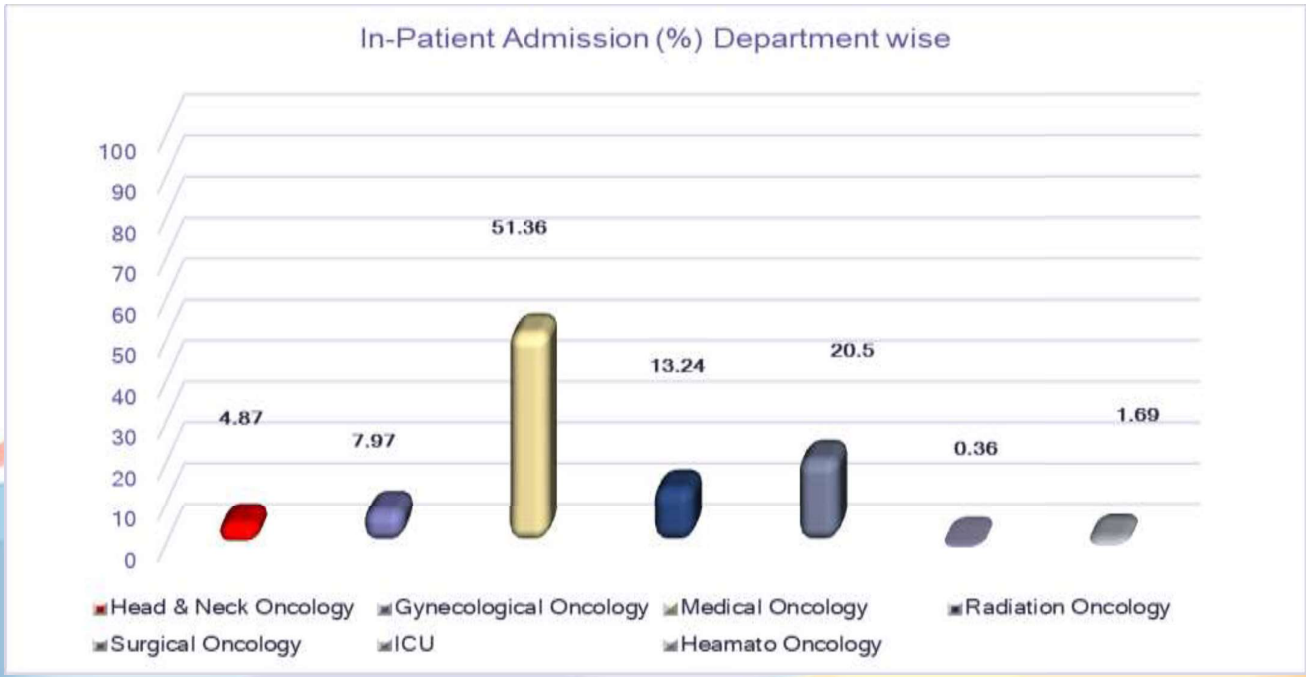


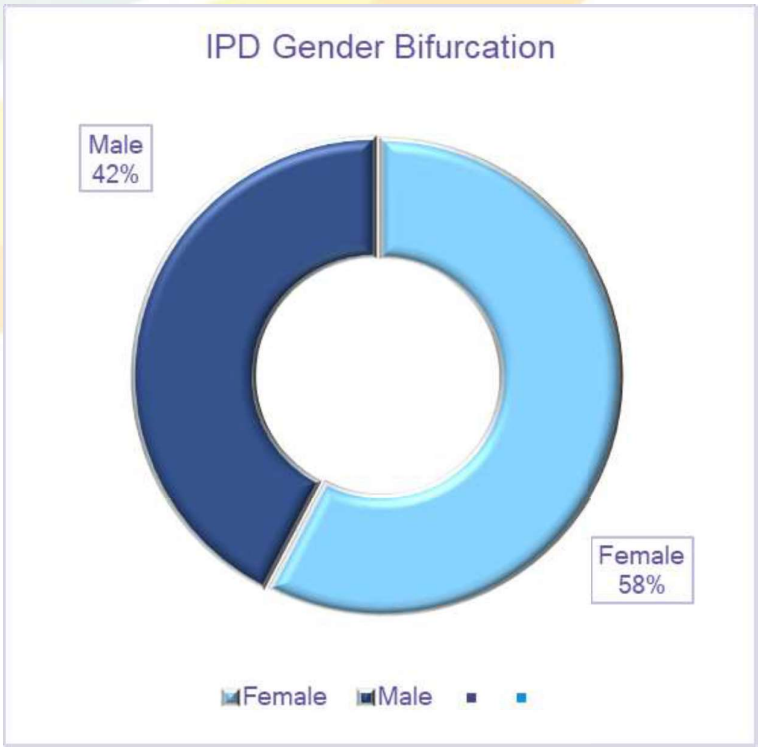


IN-PATIENT ADMISSION DETAILS

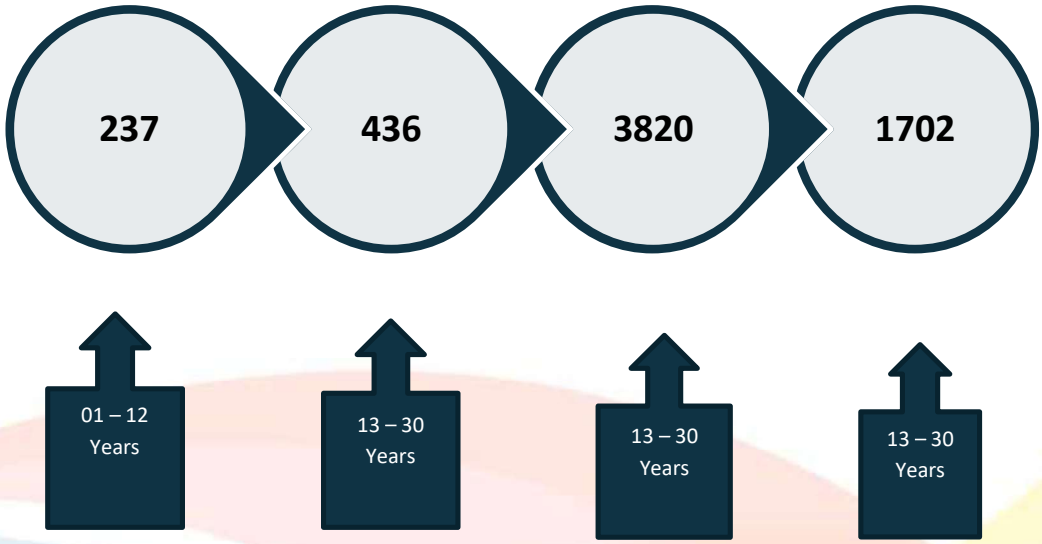
Total 6195 number of cancer patients admitted for treatment in both campus during 2021-2022.

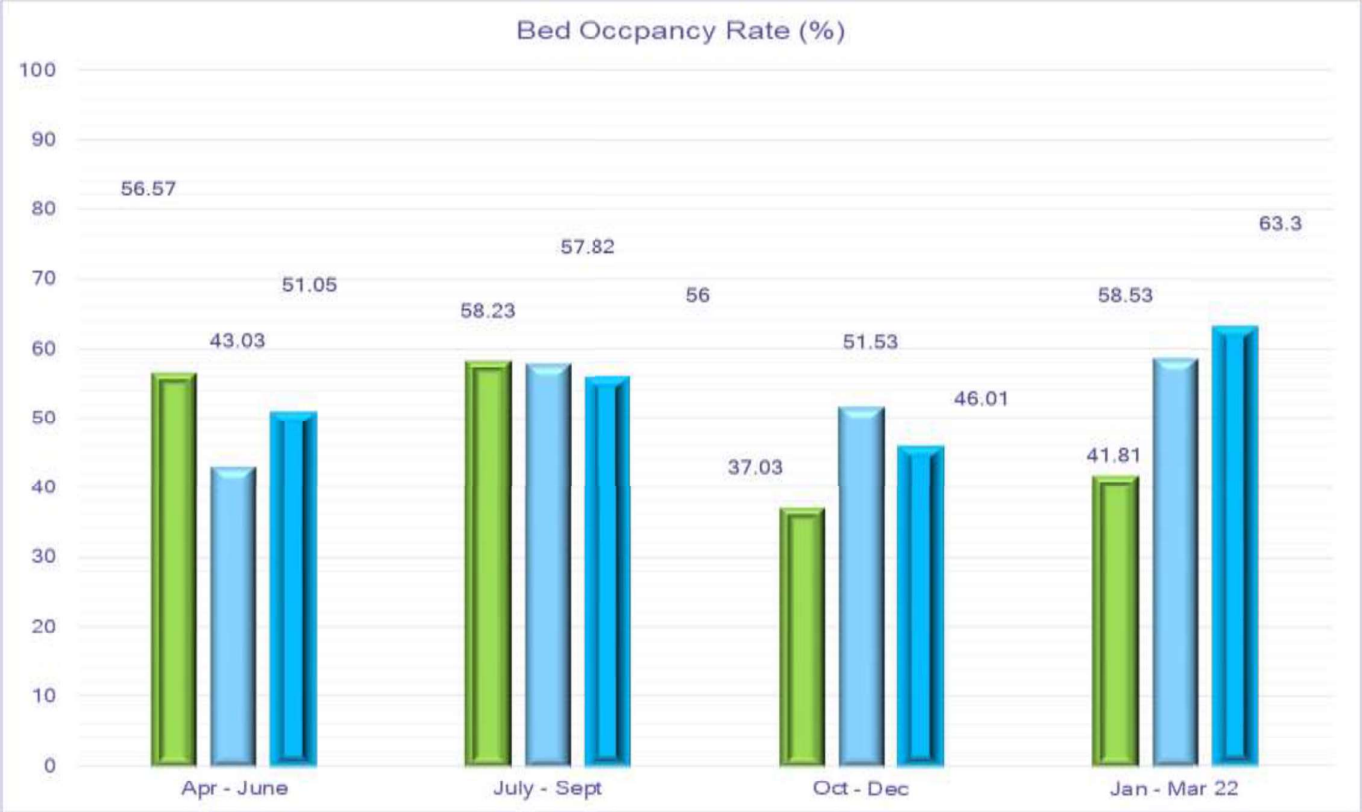


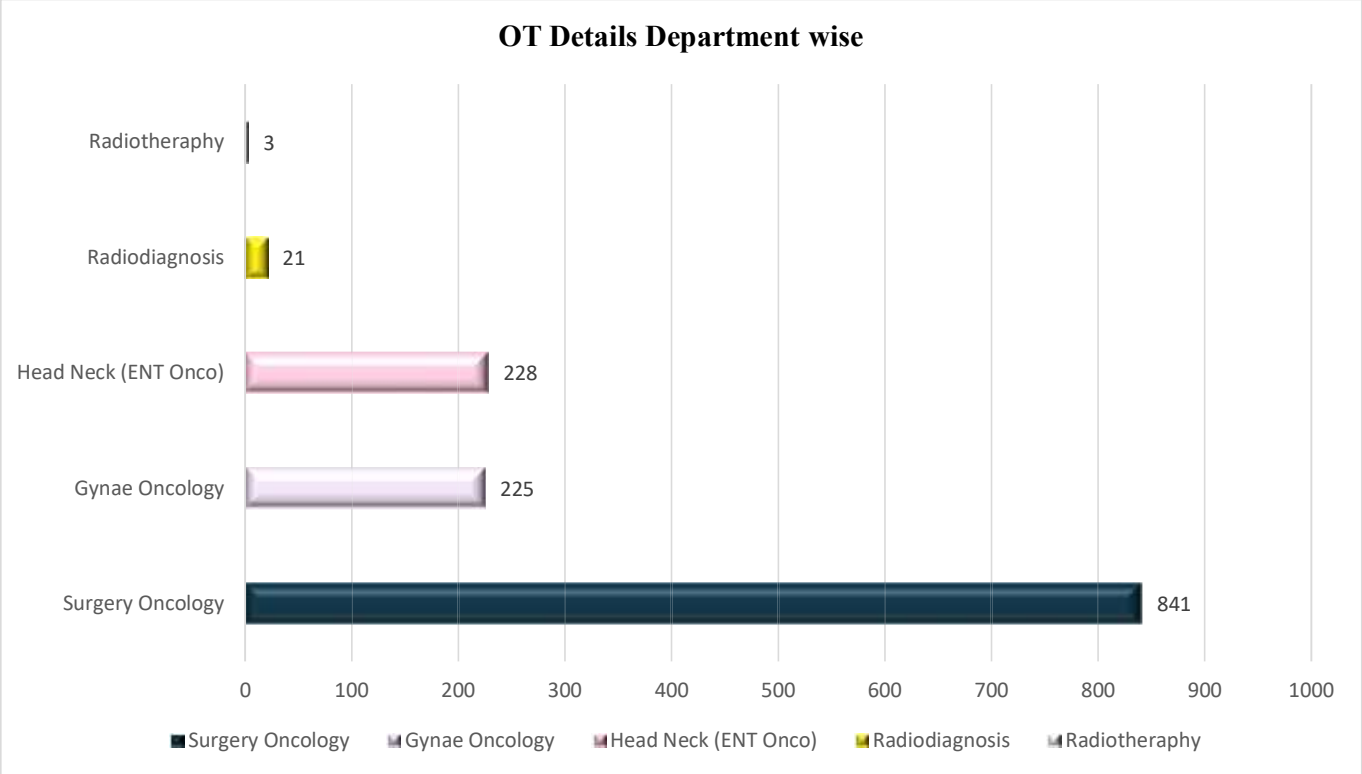


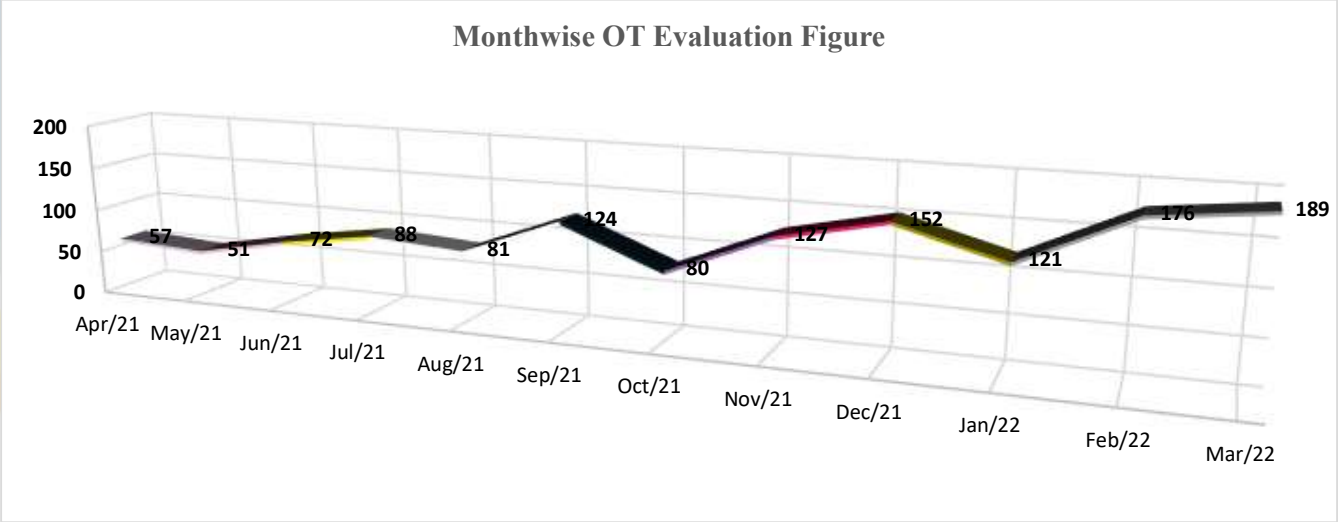


Age group wise IPD Numerical Figure




Bed Occpancy Rate (%)
100
90
80
70
60
50
40
30
20
10
0
56.57
43.03
51.05
58.23
57.82
56
37.03
51.53
46.01
41.81
58.53
63.3
Apr - June
July - Sept
Oct - Dec
Jan - Mar 22


OT Details Department wise
Radiotheraphy
3
Radiodiagnosis
21
Head Neck (ENT Onco)
228
Gynae Oncology
225
Surgery Oncology
841
0
100
200
300
400
500
600
700
800
900
1000
Surgery Oncology
Gynae Oncology
Head Neck (ENT Onco)
Radiodiagnosis
Radiotheraphy

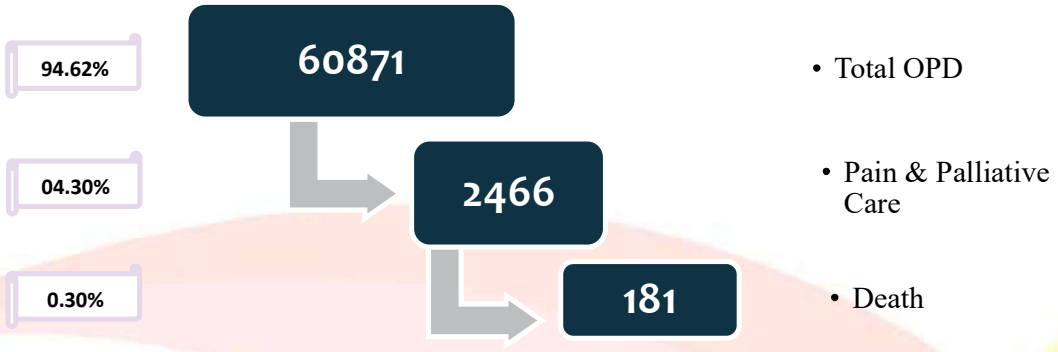


THERAPY DETAILS

Chemotherapy	Radiotherapy	Brachytherapy
• 7775	• 21174	• 541

DEATH AGAINST OPD & PAIN & PALLIATIVE CARE

The data of OPD registration and consultancy, Pain & Palliative Care against death numerical figure and percentage (%) are



DEPARTMENT OF ANESTHESIOLOGY AND ITU

Head of the Department: Dr. Shubhra Ray, Specialist Gr. I

TEAM

Hazra campus	
Name	**Designation**
Dr. Shubhra Ray	Specialist Gr. I
Dr. Deepanwita Das	Specialist Gr. II
Dr. Jyoti Gupta	Specialist Gr. II
Dr. Onzima Suba	Specialist Gr. II
Dr. Debasish Jatua	CMO

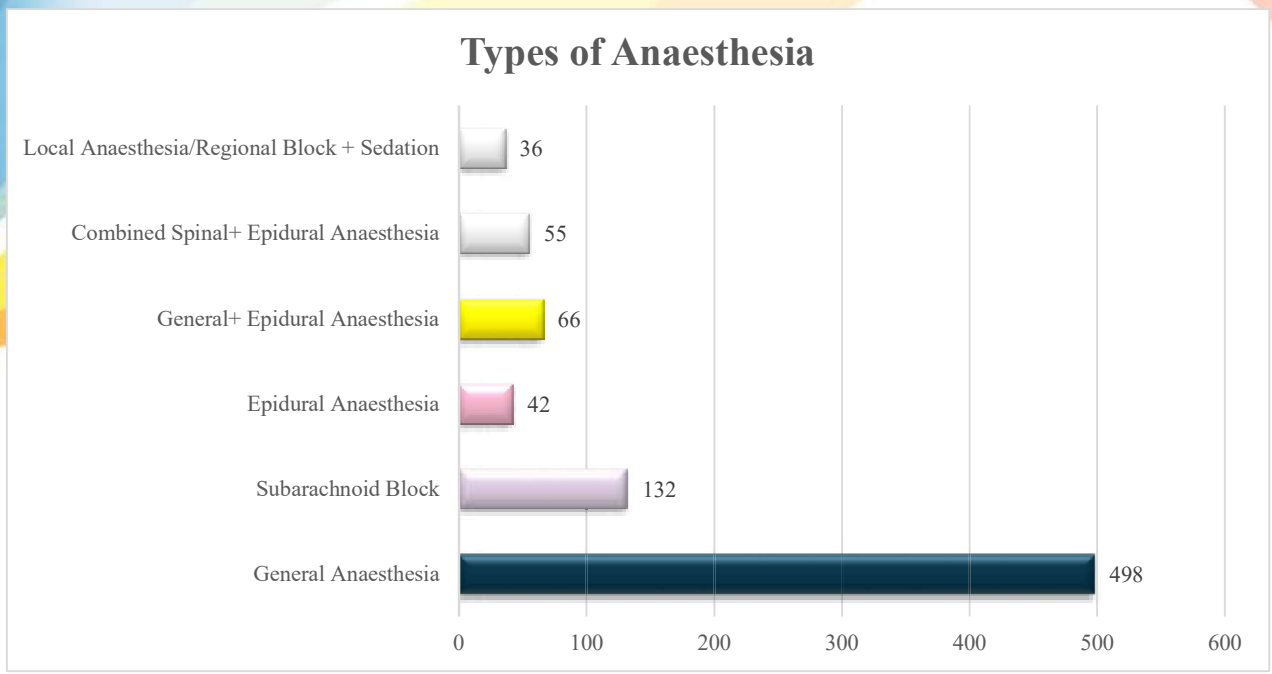
Anesthesia team, Hazra campus

New Town Campus	
Name	**Designation**
Dr. Deepa Chakrabarti	Specialist Gr. I
Dr. Sayandeep Mandal	Specialist Gr. II
Dr. Dibyadip Mukhopadhyay	Specialist Gr. II
Contractual Faculty	
Dr. Deepasri Chowdhury	Specialist Gr. II
Junior Doctors	
Dr. Ananki Chakrabarti	Senior Resident
Dr. Deepika Kaushik	Senior Resident
Dr. Shushovan Chakrabarti	Senior Resident
Dr. Sabarta Bhattacharya	ICU RMO
Dr. Nairita Sengupta	ICU RMO
Dr. Ashfakullah	ICU RMO
Dr. Koustav Chakrabarti	ICU RMO

Anesthesia team, New Town campus

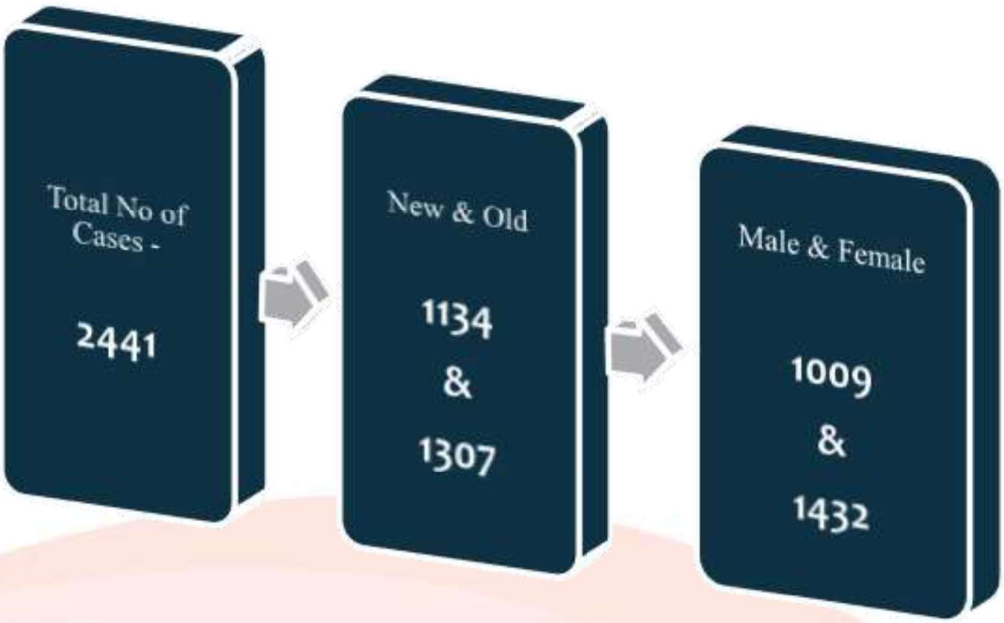
Major Surgeries under General ± Regional Anesthesia – Hazra Campus.

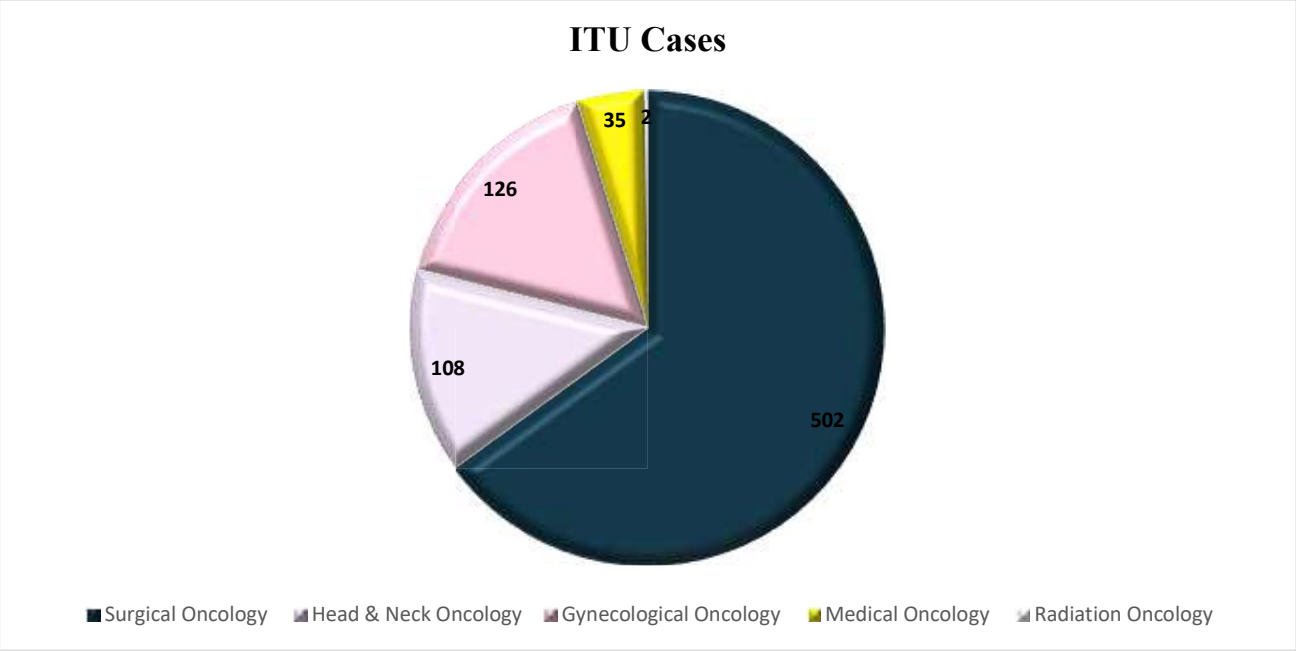
Departments	Major		Emergency	Post-OperativeElective Ventilation	Total
Surgery	GI & Genitourinary	**192**	38	24	**550**
	Head and Neck	**107**			
	Breast and Soft Tissue	**186**			
	Laparoscopy	**10**			
	Others	**55**			
Gynaecology		**123**		8	**123**
ENT and Head Neck		**108**		15	**108**
Radiotherapy + Radiology		**34**			**34**
Remote Anaesthesia		**14**			**14**
Total					**829**



Difficult Intubation Done with Flexible Video Bronchoscope - 18

Pre-Anesthetic Check-up OPD (Wednesday and Friday)

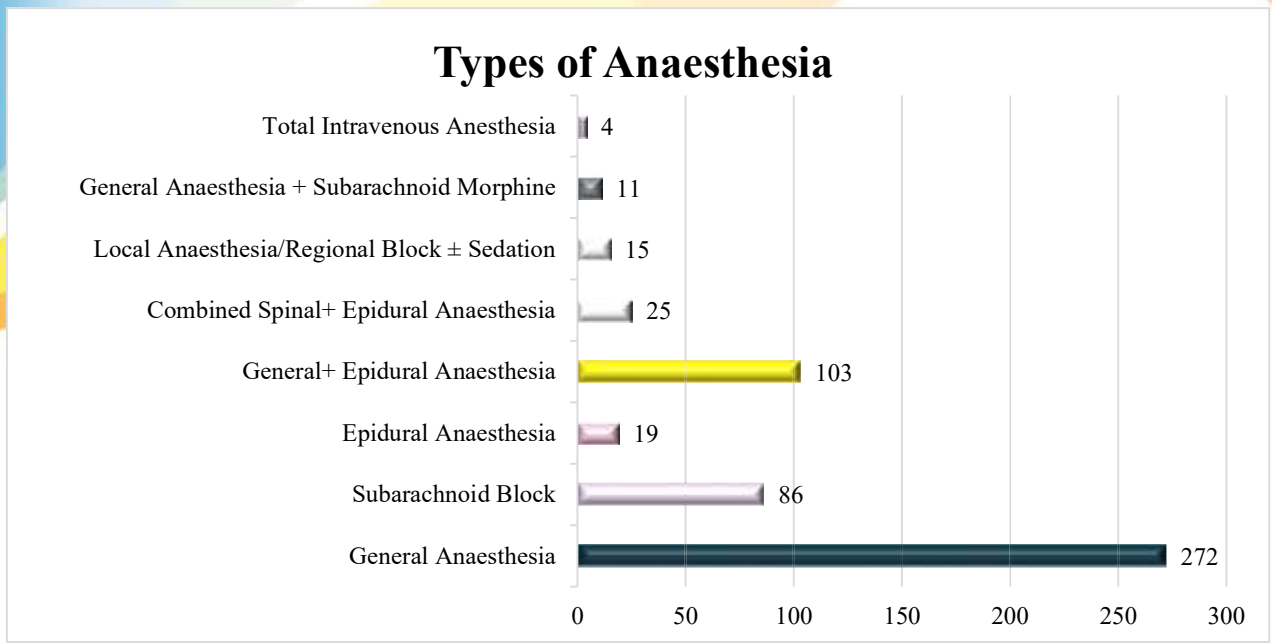




Total No. of Cases in ITU – **773** Total No. of Deaths in ITU - **23**

Major Surgeries under General ± Regional Anesthesia- New Town Campus

Departments		Emergency
Gastrointestinal Oncology	**137**	27
Genitourinary Oncology	**40**	
Breast Oncology	**96**	
Bone and Soft TissueOncology	**54**	
Head and Neck Oncology	**121**	
Gynaecological Oncology	**64**	
Brachytherapy	**48**	
Interventional Radiology	**2**	
TOTAL	**562**	



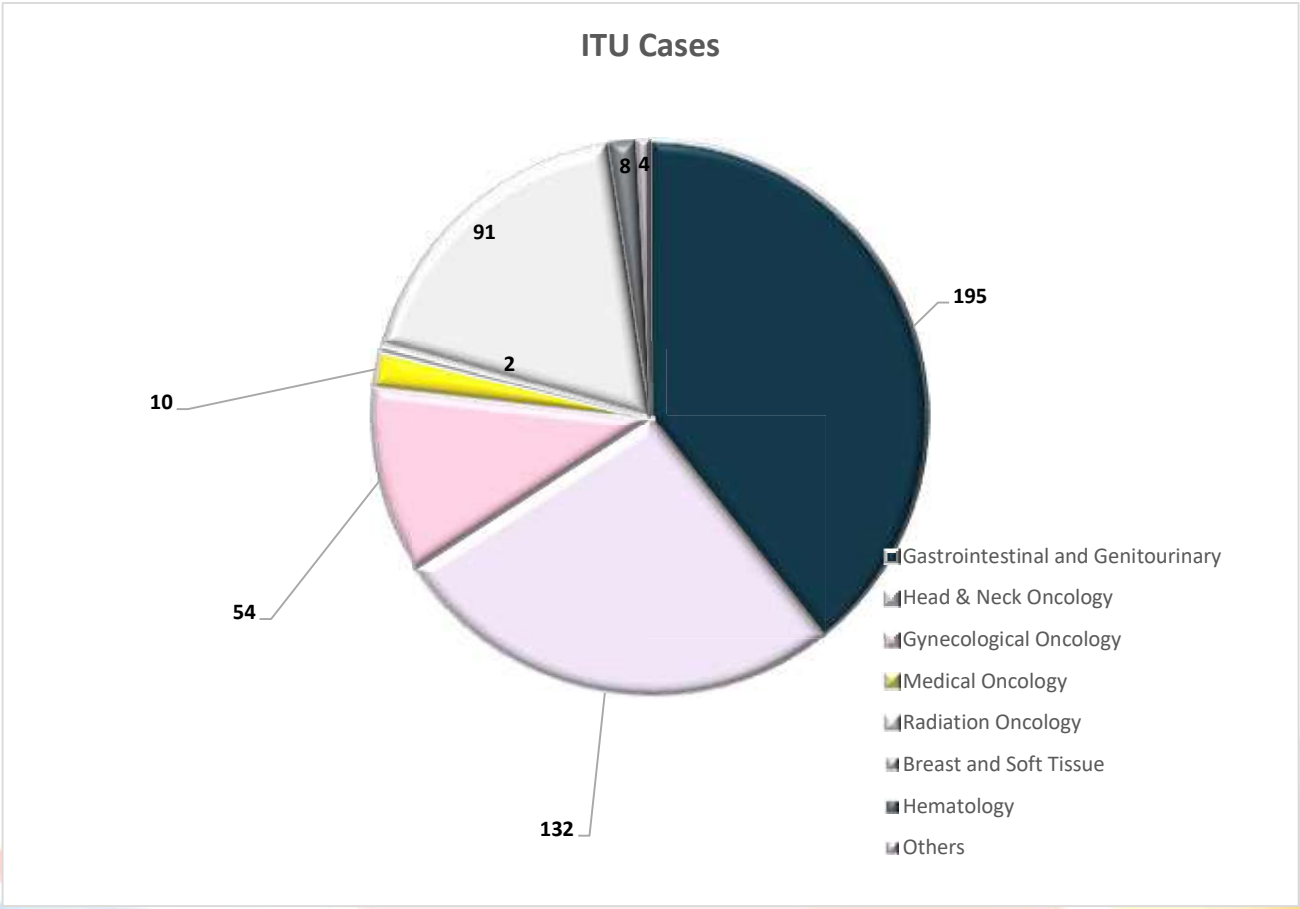
Difficult Intubation Done with Flexible Video Bronchoscope: 15

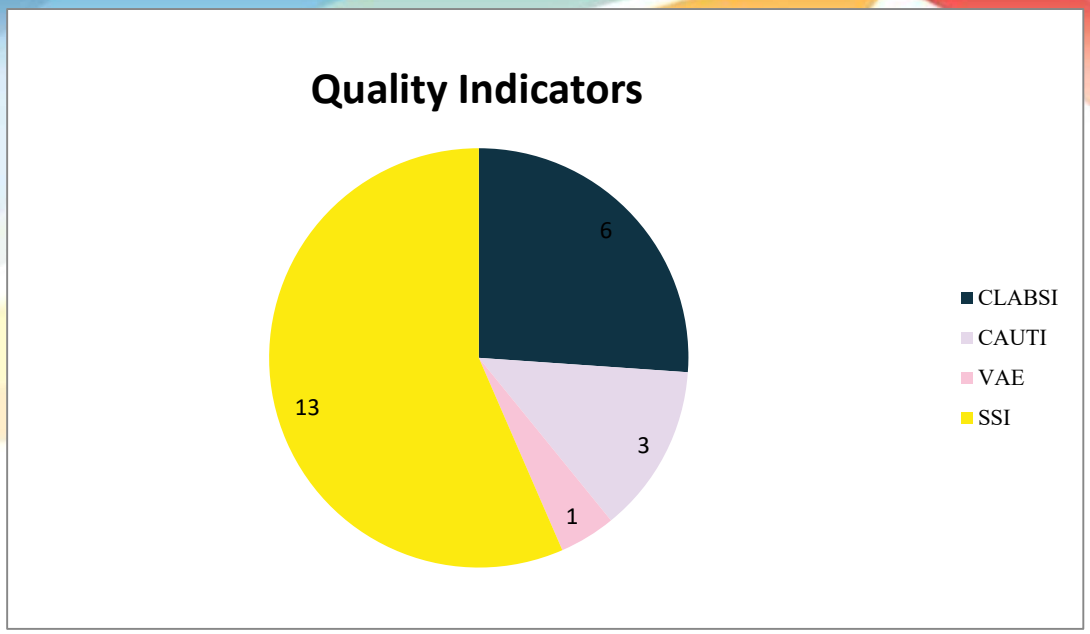
Post Operative Elective Mechanical Ventilation: 21

Pre-Anesthetic Check-up OPD

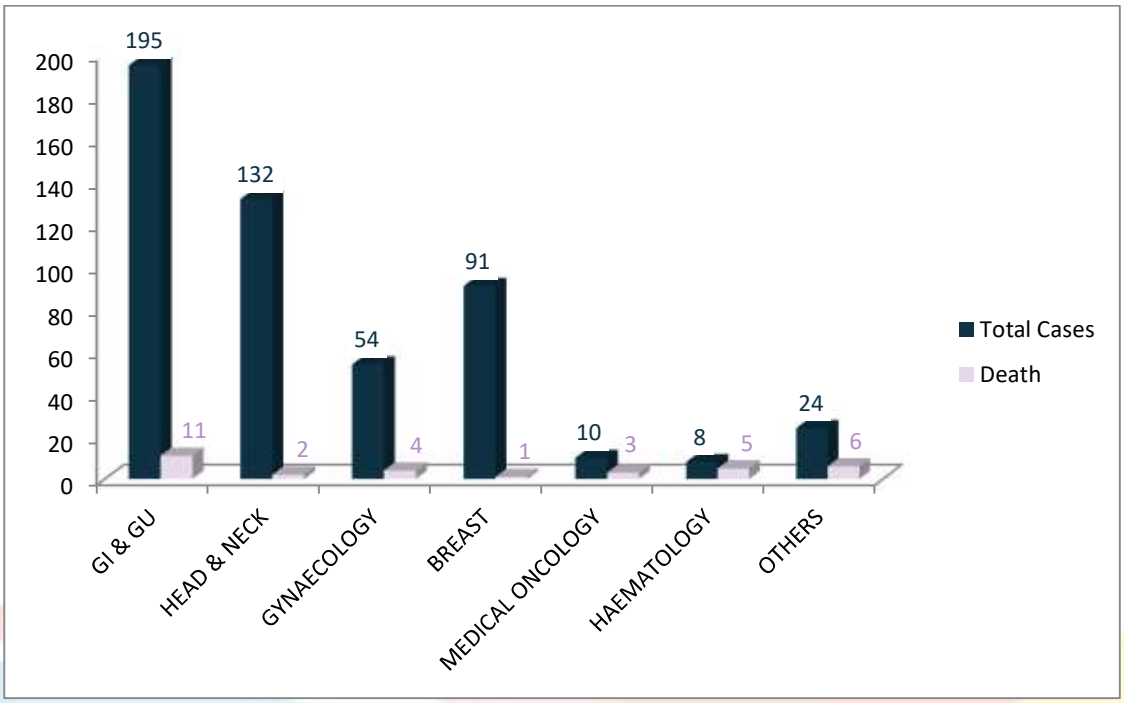
Total Number of Cases - 591

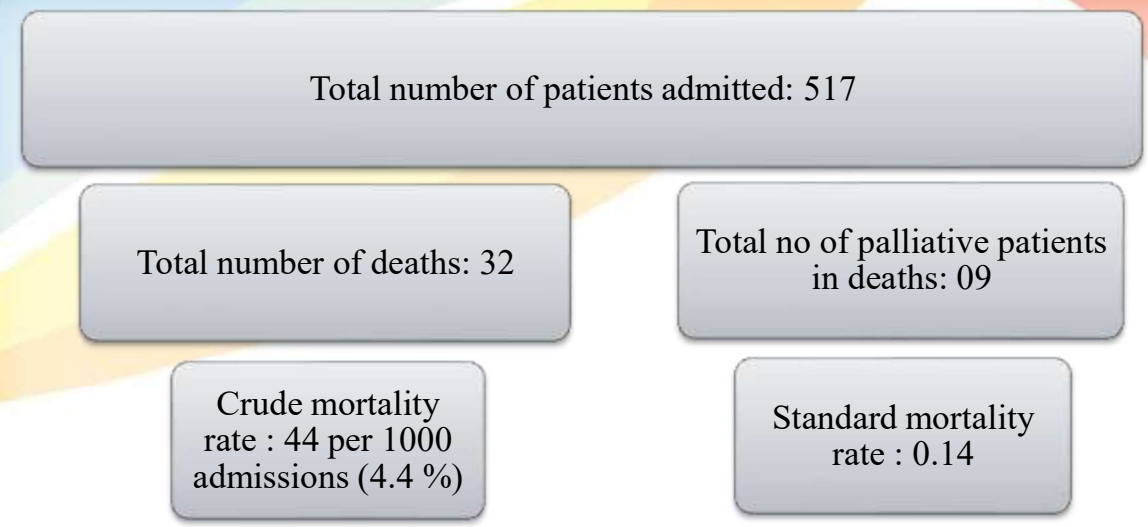
ICU Annual Report





Central Line-Associated Bloodstream Infection (CLABSI)
Catheter-associated Urinary Tract Infections (CAUTI)
Variational autoencoder (VAE)
Surgical Site Infections (SSI)




Total number of patients admitted: 517
Total number of deaths: 32
Total no of palliative patients in deaths: 09
Crude mortality rate : 44 per 1000 admissions (4.4 %)
Standard mortality rate : 0.14

DEPARTMENT OF ENT-HEAD& NECK ONCOLOGY

HEAD OF DEPARTMENT: Dr Aniruddha Dam, MS, DLO, DNB (Specialist-Grade I)

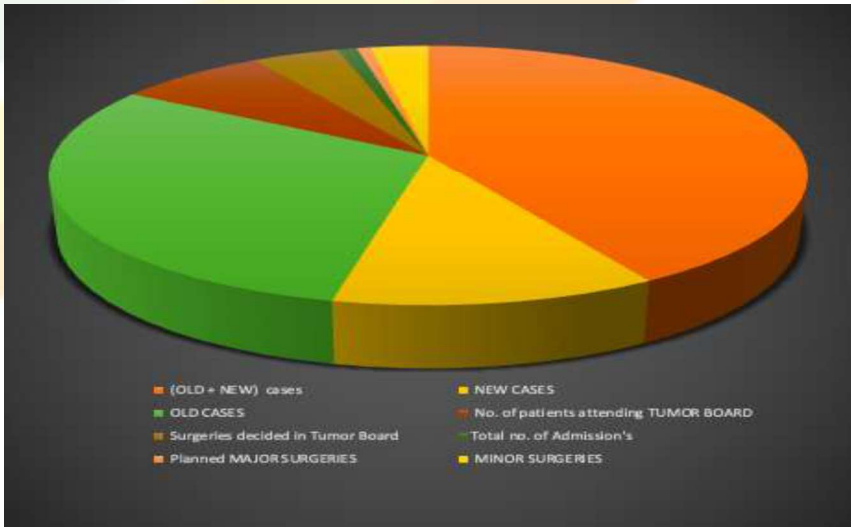
DEPARTMENTAL TEAM

Name	Designation
Dr. Anup Kr. Bhowmick, MS	(Specialist Grade I)
Dr. Rup Kr. Saha, M.B.B.S, DIH,DHA	CMO (SAG) & OIC (H)
Dr Ankit Khandelwal, BDS, MDS	(Dental and Maxillofacial Consultant)
Dr. Akhilesh Agarwal, MS, MCh	(Plastic and Reconstructive Surgeon Consultant)
Dr. Swagato Chowdhury, BDS, MDS	(Oral Reconstructive Surgeon Consultant)

DATA(I): Clinical Workload:

CLINICAL WORKLOAD	TOTAL NUMBERS
Total number of cases (OLD+ NEW) reviewed by the department:	**6107**
Total number of NEW CASES attending the department:	**1765**
Total number of OLD CASES followed up in the department:	**4451**
Total number of patients attending TUMOR BOARD	**1102**
Total number of Surgeries decided in Tumor Board	**628**
Total number of ADMISSION	**143**
Total number of Planned MAJOR SURGICAL Procedures	**102**
Total number of MINOR SURGICAL Procedures	**418**

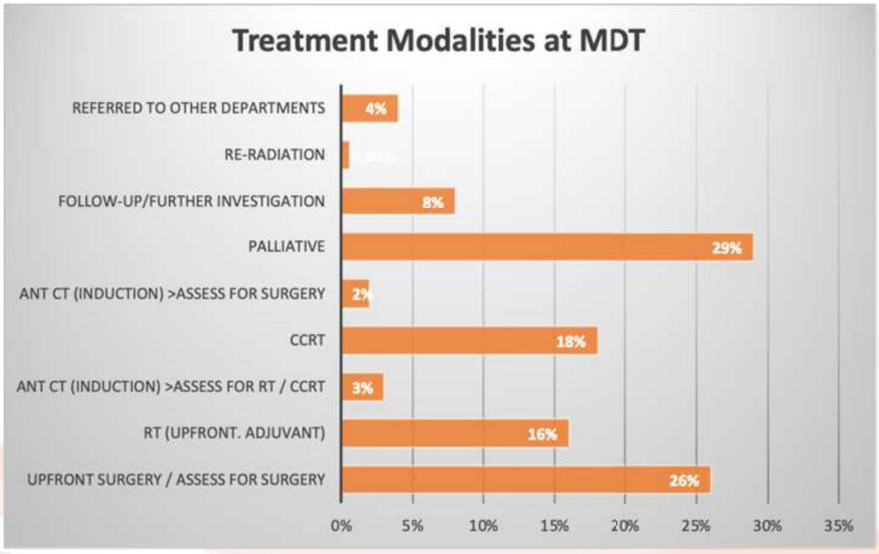
(Fig 1): Clinical Workload Analysis during this period (April 2021 to March 2022)



DATA (II): Treatment Modalities offered at Multi-Disciplinary Team Board

Ant CT (Induction) >Assess for RT / CCRT	**3%**	N=32
CCRT	**18%**	N=197
Ant CT (Induction) >Assess for surgery	**2%**	N=21
Palliative	**29%**	N=316
Follow-up/further investigation	**8%**	N=90
Re-radiation	**0.60%**	N=7
Referred to Other Departments	**4%**	N=39

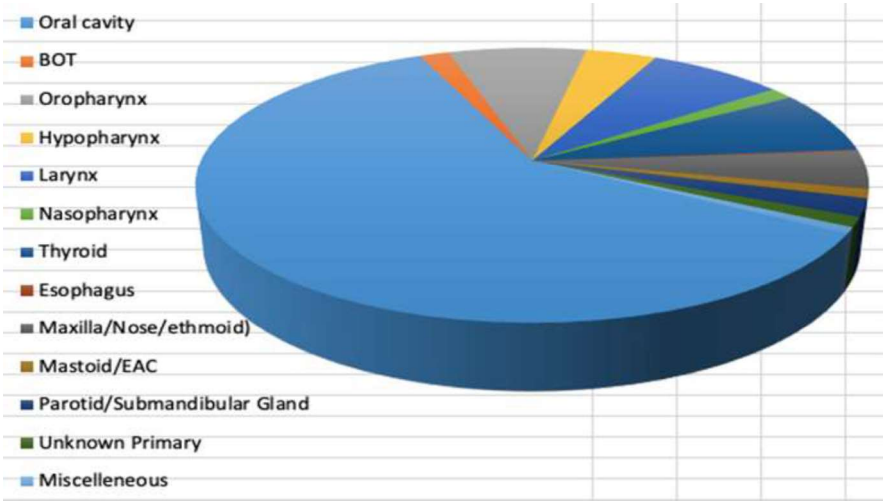
Fig 2):Treatment Modalities offered at Multi-Disciplinary Team Board during this period(April 2021 to March 2022)



DATA (III): Anatomical Region Distribution of confirmed cases

Oral Cavity	**39%**	N=685
Base of Tongue (BOT)	**1%**	N=19
Oropharynx	**6%**	N=90
Pyriform Fossa / Laryngopharynx	**3%**	N=46
Larynx (vocal cord/ Supraglottic)	**5%**	N=88
Nasopharynx	**1%**	N=16
Thyroid	**5%**	N=84
Esophagus (Upper and Mid1/3rd)	**0.10%**	N=2
Maxilla/ Nose/ Ethmoids	**3%**	N=51
Mastoid/EAC	**1%**	N=12
Salivary Glands (Parotid/ Submandibular)	**2%**	N=24
Unknown Primary	**1%**	N=13
MiscellaneousTumors: (Sarcoma of Maxilla-1, Ewings Sarcoma-1, Cervical Synovial Sarcoma-1, Anaplastic Thyroid-4, Lip Basaloid Ca-1)		

(Fig 3): Anatomical Region Distribution of confirmed cases during this period: (April 2021 to March 2022)



(Fig 3): Anatomical Region Distribution of confirmed cases during this period: (April 2021 to March 2022)

CLINICAL ACTIVITIES/OBJECTIVES OF THE DEPARTMENT:

During the above period, the ENT-Head & Neck Oncology Department continued to provide quality care to all the patients, both in the OPD and the Indoors. There was significant modification of the treatment protocols with greater emphasis being placed on upfront surgical management of Advanced T3/T4 Oral SCC's along with Microvascular free flap reconstruction. Adequate patient counselling and assistance in the psychological and social rehabilitation of such patients continued to be a part of the treatment goal. Internationally accepted treatment combinations such as Brachytherapy, Concomitant Chemo-radiotherapy, and Induction Chemotherapy were offered to patients attending the Multidisciplinary Tumour Board. The impact of Covid 19 Pandemic continued to be felt during this period with patients

attending with advanced disease often due to their inability to access hospital care due to the Lockdown and its consequences. As a result, significant portion of patients (>29%) could only be offered Palliative Care with some being given the Oral Metronomic Chemotherapy as part of trial-based assessment. In addition to accepting patients treated elsewhere (i.e., outside CNCI), the department gave its best to accommodate as many patients into the treatment arm to cover the backload of untreated cancer patients

TRAINING & TEACHING

1. **DNB& PhD:** Specialists conducted classes for **Ph.D. & DNB Students** of various disciplines (both Clinical & Research) in CNCI.
2. **Fellowship / Observer ship Program:** The department continued with the Honorary **Head & Neck Fellowship Program / Observer ship program** as part of its mandate for training of manpower in oncology.
3. Conducted weekly intra-departmental **Journal Clubs** and **CMEs** on topics such as "ITF clearance and management of advanced oral cancers", "ASCO 2021 Guidelines", "ATA 2021 Guidelines for Anaplastic Thyroid Ca".

ADMINISTRATIVE RESPONSIBILITIES

1. **SAP 2021-2022:** As Chairperson of SAP CNCI Committee, Dr Aniruddha Dam divulged the responsibilities for proper utilization of the funds allotted under SAP by taking up various cleanliness hygiene and renovation activities in all the departments of the Hospital, its surroundings. This was done in tune with the various programs of the Kayakalp Committee of CNCI. As part of its yearly ac□on plan the Institute enthusiastically observed the Swachhata Pakhwara during the fortnight from April 1st to April 15th 2021 for the Swachh Bharat Mission of Govt of India.
2. **Officer-in-Charge (Hospital)**: As the OIC (H) Dr. Rup Kumar Saha performed his additional administrative responsibility to run the hospital diligently and efficiently for better and smoother patient care services in all the departments.
3. **Dr. Sukanya Naskar** was selected as Specialist Grade II in Surgical Oncology (Head & Neck Services) CNCI 2nd Campus, Newtown, Rajarhaat on 14.07.2021

RESEARCH PROJECTS

1. **Continuation of the study** *"Integrative multi-omics spatial characterization of oral field cancerization for better informed clinical decisions"* with Dr. Biswarup Basu, Dept of Neuroendocrinology, CNCI & Dr. Nidhan Kumar Biswas, Assistant Professor, NIBMG, Kalyani as Principal Investigator.

PUBLICATIONS:

1. Chatterjee N, Sultana F, Roy R, Dam A, Bhowmick, Dey S, Naskar S, Begum R, Mandal S, Mandal R, Chakrabarti J, Panda CK, Tommasino M, Gheit T, Dutta S. *Prevalence of Novel Gamma HPV Types 223 and 225 in Oral Cavity and Skin of Indian Normal and Neoplastic Participants.* Available at SSRN: https://ssrn.com/abstract=4082322

2. A Study titled: *"A Retrospective Observational Study of the Clinical Output and Patient Care Services during Covid-19 Pandemic (April 2020 to September 2020)* "is awaiting publication submission**. This Retrospective Observational Study on COVID-19 Pandemic** is aimed to understand implication of the sudden lockdown during the Covid-19 Pandemic in the flow of clinical work output in the department of ENT-Head & Neck Oncology in CNCI to analyze the impact of the Covid-19 Pandemic on the clinical output during the first six months (April 2020 to September 2021)

3. Dey S, Dutta M, Misra S. (2022).Congenital Absence of Stapedius Muscle and Tendon: Case Report with Review of Literature, *J Clin of Diagn Res.* 16*(1), MD01-MD04. https://www.doi.org/10.7860/JCDR/2022/49726/15820*

CONFERENCE/SYMPOSIUM/WORKSHOP:

Dr. Aniruddha Dam

1. Attended the *Master course in Oral Cancer Management 2021* organized by the Dept of Head Neck Oncology, TMH Mumbai, 6-7th August 2021.
2. Faculty to the *21st Annual Conference Foundation for Head & Neck Oncology (FHNO)* Thiruvananthapuram, Kerala 10th to 12th December 2021
3. Delivered a lecture titled *"What are we dealing with"* on World Cancer Day in CNCI on 4th February 2022.
4. Attended the *Virtual Symposium on Hypopharyngeal Cancer* Organized by Dr B Borooah Cancer Institute (BBCI), Guwahati in association with Foundation of Head and Neck Oncology (FHNO) on 19 February, 2022

Dr. Anup Kr. Bhowmick

1. Participated as a Delegate virtually in ONCOSURG 2021, organized by Dept. of Surgical Oncology, Tata Medical Centre held on November 19th -21st, 2021.
2. Participated as a Delegate virtually in NATCON 2021, 34th Annual Conference of IASO held on October 23-24 & 30-31, 2021.

Dr. Ankit Khandelwal

1. Delivered a lecture titled *"Dental Problems and Oral cancer- Precautions and Cure"* on World Cancer Day in CNCI on 21st April 2021.

Dr. Samyadipta Dey.

1. Participated in the IASO Academics Masterclass Series – Maxillary Tumors on 10.02.2022
2. Participated as a Delegate in ONCOSURG 2021, organized by Dept. of Surgical Oncology, Tata Medical Centre held on November 19th -21st, 2021.
3. Participated as a Delegate in NATCON 2021, 34th Annual Conference of IASO held on October 23-24 & 30-31, 2021.
4. Participated in the "Master course in Oral Cancer Management 2021" organized by Dept. of Head Neck Oncology, Tata Memorial Hospital, Mumbai on 6th and 7th August 2021.
5. Attended a CME – "IASO Masterclass: Tongue Cancer", organized by Indian Association of Surgical Oncology Academics on 1

DEPARTMENT OF GYNAECOLOGICAL ONCOLOGY

Head of the Department – Dr. Ranajit Kumar Mandal, MD, DNB, PGDHHM

Team

Name	Designation
Dr Manisha Vernekar, MS, DNB	Specialist (Grade II)
Dr Dipanwita Banerjee, MS, DPM (Pursuing MCH Gyne onco at AIIMS, New Delhi)	Specialist (Grade II)
Dr. Puja Chatterjee, M.S, MRCOG (II)	Specialist
Dr. Chandrima Ray, DNB, (pursuing MCH Gyne onco at AIIMS, New Delhi)	Senior resident
Dr. Sreeya Bose, M.S, DNB	Project Consultant (preventive oncology)
Dr Arpita Mondal, DGO	Senior resident
Dr Bijoy Kar, M.S, DNB	DNB SS trainee
Dr Megha Nandwani, M.S, DNB	DNB SS trainee

Objectives of the Department

- Diagnostic work up of women with suspected gynecological cancers
- Appropriate management through surgery, chemotherapy and radiation therapy and their combinations
- Screening and early detection of Gynecological cancers
- Palliative treatment for gynecological cancer patients
- Generate trained human resources in early detection and effective management of Gynecological cancers
- To conduct research projects, trials and training workshops in the field of Gynecological Oncology

Clinical activities of the Department

During the period between 1st April 2021 and 31st March 2022 a total of 1179 new cases were registered in the Department. During the same period a total of 896 patients attended the OPD for follow up visits.

The diagnoses of patients according to the site are given in Table1.

Table 1: The number of new cases attended OPD during 2021-2022

Type of cancer	Number of new cases
Cervix	318
Ovary	184
Uterus	54
Vulva	21
Vagina	1
GTD	2
Ca urethra	0
Benign uterine disease	14
Benign cervix lesion	98
Benign ovarian tumour	24
Benign vulval lesion	8
Abdominal/LN kochs	5
Cervical screening (VIA + colposcopy)	450
Total	1179

The total number of patients admitted under the Department for treatment were 380.

During 2021-2022 a total 137 major surgical procedures were performed in the department. The details of the procedures are given in Table 2.

Table 2: List of major surgeries in the department during 2021-2022

Surgical Procedure	Number
Ca cervix	7
Ovarian tumour (benign/borderline/malignant)	74
Ca endometrium	21
Benign Uterine tumour	5
Ca vagina	0
Ca Vulva	16
Others (EUA+secondary suturing+cervical dilatation+surface deposits removal)	7
Laparoscopic surgery	2
Burst Abdomen Repair	1
Colostomy/ileostomy for intestinal obstruction	2
Colostomy reversal	1
RVF repair	0
Total	**137**

The total number of minor surgical procedures carried out in the Department was 992. The details are given in Table 3.

Table 3: The list of minor surgeries in the department during 2021-2022

Procedures	No of cases
Cystoscopy	54
Hysteroscopy + D/C Endometrial Biopsy	4
D/C (Endometrial biopsy/endocervical curettage)	24
Endometrial pipelle sampling	98
Pyometra Drainage	28
Cervical Biopsy	324
LEEP (Loop Electro-surgical Excision Procedure)	45
Thermo Coagulation	122
Polypectomy + D/C Biopsy	7
Vulval Biopsy	12
Wound debridement ± Secondary suturing	4
Pleural Tapping	15
Peritoneal tapping	110
Vaginal biopsy	6
Chest drain	24
Urethral biopsy	1
Colposcopy	114
Total	992

Departmental Academic work

- Multidisciplinary tumour board (MDT): conducting weekly MDT in presence of Medical oncologists, Radiologists, Radiation oncologists, Pathologists, Palliative care specialists, to discuss different gynecological oncology cases and decision for further management. The data is entered in Redcap software and also discussion done using Redcap. The recommendation and decision is maintained in the software which can be access anytime.
- Grand rounds discussion done weekly regarding the admitted ward patients. The discussions done like course of hospitalization, need for any recommendation and further treatment etc.
- Data maintenance of morbidity and mortality data as per ESGO ovarian cancer operative report, surgical list, surgical photo documentation, any rare cases, cancer related specific complications and its outcome, cancer survivor records, etc
- DNB SS teaching courses has been started for the year 2022-2023 with joining of two PDT students for DNB SS (gyne onco)
- Genetic counselling and testing for hereditary ovarian and breast cancers
- During this Covid 19 pandemic, we have generated departmental email (gynonco@gmail.com) for our patients for regular follow up with reports and also telephonic consultation if required.

Training workshops

1. DNB trainees of broad and super specialties of Gynaecology, Radiotherapy and Surgical Oncology are trained by means of regular seminars, bedside lectures

2. Colposcopy workshops held at CNCI in collaboration with West Bengal Government for master training of various Gynecologists from the state Government service

Date Of Workshop	9-Aug-21	10-Aug-21	23-Aug-21	24-Aug-21	6-Sep-21	7-Sep-21	13-Sep-21	14-Sep-21	27-Sep-21	28-Sep-21	10-Jan-22
Number Of Patients Treated	**10**	**14**	**9**	**14**	**7**	**13**	**7**	**10**	**14**	**17**	**4**

3. Cervical cancer screening camp along with awareness programme on 8th March 2021 with collaboration of BOGS. Around 65 patients were screened for the cervical cancer.

Workshops and conference attended

Dr Ranajit Kumar Mandal

1. Invited Faculty in various National and International virtual Conferences, webinars and workshops 2021-2022 including AOGIN, AGOI, IFCPC, East Zone- RCOG, Endogyn, ICOG and BOGSCON.
2. Conducted TOT Master trainer workshops on colposcopy and LEEP training of Doctors and Nurses at CNCI in association with NHM cell of The West Bengal Govt.

Dr Manisha Vernekar

1. Invited as Faculty in AGOICON 202One, the annual conference of the Association of Gynaecologic Oncologists of India, on a virtual platform on 12th, 13th and 14th November, 2021, as a moderator in a panel discussion, on "Preventing cervical cancer: How can an Obstetrician and Gynecologist make a difference?"
2. presented a oral poster in 17th world congress for cervical pathology and colposcopy, IFCPC India 2020ne, 1-5th July 2021.
3. Attended various National and International virtual conferences, webinar and CME's.
4. Part of the Organizing team and conducted TOT Master trainer workshops on colposcopy and LEEP training of Doctors and Nurses at CNCI in association with NHM cell of The West Bengal Govt.
5. Enrolled in International Gynaecologic Cancer Society fellowship training programme for the year 2021-2023 under the Mentorship of Dr Asima Mukhopadhayay and Dr Ranajit Mandal, first IGCS fellowship training in India.
6. Completed IMPACT (Integrated Module of Palliative Care in Cancer Treatment) Course 6 on 24th & 25th June, 2021, conducted by CIPLA Palliative Care and Training Centre, Pune in association with SAARC Association of Oncologists.

Dr Puja Chatterjee

1. Completed the on-line Colposcopy and Cervical Cancer Prevention training course and was successful in the ensuing objective structured clinical examination (OSCE) held online 5 July 2021. (by The International Agency for Research on Cancer (IARC) and The International Federation of Cervical Pathology and Colposcopy (IFCPC)
2. Presented oral poster and Free paper communication in 17th world congress for cervical pathology and colposcopy, IFCPC India 2020ne, 1-5th July 2021.
3. Presented poster in AGOICON 202One, the annual conference of the Association of Gynaecologic Oncologists of India, on a virtual platform on 12th, 13th and 14th November, 2021.
4. Attended various National and International virtual conferences, webinar and CME's.

Publications

1. R. Mandal, D. Banerjee, K. Gupta, Puja Chatterjee, M. Vernekar, Chandrima Ray. Experience of Human Papillomavirus Vaccination Project in a Community Set Up-An Indian Study. Asian Pacific journal of cancer prevention, March 2021.
2. Banerjee D, Mandal R, Vernekar M. Feasibility and acceptability of two dose qaudrivalent Human papillomavirus vaccine for adolescents' girls in rural parts of West Bengal- A pilot study. Asian Pacific Journal of Cancer Prevention. 22(3); 699-704.
3. Roy Sraddhya, Das Ananya, V**ernekar Manisha**, Mandal Syamsundar, Chatterjee Nabanita. Understanding the Correlation between Metabolic Regulator SIRT1 and Exosomes with CA-125 in Ovarian Cancer: A Clinicopathological Study. April 2022 BioMed Research International 2022(6):1-16

4. Sarkar, S., Pal, R., Mahata, S., Sahoo, P. K., Ghosh, S., **Chatterjee, P., Vernekar, M**., Mandal, S., Bera, T., Nasare, V. D. (2022). Evaluation of numerical rating scale and neuropathic pain symptom inventory pain scores in advanced ovarian carcinoma patients undergoing surgery and first-line chemotherapy. *Journal of clinical and translational research*, *8*(1), 54–60.
5. Sarkar S, Pranab K. Sahoo, Ranita Pal, Tanuma Mistry, Sutapa Mahata, **Puja Chatterjee**, **Manisha Vernekar,** Syamsundar Mandal, Tanmoy Bera, Vilas D. Nasare. Assessment of quality of life among advanced ovarian cancer patients in a tertiary care hospital in India. *Support Care Cancer* **30,** 3371–3378 (2022).
6. Vernekar M, Mandal A, Singh G, Banerjee D, Mandal R. Primary Synchronous Neuroendocrine, adenocarcinoma and squamous cell carcinoma of cervix- A case report. Journal of Surgical Procedures and case reports 2021, (1):1-3
7. Chatterjee P, Banerjee D, Vernekar M, Mandal R. Primary vaginal clear cell adenocarcinoma: Case report with literature review. Scholars Journal of Medical Case reports. April 2021; 9(4):393-97.
8. Chatterjee P, Dey Rupali, Banerjee D, Vernekar M. Point Prevalence study of communicable and non-communicable disease and cervical cancer screening in female sex workers (FSW) in an Urban area of eastern India. SAS J Surg, 2021 Apr 7(4): 201-206.
9. Mandal, R., Banerjee, D., Gupta, K., Chatterjee, P., Vernekar, M., Ray, C. Experience of Human Papillomavirus Vaccination Project in a Community Set Up-An Indian Study. Asian Pacific Journal of Cancer Prevention, 2021; 22(3): 699-704. doi: 10.31557/APJCP.2021.22.3.699
10. Sarkar S, Vernekar M, Chatterjee P, et al. An observational study of clinical characteristics and outcomes of Indian ovarian carcinoma patients undergoing surgery and chemotherapy: a tertiary care hospital report. Supportive Care in Cancer. EMID: a27f867c12e3820d
11. Banerjee D, Mittal S, Mandal R, Basu P. Screening technologies for cervical cancer: Overview. Cyto Journal 2022; 19:23.
12. Chatterjee, Nilanjana, Sultana Farhin, Roy Rituparna, Dey Samyadipta, Naskar Sukanya, Dam Aniruddha, Bhowmick Anup Kumar, Begum Rakiba, Mandal Syamsundar, Mandal Ranajit Kumar, Chakrabarti Jayanta, Panda Chinmay Kumar, Tommasino Massimo, Gheit Tarik, Dutta Sankhadeep, Prevalence of Novel Gamma Hpv Types 223 and 225 in Oral Cavity and Skin of Indian Normal and Neoplastic Participants. Available at SSRN: https://ssrn.com/abstract=4082322 or http://dx.doi.org/10.2139/ssrn.4082322.

DEPARTMENT OF MEDICAL ONCOLOGY

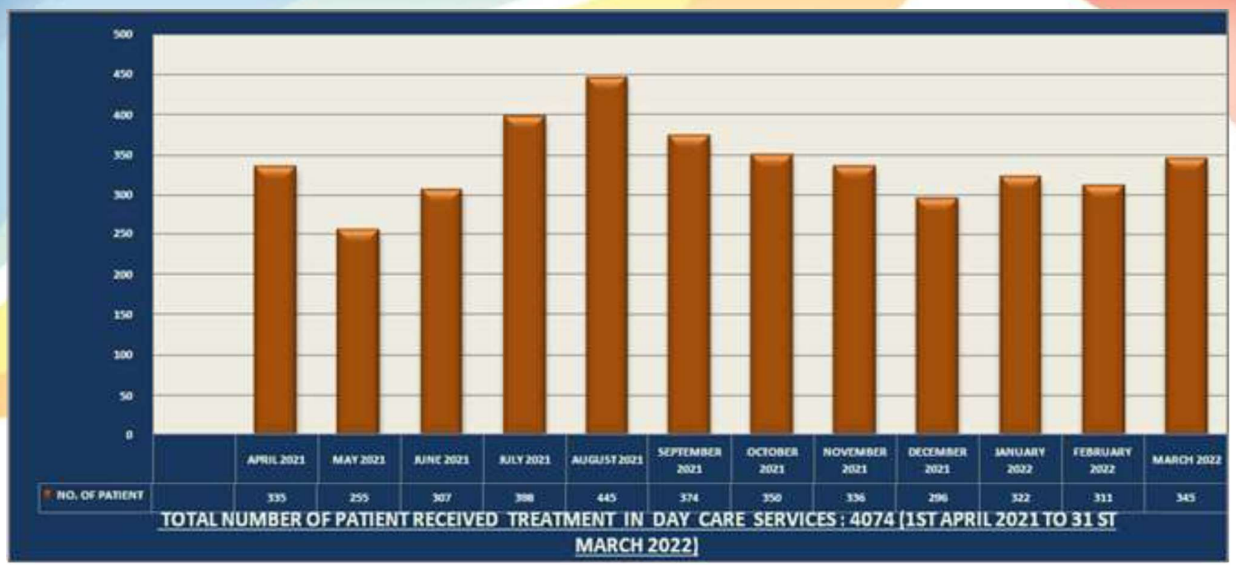
HEAD OF THE DEPARTMENT – DR. KALYAN KUSUM MUKHERJEE

Team	
Name	**Designation**
DR. RANTI GHOSH	Specialist (Grade II)
DR. SUMAN PAUL CHOWDHURY	Specialist (Grade II)
DR. SUMAN PODDAR	Specialist (Grade II)
DR. PARTHA NATH	Medical Officer CMO (NFSG)grad
DR. SHUVAM HALDER	MEDICAL OFFICER (CONTRACTUAL)

TREATMENT REPORT

PATIENT STATUS:

- Total no. patient attending the OPD in 1 year (including new patients, follow up and patients receiving chemotherapy): ---------- ---------- **16665**
- No. of new patient registered in the dept.: ---------- ---- **654**
- Patient referred from other dept. for chemotherapy: ---------- **1452**
- Total no. of patient in indoor: ---------- ---- **1229**
- No. of patient received treatment in day care services: ---------- **4074**



PAEDIATRIC ONCOLOGY: -

A new 9 bedded Paediatric Ward opened on 04-Feb-2013. Arrangement of modern treatment facilities

with isolation care has been made in this ward. Different non-Govt. organization attended the Paediatric

patients in the ward through Counseling, Play therapy and with different self-activities within the child.

No. of paediatric patient admitted in Paediatric ward --------- **214**

No. of Paediatric Patient in OPD ---------- 651

No. of new Paediatric cases ---------- 155

Total No. of new patient admitted ---------- **33**

No. of Total Paediatric Patient: - ---------- **414** (OPD+IPD)

No. of Leukemia Patient: -

Acute Lymphoblastic Leukemia ---------- **38**

Acute Myeloid Leukemia ---------- ---------- **02**

Chronic Myeloid Leukemia ---------- --- **01**

No. of Paediatric Lymphoma Patient: ---------- **12**

Pediatric Solid Tumors:

Rhabdomyosarcoma ---------- **03**

Retinoblastoma ---------- -- ------- **01**

Ewing's sarcoma ---------- --------- **03**

CA Colon ---------- **01**

Osteosarcoma ---------- ---------- **03**

Pilocytic Astrocytoma --------- ---------- **02**

Neuroblastoma---------- -------- **01**

CA Ovary ---------- **01**

Status of Total (Adult & Pediatric) patients undergone treatment Leukemia-Acute

Lymphoblastic---------- ----- **12**

Myeloid---------- **02**

TOTAL---------- **14**

CHRONIC

CML CLINIC ---------- **272**
CLL---------- **30**
TOTAL---------- **302**

LYMPHOMA CLINIC**: -** ---------- **252**
Hodgkin's disease ---------- **93**
Non-Hodgkin's diseases ---------- **159**
Multiple Myeloma: - ---------- **65**

Adult Solid Tumors:

Gynecological Tumor
Ovary ---------- **283**
Vulva ---------- ---------- **03**
Cervix ----------**73**
GTT ---------- ---------- **11**

Another Primary site:
Head and neck tumor---------- **77**
Breast---------- ---------- **777**
Lung---------- ---------- **91**
Stomach---------- ---------- **63**
Esophagus---------- ---- **13**
Colo rectum---------- **109**
Anal canal---------- **04**
Gall bladder---------- ----------**58**
Urinary Bladder---------- ----------**15**
Testis ---------- ---- **--08**
Kidney ---------- ---------- **26**
Prostate ---------- --- ---------- **35**
Supportive care (Treatment complications) - 150

Training- DNB students of Radiotherapy attended Medical Oncology Department Clinical Work on rotational basis in each year.

Dr. Kalyan Kusum Mukherjee

1. CLO22-081: Clinical Efficacy and Quality of Life of Oral Cancer Patients Treated With Paclitaxel/Cisplatin/5-FU Vs Paclitaxel/Carboplatin Chemotherapeutic Regimens in a Tertiary Cancer Center in Eastern IndiaVolume 20 (2022): Issue 3.5 (Mar 2022): Abstracts from the NCCN 2022 Virtual Annual Conference in Journal of the National Comprehensive Cancer Network, Online ISSN: 1540-1413, Print ISSN: 1540-1405.
2. Pranab Kumar Sahoo, Sinjini Sarkar, Sutapa Mahata, Ranita Pal, Tanuma Mistry, Sushmita Ghosh, Trisha Choudhury, Sriparna Datta, Anup Kumar Bhowmick, Kalyan Kusum Mukherjee, and Vilas D Nasare. 31-03-2022
3. "A Review on Therapeutic Strategies of Relapsed and Refractory Multiple Myeloma." OSF Preprints. February 8. doi:10.31219/osf.io/bfj4z. [Citation 1] Kalyan K. Mukherjee, Utpal Choudhuri. 2021.
4. Significance of Detecting Minimal Residual Disease by Flow Cytometry and its Impact on Overall Survival and Prognosis of Pediatric B-Cell ALL Patient Experience from a Tertiary Care Centre in Eastern India. Kalyan K. Mukherjee Debasish BanerjeeAnjan DasSubham HalderDattatreya Mukherjee Shyam S. MondalSurya K. RoyMili DasChinmay K. Panda Utpal Chaudhuri. CC BY-NC-ND 4.0 · Indian J Med Paediatr Oncol 2021; 42(02): 118 DOI: 10.1055/s-0041-1735366

Dr. Ranti Ghosh

1. Roy S, Mandal TK, Das S, Srinivas S, Agarwal A, Ghosh Ranti, Mishra B K. Demography and Pattern of care of patients with head-and-neck carcinoma: Experience from a tertiary care center in North India. Cancer Res Stat Treat 2020; 3:730-5

2. Mishra BK, Roy S, Mandal TK, Das S, Srinivas S, Agarwal A, Kapoor A, Ghosh Ranti Authors' reply to Singla et al. Cancer Res Stat Treat 2021; 4:177

3. Roy S, Ghosh J, Ghosh Ranti. Cancer vaccine in solid tumors- where we stand. Ind J Med Pediatric Oncol 2021; 42:319–324.

AWARDS:

Dr. Kalyan Kusum Mukherjee

1. Golden AIM awards- for Excellence & Leadership in Healthcare on 02nd February 2022. in the category of ICONIC HEALTHCARE LEADER AWARD - ONCOLOGIST.

DEPARTMENT OF MEDICAL PHYSICS

Head of the Department: **Dr. Dilip Kumar Ray,**Ph.D (JU),
M.Sc. (Gold Medalist), Dip.R.P (BARC), AERB Award

Team-1 (CNCI, Hazra)

Faculty with Educational Qualification	Designation
Shri Dillip Kumar Misra, M.Sc., Dip.R.P (BARC)	Assistant Professor,Physicist (Scientist – 2) Radiological Safety Officer (Level-III)
Shri Atanu Kumar, M.Sc., Dip.R.P (BARC)	Assistant Professor,Physicist (Scientist – 2)
Shri Rajib Das, M.Sc., Dip.R.P (BARC)	Assistant Professor,Physicist (Scientist – 2) Radiological Safety Officer (Level-III)
Shri Bijan Kumar Mohanta, M.Sc., Dip.R.P (BARC)	Assistant Professor,Physicist (Scientist – 2)

Team-2 (CNCI, Newtown)

Mrs. Poonam RayM.Sc., PMDMP (JU)	Medical Physicist

Objectives of the department:
Radiation Treatment planning, accurate and precise dose delivery to patient, radiation dosimetry, dose calculation, Calibration, Quality Assurance, maintenance of the tele-therapy and Brachytherapy machines, procurement and disposal of radioactive sources and finally ensuring radiation safety for the patient, staff and public and implementation of radiation protection rules as per Atomic Energy Regulatory Board guidelines are some of the important functions of the department. The department actively involves in medical physics research, education and training of medical and paramedical courses. International standards of dosimetry are maintained by participating in international IAEA/BARC dose inter-comparison program.

CNCI, Hazra: This department is equipped with one state of the art Dual Energy Linear accelerator (**Elekta Synergy**), one state of the art Low energy Linear accelerator (Elekta **SynergyPlatform**), one Ir-192 HDR after-loading brachytherapy machine (**Integrated brachytherapyunit**) and one state of the art 16 slices CT- Simulator (**Wipro-GE**). The

department is equipped with many sophisticated equipment's like treatment planning systems TPS (**CMS-XIO, Monaco, Oncentra**), dosimeters and calibration instruments like Unidos E electrometers,3-D RFA water phantom (**MP3-M, PTW**), fluence analysis dosimetry system (**2D array & Octavius**), Film dosimetry system etc.

CNCI, Newtown: This department is equipped with one Ir-192 HDR after-loading brachytherapy unit (**FL exitron, Elekta**).
The department is actively involved in dosimetry, data acquisition of various teletherapy machines like Telecobalt and linear accelerators. Treatment Planning and dosimetry verification of state-of-the-art radiotherapy treatment techniques like 3D conformal treatment with Multileaf collimator (MLC), Intensity Modulated Radiation therapy (IMRT), Image guided Radiation therapy (IGRT), Volumetric Modulated Arc therapy (VMAT) and SBRT treatments. We also involve in Brachytherapy planning like ICRT, ILRT, Surface Mould and Interstitial Implants (Head and Neck, Breast etc). This department is responsible for calibration and Quality assurance of the radiation therapy machines. We are also involved in radiation protection and QA of X-Ray, Mammography and CT-Scan of Radio-diagnosis department.
Our department runs Post M.Sc. Diploma course in Medical Physics and actively involved in teaching of other courses like DNB Radiotherapy, paramedical courses like DRT (Tech) and DRD (Tech) courses. This department is actively involved in research in Medical Physics also.

Brief description of the Clinical/Technical work done during the year (from 1st April 2021 to 31st March 2022):

No of External conformal treatment planning	:	320
No of conventional treatment Calculation	:	747 (New) + 340 (2nd Phase)
No of Brachytherapy treatment planning	:	408(Hazra Campus) +105(New Town)
No. of CT- simulation	:	466

Quality Assurance tests, Radiation protection and e-LORA compliance as per AERB Guidelines of the following machines:

Two Linear Accelerators,
- Five 3D Treatment Planning Systems,
- Two Brachytherapy Machine,
- One CT-Simulator
- Two Mammography
- Seven X-ray machines.

Academic Activities:

Following academic programs are undergoing in the Department:
- Post M.Sc. Diploma course in Medical Physics in collaboration with Jadavpur University.
- Ph.D. in Medical Physics under affiliation of West Bengal university of Health Sciences.
- Teaching faculty of DNB Radiotherapy.
- Teaching faculty of Ph.D. course.
- Teaching faculty of Diploma in Radio therapeutic Technology (DRT-Tech) and Diploma in Radio-diagnosis Technology (DRD-Tech).
- Internship in Medical Physics.
- Internship in DRT(Tech.)
- Clinical training of DRT (Tech) students from other institutes.

No. of candidates admitted in Post M.Sc. Diploma Course in Medical Physics =9
No. of candidates passed Post M.Sc. Diploma Course in Medical Physics = 10

No. of Medical Physics Interns admitted : 6
No. of candidates admitted DRT-Tech course : 2
No. of candidates passed DRT-Tech course : 4
No. of DRT (Tech) students admitted for internship : 4

Imparted clinical training to Eight (8) DRT (Tech.) trainees from various Govt. Medical Colleges of West Bengal.

DNB Thesis (Co-Guide):

1. A thesis titled "A prospective study on Image guidance with cone beam CT for 3DCRT Of Cancer Cervix" is completed by DNB student, Dr. Arya R M.
2. A thesis titled "A randomized comparative study on hypo fractionated verses Conventionally fractionated radiation therapy with concurrent chemotherapy with IMRT Using VMAT technique in locally advanced inoperable non-small cell lung cancer" is completed by DNB student, Dr. Shambodeep Chatterjee.
3. A thesis titled "Prospective study on hypo fractionated intensity modulated radiation Therapy (using VMAT technique) with concurrent chemotherapy in locally advanced Laryngeal and hypopharyngeal squamous cell cancers" is completed by DNB Student, Dr. Rupak Sett.
4. A thesis titled "A prospective comparative study of IMRT (intensity modulated Radiotherapy using VMAT technique) verses 3dcrt (three dimensional conformal Radiotherapy) with respect to toxicity and loco-regional response in locally advanced Cervical carcinoma" is completed by DNB student, Dr. Sujan Kumar Ghosh
5. A Thesis titled "A Prospective Comparative study between Conventional Fractionated Radiotherapy and Hypo fractionated radiotherapy by using 3-DCRT technique with respect to toxicity & quality of life in Post-mastectomy Breast Carcinoma" is currently being done by DNB student, Dr. Raka Banerjee.
6. A Thesis titled "Concurrent Chemoradiotherapy using Volumetric modulated arc therapy with simultaneous integrated boost to the involved Para Aortic Lymph Nodes in Cervical Carcinoma patients: A Prospective Observational Study" is currently being done by DNB student, Dr. Subhan Riyaz Shaikh.
7. A Thesis titled "Prospective observational study to evaluate anatomic and volumetric changes in Head & Neck Cancer during fractionated Radiotherapy by IMRT" is currently being done by DNB student – Dr. Neerajita Paul

Conference/Symposium/Workshop/Training (International/National) attended

- Dr. D. K. Ray attended one day symposium on "Strengthening the PBCR data abstraction and Quality Control" held 26th March 2022.
- Shri D.K.Misra has attended a National Science Conference as an Invited Speaker held at VECC, Kolkata on 17/12/2021.
- Dr. Dilip Kumar Ray, Shri Atanu Kumar and Shri Bijan Kumar Mohanta have attended the 4th annual Conference organized by Kolkata Gynecological Oncology Trials and Translational Research Group (KolGo-Trg) and International Gynecological Cancer Society (IGCS) held at CNCI 2nd Campus & Eco-Space, Newtown on 25th-27th March,2022.

Miscellaneous

- Dr. D. K. Ray, Shri D.K.Misra, Shri Atanu Kumar, Shri Rajib Das and Shri B.K.Mohanta acted as examiner and paper setter of Post M.Sc. Diploma in Medical Physics Course at Jadavpur University.

DEPARTMENT OF LABORATORY SERVICES

PATHOLOGY, HAZRA CAMPUS

Head of The Department: Dr Srabanti Hajra (Md, Specialist Grade I)

Team

NAME	DESIGNATION
Dr Saunak Mitra Mustafi MD	Specialist Grade- I
Dr Prachi Kukreja, MD	Specialist Grade- II
Dr Smita Gupta	Medical Officer (In Charge of Blood Centre)
Dr Kaushambi Chakraborty, MD	Senior Resident
Dr Jebaunnesa Khatun	DNB PGT
Dr Swapnika Golla	DNB PGT
Dr Afreen Fatima	DNB PGT
Dr Subhadeep Panda	DNB PGT
Dr Raya Banerjee	DNB PGT
Mr Govinda Baidya	SSA
Mr Raja Ray	SSA
Mr Bhagwan Mishra	SSA
Mr Indrajit Ghosh	JSA
Mr Somnath Mondal	SSA
Mr Pradip Bala	JSA
Mr Dinabandhu Das	SSA
Mr Jagadish Mondal	JSA
Mr Tapas Debnath	JSA
Mr Debasish Roy Chowdhury	SSA
Mr Krishanu Seth	JSA
Mrs Rakhi Das Majumder	JSA

OBJECTIVES OF THE DEPARTMENT

1. To provide precise histopathological/ cytopathological/ hematological diagnosis for different cases and to provide correct pathological staging of surgical specimen.
2. To provide biochemical, hematological and clinicopathological diagnosis/ follow- up in tumour and non- tumour cases.
3. To provide safe blood (around 3000 units) to indoor and daycare patient of CNCI both campus (Hazra and Rajarhat), Chittaranjan Seva Sadan & Sishu Sadan Hospital.
4. To run DNB pathology course (board – speciality) NBE, Govt. of India.
5. To pursue clinical research work in the field of tumour pathology.

ANNUAL REPORT OF HISTOPATHOLOGY
(Total Cases: 2293)

SERIAL	SITE	MALIGNANT	BENIGN
1	Breast	550	60
2	Oral Lesion	630	106
3	Skin	30	6
4	Lymph Node	92	25
5	Soft- tissue	47	5
6	Thyroid	41	4
7	Thymus	0	0
8	Lung	46	1
9	Larynx	16	2
10	Bone	5	2
11	Stomach	40	2
12	Colon	49	2
13	Pancreatico- biliary	10	2
14	Omentum	6	2
15	Salivary gland	28	4
16	Ovary	122	8
17	Uterus	72	5
18	Cervix	206	35
19	Kidney & urinary bladder	20	2
20	Testis	9	1
21	Penis	11	2
	TOTAL	**2020**	**273**

ANNUAL REPORT OF CYTOPATHOLOGY
(Total Cases: 1014)

SERIAL	SITE	MALIGNAT	BENIGN
1.	Breast	30	11
2.	Oral Lesion	15	03
3.	Skin	19	05
4.	Lymph Node	205	22
5.	Soft- tissue	22	05
6.	Thyroid	19	07
7.	Lung	07	01
8.	Bone	07	02
9.	GI Tract	09	02
10.	Pancreatic- biliary	180	13
11.	Salivary gland	22	05
12.	Female genital tract	33	07
13.	Kidney & urinary bladder	10	03
14.	Male genital tract	02	00
15.	Ascitic fluid	237	42
16.	Pleural fluid	36	13
17.	Scrape cytology	16	04
	TOTAL	**869**	**145**

TOTAL NUMBERS OF FROZEN SECTION: - 60
TOTAL NUMBER OF REVIEW CASES: 2100+660= 2760
ANNUAL REPORT OF HISTOPATHOLOGY REVIEW SLIDES (Total Cases: 2100)

SERIAL	SITE	MALIGNANT	BENIGN
1.	Breast	307	45
2.	Oral Lesion	409	22
3.	Skin	40	09
4.	Lymph Node	72	13
5.	Soft- tissue	55	05
6.	Thyroid	48	19
7.	Respiratory system	60	10
8.	Bone	28	10
9.	Stomach	70	20
10.	Colon	72	14
11.	Gall- bladder	85	29
12.	Liver	49	14
13.	Pancreas	19	09
14.	Salivary gland	37	13
15.	Ovary	75	25
16.	Uterus	60	22
17.	Cervix	150	50
18.	Kidney & urinary bladder	28	05
19.	Testis	20	00
20.	Prostate	36	02
21.	Penis	10	08
22.	Brain	18	08
	TOTAL	**1748**	**352**

ANNUAL REPORTS OF CYTOPATHOLOGY REVIEW SLIDES
(Total Cases: 660)

SERIAL	SITE	MALIGNAT	BENIGN
1.	Breast	85	17
2.	Oral Lesion	48	08
3.	Skin	07	02
4.	Lymph Node	83	08
5.	Soft- tissue	45	02
6.	Thyroid	53	07
7.	Respiratory system	42	10
8.	Bone	12	02
9.	Pancreatico- biliary	75	09
10.	Salivary gland	29	07
11.	Female genital tract	05	02
12.	Kidney & urinary bladder	02	00
13.	Male genital tract	03	00
14.	Ascitic fluid	55	26
15.	Pleural fluid	09	02
16.	Scrape cytology	05	00
	TOTAL	**558**	**102**

ANNUAL REPORT OF CLINICAL PATHOLOGY

1	CBC	17155
2	Hemoglobin & Total count.	1651
3	BT & CT	332
4	Serology	885
5	Bone - marrow	45
6	Malaria parasite	03

Reactive Serology: HBsAg- 09, HCV- 03, HIV- 03.

ANNUAL REPORT OF CLINICAL BIOCHEMISTRY

The unit of clinical biochemistry plays a very important role in performing routine and special biochemical tests. The unit has been functioning with automated sophisticated instrument to perform routine biochemical and electrolyte test of patients attending indoor, outdoor and various clinic in the institute. Beside these activities this unit also engaged in research work in collaboration with different departments of research wing. Clinical biochemistry unit is performing daily internal quality control as well as external quality control (EQAS0 in collaboration with CMC vellore.

SERIAL	TYPE OF INVESTIGATION	TOTAL NO.
1	Sugar (glucose)	13438
2	urea	16675
3	creatinine	16811
4	Bilirubin (total)	15337
5	Bilirubin (direct)	15337
6	Alkaline phosphatase	15337
7	SGOT	15337
8	SGPT	15337
9	Total protein	15337
10	Albumin	15337
11	Electolytes (sodium, potassium & chloride)	13885
12	Phosphate	1252
13	Magnesium	1252
	TOTAL NO. OF TEST.	109324
	TOTAL NO. OF PATIENT	17011

ANNUAL REPORT OF BLOOD CENTRE

Blood Bank CNCI attended outdoor voluntary blood donation camp for collecting blood units for the hospital. Collected blood units are processed as per blood control rule before issuing the blood to the patient.

1. Total outdoor blood donation camp attended: 31
2. Total blood collected from outdoor camp: 1403
3. In house blood collected: 59
4. Total blood collected: 1462
5. Blood supplied to the patients: 1293
6. Total blood unit transferred to 2nd campus CNCI (Rajarhat): 60
7. Total number of blood units supplied: (1293+60) 1553
8. Blood received from IBTM & IH and issued after crossmatching: 212

ACADEMIC ACTIVITIES.

- NATIONAL BOARD OF EXAMINATIONS inspected the department in September 2021 and has renewed the accreditation for DNB course from December 2020 to December 2025 in this institution.
- One primary and one secondary seat have been allotted in this institute last year.
- 02 primary DNB and 02 secondary DNB PG seats in Pathology have been approved by NBE in this department.
- Regular lectures and practical training and seminars are held in the department.
- Collaborations are done with SSKM and Command Hospital for DNB post graduate trainees.

LABORATORY SERVICES, NEWTOWN CAMPUS

Head of the Department: DR. SANKAR SENGUPTA, MD (Microbiology), Medical Superintendent

Team

Name with Educational Qualification	Designation
DR. SRABANI CHAKRABARTI MBBS, MD (PATHOLOGY)	Senior Pathologist
DR. SUBHRANSHU MANDAL MBBS, MD (MICROBIOLOGY)	Specialist Grade-II
DR. DIPKANA DAS MBBS, MD (PATHOLOGY)	Specialist Grade-II
DR. RATHINDRANATH BISWAS MBBS, MD (TRANSFUSION MEDICINE)	Specialist Grade-II
DR. GARIMA CHAUHAN MBBS, MD (BIOCHEMISTRY)	Specialist Grade-II
DR. DEBANJAN GHOSH MBBS, MD (PATHOLOGY)	Specialist Grade-II
DR. NAMRATA MAITY MBBS.MD (PATHOLOGY)	Specialist Grade-II

Sections of the Department:
Microbiology, Biochemistry, Hematology & CLP, Histo & Cytopathology, Blood bank, Molecular Pathology

Objectives of the Department:
Different sections of disciplines of Laboratory Medicine namely:

i) Medical Biochemistry, ii) Pathology and Hematology, iii) Medical microbiology, iv) Endocrinology, v) Blood Banking, vi) Immunology, and vii) Molecular diagnostics are present in the department.

All sections interact effectively with allied departments by rendering services in basic and in advanced laboratory investigations. Demonstrate application of laboratory medicine techniques in a variety of clinical settings to solve diagnostic and therapeutic problems. Interact with clinical colleagues during ward round, for other investigations, if necessary, and help in comprehensive decision making in patient's management and follow up. Ensure routine conduct of External Quality Assurance Program & Internal Quality Control Programs and take corrective steps, when needed.

DEPARTMENTAL INFRASTRUCTURE

Department of Pathology:

1. Hematology: Consists of 6-part cell counter, Flow cytometry, Coagulation profile
2. Clinical pathology
3. Histopathology and Cytopathology including immunohistochemistry and frozen section

Department of Microbiology, Molecular biology & Immunology

1. Automated state of the art microbial identification system MALDI TOF (first in the state)
2. Automated blood culture system
3. Automated Sensitivity
4. CLASS II A2 Biosafety cabinets
5. BOD incubator
6. Fully automated CLIA
7. RT PCR
8. CBNAAT

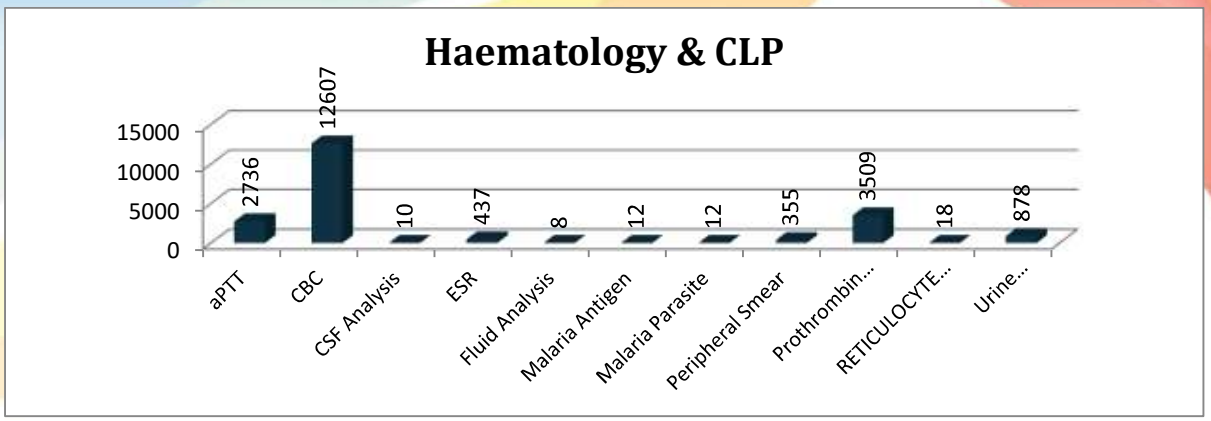
Department of Clinical Biochemistry:

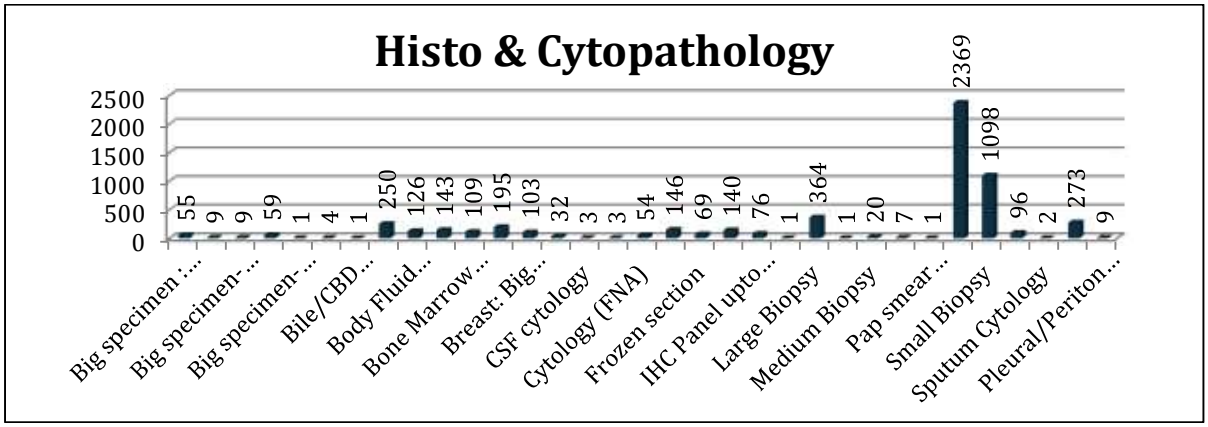
1. Routine chemistry
2. Hormones
3. Tumour Marker
4. Serum Protein electrophoresis

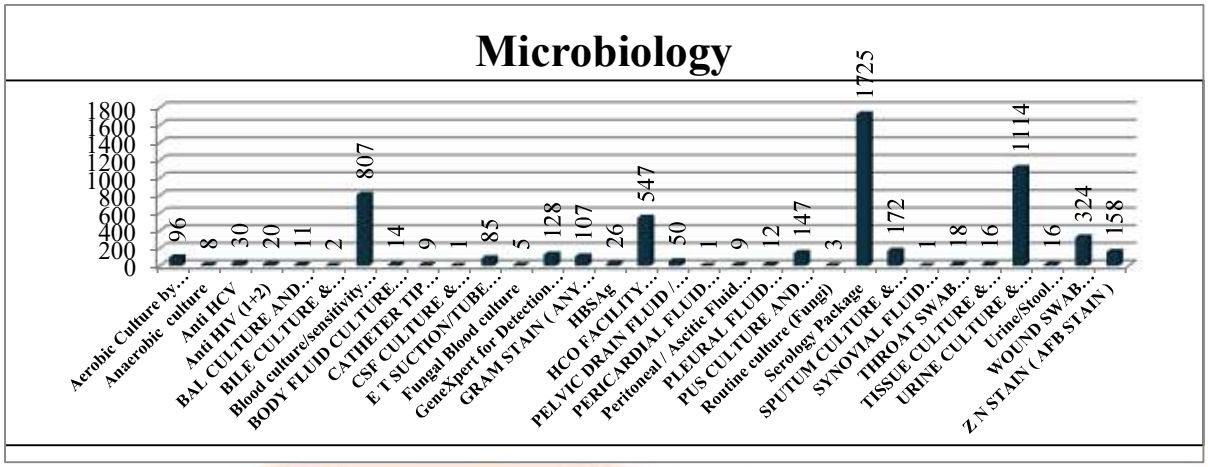
Department of Transfusion Medicine:

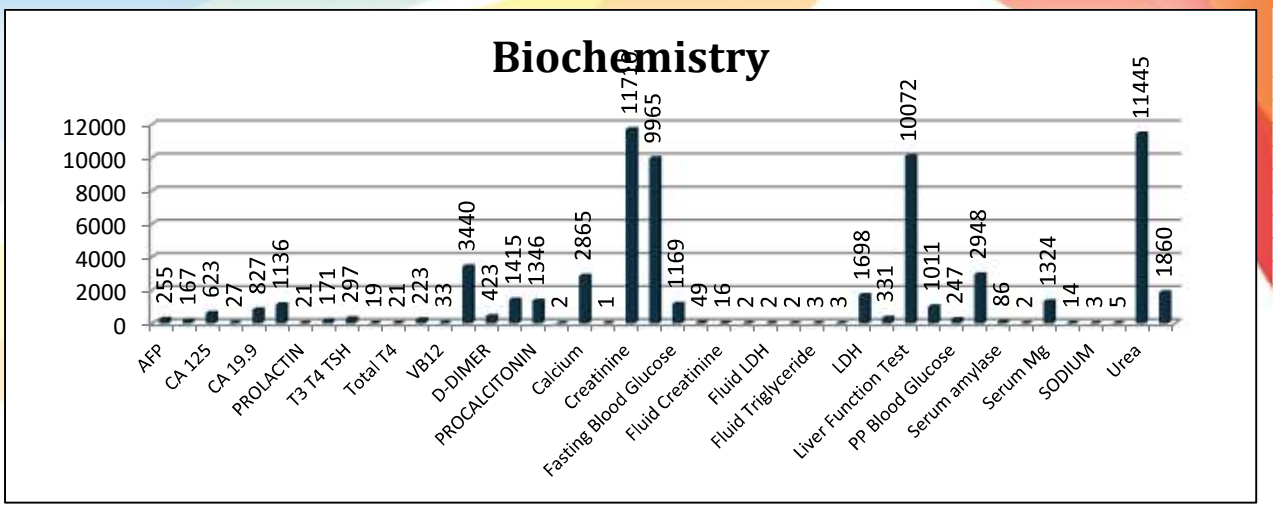
- We provide safe blood transfusion of all patients. Blood donor counselling, motivation and retention of every donor is integral part of voluntary non-remunerated blood donation. Voluntary blood donation, Serology reactive donor counselling and their treatment,
- Donor Blood testing: Blood grouping, HIV-I&II, HCV, HBV, Syphilis, Malaria, Irregular antibody screening of all donors in advanced technique. Crossmatch, DCT, ICT, Phenotyping of RBC
- Blood components therapy- P.R.B.C., Platelet Concentrate, Fresh Frozen Plasma, Cryoprecipitated ANTI- Hemophilic Factor, Cryo-poor plasma,
- Cellular therapy-Platelet Rich Plasma therapy
- Hemostasis management through appropriate blood components therapy (Single donor platelet/platelet concentrate, Fresh Frozen Plasma/Cryoprecipitate)
- Apheresis product- Single donor platelet (SDP) and Single donor plasma
- Therapeutic: Therapeutic Plasma Exchange (TPE), Exchange Blood Transfusion for Neonate and Adult, Therapeutic Leucocytapheresis, Therapeutic Plateletpheresis,
- Bone marrow/ Stem cell Transplantation: Bone Marrow / Peripheral stem cell collection, Stem cell preservation and Transfusion.
- Special products: Leukodepleted P.R.B.C., Leucoreduced Platelet, Irradiated Cellular blood product.
- Special procedure: Cryopreservation of stem cells. Rare RBC antigen cryopreservation.

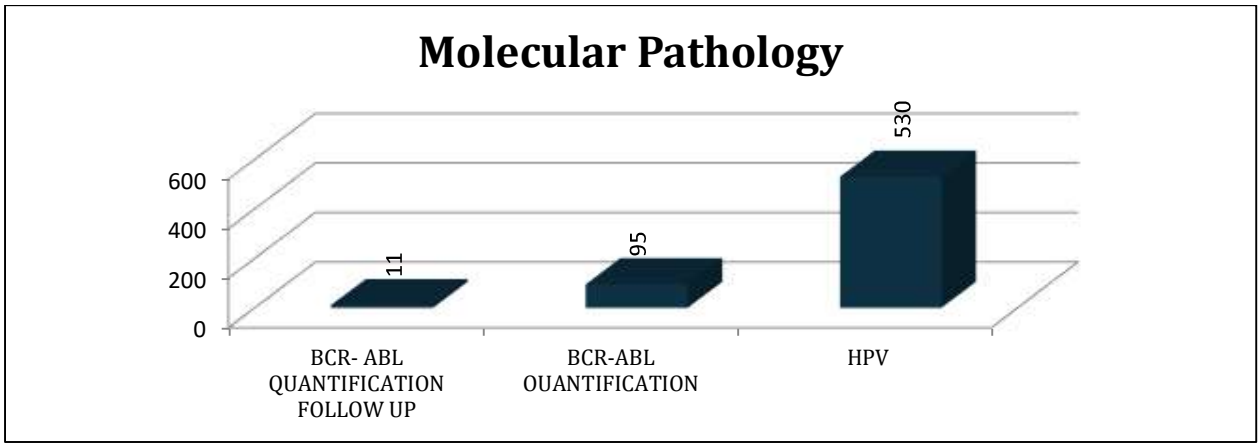
DEPARTMENT OF LABORATORY SERVICES

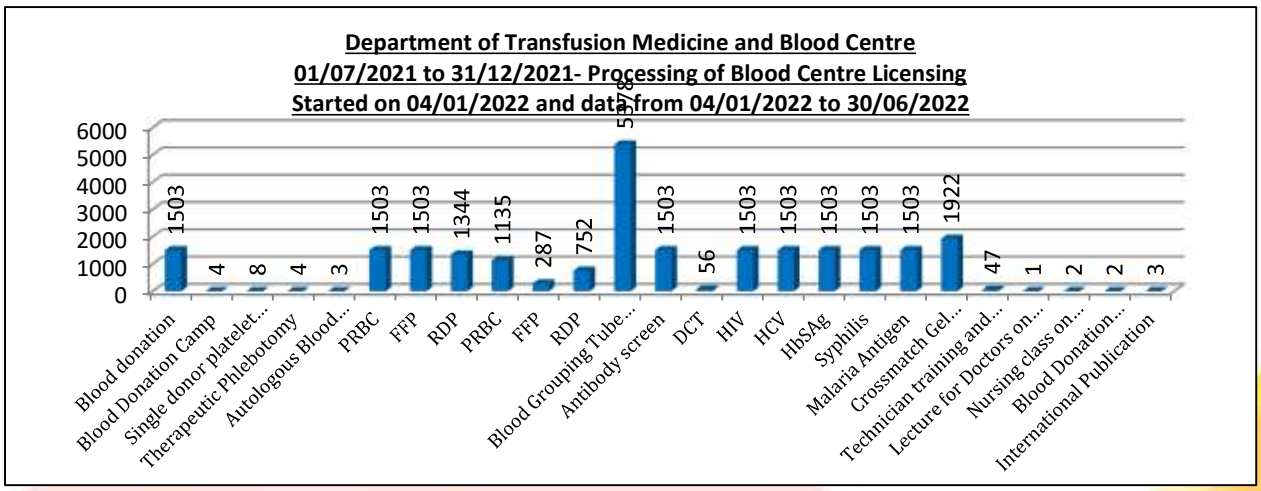

Haematology & CLP
15000
10000
5000
0
2736
12607
10
437
8
12
12
355
3509
18
878
aPTT
CBC
CSF Analysis
ESR
Fluid Analysis
Malaria Antigen
Malaria Parasite
Peripheral Smear
Prothrombin...
RETICULOCYTE...
Urine...


Histo & Cytopathology
2500
2000
1500
1000
500
0
55
9
9
59
1
4
1
250
126
143
109
195
103
32
3
3
54
146
69
140
76
1
364
1
20
7
1
2369
1098
96
2
273
9
Big specimen :...
Big specimen- ...
Big specimen- ...
Bile/CBD...
Body Fluid...
Bone Marrow...
Breast: Big...
CSF cytology
Cytology (FNA)
Frozen section
IHC Panel upto...
Large Biopsy
Medium Biopsy
Pap smear ...
Small Biopsy
Sputum Cytology
Pleural/Periton...


Microbiology
1800
1600
1400
1200
1000
800
600
400
200
0
96
8
30
20
11
2
807
14
9
1
85
5
128
107
26
547
50
1
9
12
147
3
1725
172
1
18
16
1114
16
324
158
Aerobic Culture by...
Anaerobic culture
Anti HCV
Anti HIV (1+2)
BAL CULTURE AND...
BILE CULTURE &...
Blood culture/sensitivity...
BODY FLUID CULTURE...
CATHETER TIP ...
CSF CULTURE &...
E T SUCTION/TUBE...
Fungal Blood culture
GeneXpert for Detection...
GRAM STAIN (ANY ...
HBSAg
HCO FACILITY...
PELVIC DRAIN FLUID /...
PERICARDIAL FLUID...
Peritoneal / Ascitic Fluid...
PLEURAL FLUID...
PUS CULTURE AND...
Routine culture (Fungi)
Serology Package
SPUTUM CULTURE &...
SYNOVIAL FLUID...
THROAT SWAB...
TISSUE CULTURE &...
URINE CULTURE &...
Urine/Stool...
WOUND SWAB...
Z N STAIN (AFB STAIN)







Departmental Academic & Training Work:

1. Department of Biochemistry participating in EQAs program conducted by CMC Vellore
2. Department of Hematology participating in EQAs program conducted by AIIMS, New Delhi
3. Department of Microbiology participating in EQAs program conducted by IAMM, Sir Ganga ram Hospital, New Delhi

4. Department has got Entry level NABL accreditation and planning for going towards full scale accreditation very soon.
5. Department has completed Ministry visit for the course of MD laboratory medicine
6. Department has completed the visit of West Bengal State Medical faculty for the couse of DMLT
7. Department has signed a MOU with RKMVERI for various allied medical science courses.
8. Department of Pathology has got one observer from BR Singh Hospital since March 2022
9. Department of Microbiology has trained 03 interns from various colleges around the Eastern India last year.

Collaborative Research Activities in the Department:

HPV surveillance

Surveillance for Enteric fever in India(SEFI)- Tertiary care suveillance with NICED , KOLKATA

Studies on antimicrobial resistance and molecular subtypes of gram negative bacilli isolated from sepsis patients admitted in tertiary care hospitals in Kolkata with NICED, KOLKATA

Publications of the Department.

1.DR. SANKAR SENGUPTA

1. The impact of COVID-19 on health care–associated infections in intensive care units in low- and middle-income countries: International Nosocomial Infection Control Consortium (INICC) findings. Rosenthal V, Gupta D, Mandal S, Sengupta S etal International Journal of Infectious Diseases 118 (2022) 83-88

2. DR. SUBHRANSHU MANDAL

1. Emergence of ceftriaxone resistant Salmonella enterica serovar Typhi in Eastern IndiaSamajpati, S., Pragasam, A.K., Mandal, S., Balaji, V., Dutta, S.Infection, Genetics and Evolution, Volume 96, December 202.

2. The impact of COVID-19 on health care–associated infections in intensive care units in low- and middle-income countries: International Nosocomial Infection Control Consortium (INICC) findings. Rosenthal V, Gupta D, Mandal S, Sengupta S etal International Journal of Infectious Diseases 118 (2022) 83-88

DEPARTMENT OF RADIATION ONCOLOGY

HEAD OF THE DEPARTMENT: DR. TAPAS MAJI, MD, DNB, Prof. and Specialist Grade I (SAG)

Team:

Name	Designation
Specialists	
Dr. Tapas Maji, MD, DNB	Professor and Specialist Grade I (SAG) &Head, Department of Radiation Oncology
Dr. Debarshi Lahiri, MD	Professor and Specialist Grade I, Radiation Oncology, and DNB Course Coordinator, CNCI
Dr Amitabh Ray, MD, DNB	Associate Professor and Specialist Grade I, Radiation Oncology
Dr. Koustav Mazumder, DMRT, MD, DNB	Assistant Professor and Specialist Grade II, Radiation Oncology
Dr. Palas De, MD, DNB	Assistant Professor and Specialist Grade II, Radiation Oncology
Senior Residents	
Dr. Sujata Sarkar, DNB	Senior Resident
Dr. Arya R M, DNB	Senior Resident
Radiotherapy Technicians	
Mr. Barun Roy Chowdhury	Radiotherapy Technician
Mr. Tapas Kar	Radiotherapy Technician
Mr. Manas Chakraborty	Radiotherapy Technician
Mr. Koushik Ghosh	Radiotherapy Technician
Mr. Prashanta Kr Ray	Radiotherapy Technician

Objectives of the department:

Comprehensive management of patients under the department of Radiation Oncology. This includes decision making and implementation of treatment options regarding clinical management of cancer patients including comprehensive multidisciplinary cancer care and participation in the institutional joint tumor boards followed by radiation treatment planning, evaluation, implementation and their follow-up.

The department along with the medical physics team is actively involved in delivery of different radiation modalities including radical, palliative and prophylactic treatments for various tumors.

The department is equipped with one state of the art Dual Energy Linear accelerator (ELEKTA Synergy) with electron beam treatment facility, one low energy (6 MV) Linear accelerator (ELEKTA) machine with IMRT and electron beam treatment facility, one 16 slice CT simulator and two Ir-192 HDR after-loading brachytherapy machines. Furthermore, the 25 years old Tele-Cobalt machine (Theratron 780 C) has been decommissioned and a new Tele-Cobalt machine (Bhabha Tron II) is under installation process.

Description of work done from 1st April 2021 to 31st March 2022 (1st campus+ 2nd campus):

Total no. of Radiotherapy beds (1st campus+ 2nd campus) = (37+30=67)
Total no. of Indoor admissions (1st campus+ 2nd campus) = 408+615= 1023
OPD attendance (1st campus+ 2nd campus) = 14824+2279 = 17103
New Cases planned for External Beam Radiotherapy (Computerized + Manual) = (320+747=1067)
Brachytherapy: ICRT for Cervix, Vagina and Endometrial cancers (1st campus+ 2nd campus) = 146+ 63=209
Day care procedure (1st campus+ 2nd campus) = 523+71= 594
No of CT-simulation \= 466

Details of category of new cases received for treatment by the department of Radiotherapy from the existing departments of the institute (Surgical Oncology, Medical Oncology, ENT H & N Oncology and Gynecological Oncology):

Site	Subsite/ Type of Cancer	Number Of Patients
Skin		4
Lung		83
Breast		293
Head And Neck		326
G.I. System	Esophagus	11
	Stomach	4
	Colo Rectum	76
	Anal Canal	6
	Hepatobiliary - Pancreas	1
G.U. System	Cervix Uteri	116
	Endometrium	26
	Vulva	11
	Vagina	5
	Kidney	5
	Urinary Bladder	2
	Prostate	32
Lymphoma And Hematological Malignancies	Hodgkins Lymphoma	0
	Non-Hodgkins Lymphoma	7
	Myeloma/ Plasmocytoma	1
	Leukemia	24
Primary Tumours of Central Nervous System		19
Soft Tissue Sarcoma		14
Unknown Primary		1
Total		**1067**

Academic Activities:

Following academic programs are undergoing in the department–

a. DNB Radiotherapy affiliated to National Board of Examinations (NBE), New Delhi.
b. Diploma in Radio therapeutic Technology (DRT-Tech) and Diploma in Radio-diagnosis Technology (DRD-Tech).
c. Internship in DRT(Tech.)
d. Clinical training of DRT (Tech) students from other institutes.
e. Teaching faculty of Post M.Sc. Diploma course in Medical Physics.
f. Internship in Medical Physics.

Thesis/ Publication:

1. A thesis titled "A study on high grade glioma using Intensity Modulated Radiotherapy by Simultaneous Intensity Boost vs Sequential boost" was submitted by Dr Patibandla Srikanth (Guide: Dr Tapas Maji, Co-Guide: Dr. Debarshi Lahiri ,Dr. Dilip Kumar Ray) to the National Board of Examinations in Medical Sciences (NBEMS), New Delhi and was duly accepted by NBEMS.
2. A thesis titled "A prospective study on Image guidance with cone beam CT for 3DCRT of Cancer Cervix" was submitted by Dr Arya R M (Guide: Dr Debarshi Lahiri; Co-Guide: Dr. Tapas Maji, Dr.Dilip Kumar Ray, Mr. Dillip Kumar Mishra) to the National Board Examinations in Medical Sciences (NBEMS), New Delhi and was duly accepted by NBEMS.
3. A thesis titled "A randomized comaparative study on hypofractionated versus conventionally fractionated radiation therapy with concurrent chemotherapy with IMRT using VMAT technique in locally advanced inoperable non-small cell lung cancer" was submitted by Dr. Shambodeep Chatterjee (Guide: Dr. Tapas Maji, Co-Guide: Dr. Debarshi Lahiri, Dr. Dilip Kumar Ray) to the National Board Examinations in Medical Sciences (NBEMS), New Delhi and was duly accepted by NBEMS.
4. A thesis titled "Prospective study on hypo fractionated intensity modulated radiation therapy (using VMAT technique) with concurrent chemotherapy in locally advanced laryngeal and hypopharyngeal squamous cell cancers" by Dr. Rupak Sett (Guide: Dr. Debarshi Lahiri) was submitted to the National Board Examinations in Medical Sciences (NBEMS), New Delhi and was duly accepted by NBEMS.
5. A thesis titled "A prospective comparative study of IMRT (Intensity Modulated radiotherapy using V-MAT technique) versus 3CRT (three-dimensional conformal radiotherapy with respect to toxicity and loco-regional response in locally advanced cervical carcinoma" was submitted by Dr. Sujan Kumar Ghosh (Guide: Dr. Tapas Maji) was submitted to the National Board Examinations in Medical Sciences (NBEMS), New Delhi and was duly accepted by NBEMS.
6. A thesis titled "A prospective comparative study between conventional fractionated radiotherapy and hypo fractionated radiotherapy by using 3D-CRT technique with respect to toxicity and quality of life in postmastectomy breast cancinoma" has been submitted by Dr. Raka Banerjee (Guide: Dr. Tapas Maji) to the National Board of Examinations in Medical sciences.
7. A thesis titled "Concurrent chemoradiotherapy using volumetric modulated arc therapy with simultaneous integrated boost to the involved para-aortic lymph nodes in cervical carcinoma patients: a prospective observational study" has been submitted by Dr. Subhan Riyaz Shaikh (Guide: Dr. Debarshi Lahiri) to the National Board of Examinations in Medical sciences.
8. A thesis titled "A prospective observational study to evaluate anatomic and volumetric changes occurred during fractionated radiotherapy of head and neck cancer" was submitted by Dr. Neerajita Paul (Guide: Dr. Tapas Maji) to the National Board Examinations in Medical Sciences (NBEMS), New Delhi and was duly accepted by NBEMS.
9. Intensity modulated radiotherapy in carcinoma cervix with metastatic para-aortic nodes: an institutional experience from a Regional Cancer Centre of Eastern India. Reports of Practical Oncology and Radiotherapy 2021, Volume 26, Number 3, pages: 400- 407.

Other academic activities

1) Dr. Arya R M successfully passed DNB Radiotherapy from this Institute.

DEPARTMENT OF RADIODIAGNOSIS

HEAD OF THE DEPARTMENT – DR. SUPARNA MAZUMDER, MD

Team

Name & Designation
Dr. Sounak Paul Specialist Gr. II
Dr. Srabanti Roy Choudhury Contractual Radiologists
Technical Staff
Mr. Alok Roy, Technician
Mr. Kamal Ghosh, Technician
Mr. Debapratim Das, Technician

OBJECTIVE

- To get started right away, just tap any placeholder text (such as this) and start typing to replace it with your own. The department is a vital link providing diagnostic support to all the departments in the hospital wing, both OPD and IPD. It plays an important role in patient care services and management – both routine and emergency, of new cancer cases as well as those on follow-up by helping in early detection, diagnosis, intervention, prognosis and follow-up.
- The department played a vital role in the COVID situation providing X-Ray, USG and HRCT services as and when required. maintaining all the sanitization protocol.
- The department also managed installation of many new equipment and also started radiological diagnostic services in the new second campus at Rajarhat.
  - New Machines Installed (First Campus)
  - 128 Slice MDCT Scan Incisive (Philips)

  - The Current Radiological facilities combined at both the campuses include the following services:
    - X-ray – For general radiography and special procedures
    - Computerized Radiography system with laser camera for digital films.
    - Ultrasonography- All with color Doppler.

- Mammography unit (analogue and digital model).
- Guided (USG) interventions such as FNAC, biopsy, drainage.
- Review reporting of imaging (CT/ MRI) done outside.
- CT SCAN with guided biopsies.
- MRI 3T with spectroscopy

Ultrasonography with interventions and Mammography (First Campus)

Months	Number of Patient / Cases	USG - Abdomen	USG - Small Parts Doppler	FNAC	MMG	USG Guided Bx
21-Apr	41	97	74	41	56	22
21-May	33	54	53	40	15	17
21-Jun	109	107	79	53	16	17
21-Jul	96	96	120	42	48	27
21-Aug	105	22	76	51	35	13
21-Sep	201	52	70	28	61	14
21-Oct	161	54	50	20	26	10
21-Nov	194	78	78	25	14	15
21-Dec	264	95	93	37	58	13
22-Jan	261	106	106	41	20	17
22-Feb	204	71	107	43	25	8
22-Mar	286	81	206	62	43	13
Grand Total	1955	913	1112	483	417	186

Computed Tomography Scans (First Campus)

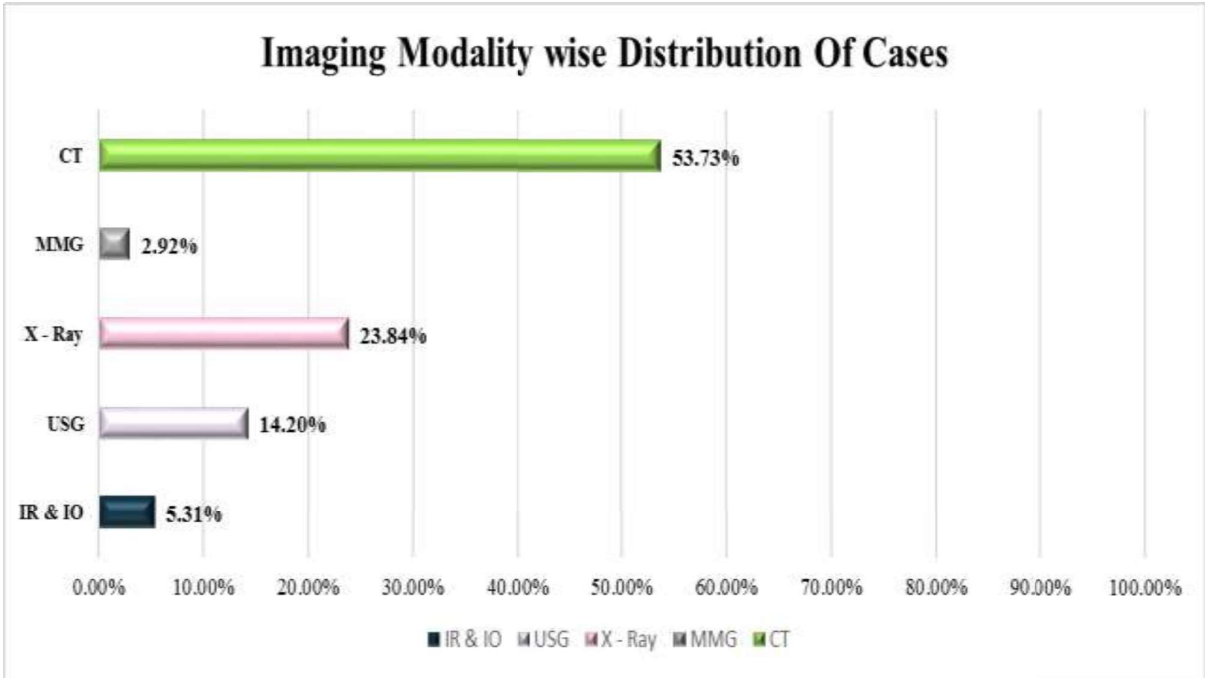
Months	BX / FNA	Patient	Brain	Body
21-Apr	2	238	107	430
21-May	4	183	78	355
21-Jun	5	250	85	483
21-Jul	6	299	97	605
21-Aug	9	296	85	608
21-Sep	6	304	115	612
21-Oct	9	272	111	542
21-Nov	11	302	85	594
21-Dec	10	309	81	630
22-Jan	8	288	65	610
22-Feb	11	277	77	561
22-Mar	8	294	126	522
Grand Total	89	3312	1112	6552

X - rays (First Campus)

Months	X-Ray	Special Investigations
Apr-21	254	18
May-21	172	14
Jun-21	258	21
Jul-21	328	52
Aug-21	294	63
Sep-21	290	70
Oct-21	188	27
Nov-21	267	17
Dec-21	196	20
Jan-22	230	34
Feb-22	243	25
Mar-22	284	35
Grand Total	**3004**	**396**

MRI (Both Campus Cases)

Months	MRI
Sep-21	21
Oct-21	70
Nov-21	40
Dec-21	124
Jan-22	110
Feb-22	91
Mar-22	140
Total Case	**596**



Training Program

1. DNB faculty
2. PhD program faculty
3. DRD (Tech) & DRT (Tech)- these are two-year Diploma courses for paramedical training run under the aegis of West Bengal State Medical Faculty. All the members of the Department are actively involved in various capacities.

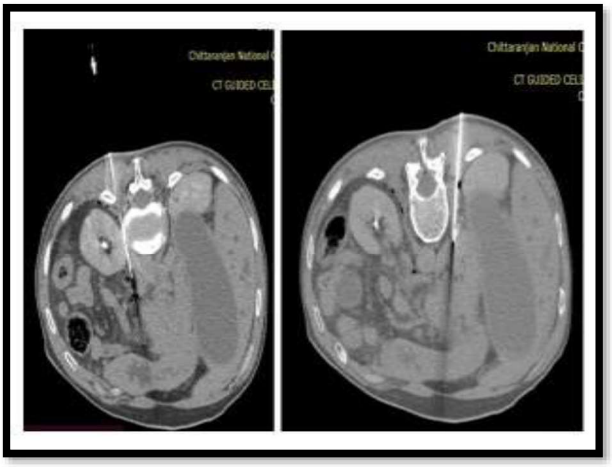
4. Clinical Trials: CT imaging review for, breast, lung cancers, & colorectal cancers etc. for departments like medical oncology, gynae-oncology & others as per RECIST criteria are being done actively.
5. Webinar programs.

Future Upgradation plans

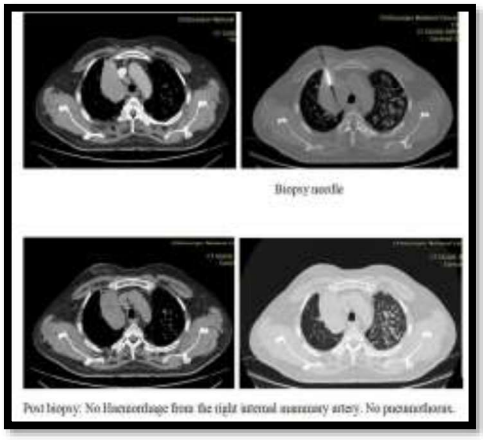
1. OPG Machine

NOTE: In spite of the COVID pandemic situation, the department performed reasonably well with near comparable CT scans and only 30% reduction in X-rays, Interventions, USGs and Mammograms as compared to the previous year.

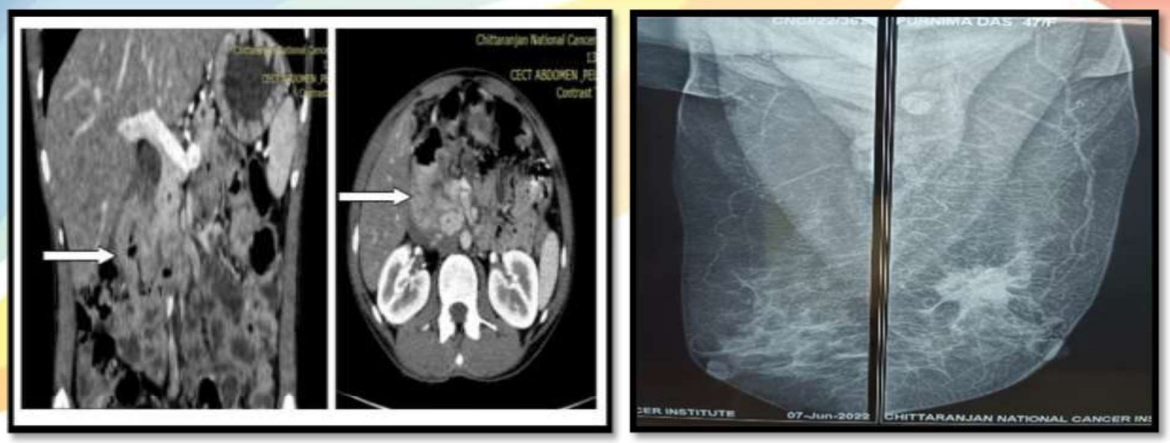
PICTORIAL EVIDENCE



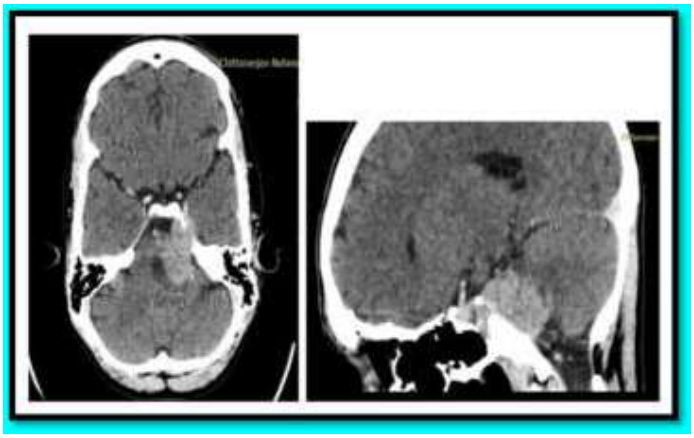
Case 1: Coeliac Plexus Neurolysis – Interventional Radiology



Case 2: Right upper lobe lung mass Biopsy



Case 3: Duodenal Lymphoma – Diagnostic Radiology



Case-4 Lt Breast Mass- Digital Mamography

Case 5: Left trigeminal Schwannoma – Diagnostic Radiology Case 6: Epiglottic mass – Diagnostic Radiology

DEPARTMENT OF SURGICAL ONCOLOGY

Head of the Department– Dr.Jayanta Chakrabarti, Director

Team

Surgical Oncology – Hazra Campus	**Designation**
Dr. Neyaz Alam, M S	Specialist (Grade I)
Dr. Sagar Sen DNB (Gen Sur), DrNB (Sug. Onco.), FMAS	Specialist (Grade II)
Dr. Indranil Ghosh, FRCS	CMO
Surgical Oncology (GI & GU)	**Designation**
Dr. Sandip Swarup Mondal, MS	Specialist (Grade II)
Dr. Durga Prasad Nanda, M S	Specialist (Grade II)
Dr. Abhishek Gangopadhyay, M S, M Ch.	Specialist (Grade II)
Surgical Oncology (Gynaecology)	**Designation**
Dr. Ashima Mukhopadhyay, MD, DNB, DGO, MRCOG, PhD, M Sc	Specialist (Grade I)
Dr. Sunaina Wadhwa, M S (Gynae. Onco)	Specialist (Grade II)
Surgical Oncology (Head & Neck)	**Designation**
Dr. Rajdeep Guha, M S(ENT)	Specialist (Grade I)
Dr. Sukanya Naskar, M S (ENT)	Specialist (Grade II)
Surgical Oncology (Breast & Soft tissue)	**Designation**
Dr. Souradip Gupta, M S, M Ch (Plastic Sur.)	Specialist (Grade II)
Dr. Santosh Madhabathula, M S, DrNB	Specialist (Grade II)

Surgical Oncology Team

Surgical Oncology Team – Hazra Campus

Surgical Oncology (Head & Neck) Team

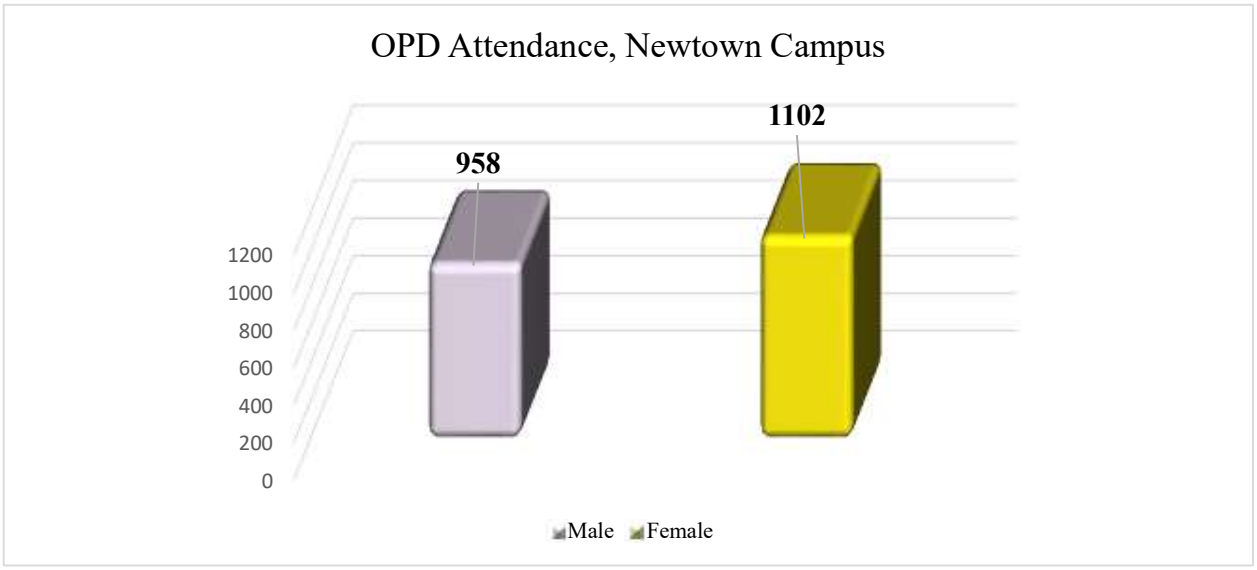
SURGERY DETAILS

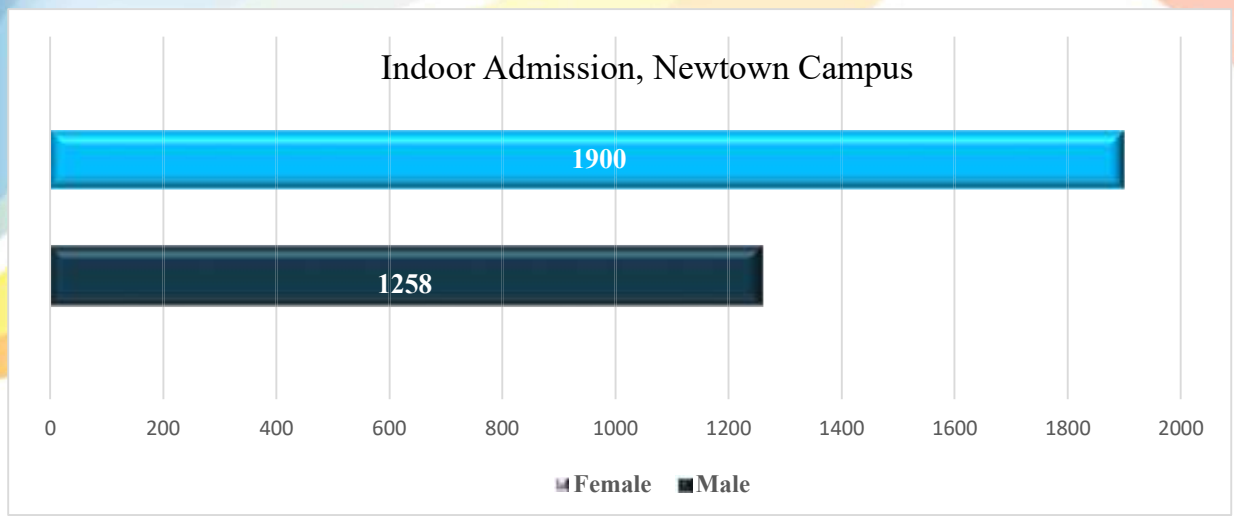
- GI & GU Unit Surgeries at NEWTOWN CAMPUS - 184

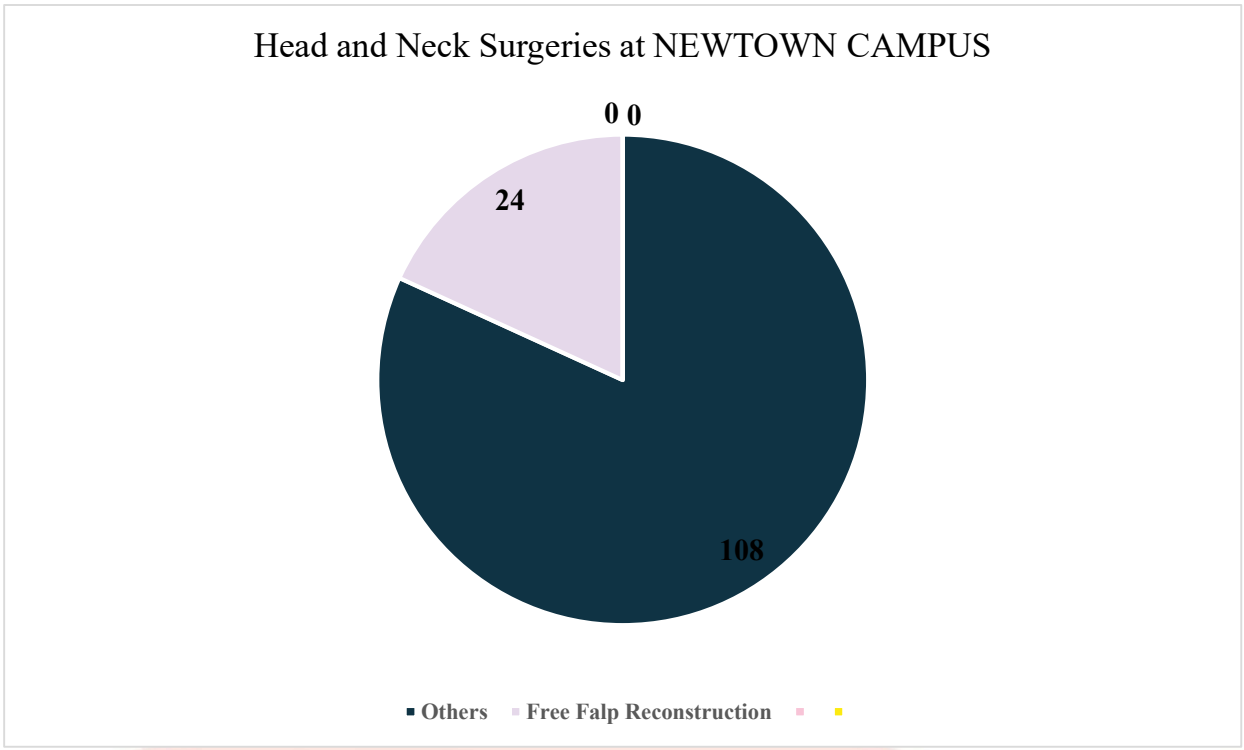
System wise Distribution

- Colorectal Surgeries - **74**
- Stomach Surgeries - **35**
- Retroperitoneal Tomours - **5**
- •Hepatopancreatic Biliary Surgeries- **25**
- •Genitourinary Surgeries- **41**
- •Miscellaneous - **4**

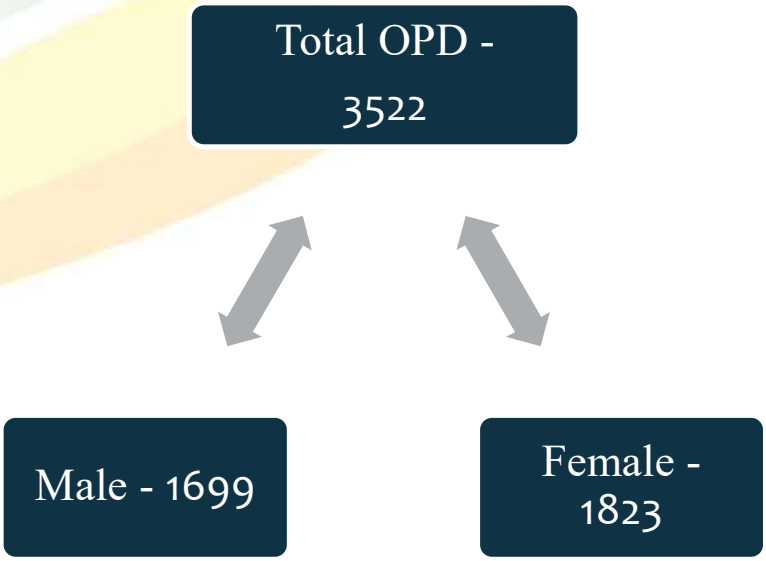
Gender Bifurcation

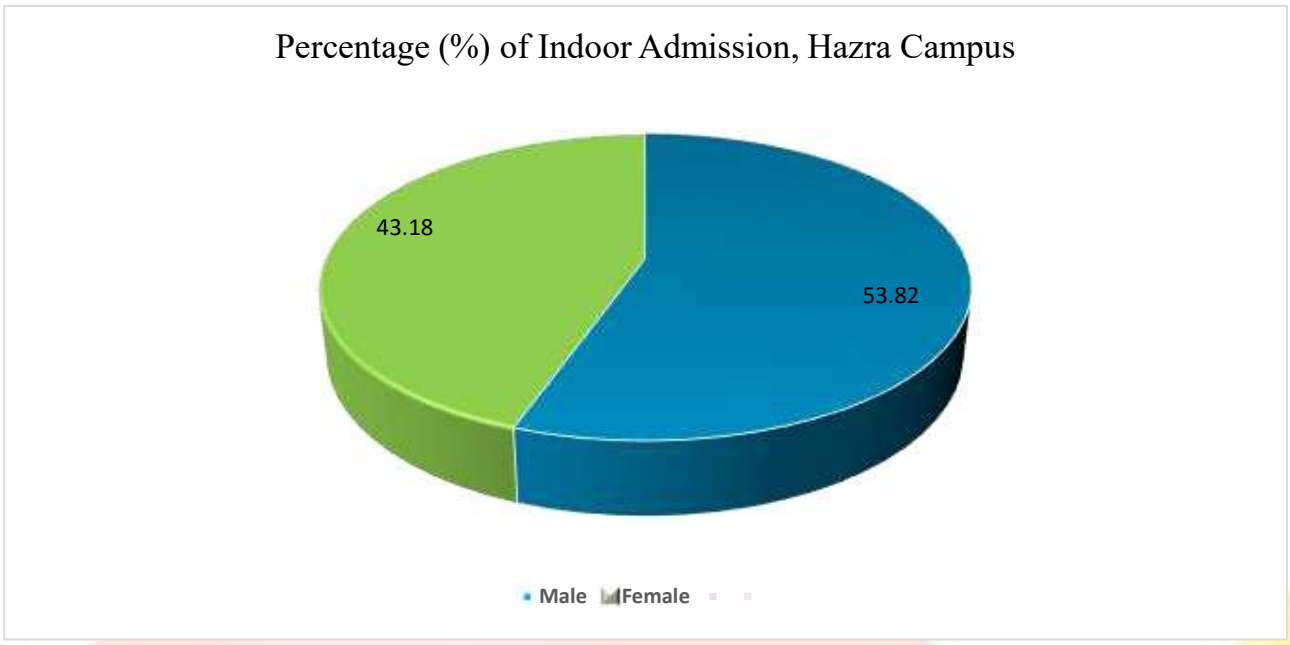



Indoor Admission, Newtown Campus
1900
1258
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Female
Male

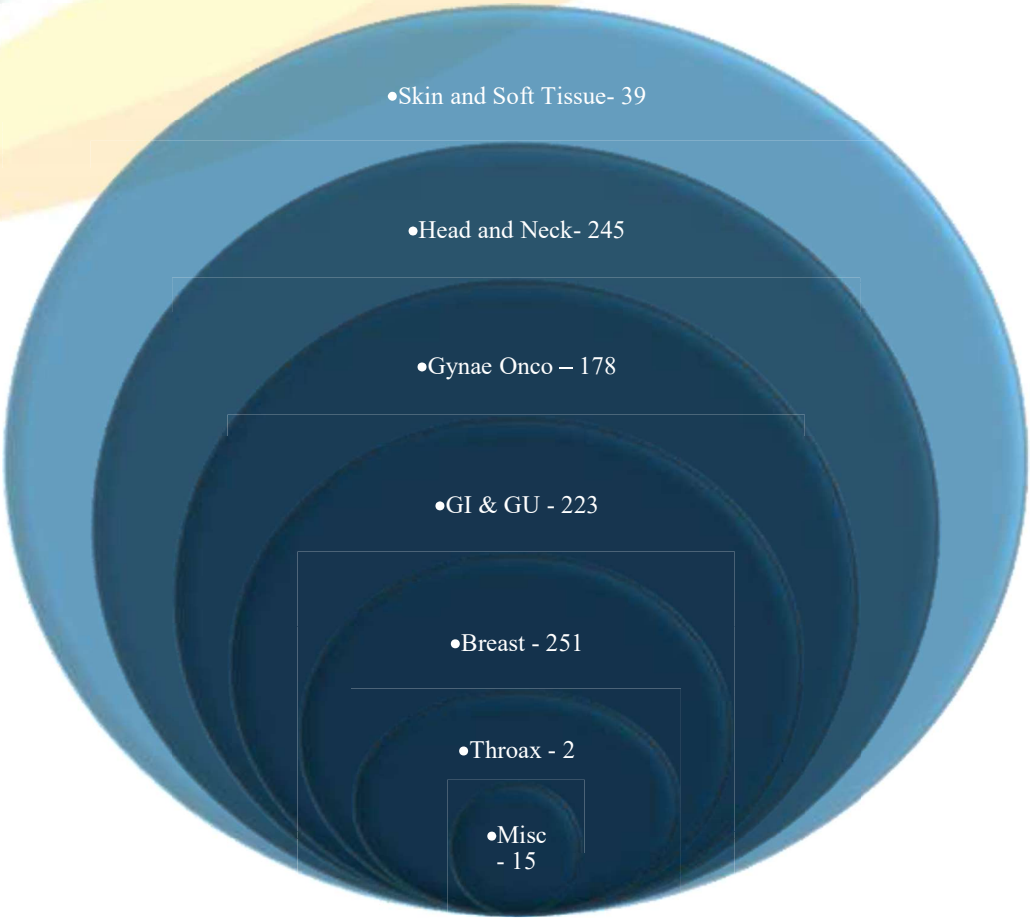

Head and Neck Surgeries at NEWTOWN CAMPUS
0 0
24
108
Others
Free Falp Reconstruction

Total OPD Registration in Surgeries and **Gender Bifurcation** at **HAZRA CAMPUS**.





Surgeries All Dept.in Hazra Campus - 953



Actual Figure of Surgical Oncology (only).

Department	Major		Emergency	Post-op Elective Ventilation	Total
Surgery	GI & Genitourinary	**192**	38	24	**550**
	Head and Neck	**107**			
	Breast and Soft Tissue	**186**			
	Laparoscopy	**10**			
	Others	**55**			
Total					**550**

PUBLICATIONS

- Dr. Jayanta Chakrabarti.
    - Ranganathan P, Sengar M, Chinnaswamy G, Agrawal G, Arumugham R, Rajiv Bhatt, Bilimagga R, Chakrabarti J, Chandrasekharan A, Kumar Chaturvedi H, Choudhrie R, Dandekar M, Das A, Goel V, Harris C, Hegde S K, Hulikal N, Joseph D, Kantharia R, Khan A, Kharde R, Khattry N, Lone M M, Mahantshetty U, Malhotra H, Menon H, Mishra D, Nair R A, Pandya S J, Patni N, Pautu J, Pavamani S, Pradhan S, Thammineedi S R, Selvaluxmy G, Sharan K, Sharma B K, Sharma J, Singh S, Srungavarapu G C, Subramaniam R, Toprani R, Raman R V, Badwe R A, Pramesh C S, Impact of COVID-19 on cancer care in India: a cohort study, The Lancet Oncology, Volume 22, Issue 7, 2021, Pages 970-976, ISSN 1470-2045, DOI: https://doi.org/10.1016/S1470-2045(21)00240-0.
- Dr. Neyaz Alam.
    - (2021 April – 2022 March)
    - 1. Dasgupta S, Ghosh T, Dhar J, Bhuniya A, Nandi P, Das A, Saha A, Das J, Guha I, Banerjee S, Chakravarti M, Dasgupta PS, Alam N, Chakrabarti J, Majumdar S, Chakrabarti P, Storkus WJ, Baral R, Bose A. RGS5-TGFβ-Smad2/3 axis switches pro- to anti-apoptotic signaling in tumor-residing pericytes, assisting tumor growth. Cell Death Differ. 2021 Nov;28(11):3052-3076. doi: 10.1038/s41418-021-00801-3. Epub 2021 May 19. PMID: 34012071; PMCID: PMC8564526.
    - 2. Ray S, Saha D, Alam N, Mitra Mustafi S, Mandal S, Sarkar A, Majumder B, Murm N. Exposure to chewing tobacco promotes primary oral squamous cell carcinoma and regional lymph node metastasis by alterations of SDF1α/CXCR4 axis. Int J Exp Pathol. 2021 Apr;102(2):80-92. DOI: 10.1111/iep.12386. Epub 2021 Mar 3. PMID: 33655604; PMCID: PMC7981595.
- Dr. Sagar Sen.
    - Orchestrated expression of vasculogenic mimicry and laminin-5γ2 is an independent prognostic marker in oral squamous cell carcinomaFebruary 2022, International Journal of Experimental Pathology
- Dr. Avishek Ganguly.
    - First author of international original article “Primary chest wall sarcoma: a single institution experience of 3 years” cancer treatment and research communication, volume 27, 2021, 100326. DOI: https://doi.org/10.1016/j.ctarc.2021.100326
- Dr. Sandeep Sahu.
    - IASO Mid-con Shillong Presentation-Single centre experience of reconstruction by pancreatic gastrostomy post Whipple’s surgery in ca pancreas.

DEPARTMENT OF PAIN AND PALLIATIVE CARE

Head of the Department - Dr. Ranajit Kumar Mandal, MD, DNB, PGDHHM, Professor [Specialist Grade I(SAG)]

Team
Faculty
Dr. Debasish Jatua Chief Medical Officer & In Charge, Department Of Pain & Palliative Care
Contractual Medical Officer
Dr Soumen Pramanik
Nursing Staff
S/N Moushumi Chowdhury (Chakraborty)
S/N Soma Das (Jana)
S/N Arpita Dey

Objectives of the department

Palliative care improves the quality of life of patients and families who face life-threatening illness, by providing pain and symptom relief, spiritual and psychosocial support to from diagnosis to the end of life and bereavement. Palliative care:

1. Provides relief from pain and other distressing symptoms.
2. Affirms life and regards dying as a normal process.
3. Intends neither to hasten or postpone death.
4. Integrates the psychological and spiritual aspects of patient care.
5. Offers a support system to help patients live as actively as possible until death
6. Offers a support system to help the family cope with the patient's illness.
7. Uses a team approach to address the needs of patients and their families, including bereavement counseling, if indicated.
8. Will enhance quality of life, and may also positively
9. influence the course of illness
10. Is applicable early in the course of illness, in conjunction with other therapies that are intended to prolong life, such as chemotherapy or radiation therapy, and includes those investigations needed to better understand and manage distressing clinical complications.
11. The patients experience pain often at presentation, sometimes during treatment and even during post treatments follow up as a sequential result of the treatment or as a result of treatment failure rather with the further progress of the disease. The efficient and judicious management of pain at any stage thus helps to reduce the pain and improves the QOL of the sufferer. With a well-designed target, the functioning of this Department is continued with the regular supply and distribution of Morphine tablets at free of cost and with all the supportive care (wound care, lymphedema care, psychosocial counseling, Telephonic support and home-based care) as applicable in individual patients at this Institute.

Brief description of the work done

The number of new patients attending this Department is gradually increasing. In house patients are also attended on their needs. Approximately 101538 tablets (1.48KG approx.) of Morphine [10 mg (SR & IR) & 30 mg-SR] have been supplied to the patients of this Institute during the last one year to meet the challenge of pain management effectively and adequately. Fentanyl patches (25mcg and 50 mcg) and Buprenorphine patches (10mcg) are also distributed to the needy patients free of cost

The Departmental OPD is functional 6 days/week. The Department attends to referred indoor cases as and when requested from other Departments both in OPDs & in wards. A total number of **862** patients have been **newly registered** in the Department during the period between April' 2021 and March' 2022.The Department also have treated **1386** of **old/follow** up patients during the year. Total number of patients during the year is **2296 among which 15 patients were** referred from other Institutions (like TMH Mumbai, TMC Kolkata, CMC Vellore, ESI Hospital, Kolkata). Total number of OPD patients seen are 2263

Only Tablet Morphine was supplied against proper prescription to 21 patients referred from CNCI, Rajarhat from OPD of Dept of Pain & Palliative Care, CNCI, Hazra.

Among these the total number of patients who were provided Psychosocial **Counseling** are 400, Diet Counselling are 46 and General physiotherapy are 70.

Interventional procedures done are:

OMT-21

PERITONEAL TAPPING-10

URINARY CATHETERISATION-3:

According to Gender and the site of malignancy the patients are tabulated as below:

Distribution of Total cases

Total Number of patients seen at OPD	-	2263
Total Number of Female Patients seen at OPD	-	1111
Total Number of Male Patients seen at OPD	-	1152
Total Number of Patients seen for Palliative Care	-	817
Total Number of Patients seen for Pain Management	-	1446

Disease Site	Total Cases
Head & Neck	759
Thorax (Lungs, Breast)	405
Upper Abdomen (Stomach, GB, Liver, Pancreas, Esophagus)	421
Lower Abdomen (Rectum, Bladder, Prostate, Colon)	139
Gynecological Malignancies	345
Genito-Urinary	86
Others (Misc. malignancies/ Bone/STS/Lymphomas) l sites	108
Total	2263

Ruma Abedona Hospice, a city-based NGO has started functioning in this institute since June'2013.This NGO helps the patients of this hospital and their care givers with careful and effective counseling as and when required. With the help of this NGO, we have started with home based Palliative care services to the needy and deserving patients free of cost. This

organization offers healthy dressings of the wounds of the patients under care of the Palliative care unit effectively under close supervision of the doctors.
The total home-based Palliative care services provided to the needy and deserving patients free of cost are **21 while Home basedBereavement care was supported for 12 families** from the period of April 2021 to March 2022 around Kolkata and adjacent area, Hoogly. Approximately **21** patients received **Lymphedema Care** & 250 patients were provided comprehensive Wound care between April' 2021 and March' 2022.
We are getting the active support of this NGO at this institute OPD twice in a week as a routine. They are also providing medicines & Dressing kits to the poor patients free of cost. Around **293** patients were benefitted from such an initiative. Thus, improving the QOL of the patients concerned.
In February 2022, 15 bedded "**CNCI Hospice"** is set up in partnership with Ruma Abedona Hospice for providing Hospice & Holistic care to patients needing End of Life Care /Respite Care/Hospice Care **at Ruplal Nandi Memorial Cancer Research Centre (RNMCRC), Chandan Nagar.** From 22nd February 2022 till 31st March 2022 total 28 number of persons received medical management, wound management, Lymphedema training to family caregivers, Bed sore management, Oral care, Ostomy care, Psycho-Socio-Spiritual counseling & Music Therapy at RNMCRC, Chandernagore.

Academics:

- Dr Debasish Jatua was invited as Speaker/Faculty in the scientific deliberation in "Three days Orientation Programme on Palliative Medicine" to coordinate a **Workshop on Communication at** ESI Institute of Pain Management, Sealdah in March 2022.
- Dr Debasish Jatua was invited as Speaker/Faculty in the Scientific deliberations at ISACON West Bengal 2021 on the topic**: Chronic Postoperative Pain in Oct 2021.**
- Dr Debasish Jatua gave lecture as Guest Faculty at ESI Institute of Pain Management (under WBUHS) on various aspects of Pain Management &Palliative Medicine after proper permission from Competent Authority of CNCI.

DEPARTMENT OF PREVENTIVE ONCOLOGY

Team

Name	Designation
Specialists	
Dr. Ranajit Kumar Mandal, MD, DNB, PGDHHM	Professor and Head of the Department
Dr. Sreeya Bose, MD, DNB	Project Consultant (preventive oncology)
Dr. Chandan Mandal, Ph.D	Senior Research Associate (PRESCRIP-TEC)

Objectives of the Department

- Screening and early detection of Gynecological cancers
- Generate trained human resources in early detection and effective management of pre cancers
- To conduct training workshops on cervical cancer screening and its management
- Awareness programme on cervical cancer and its management, early diagnosis, importance of HPV vaccination, etc.
- Conduct HPV vaccination programme in various districts of the state.

Clinical activities of the Department

During the period between 1st April 2021 and 31st March 2022 a total of 5815 women were screened in the form of HPV DNA test and VIA (Visual Inspection with acetic acid) of in various districts of the state. Out of this, 251 women were Positive for HPV test. Around 188 women underwent colposcopic evaluation. The colposcopic evaluation given below in the table 1.

Table 1: The colposcopic findings of screened women during 2021-2022

Findings	Number of cases
Normal	**144**
Low grade lesion	**25**
High grade lesion	**9**
Invasive lesion	**1**
Inadequate	**9**
Total	**188**

During 2021-2022, all the 188 women were managed accordingly. The details of the procedures are given in Table 2.

Procedure	Number
Thermal ablation	**114**
LLETZ/LEEP	**46**
Biopsy	**27**
RT	**1**

Table 3: The report of HPE findings during 2021-2022

Procedures	No of cases
Normal	**156**
CIN I	**9**
CIN II	**1**
CIN III	**6**
Squamous cell Carcinoma	**6**
Inadequate	**2**
Not available	**8**

During the period, total 67 screening camps were conducted in 9 districts of state (24 PG (S), 24 PG (N), Purba Mednipore, Paschim Mednipore, Howrah, Kolkata, Hooghly, Bardhaman, Bankura, Nadia).

Training workshops

1. Colposcopy workshops held at CNCI in collaboration with West Bengal Government for master training of various Gynecologists from the state Government service.

Date of workshop	Number of patients treated
09/08/2021	**10**
10/08/2021	**14**
23/08/2021	**09**
24/08/2021	**14**
06/09/2021	**7**
07/09/2021	**13**
13/09/2021	**7**
14/09/2021	**10**
27/09/2021	**14**
28/09/2021	**17**
10/01/2022	**4**

2. Cervical cancer screening camp along with awareness programme on 8th March 2021 with collaboration of BOGS. Around 65 patients were screened for the cervical cancer.

Research activities in the department

Research activities in the department
Community Based Cervical Cancer Screening Programs of the Department
Integrated project on Non communicable diseases (IPNCD) (Principal Investigator: Dr. Ranajit Mandal)

1. The project started in May, 2017 to assess the feasibility of a comprehensive non communicable diseases screening approach for women in collaboration with International Agency for Research on Cancer, WHO that includes cervical screening on self-collected vaginal samples. Despite of increasing trend of Covid

   19 pandemic and lockdown period, the cancer screening was being continued in different districts in collaboration with various NGOs of the locality. The vaginal smear was obtained by self-sampling by the women themselves. Between April 2021 to March 2022, total 5800 women aged between 30-60 years have been recruited in this project of which

253 women screened positive with HC2. Out of the screen positive women, 183 underwent Colposcopic examination by AI in the hospital followed by treatment using thermocoagulation (115 cases), LEEP (45 cases).

2. **Feasibility and Acceptability of two dose quadrivalent Human papillomavirus vaccine for adolescent girls in rural parts of West Bengal- A pilot study (Principal Investigator- Dr. Dipanwita Banerjee)**

The HPV vaccination project started in July, 2017 in association with Rotary International Initiative is a community-based HPV vaccine project. The project is the first community-based demonstration project in eastern India to assess the feasibility and acceptability of two dose HPV vaccination in rural population of West Bengal. Total 1664 girls between 9-14 years were recruited in this project (Phase 1 and Phase 2) and received their two-dose vaccination till February, 2021. No serious adverse effects were reported.
Later, the project was continued from 31/10/2021-25/3/2022 with total 953 vaccination done and 89 second dose completion. No side effects reported.

3. A Phase-II/III, Partially Double-blind, Randomized, Active-controlled, Multi-centric Study to Assess the Immunogenicity and Safety of SIIPL's qHPV Vaccine administered Intramuscularly in Healthy Volunteers according to a Two-dose Schedule to Cohort 1 (Girls and Boys Aged 9-14 years) and a Three-dose Schedule to Cohort 2 (Females and Males Aged 15-26 years) as Compared to Merck's HPV6/11/16/18 vaccine (Gardasil®)

- IPIROC (translational and clinical trial): Intermittent PARP inhibitor in recurrent ovarian cancer. KolGo TRg study (Funding: CRUK- DBT seed funding, £30,000- full funding application in process for £ 1.5 million GBP)-GCIG badged. Total 7 patients recruited till now.
- INTERLACE multicentric RCT (GCIG-CCRN) in cervical cancer. Total 6 patients recruited.
- SENTICOL3: International validation study of sentinel node biopsy in early cervical cancer: A GINECO, ENGOT and GCIG study. Two patients recruited till now.
- NuGenA: Nurse led Genetic counselling in improving Awareness and implementation of screening services for hereditary women's cancer- submitted to NIHR GACD call (2020)- 2.5 million GBP
- SAVE-CERVIX- A multicentric study in collaboration with IARC for evaluation of Artificial Intelligence image recognition in cervical screening in LMICs
- PRESCRIP-TEC DBT funded- A multicentric study, The Prevention and Screening Innovation Project Toward Elimination of Cervical Cancer focuses on increasing adoption of cervical cancer screening including direct treatment and follow up for women in resource poor and hard to reach settings

Workshops and conference attended

Dr Ranajit Mandal

1. Conducted TOT Master trainer workshops on colposcopy and LEEP training of Doctors and Nurses at CNCI in association with NHM cell of The West Bengal Govt.
2. Invited as Faculty in AGOICON 202One, the annual conference of the Association of Gynaecologic Oncologists of India, on a virtual platform on 12th, 13th and 14th November, 2021, as a moderator in a panel discussion, on "Preventing cervical cancer: How can an Obstetrician and Gynecologist make a difference?"
3. Invited faculty at 17th world congress for cervical pathology and colposcopy, IFCPC India 2020ne, 1-5th July 2021.

4. Invited as faculty in 46th Annual conference of The Bengal obstetrics and gynecological societies, (BOGSCON), on March 31st 2022- 2nd April 2022.
5. Invited as faculty in 46th Annual conference of The Bengal obstetrics and gynecological societies, (BOGSCON), on March 31st 2022- 2nd April 2022, pre congress workshop.

Dr Sreeya Bose

1. Oral poster presentation – 'A pilot study on feasibility and acceptability of two dose Quadrivalent HPV vaccine for adolescent girls in rural Bengal.' at the 17th World Congress for Cervical pathology and colposcopy organized by IFCPC India 2020ne from 1st to 5th July, 2021.
2. Poster presentation at AGOICON 202ONE "Role of Colposcopy as a triage tool and treatment of pre-cancer lesions according to recent WHO guidelines"
3. Paper presentation at AOGIN 2021-Received First Prize for paper on "Cervical cancer screening by HPV self-sampling during Covid -19 pandemic: Screening techniques and measures undertaken in a community-based project"
4. Paper Presentation in 46th Annual Conference of the Bengal obstetrics and gynecological societies, (BOGSCON), on March 31st 2022- 2nd April 2022, on Cervical Cancer Screening By HPV-Self Sampling Method – A Measure Taken To Uphold Cervical Cancer Screening During The Covid-19 Pandemic" has been accepted for oral presentation at the Conference.
5. Invited as a Delegate and a Resource person on Training on Innovative Cervical Cancer Screening & Qualitative Research Methodology' , held at Manipal Academy of Higher Education, Manipal, Karnataka on 12th & 13th April 2022.
6. Part of the Organizing team and conducted TOT Master trainer workshops on colposcopy and LEEP training of Doctors and Nurses at CNCI in association with NHM cell of The West Bengal Govt.
7. **Attended 24th National Exhibition organized by Central Calcutta Science and Culture Organization for Youth at science city Maidan, Kolkata, from 28th - 31st October 2021. :** awareness on cervical cancer screening, importance of HPV vaccination was done among the school students and the visitors on the site. Information on cervical cancer screening was distributed in the form of pamphlets, leaflets, posters etc.

Publications

1. R. Mandal, D. Banerjee, K. Gupta, Puja Chatterjee, M. Vernekar, Chandrima Ray. Experience of Human Papillomavirus Vaccination Project in a Community Set Up-An Indian Study. Asian Pacific journal of cancer prevention, March 2021.
2. Banerjee D, Mandal R, Vernekar M. Feasibility and acceptability of two dose qaudrivalent Human papillomavirus vaccine for adolescents' girls in rural parts of West Bengal- A pilot study. Asian Pacific Journal of Cancer Prevention. 22(3); 699-704.
3. Chatterjee P, Dey Rupali, Banerjee D, Vernekar M. Point Prevalence study of communicable and non-communicable disease and cervical cancer screening in female sex workers (FSW) in an urban area of eastern India. SAS J Surg, 2021 Apr 7(4): 201-206.
4. Mandal, R., Banerjee, D., Gupta, K., Chatterjee, P., Vernekar, M., Ray, C. Experience of Human Papillomavirus Vaccination Project in a Community Set Up-An Indian Study. Asian Pacific Journal of Cancer Prevention, 2021; 22(3): 699-704. doi: 10.31557/APJCP.2021.22.3.699.

Awareness of cervical cancer screening at the camp

VIA Examination Camp

IPNCD Project

HPV Vaccination Camp

Team at National Exhibition Stall

DEPARTMENT OF MEDICAL RECORD

In-Charge of the Department: Sanmoy Chakraborty, Assistant Library & Information Officer

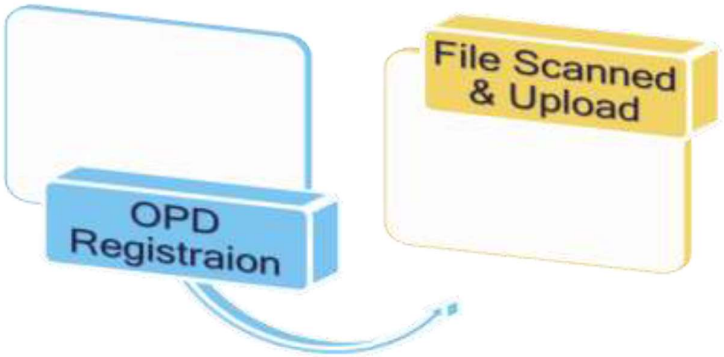
CNCI, being one of the regional cancer centres of Eastern India, the number of cancer patients visiting the hospital is increasing each day which has a proportional effect on the number of records stored in the Medical Record Department. Also, CNCI receives frequent requests for medical records from various researchers working in the field of cancer research in this institute. Moreover, medical records of cancer patients are unique in nature as compared to medical records of the patients of general hospitals, due to the fact that the history of previous treatments are very useful at the time of subsequent follow-ups or in case of second line treatment for recurrence of cancers and occurrence of cancer in any other primary site, which may occur due to curative treatment of the patient's previous cancer. The medical records of the patients are required to be kept till the natural death, or death due to cancer of the patients. Moreover, even after the death of the patients, records are required for the research purposes. On the contrary, most of the medical records of the patients of general hospitals are required to be kept for few days or months. Only thus, in view of treatment and cancer research, it is necessary to computerize the medical records of cancer patients. Meticulous medical record keeping directly helps in bio-statistics of National Cancer Registration not only in India but also in the world.

OBJECTIVE

1. To assess the current status of the existing facilities with respect to infrastructure components such as scan, upload, structural ability, functional work areas etc.
2. To maintain the medical records of the patients who come for their treatments to the hospital of this institute.
3. To do a Gap Analysis based on the assessment findings.
4. To provide medical records of the patients to the departments related to patients' services and research.
5. It is an official record which digitalizes the health information for improving efficiency, quality of care and it definitely reduces the costs.
6. Understanding patient perspectives for patient centred facilities through a User Perspective Study compromising of both inpatient and outpatient respondents.
7. Consultation with key clinical and support staff to understand provider perspectives on infrastructure requirements for safe and efficient functioning.
8. Enhance public service and cut down on time lags due to want of physical documents and ensure better security and confidentiality of documents.
9. Documenting all information helps mitigate the risk of malpractice. A record that has been well-maintained will be able to reduce liability concerns if a file claim is made from patient' family.

Brief description of the work done related to the patient-services provided by the Medical Records Unit during the year (from 1st April 2021 to 31st March 2022) are as follows:-

- CNCI has procured and implemented Hospital Information Management System (HIMS) for maintaining the electronic medical record for clinical and research purpose. This software provides the ability to manage all the paperwork in one place, reducing the work of staff in arranging and analyzing the paperwork of the patients.

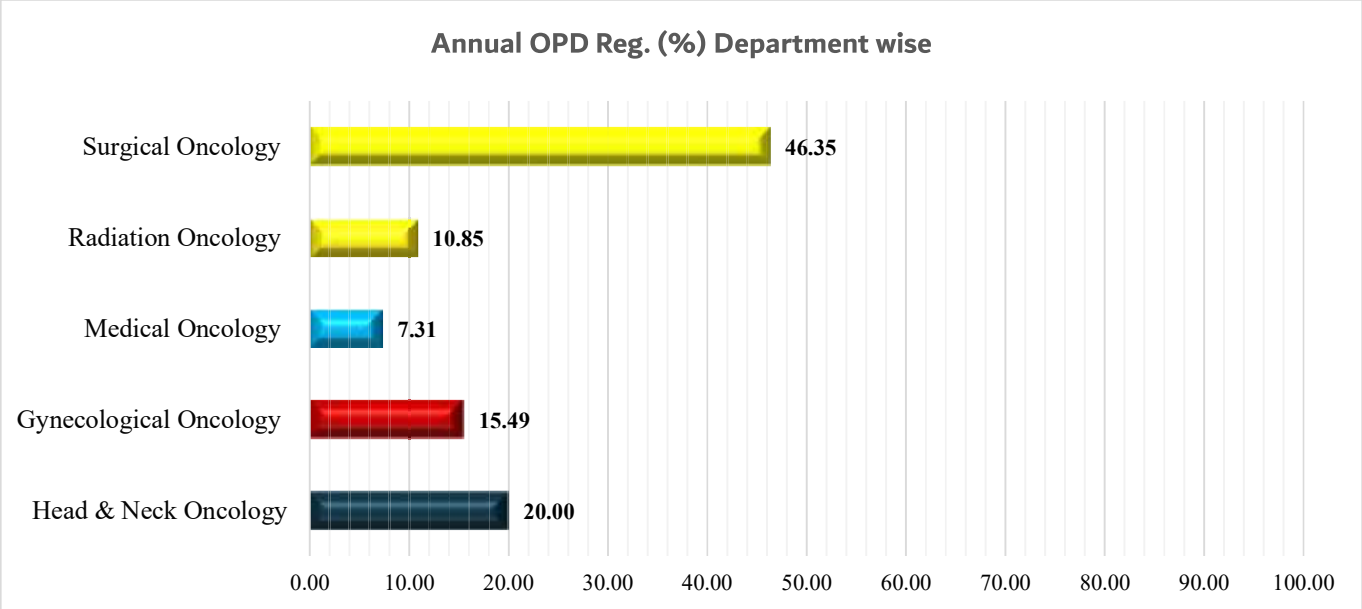


- **OPD REGISTRATION**

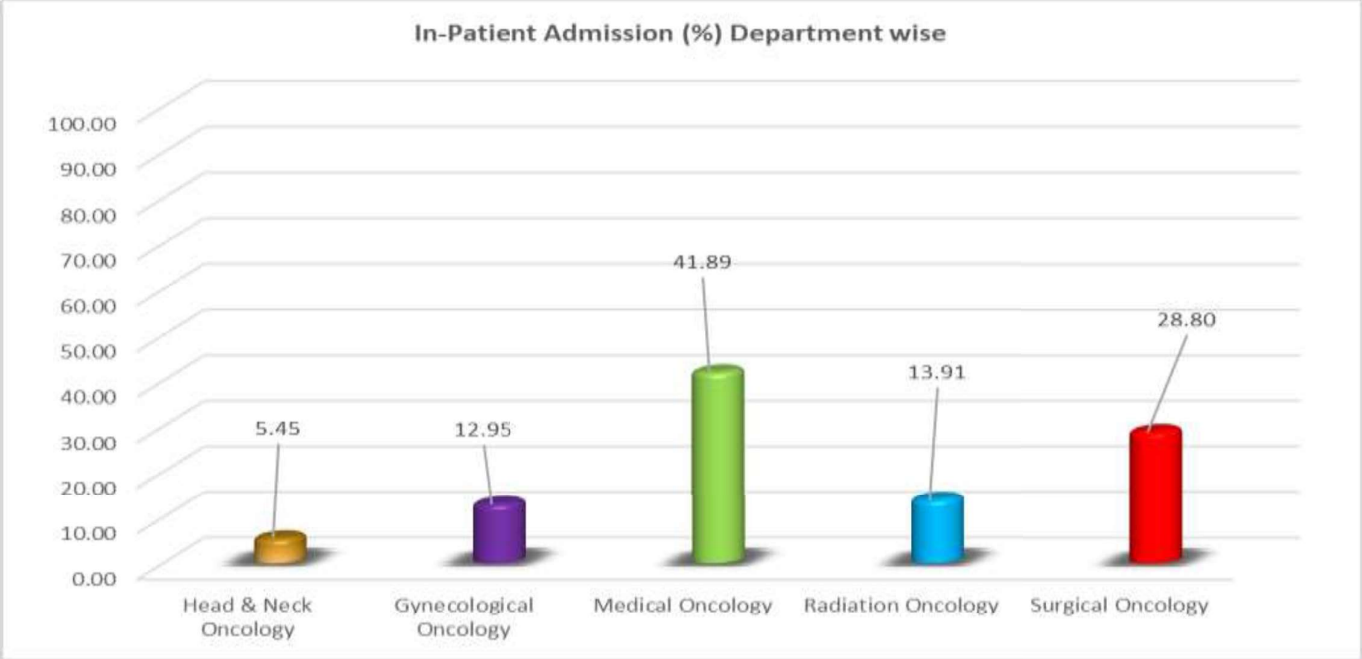
Total **7610** nos. of new cancer patients registered and **51103** nos. old patients Follow up for treatment during April 2021 to March 2022.

New OPD Nos. and Percentage are as follows:

Gynecological Oncology	Head & Neck Oncology	Medical Oncology	Radiation Oncology	Surgical Oncology
1179	**1522**	**556**	**826**	**3527**

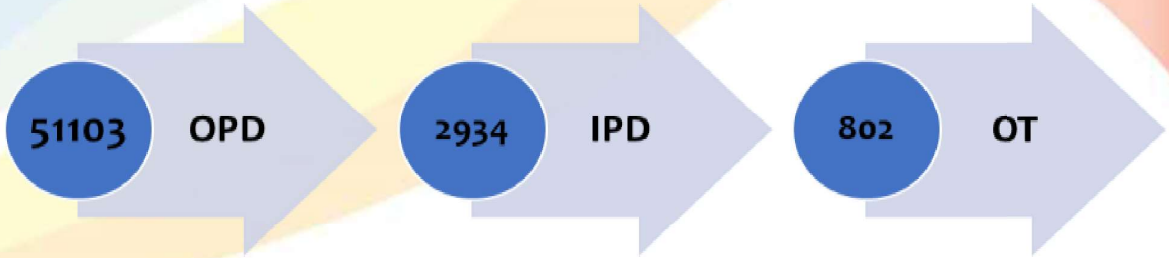


IN-PATIENT ADMISSION



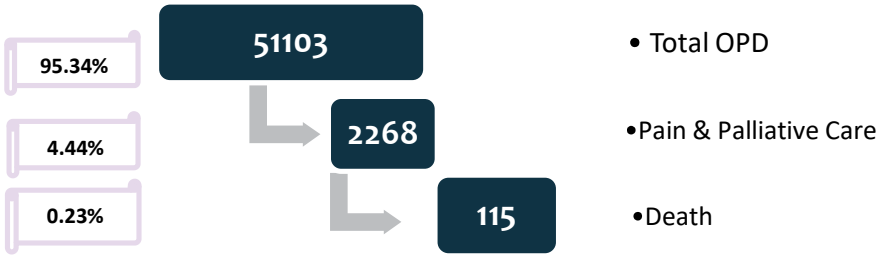
- Digitization of in-patient medical records of hospital was started from 2012 for easy retrieval of records. Over one lakh of case records of patients has been scanned for future reference. Total **2934** number of cancer patients admitted for treatment in Hazra campus during 2021-2022**.**

OT AGAINST OPD & IPD



DEATH AGAINST OPD & Pain & Palliative Care.

Also, the data of OPD registration and consultancy, Pain & Palliative Care against death numerical figure and percentage (%) are



DEPARTMENT OF DIETETICS

Head of the department: Ms. Paromita Das Dutta, Dietitian, RD., M.Sc.; PG Dip. Diet.

Objectives of the department:

Diet Therapy has an immense evidenced role in treatment as well as prevention of Cancer. The Department of Dietetics was started to make Diet Therapy an integral part of Treatment in this hospital. This Dept. is run singlehandedly by Ms. Paromita Das Dutta, Dietitian, since its inception in 1997 at CNCI (Hazra Campus). Ms. Debolina Banerjee has joined as Junior Dietitian (Contractual) at CNCI (New Town Campus) since July, 2022.

The Department plans diets for patients, educates people about eating healthy foods, supervises food preparation and service to inpatients of CNCI (H). Ms. Soumita Bandhopadhyay has joined as Service dietitian on behalf of Diet suppliers at CNCI (New Town Campus) since January, 2022.

At present 11 types **of diet are supplied to the patients to cater to the different requirements. The details are as follows:-**

Sl. No.	Type of Diet	Energy (Kcal)	Carbohydrate (Gm)	Protein (Gm)	Fat (Gm)
1	Normal Non- vegetarian	2472	409	88	49
2	Normal vegetarian	2357	412	67	44
3	Diabetic Non- vegetarian	1882	269	90	47
4	Diabetic vegetarian	1727	266	56	46
5	Normal Liquid	1858	242	72	62
6	Normal High Protein Non-vegetarian	2629	433	105	48
7	Normal High Protein vegetarian	2510	436	72	48
8	Liquid High Protein	2050	278	78	62
9	Liquid Diabetic	1423	144	71	59
10	Pediatric Diet	2125	314	71	62
11	Pre-op/ light diet	1925	333	64	34

Apart from the above 11 types of diet supplied from hospital scale, special therapeutic dietsare planned for patients with special dietary needs. Soft and bland diets are the normal diets with different food consistency.

Special Food is arranged for all festivals for the indoor patients admitted in CNCI (in addition to the usual food supplied)

Brief description of the work done during the year **(from 1st April 2021 to 31st March 2022):**

Management Activities

- meal planning
- training new workers
- Supervising workers to plan, prepare and serve meals
- Inspection of the prepared meals
- Assessment of meals in terms of quality and quantity
- Inspection of Kitchen (outside Hospital Premises) at regular intervals
- Regular visits to CNCI 2nd Campus (New Town) to set up the dietary department there

Administrative Activities

- Special initiative was taken to serve food separately packaged in disposable containers to be supplied in the isolation ward keeping in mind the Covid Pandemic situation.
- Special arrangement of food, so that patients can be supplied food in aseptic condition keeping in mind the Covid Pandemic situation.
- Preparation of Tender Papers for CNCI 2nd Campus(New Town).
- Convener of Diet Committee.
- Maintaining records and preparation of reports and everything pertaining to patients' diet.
- Checking safety and cleanliness rules are being strictly followed.
- Checking, verification and certifying Monthly Diet Bills.

Clinical Activities

- Providing foods that provide the correct nutrients for patients, in close coordination with doctors and health care workers.
- Based on patients' health and nutritional information, developing diets.
- Changing the diet according to the patients' need.
- Doing Nutritional Assessment, Nutrition Prescriptions, daily Ward Rounds and OPD clinics.
- Approximately 200 new cases were screened and nutritional assessment done per month.
- Issuing Home Diet Charts to discharged patients and preparing Special Therapeutic Diet Charts.

Other Recent Activities

Paromita Das Dutta:

She is the founder Secretary of a voluntary nonprofit professional association "Society for Nutrition & Dietetics" founded in 2012. She is the Honorary Secretary of International College of Nutrition, Calcutta Chapter, a voluntary nonprofit professional association since 2008.

She has delivered lectures and radio talks on various occasions at different forums. She is a regular speaker for different electronic media on nutrition and health related issues. She has been registered as a Reviewer of "Food & Nutrition Research", a peer-reviewed journal that presents the latest scientific research in various fields focusing on human nutrition. The journal publishes both quantitative and qualitative research papers.

She is a regular Guest Faculty for P.G. Diploma in Dietetics and Master Degree Courses at All India Institute of Hygiene and Public Health under West Bengal University of Health Sciences and PG Diploma Course in Gerontology & Age Management recognized by University of Calcutta. She acts as the External Examiner of P.G. Diploma in Dietetics and Master Degree Courses under West Bengal University of Health Sciences. She is Member, Board of Studies, Sister Nivedita University.

She is an avid Rotarian since 2016 and is currently holding the position of Chair, Service Projects(Medical) in Rotary Club of Calcutta Jadavpur. She is the proud recipient of Prestigious "Manyata" Award of Rotary District 3291.

Started imparting internship training to would be Clinical dietitians regularly. This is mandatory requirement for students of Nutrition and Dietetics who wish to pursue the field of Clinical Dietetics. Till March 2022 11students have been trained successfully.

RESEARCH WING

DEPARTMENT OF ANTI –CANCER DRUG DEVELOPMENT & CHEMOTHERAPY

Head of the department: Dr. Rathindranath Baral, Ph.D.

Team

Name:	**Designation:**
Faculty with educational qualification	
Dr. Supratim Ghosh (Ph.D.)	Senior Scientific Officer (Gr. II)
Scholars	
Ms. Oyendrila Ghosh	CSIR-Senior Research Fellow
Mr. Sougata Mondal	CSIR-Junior Research Fellow
Ms. Bidisha Maiti	UGC-Junior Research Fellow

Objectives of the department:

As mentioned in the previous year report, our current research interest is focused on the natural product based chemotherapeutics for advanced cancer treatment. Alongside, we are also expanding our research towards the field of radiation therapy.

In ancient Ayurveda, metal-based compounds were widely used in the treatment of various diseases including arthritis, leishmaniasis, syphilis as well as malignant tumors. However, the lack of clear distinction between their therapeutic and toxic doses was a major challenge for the wide-spread use of these compounds /complexes. With the discovery of cisplatin by Barnett Rosenberg in 1960s, a milestone in the history of metal-based drug was established.

As we mentioned in the previous year's report, we are developing a mercury based organo-metallic complex for the treatment of acute leukemia and a vanadium-based complex for the treatment of epithelial malignancies. **An Indian patent for the mercury-based complex is filed (Apllication No. 201931006856; Feb, 2020).** The biophysical characterizations including *in silico* studies, along with *in vitro* investigation of anti-cancer activity of the above-mentioned complexes are under progress. We are also started exploring the field of aptamer based targeted drug delivery for hepatocellular carcinoma. Details are mentioned below.

Brief description of the work done during the year (from 1st April 2021 to 31st March 2022):

- Development of mercury based organo-metallic complex for acute leukemia treatment

Name of researchers: Dr. Supratim Ghosh and Mr. Sougata Mondal

Since 2019, our primary research focus is to develop natural product based organo-metallic complexes for advanced cancer therapy. The efficient outcomes of the divalent metal ions (Hg^{2+}, Cu^{2+}), evidently reported their beneficial role in bone marrow differentiation. In further development, we have synthesized an organo-metallic complex by conjugating mercury with curcumin molecule for acute leukemia treatment. The molecular weight of the synthesized complex is ~627 Da, while the mercury content is~24% (w/w). Therefore, mercury exposure should be within the range of WHO guideline (25.0 µg/Kg body weight per day), if the complex is applied, up-to 80.0µg/kg body weight per day. Current therapeutics for acute leukemia are mostly cytotoxic analogues of nucleoside/s causing severe hepatocellular, cerebellar and haematopoietic toxicity in the long run. In contrast, controlled cytotoxic activity of our synthesized complex should reduce the immature blast count in the short term and its divalent metal ion, mercury should induce bone marrow differentiation for the long run.

In the previous year report, we have described synthesis and biophysical characterization (UV-Visible, Fluorescence and NMR spectroscopy) of mercury (Hg) based organo-metallic complex. Further, the complex was characterized using HPLC, AAS, and FT-IR Spectroscopy. The metal content of the synthesized complex was determined by AAS in flame mode. Calculated mercury content of our complex was ~ 24% (w/w). FTIR spectroscopy [**Figure 1.i**] suggested inclusion of a new hydroxyl group in the complex. Complex formation also caused variable stretching vibrations of aromatic C-C, comparing to that of curcumin. A new distinct band around 1600 cm^{-1} also suggested change in C=C and C=O stretching vibration due to mercury binding to curcumin. HPLC analysis concluded that mercury ion complexed to the curcumin without degrading its structure. *In silico* study was carried out with the DFT calculation and HOMO-LUMO energy gap [**Figure 1.ii**] is optimized with the help of G09 program to study the charge transfer possibility within the complex. Cell viability assay demonstrated preferential cytotoxic activity of the mercury complex against AAL cells (MOLT-4) as well as AML cells (HL-60), comparing to non-cancerous epithelial cells (HEK-293). The IC_{50} value of the complex on HEK-293 is ~25 µM which is higher than IC_{50} values on MOLT-4 (~10 µM) and HL-60 (~16 µM). Therefore, the complex showed preferential cytotoxicity on leukemia cell, comparing to normal epithelial cells. Mode of cell death (apoptosis) was investigated by FACS analysis with Annexin-V and PI staining. Potential mechanism of action of our complex was investigated by cell cycle analysis; results suggested that the complex can arrest the cell cycle at the 'S' phase [**Figure 1.iii**]. Mitochondrial membrane potential assay by FACS suggested that apoptosis was induced by mitochondrial intrinsic pathway [**Figure 1.iv**].

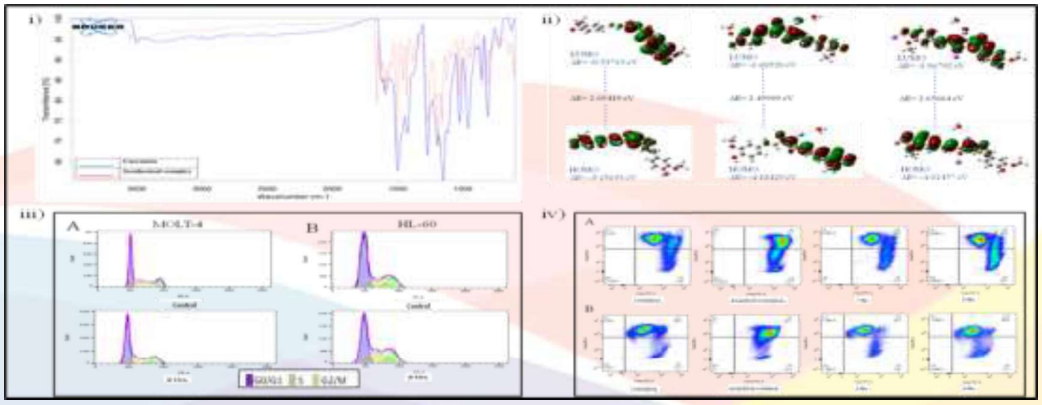


Figure 1:i) FT-IR spectrum of curcumin and synthesized complex. **ii)** HOMO-LUMO energy gap of Curcumin (**A**), Curcumin-Hg intermediate

complex (**B**), final synthesized complex (**C**). **iii)** Cell cycle analysis of MOLT-4 (**A**) and HL-60 (**B**) by FACS. **iv)** Effect of synthesized complex on mitochondrial membrane potential. MOLT-4 (**A**) and HL-60 (**B**) cells.

➢ Development of vanadium based organo-metallic complex for enhanced radiation therapy

Name of researchers : Dr. Supratim Ghosh and Ms. Oyendrila Ghosh

In a separate project, we are trying to develop organo-metallic complex/es as radiation sensitizer / enhancer. As the first candidate we have synthesized a vanadium containing complex. Presently we are in the process of its biophysical characterization and evaluation of anti-cancer activity, *in vitro* on human squamous carcinoma cell line, FaDu. The complex demonstrated notable anti-proliferative activity in a dose dependent manner, and calculated IC_{50} was ~11.16 µM [**Figure 2.i**]. The fluorescence microscopic images also visually confirmed cytotoxic effect of our complex [**Figure 2.ii].** Mode of cell death was analyzed using FACS and data suggested that the cell population started shifting towards early as well as late apoptosis. Effect of complex treatment on cell cycle progression was analyzed by FACS, results demonstrated that the complex could arrest the cell cycle at 'G2/M' phase.

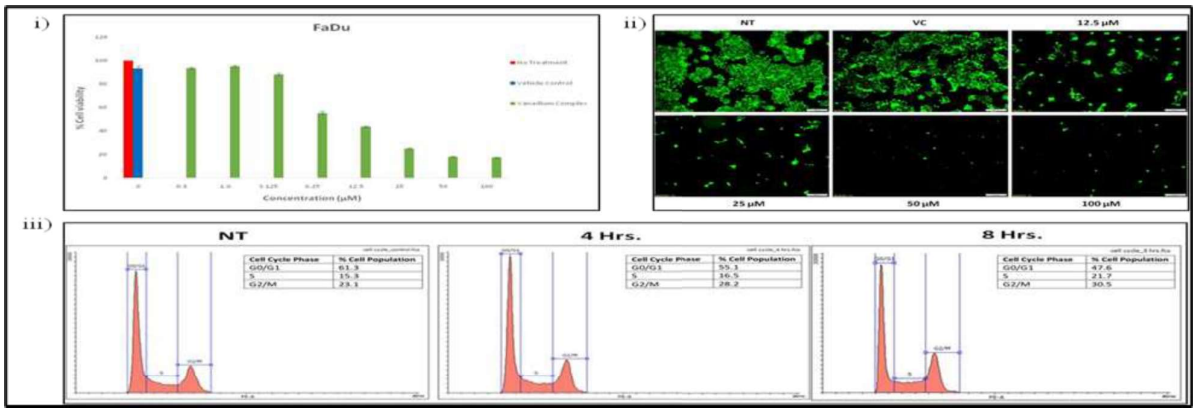


Figure 2: i) MTT assay demonstrated dose-dependent cytotoxicity on FaDu cells. **ii)** Fluorescence microscopic images also confirmed dose dependent cytotoxic effects of thecomplex. **iii)** Cell cycle analysis of FaDu cells by FACS with Propidium Iodide (PI) staining.

➢ Development of aptamer based targeted therapy for hepatocellular carcinoma

Name of researchers : Dr. Supratim Ghosh and Ms. Bidisha Maiti

In another project, we are trying to develop an aptamer based targeted therapeutics against hepatocellular carcinoma (HCC). Recently, a HCC-specific aptamer (TLS11a) was reported by other research group that could selectively target mouse and human hepatocellular carcinoma *in vitro.* Based on this, we are trying to develop a targeted therapy for liver cancer by adding a short tail of 5FU (5 fluorouracil) with the TLS11a, followed by complex formation with mercury. Initially we have started our project by modifying the aptamer with short thymine chain at the 5' end (TLS11a-T_{10}) to fulfill our two primary objectives; successful formation of the Hg^{2+}-TLS11a complex and determining binding specificity of this modified sequence *invitro*. Alongside, we designed another negative control sequence [**Figure 3.i**]. The Hg^{2+}-TLS11acomplexes were developed by incubating sequences with mercuric chloride solution in water for overnight. A hypochromic shift was observed in UV-visible spectrum, indicating successful complexation.In CD spectroscopy, bathochromic shift of the maximal positive ellipticity (291→300) for TLS11a-T_{10} indicated Hg^{2+} mediated interstrand crosslinking [**Figure 3.ii]**. Binding specificity of both sequences were investigated using confocal microscopy as well as FACS analysis. Confocal images [**Figure 3.iii**] showed a higher binding tendency of control sequence-T_{10} than TLS11a-T_{10} whereas FACS data [**Figure 3.iv**] showed higher binding affinity of TLS11a-T_{10} than the control sequence.

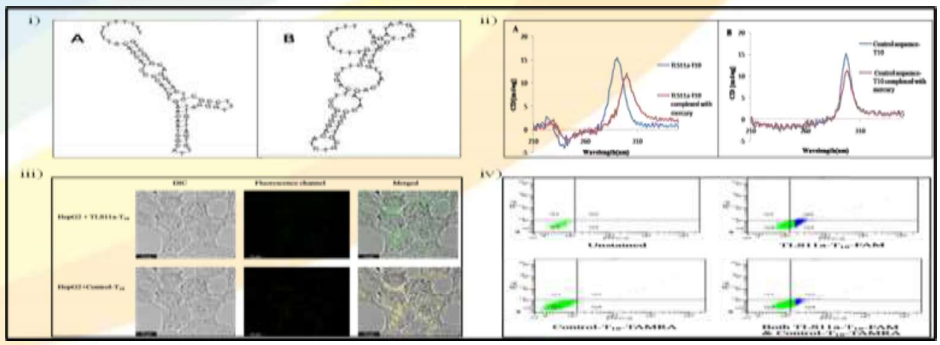


Figure 3:i) Secondary structure of **A)** TLS11a and **B)** negative control sequence. **ii)** CD spectra demonstrate Hg^{2+} induced structural changes to **A)** TLS11a-T_{10} &**B)** control **–**T_{10}. **iii)** Confocal images of HepG2 upon treatment with 6-FAM tagged TLS11a-T_{10} and 6-TAMRA tagged control-T_{10} sequence. **iv)** FACS analysis of HepG2 cells with aptamers. In all cases X axis represents 6-FAM fluorescence and Y axis represents 6-TAMRA fluorescence.

Utilizing our available resources and equipment from other institutions, we completed synthesis of the complexes and progressing towards the biophysical characterizations and *in vitro* activity analysis. For near future, we are planned to complete the biophysical characterization as well as in vitro activity analysis and evaluate their activity *in vivo*. In addition to the above-mentioned works, we are also trying to synthesize other organo-metallic complexes with different transition metals, having anti-proliferative as well as radiation sensitizing capability. We are expecting that the organic parts will provide anti-proliferative activity and sensitize the malignant cells towards radiation, while metallic parts will enhance the ROS production significantly. Moreover, these organic moieties will also elevate the immune system for long-term disease-free survival.

Projects running (Extramural) – Name of the P.I. → Project Title → Funding agency

P.I. : Dr. Supratim Ghosh

Title: "Development of a novel mercury based organo-metallic complex for acute leukemia treatment.**"**

Funding Agency: Indian Council of Medical Research (Govt. of India)

Projects running (Internal) – Name of the P.I. → Project Title

P.I. : Dr. Supratim Ghosh

Projects:

1. "Development of a novel radiation sensitizer cum enhancer for localized cancer treatment."
2. "Development of aptamer based targeted therapy for hepatocellular carcinoma."

Students' Projects running – Name of the Student → Project Title → Funding agency

Student: Ms. Upasana Das

Title: "Development of a novel class of multi-modality nano-conjugate for advanced cancer therapy."

Funding Agency: Indian Council of Medical Research (Govt. of India)

Publications / Monographs / Patents etc. (*please mention international and national publications separately*):

Nil

Other academic activities

i) Paper presented: Mr. Sougata Mondal presented a poster on "Development of a novel mercury based organo-metallic complex for acute leukemia treatment" in "National Science Day", 28th February, 2022, at Chittaranjan National Cancer Institute.

ii) PhD awarded: **Ms. Upasana Das** was awarded PhD (Science) degree in the year 2022 from the University of Calcutta for her thesis entitled "Development of an Advanced Class of Therapeutics for Progressive Cancer Treatment" under the supervision of Dr. Supratim Ghosh.

iii) Students undergoing PhD:

Ms. Oyendrila Ghosh (CSIR-SRF), Mr. Sougata Mondal (CSIR-JRF), Ms. Bidisha Maiti (UGC-JRF)
iv) Other awards or special achievements: **Nil**
v) Conference / Symposium / Workshop (*International / National*) attended: **Nil**
vi) Interesting observations, if any: **Nil**
vii) Training Program:

Summer Intern Training

1. Ms. Sumita Panda
   Student of M.Sc. in Biotechnology
   Pondicherry University

Project Title: "A comparative study demonstrating cytotoxic activity of cytarabine and a novel organo-metallic complex on leukemia and normal epithelial cells". (August, 2021 - September, 2021)

DEPARTMENT OF CANCER CHEMOPREVENTION

Head of the Department: Dr. Prosenjit Saha, M.Sc., Ph.D

Team

Faculty	
Dr. Subhadip Hajra, M.Sc. Ph.D	Senior Scientific Officer Grade-II
Post-Doctoral Fellow	
Dr. Arijit Bhowmik	SERB- Research Associate
Research Scholars	
Ms. Pritha Choudhury	SRF
Mr. Souradeep Biswas	ICMR-SRF
Ms. Rituparna Ghosh	ICMR-SRF
Ms. Priya Samanta	CSIR-JRF
Ms. Rupali Sarkar	SERB-PA-I
Ms. Shampa Pakhira	CNCI-JRF
Ms. Mrinmoyee Mondal	CNCI-JRF

Objectives of the Department: The long-term objective of our department is to prevent the cancer incidence in our society by using therapeutic procedures which are targeted and with low side effects, like natural compounds, present in our foods/beverage or in medicinal plants/ immunotherapeutic tools. These types of studies enable us to discover more effective strategies for cancer prevention and therapy to reduce drug resistance and recurrence as well as to improve survivability and quality of life. This Department also involved in public awareness program for campaigning the myth and truth about CANCER.

Brief description of the work done during the year (2021-22)

Project 1: Role of Eugenol in Modification of Cancer Stem Cells in-vivo:

In this study, the candidate established the anticancer property of "eugenol", the most active component of clove. This study elucidated the chemopreventive and therapeutic potential of eugenol against lung and breast cancer models *in vivo*. At first, we established the gradual progression of lung carcinogenesis induced by commercially available tobacco related carcinogen NDEA (N-nitrosodiethly amine) to mimic the effect of lung cancer due to chronic exposure of smoking. We

focused to establish the potential anti-CSC (Cancer Stem Cell) property of eugenol. Mechanistic study revealed that established a novel target molecule of eugenol i.e. β-catenin, where this molecule acts as a central regulator of CSC markers of CD44, Oct4, EpCAM and Notch1. Eugenol by modulating the signature phosphorylation pattern of β-catenin causing its degradation. That ultimately resulted in significant suppression of CSCs, the root cause of all the virulence of cancers, hence increased host survival. Thus, we established a novel CSC regulatory target of eugenol and its associated mechanistic strategy against lung and breast cancer. It holds the potential to get a longer survival of patients and their improved quality of life.

Project 2: Chemotherapeutic efficacy of Rutin during metastasis by targeting EMT and Anoikis:

Rutin is flavonoid mostly derived from Olive, Capers plant etc. Many previous studies shown that Rutin have anticancer effects over breast cancer cells. We are trying to use this beneficial role of Rutin to prevent EMT (Epithelial to mesenchymal transition) and subsequently Anoikis resistance in Breast cancer. Induction of EMT in breast cancer significantly increases their migration and invasion property by upregulating several transcription factors like, SNAIL, SLUG, TWIST. Our finding suggests that Rutin can inhibit this EMT process by inhibiting these transcription factors proved by western blot analysis. Also, reduction of E-cadherin, a surface marker for epithelial cells and upregulation of N-cadherin which promote the cell achieve a mesenchymal phenotype is a characteristic phenomenon in EMT process. Flow cytometric analysis show that Rutin effectively downregulate N-cadherin and alternatively increase E-cadherin in these EMT induced Breast cancer cell line.

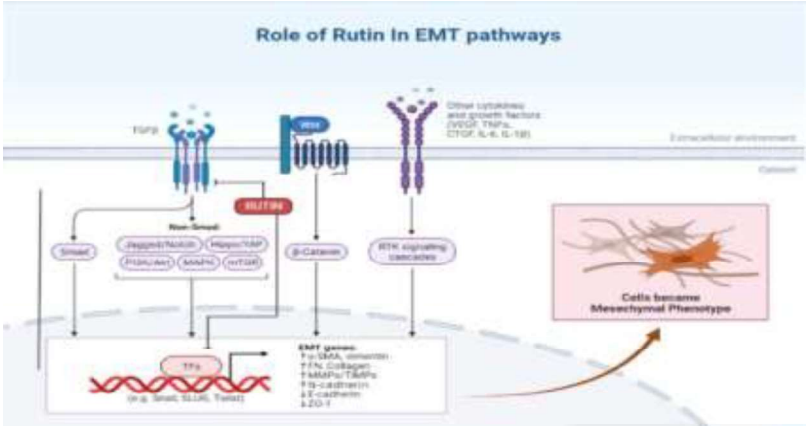


Fig. 1: Role of Rutin in EMT pathways by inhibiting TGFβ signaling and downstream Transcription factors (i.e., Snail, SLUG, Twist) which promotes EMT.

Project 3: Preventive and therapeutic efficacy of crude extract of tulsi leaf (Ocimum sanctum) and its purified compound orientin against colon carcinoma

Orientin is a natural flavonoid found in many plants like Tulsi or Holy basil (*Ocimumsanctum*). In this present study we found that orientin is able to reduce the effective dose of 5Flurouracil (5FU) when used in combination therapy. 5FU is well-known inducer of angiogenesis and cancer stem cell (CSCs) proliferation by activating HIF1α. In silico studies predicted that orientin form stable conformation with HIF1α. Western blot and flow cytometric analysis proved that combination therapy can reduce CSC markers like CD44, CD133, Nanog, Oct4 and Sox2. Orienin also inhibits angiogenesis by reducing VEGF. Orientin and 5FU in combination inhibits CT26 induced colorectal tumor growth in BALB/c mice. Immunofluorescence study showed that orientin inhibits angiogenesis by reducing expression of HIF1α and VEGF *in vivo*. Moreover, the concurrent administration of orientin provided additional survival advantages by attenuating the toxicity induced by 5FU to host organs. Hence, it would be beneficial to study the effects of orientin implementation in 5FU-treated cancer patients, in the hope of augmenting its efficacy and reducing toxicities towards host cells.

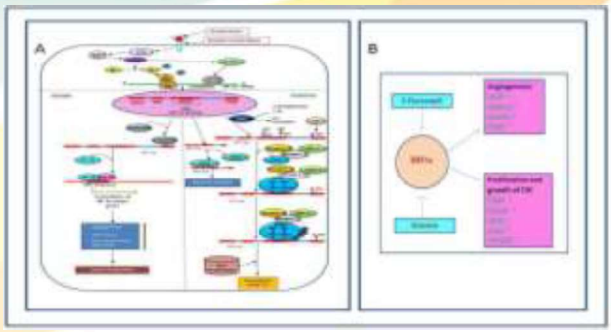


Fig. 2: A. Regulation of HIF1α in hypoxic and normoxic condition. B. Regulation of protein involved in angiogenesis and growth and proliferation of CSCs by HIF1α

Project 4: Evaluation of therapeutic and chemoprotective efficacy of indole based small molecule 3,3′-diindolylmethane (DIM) against triple negative breast cancer

Natural compounds present in daily dietary foods play a crucial role in the development of novel drug leads for the treatment and prevention of diseases including cancer. One of the key constituents of Brassica vegetables is 3,3'-diindolylmethane (DIM), which occurs naturally as glucosinolate conjugates, and are released upon hydrolysis of Indole-3-Carbinol (I3C). A number of preclinical studies have shown that DIM can prevent carcinogenesis in multiple target organs such as mammary tissue, liver, endometrium, lungs and colon. On the basis of above background, the present study was undertaken to evaluate the therapeutic efficacy of standard chemotherapeutic drug doxorubicin (DOX) by the concurrent use of indole based natural compound 3,3'-diindolylmethane (DIM) against triple negative breast cancer. From experimental study it is showed that co-delivery of DIM and DOX arrests cell cycle of breast cancer cell 4T1 at G2/M phase. Furthermore, ICC, western blot and FACs analysis have shown that expression of p53, p21 and p16 get upregulated whereas Cyclin B and CDK1 get inhibited as a result of DIM, DOX co-treatment. Additionally, after blocking cell cycle, DIM and DOX co-treatment mediates apoptosis of cancer cells. FACS analysis by Annexin v/PI and western blot analysis revealed that DIM-DOX conjugation treatment increases the expression of proapoptotic protein Bax, Caspase 3, Caspase 9, Apaf-1 and decreases anti apoptotic protein Bcl2, Bcl-Xl etc. It also stimulates intrinsic apoptotic pathway by promoting cytochrome C release from mitochondria.

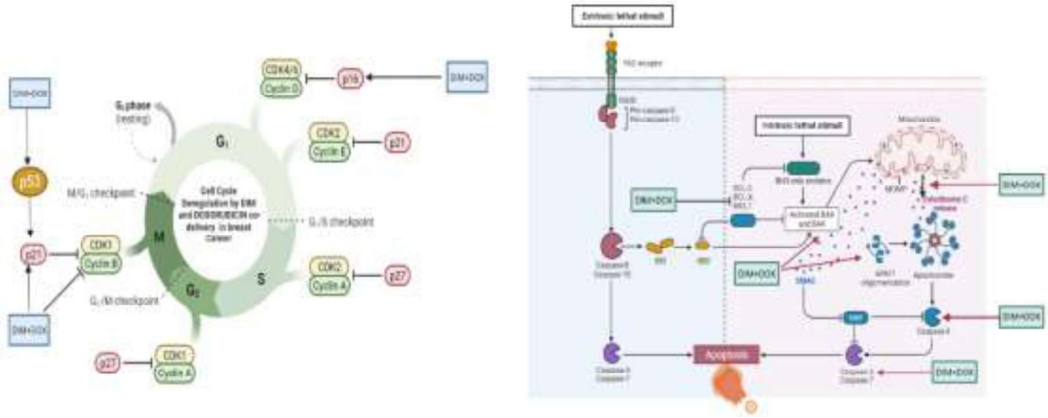
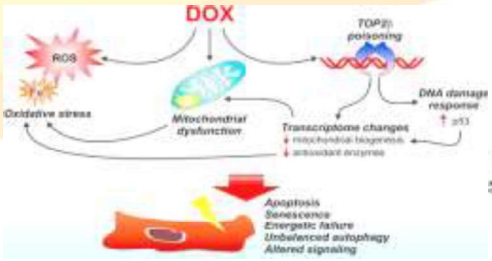


Fig. 3: Schematic representation of cell cycle analysis and regulation by DIM and DOX combination therapy.

Project 5:Regulation of crosstalk between EMT pathways and pathways maintaining anoikis resistant CSCs in triple negative breast cancer by exosome mediated co-delivery of 3,3'-diindolylmethane (DIM) and doxorubicin (DOX)

The work deciphered *in vitro* and *in vivo* proof of oncogenic progression due to DOX resistance. The novel approach of combating DOX resistance of triple negative breast cancer cells by DIM is adding further significance to this study. Apart from these, exosomal nanoparticle mediated efficient co-delivery of DOX and DIM to the triple negative breast cancer cells may open up new avenue in the field of DOX related toxicity reduction and efficacy induction for effectual anticancer therapy. From the curent data generated in last one year we can observe : (1) In lower dose, combinatorial treatment of DIM and DOX is much effective than individual treatment of the same and exerts effects like cell cycle arrest (within 4 hrs of treatment) and apoptosis

(within 24 hrs of treatment) ; (2) In case of spheroid culture, DIM and DOX combinational treatment not only decreases the size compared to the control, only DIM and only DOX treated group but also reduced the numbers. Expression of SNAIL as a marker of EMT/anoikis and cancer stemness is observed in spheres which is highly comparable with the in silico data stating high expression of SNAIL in TNBC patients as well ; (3) eGFP expressing stable syngeneic TNBC cells were injected in Balb/C mice and prominent metastatic progression is observed by whole body imaging and histology of body parts with distant localization of cancer cells. (4) To co-deliver both DIM and DOX efficiently, exosomes sheathed mesoporous nanoparticles were generated and characterized by immunocytochemistry using CD63 antibody as exosome marker, and also by SEM as well as LS spectroscopy. Further effect of these nanoparticles on TNBC will be deciphered in the coming year.



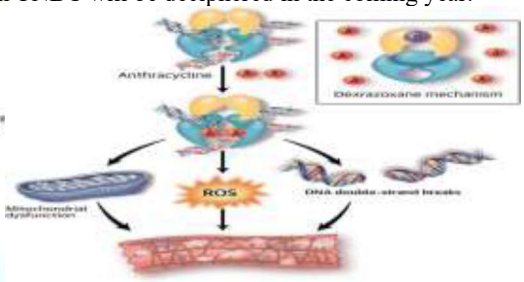


Fig: Schematic representation of cell cycle analysis and regulation by DIM and DOX combination therapy.

Fig: Schematic representation of cell cycle analysis and regulation by DIM and DOX combination therapy.

Figure: Role of Doxorubicin in apoptosis induction and ROS production

Project 6: Regulation of oncogenic hallmarks of KRAS mutated colorectal cancer cells by co-treatment of 3, 3'-diindolylmethane and 5-fluorouracil

The effect of co-treatment by 3, 3'-diindolylmethane and 5-fluorouracil is studied on human KRAS mutated colon cancer cell line HCT116.For preliminary research work; we determined IC50 value of DIM and 5FU through MTT Assay. IC25 doses for both DIM and 5FU are used in combination therapy whereas 5FU monotherapy group is treated with IC50 dose. In combinational therapy presence of DIM with 5FU significantly induces apoptosis rather than 5FU monotherapy. Thus these findings suggest that combination therapy is more efficient rather than 5FU monotherapy and confer less toxicity to patients. In the basis of preliminary data it is expected that this combinational therapy going to be a fruitful therapeutic approach for KRAS mutated colon cancer patients.

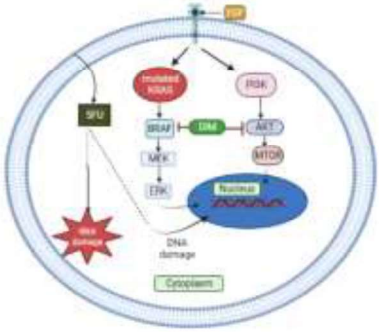


Fig.4 : Regulation of oncogenic hallmarks of KRAS mutated colorectal cancer

Project 7: Regulation of nutrient transporters in cancer cells by polyphenolic phytochemical

Nutrient transporters are transmembrane proteins that transport amino acid, glucose, micronutrients etc. Amino acids are important signaling molecules for regulation of metabolic pathways, regulation of protein translation, control of autophagy, initiation of defense against reactive oxygen species in cancer cells. Evaluation of the role of nutrient transporters, specifically amino acid transporters like Lat1. LAT1 (SLC7A5) is a sodium and pH-independent transmembrane transporter that forms a heterodimeric complex with the glycoprotein 4F2hc (CD98, SLC3A2) to import large and neutral amino acids (e.g., leucine, phenylalanine) in exchange for intracellular amino acids (e.g., glutamine). Rutin or rutoside (quercetin-3-O-rutinoside) is classified as a polyphenolic flavanoid. It is abundantly found in many plants and food products of plant origin like passion flower, buckwheat, tea, and apple . LAT1 is sensitive to BCH and JPH203, the specific inhibitor of this amino acid transporter. Here, we target Rutin and the inhibitors to show that if it can restrict cancer cell growth which in turn cause cancer progression.

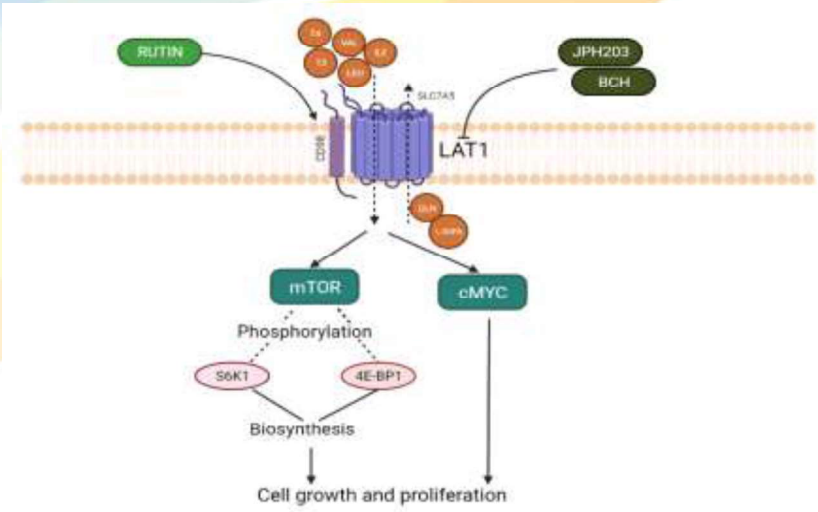


Fig.5: Regulation of nutrient transporters in cancer cells by polyphenolic phytochemical rutin

Projects running (Extramural) –

- P.I.: Dr. Prosenjit Saha
  Project Title: Exosome mediated co-delivery of natural flavonoid Orientin and 5-Fluorouracil for targeting colorectal cancer stem cells involved in angiogenic progression.
  Funding agency: **SERB**
- P.I.: Dr. Subhadip Hajra
  Project Title: Regulation of crosstalk between EMT pathways and pathways maintaining noikis resistant CSCs in triple negative breast cancer by exosome mediated co-delivery of 3,3'-diindolylmethane (DIM) and doxorubicin (DOX).
  Funding agency: **SERB.**
- P.I.: Dr. Prosenjit Saha
  Project title: Evaluation of chemotherapeutic efficacy of rutin during metastasis by targeting EMT and Anoikis.
  Funding agency: **ICMR**
- P.I.: Dr. Prosenjit Saha
  Project title: Inhibition of 5-flurouracil induced cancer stem cells mediated angiogenesis by natural flavonoid orientin in colorectal carcinoma.
  Funding agency:***ICMR***
- P.I.: Dr. Subhadip Hajra
  Project title: Evaluation of therapeutic and chemoprotective efficacy of indole based small molecule 3,3′-diindolylmethane (DIM) against triple negative breast cancer.
  Funding agency:***CSIR***

Projects running (Internal) –

- P.I.: Dr. Prosenjit Saha
  Regulation of nutrient transporters in cancer cells by polyphenolic phytochemical
- P.I.: Dr. Subhadip Hajra
  Project Title: Evaluation of chemopreventive and therapeutic efficacy of naturally occurring phytochemicals by targeting stem cell self-renewal pathways *in vivo* and *in vitro* experimental models.

Publication (Peer reviewed)

1. Bhowmik A, Biswas S, Hajra S, Saha P. 2021. In silico validation of potent phytochemical orientin as inhibitor of SARS-CoV-2 spike and host cell receptor GRP78 binding. Heliyon. 7(1):e05923.
2. Roy R, Mandal S, Chakrabarti J, Saha P, Panda CK. 2021. Downregulation of Hyaluronic acid-CD44 signaling pathway in cervical cancer cell by natural polyphenols Plumbagin, Pongapin and Karanjin. Mol Cell Biochem. 476(10):3701-3709.
3. Choudhury P, Barua A, Roy A, Pattanayak R, Bhattacharyya M, Saha P. 2021. Eugenol emerges as an elixir by targeting β-catenin, the central cancer stem cell regulator in lung carcinogenesis: an *in vivo* and *in vitro* rationale. Food Funct. 12(3):1063-1078.
4. Barua A, Choudhury P, Panda CK, Saha P. 2022. Evaluation of chemopreventive potential of xanthone from Swertia chirata against DMBA/croton oil-induced chemical carcinogenesis in Swiss mice. Current Science. 122(4):429-438.
5. Barua A, Choudhury P, Nag N, Nath A, Kundagrami S, Pal A, Panda CK and Saha P. 2022. Novel Xanthone From Swertia Chirata Exerts Chemotherapeutic Potential Against Colon Carcinoma. Current Science. 122 (1), 10 DOI: 10.18520/cs/v122/i1/47-55.
6. Nandi SK, Roychowdhury T, Chattopadhyay S, Basu S, Chatterjee K, Choudhury P, Banerjee N, Saha P, Mukhopadhyay S, Mukhopadhyay A, Bhattacharya R. 2022. Deregulation of the CD44-NANOG-MDR1 associated chemoresistance pathways of breast cancer stem cells potentiates the anti-cancer effect of Kaempferol in synergism with Verapamil. Toxicol Appl Pharmacol. 18:115887.
7. Ghosh R, Samanta P, Sarkar R, Biswas S, Saha P, Hajra S, Bhowmik A. 2022. Targeting HIF-1? by natural and synthetic compounds: A promising approach for anti-cancer therapeutics development. Molecules. (Accepted)

Other academic activities:

a) Paper presented (Oral/Poster):

1. **Mr. Souradeep Biswas** presented a paper entitled "Evaluation of chemotherapeutic efficacy of Rutin during metastasis by targeting EMT and Anoikis" at Adamas University, Kolkata.
2. **Ms. Rituparna Ghosh** presented a paper entitled "Enhanced efficacy and reduced toxicity of 5-Fluorouracil by synergistic treatment with natural flavonoid Orientin in colon carcinoma" at Adamas University, Kolkata.
3. **Ms. Priya Samanta** presented a paper entitled "Chemopotentiating and chemoprotective role of natural compound 3, 3'diindolylmethane (DIM) during adjuvant therapy with doxorubicin (DOX) in tumor-bearing mice" at Adamas University, Kolkata.
4. **Mr. Souradeep Biswas** presented a paper entitled "Evaluation of chemotherapeutic efficacy of Rutin during metastasis by targeting EMT and Anoikis" at Chittaranjan National Cancer Institute, Kolkata.
5. **Ms. Rituparna Ghosh** presented a paper entitled "Natural compound Orientin attenuated 5-FU induced Cancer Stem Cells growth in colon carcinoma" at Chittaranjan National Cancer Institute, Kolkata.
6. **Ms. Priya Samanta** presented a paper entitled "Small molecule 3,3'diindolylmethane maximizes doxorubicin therapy in triple negative breast cancer at Chittaranjan National Cancer Institute, Kolkata.

b) Ph.D awarded

1. Mr. Atish Barua was awarded Ph.D (Science) degree in the year 2021 from University of Calcutta for his thesis entitled "**Cancer preventive and therapeutic efficacy of Tri-Hydroxy-Methoxy Xanthone isolated from *Swertia chirata***" under the supervision of Dr. Prosenjit Saha.
2. Ms. Pritha Choudhury was awarded Ph.D (Science) degree in the year 2021 from University of Calcutta for his thesis entitled "**Role of eugenol in modification of cancer stem cells in-vivo**" under the supervision of Dr. Prosenjit Saha.

Other awards or special achievements

- **Mr. Souradeep Biswas** presented a paper entitled "Evaluation of chemotherapeutic efficacy of Rutin during metastasis by targeting EMT and Anoikis" and won first prize in a seminar on National Science Day, February, 2022 at Chittaranjan National Cancer Institute, Kolkata.
- **Ms. Rituparna Ghosh** presented a paper entitled "Natural compound Orientin attenuated 5-FU induced Cancer Stem Cells growth in colon carcinoma" and won second prize in a seminar on National Science Day, February, 2022 at Chittaranjan National Cancer Institute, Kolkata.

c) Conference / Symposium / Workshop (*International / National*) attended –

- Ms. Mrinmayee Mondal attended seminar on National Science Day held on 4th February, 2022 at Chittaranjan National Cancer Institute, Kolkata.
- Dr. Prosenjit Saha attended the 41st International Annual Conference of the Indian Association for Cancer Research (IACR-2022) held at Amity University, Uttar Pradesh, Noida.
- Dr. Subhadip Hajra attended the 41st International Annual Conference of the Indian Association for Cancer Research (IACR-2022) held at, Amity University, Uttar Pradesh, Noida.
- Dr. Arijit Bhowmik attended the 41st International Annual Conference of the Indian Association for Cancer Research (IACR-2022) held at Amity University, Uttar Pradesh, Noida.
- Mr. Souradeep Biswas attended the 41st International Annual Conference of the Indian Association for Cancer Research (IACR-2022) held at Amity University, UP, Noida.
- Ms. Rituparna Ghosh attended the 41st International Annual Conference of the Indian Association for Cancer Research (IACR-2022) held at Amity University, UP, Noida.
- Ms. Priya Samanta attended the 41st International Annual Conference of the Indian Association for Cancer Research (IACR-2022) held at Amity University, UP, Noida.
- Ms. Rupali Sarkar attended the 41st International Annual Conference of the Indian Association for Cancer Research (IACR-2022) held at Amity University, UP, Noida.

d) Training Programme: Seven students from different colleges and universities from various parts of India completed their short term projects in this department.

e) Miscellaneous:

- Department organize a one day cancer awareness camp at Udaypur Nagendra Vidyaniketan, Khanakul, Hoogly funded by Science and Engineering Research Board (SERB).
- Dr. Prosenjit Saha acted as a reviewer of extramural projects submitted in SERB.

Dr. Subhadip Hajra has reviewed several research papers for multiple international journals.

DEPARTMENT OF CLINICAL AND TRANSLATIONAL RESEARCH

Head of the Department: Dr. Kalyan Kusum Mukherjee, MBBS, MD, FCCM, ECMO

Team (including permanent employees, other staff members and students)

Faculty with educational qualification	
Ugir Hossain Sk, M. Sc, PhD Senior Scientific Officer	
Other Team Members	
Mr. Subhabrata Dey	Technical Officer, In-Charge - Technical Facility
Mr. Somnath Chakraborty	Clinical Trial Manager & Co-Ordinator
Mrs. Mili Das	Clinical Research Co Ordinator
Students	
Debapriya Roy Mahapatra	CNCI-Junior Research Fellow
Susmita Mondal	CSIR- Junior Research Fellow
Rubi Roy	CSIR- Junior Research Fellow
Tasnim Ria	CNCI-Junior Research Fellow

Objectives of the department: Our objective is to develop highly interdisciplinary research focused on the pre-clinical development of novel organic molecules and therapeutic devices against different types of cancer. The scientists and clinicians are doing research together to synthesized novel molecules and their implications against cancer. We are also focusing to developed nano-size polymeric drug delivery system to enhance the therapeutic efficacy of the existing therapeutic drugs along with repositioning of the clinically relevant non oncogenic drug in cancer. The nanodevices will be based on drug-polymer conjugation with the sustained drug release capacity. Our Objective is to create a pathway which bridge between scientist and clinician to translate basic research outcome to the clinic for the cancer patient health benefit by improving the prognosis rate. The mission of this department is to initiate clinical trials based on the finding on the basic research team. The work will be carried out with biologists and drug discovery scientists for the development of novel targeted cancer therapeutics. Our team is a highly interdisciplinary and efficient researcher consists of organic chemistry and clinician from medical oncology experts.

Ongoing Research work (from Basic research):

Project 1: Synthesis of the novel molecules and their drug delivery system for anticancer activity.

In cancer treatment the main limitation arise due to toxicity and off targeted to the cancer tissues. To solve this issue the

welcoming idea is targeted drug delivery approach using small molecule. Due to this reason it is important to synthesis a new molecule attached with a known clinically established drug (either oncologic or non oncologic drug) and further design a drug delivery conjugate and diminish toxicity and increasing bio-avaiability to surrounding, non-pathological tissues.For the development of new chemotherapeutic drugs, DNA is considered to be one of the most important targets. Our main objective is to synthesizing as well as modifying the novel molecules having DNA intercalating properties like naphthalimide and Phenoxazine moiety, attaching with a known oncologic drug or non oncologic drug for improving the antitumor activity, efficacy and safety profile of the novel molecules after their remodulation. As the newly synthesized novel small molecules having low bioavaibility, herein to solve problem the novel small molecules having a known chemical entity attached with polymer that will help to increase bioavaibility, sustained release of the dug from the polymer and lowers the toxicity. Our aim is to synthesis of novel molecules followed by drug delivery system to have the better pharmacokinetics and to have maximum therapeutic efficacy. We have synthesized series of small novel compound for our study and characterized by 1H-NMR, and EI-MS using LCMS followed by their DNA interaction ability using UV spectrophotometer. The DNA interactive ability was established and biological activity is under process.

Project 2: Rebaudioside-A based drug delivery nanomaterial development: With the objective of low toxic efficient novel drug delivery nano-devise synthesis, natural glycoside based (Stevioside/Rebaudioside-A) have taken as central molecules followed by modification with VPGVG peptide and 5K-PEF molecules. The available hydroxyl function group will be conjugating with anticancer drug molecules. Main goal is to have efficient sustainability therapeutic devices. In the multi steps synthetic process we have completed the PEGylated Rebaudioside-A via Trans esterification which were characterize via several characterize method. The known Sorafenib compound is being modified to make new selenium analogue owing to have novel synthetic drug discovery against liver cancer.

Project 3:Targeted drug delivery in lymphoma: Our objective is to develop mannose and folate mediated drug delivery system and further attached it with FITC. This novel synthesized theranostic drug delivery system will conjugate with anticancer drug for increasing bioavaibility in lymphoma for enhancing prognosis rate.

Project 4: Determination of heavy metal in cancer patient blood: This study has attempted to establish an analysis method of heavy metals copper, lead, cadmium and arsenic level in blood serum of cancer patients by using AAS for finding out the relevance between heavy metals and different type of cancer and after analyzing the distribution of heavy metal concentrations and their correlations between a control group and cancer patient group. So far we just initiated this work by using different cancer patient samples.

Extramural Funding support:

1. Principal Investigator: Dr. Ugir Hossain Sk, Project no. 80(0090)/20/EMR-II, entitled "Development of the natural glycoside (Stevioside/ Rebaudioside-A) based drug delivery nano-probe-carrier for cancer therapeutics" Grant Value: 32 lakhs, Funding agencies: CSIR-EMR-II, Duration Jan. 2021-Dec. 2023.

Poster Presentation:

Debapriya RoyMahapatra delivered **oral presentation** on 28th February, 2022 at CNCI. The title of her delivered lecture was: "Repositioning of temozolomide in conjugation with PAMAM-dendrimer as drug delivery system in experimental model of murine lymphoma"

The facility of the Department:

The translation research department is well equipped with modern instrument like atomicabsorption spectroscopy, LC-Mass Spectrometry (UPLC), Elisa Reader Tecan Austria GmbH, which will be accessible to patient sample analysis, research molecules validation for the release study, and pharmacokinetics. The chemical synthesis instrument rotary evaporator, chillier, the vacuum pump, and chemical fume hood, ultrasonic bath, and magnetic stirrer and vortex are available for the synthesis of small molecules and polymer-drug conjugates. Furthermore, the departments will also aim to undertake a facility for analyzing metabolites in biological samples using mass spectrometry (LCMS). Also to determine the heavy metal concentration in the cancer patient sample for higher research through AAS.

Ongoing Research work (Clinical Research):

1. RESONATE Study: Real-world outcomES with ribOciclib in indiaN pATiEnts with HR+,

HER2 -, Advanced Breast Cancer (Ongoing- Global)

2. A Phase 2 Basket Study of the Oral TRK Inhibitor Larotrectinib in Subjects with NTRK Fusion-Positive Tumors. 20289 (Ongoing-Global)
3. A Phase 3, Randomized, Multi-center, Open-label Study of Trastuzumab Deruxtecan (T-DXd) Versus Investigator's Choice Chemotherapy in HER2-low, Hormone Receptor Positive Breast Cancer Patients whose Disease has Progressed on Endocrine Therapy in the Metastatic Setting (DESTINY-Breast06) (Ongoing-Global)
4. A Multicenter, Double-Blind, Randomized, Parallel-Group, Active-Controlled, Two Part, Phase III, Global Study to Evaluate the Pharmacokinetics, Efficacy and Safety of BP 02 (Trastuzumab) in comparison with Herceptin®- EU in Patients with HER2-Positive Early Breast Cancer (EBC) and Metastatic Breast Cancer (MBC)". (Ongoing- Global)
5. A Randomized, Multiple-dose, Multicenter, and Comparative Parallel Study to Evaluate the Efficacy, Safety and Pharmacokinetic Characteristics of Intravenous Infusion of Trastuzumab (Hetero) and Reference Medicinal Product (HERCEPTIN® - Trastuzumab, Genentech, Inc.) in combination with standard chemotherapy in Patients of HER2-positive Metastatic breast cancer. (**Completed**- Indian)
6. Randomized, Assessor-Blind, Multicentre, Parallel Group, Two Arms, Clinical Study to Assess the Efficacy, Pharmacokinetics, Pharmacodynamics, Immunogenicity and Safety of Rituximab (Test Product, Zydus) in comparison with Rituximab (Reference Product, Roche/Genentech) in Patients with Diffuse Large B Cell Lymphoma (DLBCL). (Ongoing-Indian)
7. A global, multicentre, three arms, open-label randomized study to evaluate the efficacy and safety of Nanosomal Docetaxel Lipid Suspension compared to Taxotere® (Docetaxel Injection Concentrate) in triple-negative breast cancer patients with locally advanced or metastatic breast cancer after failure to prior chemotherapy. (Ongoing- Indian)
8. A Multi-Centre, Randomized, Double Blind, Parallel-Group, Comparative Clinical Trial to evaluate the Safety and Clinical Equivalence of Generic Clotrimazole Troche/Lozenges USP, 10mg (Unique Pharmaceutical Laboratories, India) to Clotrimazole Troche/Lozenges ® 10mg (Roxane Laboratories Inc., USA) in subjects with Oropharyngeal Candidiasis". (**Completed**-Global)

Clinical trial:

The clinical data process team is also delivering output through the following project. The project consists of the following manpower:

- Dr. Kalyan Kusum Mukherjee (Principal Investigator)
- Dr. Suparna Mazumder (Radiologist-Investigator)
- Dr. Durga Prasad Nanda (Investigator)
- Dr. Shuvam Halder (Investigator)
- Dr. Ranti Ghsoh (Investigator)

Publications:

Dr. Kalyan Kusum Mukherjee

5. CLO22-081: Clinical Efficacy and Quality of Life of Oral Cancer Patients Treated With Paclitaxel/Cisplatin/5-FU Vs Paclitaxel/Carboplatin Chemotherapeutic Regimens in a Tertiary Cancer Center in Eastern IndiaVolume 20 (2022): Issue 3.5 (Mar 2022): Abstracts from the NCCN 2022 Virtual Annual Conference in Journal of the National Comprehensive Cancer Network, Online ISSN: 1540-1413, Print ISSN: 1540-1405.
6. Pranab Kumar Sahoo, Sinjini Sarkar, Sutapa Mahata, Ranita Pal, Tanuma Mistry, Sushmita Ghosh, Trisha Choudhury, Sriparna Datta, Anup Kumar Bhowmick, Kalyan Kusum Mukherjee, and Vilas D Nasare. 31-03-2022
7. "A Review on Therapeutic Strategies of Relapsed and Refractory Multiple Myeloma." OSF

Preprints. February 8. doi:10.31219/osf.io/bfj4z. [Citation 1] Kalyan K. Mukherjee, Utpal Choudhuri. 2021.

8. Significance of Detecting Minimal Residual Disease by Flow Cytometry and its Impact on Overall Survival and Prognosis of Pediatric B-Cell ALL Patient Experience from a Tertiary Care Centre in Eastern India. **Kalyan K. Mukherjee** Debasish BanerjeeAnjan DasSubham HalderDattatreya Mukherjee Shyam S. MondalSurya K. RoyMili DasChinmay K. Panda Utpal Chaudhuri. CC BY-NC-ND 4.0 · Indian J Med Paediatr Oncol 2021; 42(02): 118 DOI: 10.1055/s-0041-1735366

Ugir Hossain Sk.

1. Nilava Debabhuti , Sumani Mukherjeeb , Swarnali Neogi , Prolay Sharma, **Ugir Hossain Sk**, Soumen Maiti , Mousumi Poddar Sarkar , Bipan Tudu , Nabarun Bhattacharyya, Rajib Bandyopadhyay : " A study of vegetable oil modified QCM sensor to detect β-pinene in Indian cardamom" **Talanta**, 236, 122837.
2. **Ugir Hossain Sk,** Debapriya RoyMahapatra, Sudin Bhattacharya, Selenium Nanoparticle in the Management of Oxidative Stress During Cancer Chemotherapy, **Handbook of Oxidative Stress in Cancer: Therapeutic Aspects, (Accepted, 2022)**
3. **Ugir Hossain Sk,** Sudin Bhattacharya, Oxidative Stress in Cancer,**Handbook of Oxidative Stress in Cancer: Mechanistic Aspects**, 2049-2071, **(Accepted, 2022)**

Other academic activities:

1. **Sk U H**, Editorial Board Member, **'Nature Scientific Reports'** 2015-Present
2. **Sk U H**, Editorial board of "**Frontiers inChemistry**" as a review editor
3. **Member subject expert committee, DCGI, MoH&FW, Govt.of India**, KalyanK Mukherjee

DEPARTMENT OF ENVIRONMENTAL CARCINOGENESIS & TOXICOLOGY

Head of the Department: Dr Madhumita Roy, OIC(R) **(01.4.2021 – 30.11.2021)**
Dr. Sutapa Mukherjee, PhD SSO-I Grade **(01.12.2021 – 31.03.2022)**

Team Members	
Dr. Debomita Sengupta	CSIR-Senior Research Associate **(Pool Scientist)**
Students	
Ms Elizabeth Mahapatra	SRF (Institute)
Mr Archismaan Ghosh	SRF (Institute)
Ms Salini Das	CSIR-SRF
Mr. Debanjan Thakur	JRF (Institute) **Joined on 15.11.2021**

Objectives of the Department:

- Elucidation of the role of black tea in prevention of arsenic induced skin cancer involving EMT
- Understanding the role of serine threonine kinases (PI3K/Akt, IAPs, and Aurora Kinases) in rendering therapy-resistance (chemo/radioresistance) in breast and cervical cancer scenarios.
- Identifying the potential of serine threonine kinases (PI3K/Akt, IAPs, and Aurora Kinases) as predictive biomarkers of chemo and radio resistance in aggressive stages of breast and cervical cancers.
- Comprehension of any presumptive role of stemness factors in inducing Aurora Kinase overexpression among aggressive stages of breast cancers.
- Role of Glucocorticoid Receptor and Stemness Factors in Transcriptional Regulation of Aurora Kinase A in Breast Cancer

Brief description of the work done during the year **(from 1st April 2021 to 31st March 2022):**

Projects running (Internal) –

PI	**Project Title**	**Status**
Dr. Madhumita Roy	Black tea in prevention of skin cancer: A mechanistic study.	Ongoing (**Concerned SRF is working under this project)**
Dr. Sutapa Mukherjee	Phenethylisothiocyanate: Role in enhancing platinum accumulation in cervical cancer	Ongoing
Dr. Sutapa Mukherjee	Crosstalk between Glucocorticoid Receptor and Stemness Factors in Transcriptional Regulation of Aurora kinase A in Breast Cancer	Ongoing

Students' Projects running –

PI/Mentor	Student/Post Doc	Project Title	Funding Agency
Dr. Sutapa Mukherjee **(Mentor)** Dr. Debomita Sengupta **(PI)**	-	Role of Oct4 and Sox2 in p53 or Myc mediated transcriptional regulation of Aurora Kinase A and its implications on cell polarity during cell division with reference to cancer	CSIR-SRA
Dr. Sutapa Mukherjee	Ms. Salini Das	Molecular Targeting of GADD45a and AURKA: A Therapeutic approach to reverse radioresistance in cervical cancer	CSIR-SRF

Publications / Monographs / Patents etc. (*please mention international and national publications separately*) –

International:

i. Das S, Mahapatra E, Biswas S, Roy M, Mukherjee Sutapa (2021). Emerging Role of Aurora A in Radioresistance: A Comprehensive Review. EMJ Oncol; 9[1]:81-90.

ii. Mahapatra E, Das S, Biswas S, Ghosh A, Sengupta D, Roy M, Mukherjee S (2021). Insights of Cisplatin Resistance in Cervical Cancer: A Decision Making for Cellular Survival. Cervical Cancer - A Global Public Health Treatise. DOI: 10.5772/intechopen.94815; ISBN: 978-1-78985-346-9; Print ISBN: 978-1-78985-345-2; eBook (PDF) ISBN: 978-1-83880-004-8.

iii. Ghosh A, Mukherjee S, Roy M (2021). Co-Carcinogenicity of Arsenic: Probable Mechanisms. Int. J. Curr. Microbiol. App. Sci, 10(11): 294-305.

iv. Ghosh A, Mukherjee S, Roy M (2021). Chemopreventive Role of Black Tea Extract in Swiss Albino Mice Exposed to Inorganic Arsenic. Asian Pacific J of Cancer Prevention, 22 (11), 3647-3661.

Other academic activities

Paper presented (Oral / Poster) – for style and format, please see below

- Dr. Sutapa Mukherjee delivered an invited Oral Presentation on "**Therapy Resistance in Cervical Cancer: A Necessary Evil for Evolving Neoplasms**" in Two-day Virtual National Seminar on "Genetics – New Challenges" organized by Sarojini Naidu Vanita Maha Vidyalaya, affiliated to Osmania University, Hyderabad on July, 20, 2021.
- Dr. Sutapa Mukherjee delivered an invited Oral Presentation on "**PEITC Suppresses Metastasis and Induce Apoptosis in Breast Cancer Cells by Disrupting the Interplay of Serine/Threonine Kinases**" in "4th Virtual Conference on Cancer Science and Oncology" on September 27, 2021.
- Dr. Sutapa Mukherjee delivered an invited Oral Presentation on "**Contributions to Science By Indian Women – The personal journey**" organized by ICMR-National Institute for Research in Reproductive and Child Health on October 15, 2021.
- Dr. Sutapa Mukherjee chaired a session on "**Recent Advances in Cancer Diagnosis and Precision Medicine**" in the 47th Annual Conference of Association of Clinical Biochemists of India (ACBICON 2021) on December 13, 2021
- Dr. Sutapa Mukherjee presented a poster (ONLINE MODE) on "**PEITC Mediated Reversal of Cisplatin Resistance in Cervical Cancer: An act of Flaying the Enemy with Its Own Sword**" in the 41st Annual Conference of Indian Association for Cancer Research (IACR) during the period of March 2-5, 2022.
- Ms. Elizabeth Mahapatra delivered an oral presentation "**Reversal effect of PEITC on PI3K/Akt signalling mediated Cisplatin Resistance in Cervical Cancer**" in the 47th Annual Conference of Association of Clinical Biochemists of India (ACBICON 2021) held during the period of December 12-15, 2021.
- Ms. Salini Das delivered an oral presentation "**Targeting AURKA signalling by Aspirin:**

Novel strategy to prevent fuelling of radioresistance in cervical cancer" in the 47th Annual Conference of Association of Clinical Biochemists of India (ACBICON 2021) held during the period of December 12-15, 2021.

- Mr. Archismmaan Ghosh delivered an oral presentation in "**2nd RMBPD colloquium"**, hosted by Dept of Zoology University of Delhi, on Deciphering Bioregulatory Mechanism in Health and Disease using 'Omics' Approach during February 24 – 25, 2022.

Students undergoing PhD: 5

Other awards or special achievements

- **Ms Salini Das** was awarded with "**Sita Devi Award**" Best Oral Presentation in the 47th Annual Conference of Association of Clinical Biochemists of India (ACBICON 2021) held during the period of December 12-15, 2021.
- **Mr. Archismaan Ghosh** was awarded with Best Oral Presentation in the "2nd RMBPD colloquium", hosted by Dept of Zoology University of Delhi, on Deciphering Bioregulatory Mechanism in Health and Disease using 'Omics' Approach during February 24 – 25, 2022

Conference / Symposium / Workshop (*International / National*) attended –

- The team members of ECT actively participated in the program of World Cancer Day organized by Chittaranjan National Cancer Institute Kolkata on 4.2.2022.
- The team members of ECT actively participated in the program of National Science Day organized by Chittaranjan National Cancer Institute Kolkata on 28.2.2022.

Interesting observations, if any

Project 1: Black tea in prevention of skin cancer: A mechanistic study.

Chronic iAs exposure preliminarily manifests in Squamous cell carcinoma of the skin in addition to causing cancers of lung, bladder, liver, kidney and prostrate. The present study, therefore, deals with amelioration of iAs induced carcinogenesis with the help of black tea extract (BTE) both in *in-vivo* (Swiss albino mice) and *in-vitro* (HaCaT cells, skin keratinocyte). Carcinogenesis by iAs is mediated by outburst of reactive oxygen species (ROS) which can be quenched by established antioxidants like Black tea extract (BTE). Therefore, in this regard, the chemopreventive role of BTE has been has been studied to inhibit iAs induced carcinogenesis.

Epithelial to Mesenchymal Transition (EMT), an important phenomenon initiates skin carcinogenesis where the epithelial cells lose their polarity, cellular junctions and their morphology to adopt a mesenchymal phenotype which helps them to invade the surrounding tissue and perform metastasis. Downregulated epithelial markers like E-cadherin, Desmoplakin followed by upregulation of mesenchymal markers like Vimentin and N-cadherin along with other transcriptional factors like Snail, Slug, Zeb and Twist. Inhibition of EMT halts progression to cancer.

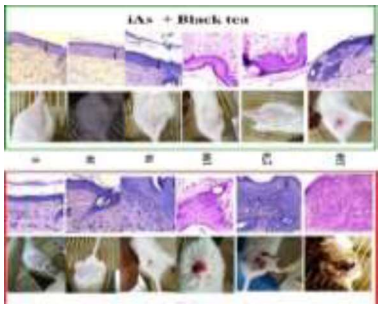


Fig. 1: Development of skin carcinoma in Swiss Albino Mice followed by its amelioration with BTE

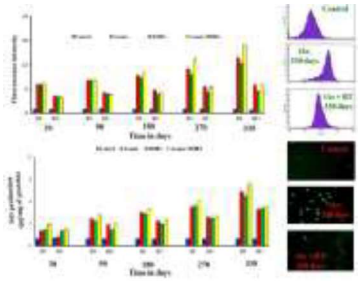


Fig. 2: Quenching of excess ROS generated due to chronic iAs exposure and its amelioration by BTE

The *in-vitro* investigations were carried out in HaCaT cells. HaCaT cells were divided into three groups: (i) untreated group, (ii) chronically iAs exposed group, (iii) black tea extract (BTE) along with iAs treated group. ROS was estimated by flowcytometry, EMT parameters by FACS, immunoblot and immunofluorescence. Long term exposure of HaCaT cells to iAs causes excess generation of ROS. Morphological transformation and EMT were apparent at 210 days of exposure to iAs. Development of metastatic characteristics was observed at 240 days. Therefore, BTE may be considered to be a potential phytochemical to prevent the deleterious effect of iAs. Skin carcinogenesis by iAs may thus be prevented by BTE via inhibition of EMT. Both the in-vitro (Swiss albino mice) as well as in-vivo (HaCaT

cells) studies have shown that BTE can be a prominent chemopreventive agent which can counter the iAs induced skin carcinogenesis by inhibiting EMT.

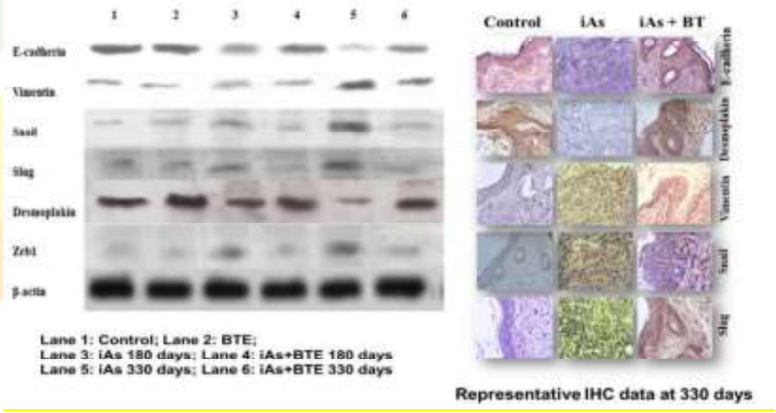


Fig. 3: Western Blot and IHC analysis of induction of EMT by chronic iAs exposure and its inhibition by black tea extract

Project 2: Phenethylisothiocyanate: Role in enhancing platinum accumulation in cervical cancer.

Compromised drug retention capacities of cervical cancers are due to their upregulated PI3K/Akt signalling as it results in overexpression of MRP2 *(cisplatin-exporter)* along with other prosurvival-effectors like NFκB and IAPs. In this regard, our study challenges PI3K/Akt axis in cisplatin-resistant cervical cancer scenario with phenethylisothiocyanate *(PEITC; a phytochemical of brassica vegetables)* for chemosensitization of SiHa^{R}, a cisplatin resistant sub-line of SiHa and 3-methylcholanthrene induced cervical cancer mice models. SiHa^{R} exhibited higher MRP2, p-Akt^{Thr308}, NFκB, XIAP, and survivin expressions which cumulatively compromised cisplatin retention capacity and accumulated PEITC better than SiHa.

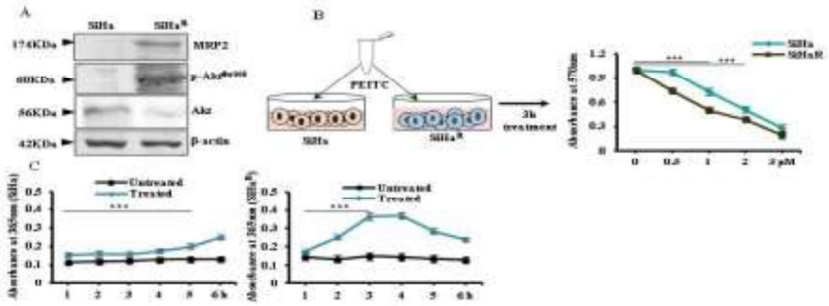


Fig. 4: Increased PEITC accumulation in SiHa^{R} expressing prosurvival biomarkers like MRP2 and pAkt^{Thr308}.

PEITC accumulation rates were in strong positive-correlation with MRP2 expressions of SiHa^{R}.

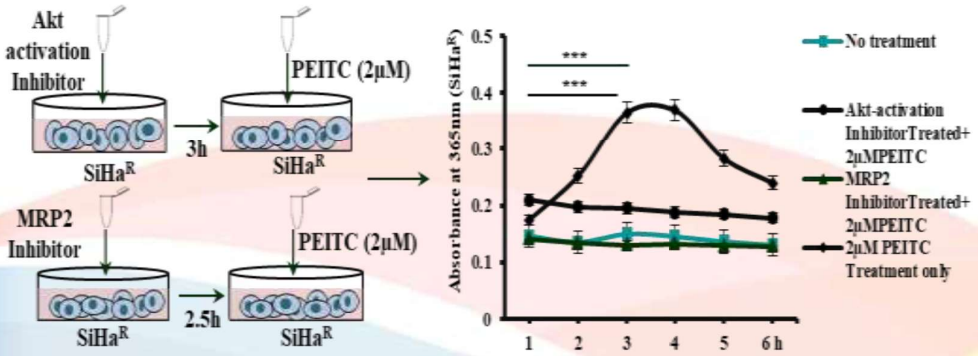


Fig. 5: Increased MRP2 levels enabled PEITC uptake in SiHa^{R}.

A3h treatment of PEITC prior to cisplatin exposure revived intracellular platinum levels, reduced free GSH levels, generated greater ROS and altered mitochondrial membrane-potential compared to SiHa.

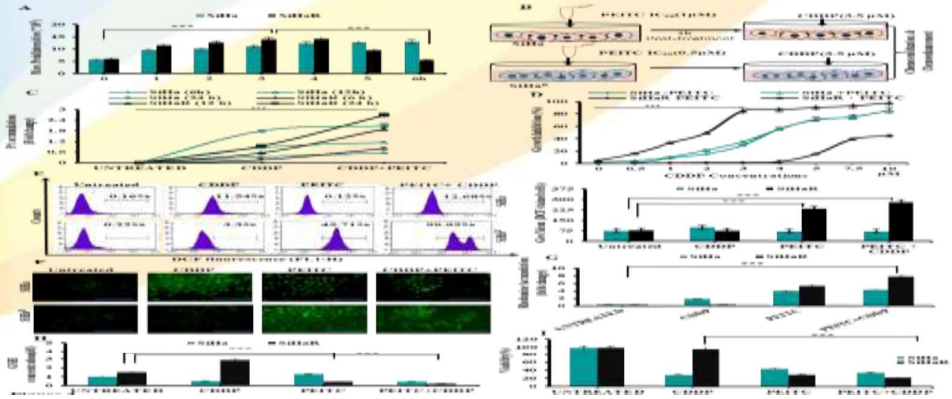


Fig. 6: Role of PEITC as cisplatin sensitizer and enhancer

PEITC was found to successfully downregulate MRP2 in addition to suppressing p-Akt^{Thr308}, XIAP, survivin and NFκB expressions.

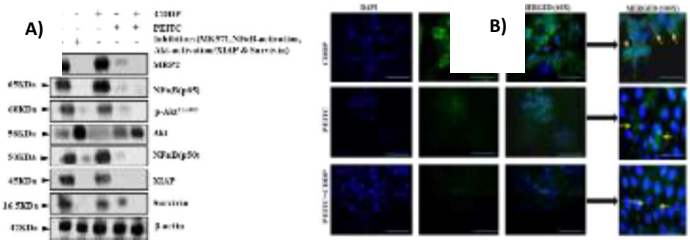


Fig.7: Modulatory role of PEITC upon the biomarkers of cisplatin resistance in SiHa^{R}

In mice models, administration of a PEITC priming dosage prior to treatment with 3mg/kg body-weight of cisplatin, remediated cervical histology and induced tumour regression in contrast to the group receiving same dosage of cisplatin only.

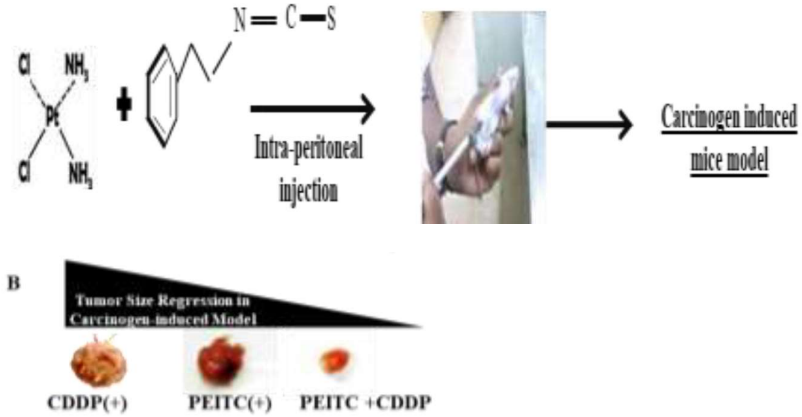


Fig.8:PEITC potentiated cisplatin therapy in carcinogen induced mice model. This suggested PEITC as a potential chemosensitizing agent in light of acquired cisplatin resistance in cervical cancer and also established its candidature for Phase I clinical trial.

Project 3: Crosstalk between Glucocorticoid Receptor and Stemness Factors in Transcriptional Regulation of Aurora kinase A in Breast Cancer (The project work commenced on 15.11.2021)

Breast cancer cell lines MCF7 and MDAMB231 were maintained under culture conditions and treated with different doses of cortisol (1nm – 50 um) for different time periods.MTT assay was performed and percent cell viability was calculated. Preliminary findings showed dose and time dependent effects of cortisol treatment on cell viability in both breast cancer cell lines.

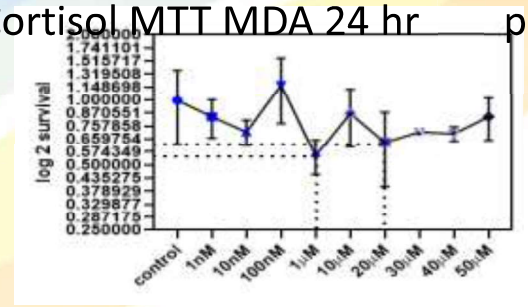


Fig. 9: Graphical representation showing dose dependent effects on cell viability following hydrocortisone treatment in breast cancer cell line MDAMB 231 as seen in MTT assay

Project 4: Role of Oct4 and Sox2 in p53 or Myc mediated transcriptional regulation of Aurora Kinase A and its implications on cell polarity during cell division with reference to cancer

Aurora Kinase A (AURKA) and Sox2 transcript expressions demonstrate positive correlation in both breast cancer tumour tissues and adjacent normal tissues as per The Cancer Genome Atlas (TCGA). There is no report till date stating Sox2-mediated AURKA transcriptional regulation. Sox2 knockdown has been already reported to sensitize cancer cells towards cisplatin and doxorubicin (Zhang et al., 2020) given the fact that Sox2 is responsible for upregulating the drug efflux pumps. A Doxorubicin-resistant cell line variant of MCF-7 has been already reported by our lab to overexpress AURKA (Biswas et al., 2021).

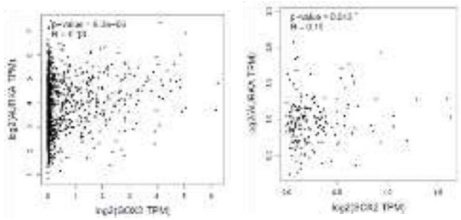


Figure 10: Scatter plots representing positive correlation of AURKA transcripts with that of Sox2; left panel demonstrates breast cancer samples from TCGA and right panel demonstrates normal breast tissues

Given the positive correlation of AURKA with Sox2 as obtained from TCGA/GTex databases, we analysed Sox2 expression in the same to find out significant upregulation of Sox2 in the resistant cell line (Figure 11A) compared to classical MCF-7 thereby indicating possible regulation of AURKA by Sox2. Overexpression of Sox2 in MCF-7 cell line resulted in significant increase in AURKA expression (Figure 11B) thereby confirming our hypothesis.

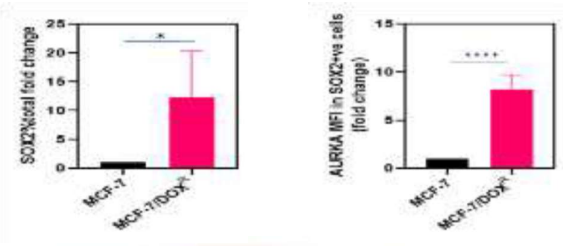


Figure 11A: Column bar diagram representing Sox2 upregulation in Doxorubicin resistant breast cancer cells (left panel) and AURKA upregulation in the Sox2+ve cells compared to Doxorubicin sensitive breast cancer cells (right panel);* represents p=0.0328 and **** represents p<0.0001in unpaired t-tests.

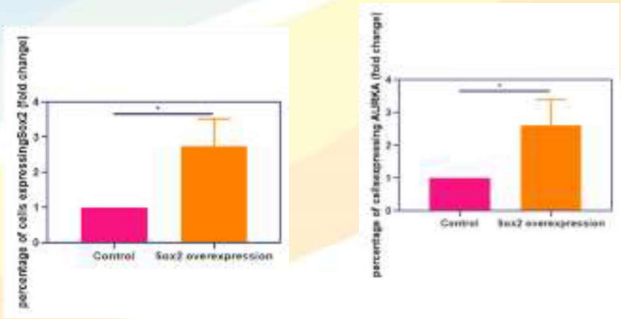


Figure 11B: Column bar diagram representingAURKA upregulation (right panel) under Sox2 overexpression (left panel) in MDA MB-231 breast cancer cells;* represents p=0.0234(right panel) and p=0.017 (left panel) respectively in unpaired t-tests.

Furthermore, screening of AURKA promoter *insilico* revealed several binding sites of the same, in which Sox2 was found to be binding within the genomic region 56393031 – 56392300 through Chromatin Immunoprecipitation assay (Figure 12).

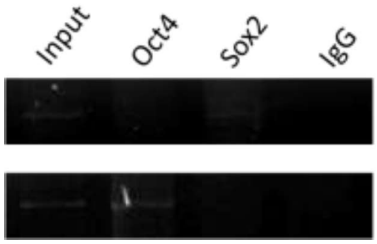


Figure 12: Chromatin Immunoprecipitation Assay depicting Sox2 (upper panel) and Oct4 (lower panel) binding to ~4-5kb upstream of AURKA

Importantly, another associated stemness factor Oct4, was found to be binding in the same region, along with the region 56394081-56393200. Whether the Oct4 and Sox2 binding to AURKA promoter is interdependent or whether these binding sites are involved in development of doxorubicin resistance, are yet to be confirmed and the work is ongoing.

Project 5: Molecular Targeting of GADD45a and AURKA: A Therapeutic approach to reverse radioresistance in cervical cancer

Radiotherapy is the primary treatment modality of cervical cancer especially at the advanced stage (stage IIB onwards according to FIGO). Failure to radiotherapy, together with subsequent locoregional recurrence and relapse of tumor is often creating serious concerns in the treatment of cervical cancer. Aurora Kinase A (AURKA), a mitotic serine/threonine kinase which being frequent overexpression renders therapy resistance. Compromised cell cycle checkpoint is a major obstacle against radiotherapeutic success. Aspirin (ASA), a FDA-approved anti-inflammatory agent was repurposed previously for improving radiotherapy by limiting radiation toxicity. However, the underlying mechanism was unclear. The principal objective of this study was to characterize the phenotypic and molecular alterations (AURKA) upon acquirement of radioresistance and identifying the mechanism of ASA mediated reversal of radioresistance. Parental cervical squamous cell carcinoma cell line SiHa was subjected to recurrent insult by fractionated dose of X-irradiation. Finally, a resistant cell (SiHa/RR) was isolated at 40Gy. The development of radioresistance with improved radioadaptive response in isolated SiHa/RR cells was affirmed by increased proliferative potential and clastogenic ability; which bypassed the cell cycle restrictions. The expression of AURKA and its upstream and downstream mediators (pAURKA, HIF1α, pAkt, NF-κB) were significantly high vis-à-vis lower expressions of the molecules of DNA damage response (p53, Gadd45α, γH2AX). Contrarily, these cells showed improved radiosensitivity upon inhibition of AURKA. Colony forming ability of SiHa/RR was much higher compared to SiHa, which becomes restrained upon ASA (5μM) treatment prior to IR. Analysis of ASA-treated cells by flow cytometry showed increased G2/M population followed by enlargement of cells displaying giant multinucleated morphology, typical characteristics of mitotic catastrophe. When treatment duration of ASA in SiHa/RR was lengthened (12h), apoptosis was induced by altering expressions of Bcl2, Bax and cytochrome C. Combination treatment of ASA/IR exhibited better apoptotic potency through the event of mitotic catastrophe. Underlying noteworthy mechanisms involved decreased expressions of G2/M regulatory proteins (cyclin B1, CDK1, AURKA, pAURKA) in IR/ASA treated cells.

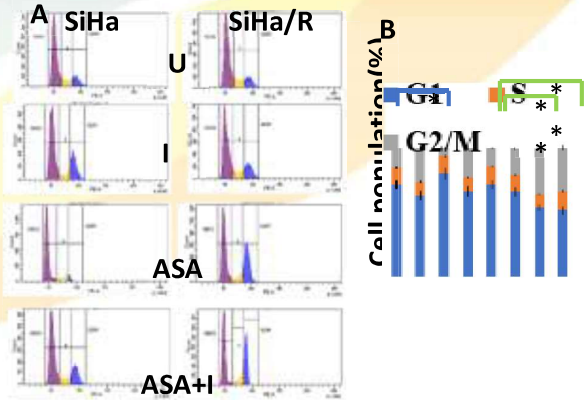


Fig. 13: **Effect of ASA and/or radiation on cell cycle: A.** SiHa (left panel) and SiHa/RR (right panel) cells were exposed to ASA (5μM) for 6 h; with or without post-exposure to radiation (4 Gy). Distribution of cells at different phases was measured by flow cytometry succeeding PI staining. Untreated cells were taken as control. **B.** Frequency distribution of cells after quantification of cells at different phases of cell cycle has been represented graphically. Data (Mean ± SD) are representative of three independent experiments. $^{*}p< 0.001$, $^{**}p< 0.0001$ refers deviation from untreated control cells

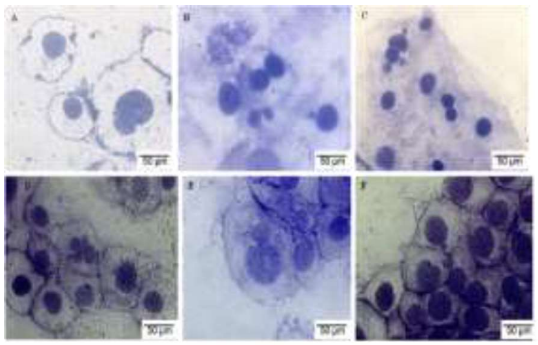


Fig. 14: Representative images of SiHa/RR showing features of ASA induced mitotic catastrophe like **A.** giant cells with nuclear bridge, **B.** micronuclei with chromosomal arrest, **C.** simultaneous polynucleation and micronucleation, **D.** quadrinucleated cells, **E**

Training Program: Six students from different Colleges and Universities from various parts of India have successfully completed their short-term projects in this department under the supervision of Dr Madhumita Roy and Dr Sutapa Mukherjee

h) Miscellaneous:

❖ **Dr. Madhumita Roy Acted as reviewer of international peer reviewed journals like *Food and Chem Toxicol, Env Toxicol, Human Exptl Toxicol, J Ethnopharmacology, Current Med Chem, Drug Delivery J, Tumor Biol, Int J Cancer, Mutation Research.***

❖ **Dr. Sutapa Mukherjee** acted as reviewer of international peer reviewed journals like Human & Experimental Toxicology, SAGE Publications, Gene Reports, ELSEVIER Publication, Oral Science International, Wiley Online Library, Cancer Management and Research, Dovepress, Frontiers in Oncology; Frontier Media, Current Pharmaceutical Biotechnology, Bentham Science, Current Protein & Peptide Science, Bentham Science, BIOCELL, Tech Science Press, Genome, Canadian Science Publishing, Journal of Cellular Biochemistry, Wiley Online Library.

❖ **Dr Madhumita Roy & Dr. Sutapa Mukherjee** contributed to research by guiding PhD student, publishing research articles in peer reviewed journals, presenting laboratory work in conferences.

❖ **Dr. Madhumita Roy** being the Officer-in-Charge (Research) of CNCI till 30.11.2021 took the following initiatives

- Central Research Instrument Facility (CRIF) has been re-structured and renovated to make room for new equipment and for better utilization of space.
- Responsibilities of different equipment have been distributed among scientists for smooth running of CRIF.
- Being a member of Internal Complaint Committee (ICC), actively involved to sort out harassments and complains at work place.
- Being a member of Institutional Ethics Committee (IEC), dealt with ethics issues related to use of human

samples.

- Acted as a Co-Chairperson in the Institutional Biosafety Committee, conducted virtual meeting.
- Organizing monthly meeting with all scientists to discuss various issues/problems pertaining to research wing of CNCI and to sort out problems to run research work smoothly.
- As HOD, CRIF, organized regular meetings with CRIF Committee members for formulating and maintaining SOP for all equipment.
- As the Chairperson of the Academic Committee, facilitated and streamlined several academic activities of CNCI Research.
    - ❖ **Dr. Sutapa Mukherjee** has been the Academic Coordinator of the Institute by since February, 2013, till November 30, 2021.

Besides this, some of the additional duties rendered by her are enlisted below-

1) Member of Institutional Animal Ethics Committee (IEC).
2) Member of Institutional Ethics Committee (IEC) dealing with the norms for employment of human samples/subjects in Academic Research.
3) Convener of the Internal Complaint Committee (ICC).
4) Member of Institutional Rate Contract Committee.

DEPARTMENT OF EPIDEMIOLOGY & BIO-STATISTICS

Head of The Department: Dr. Jayanta Chakrabarti, Director

Team

Dr. Syamsundar Mandal, Ph D – Statistical Officer (Retired on 31/01/2022)

Project Staff

Papulation Based Cancer Registries and Population Based Cancer Survival, Kolkata

Name & Designation of the Staff	
INDRANI NANDI	Social Investigator
SOUMYA ROY	Social Investigator
PRANATI SARKAR	Social Investigator
SOMA DAS	Social Investigator
BISWANATH GHOSH	Social Investigator
BISWAJIT BHATTACHARJEE	Data Entry Operator cum Social Investigator

Hospital Based Cancer Registries and Patterns of Care and Survival Studies (POCSS)Breast, Cervix, Head & Neck cancers

Name & Designation of the Staff	
SUDESHNA GHOSH	Social worker
JULEKHA MONDAL	Social worker
RINKI CHITRAKAR	Social worker
KABERI BISWAS	Social worker
SUSMITA PATRA	Data entry operator
PRIYA KUMARI SINGH	Data entry operator
DIPANJAN MAZUMDER	Data entry operator

PROJECT RUNNING:

1. POPULATION BASED CANCER REGISTRY, KOLKATA.
2. POPULATON BASED CANCER SURVIVAL STUDIES (PBCS).
3. IMPLIMENTATION OF NCDIR E-MORT SOFTWARE TO STRENGEHENING THE MEDICAL CERTIFICATION OF 'CAUSE OF DEATH'

Objectives of PBCR & PBCS:

- To generate authentic and reliable cancer data which included the cancer control programme in the community.
- The Registry Data also helps the researcher for their research programs.
- The Population-Based Cancer Registry plays an important role in improving patient care programs.
- Cancer surveillance programs such as SEER use cancer statistics collected by PBCR to monitor the distribution of cancer among certain occupations, communities, ethnicities, ages and other demographic groups.
- Survival refers to the life of a person after diagnosis of a disease and survival studies have the objective of evaluating the overall performance of a group of patients in terms of quality and quantity of life after the diagnosis of treatment.

Challenges:

- Low coverage, PBCR covers only 10% of total population of the country.
- Poor Linkage of others PBCRs, HBCRs & Source of Registration, A good PBCR should have a well linkage between others PBCRs as well as HBCRs and the Sor's as it is very much

necessary for obtaining a clear picture of cancer burden in a specific geographical region.

- Less awareness among the people lacks of follow-up and survival data.
- PBCS requires time and finance for the conduct of the study, the problem of lost to follow-up and also the time gap between the year of diagnosis of the patients and availability of result on their survival is a big challenge.
- In general, there are numerous difficulties in the conduct of PBCS but still the survival study of Breast, Cervix & Head & Neck are being carried out by PBCR staffs.

BRIEF DISCUSSION OF THE PROJECT:

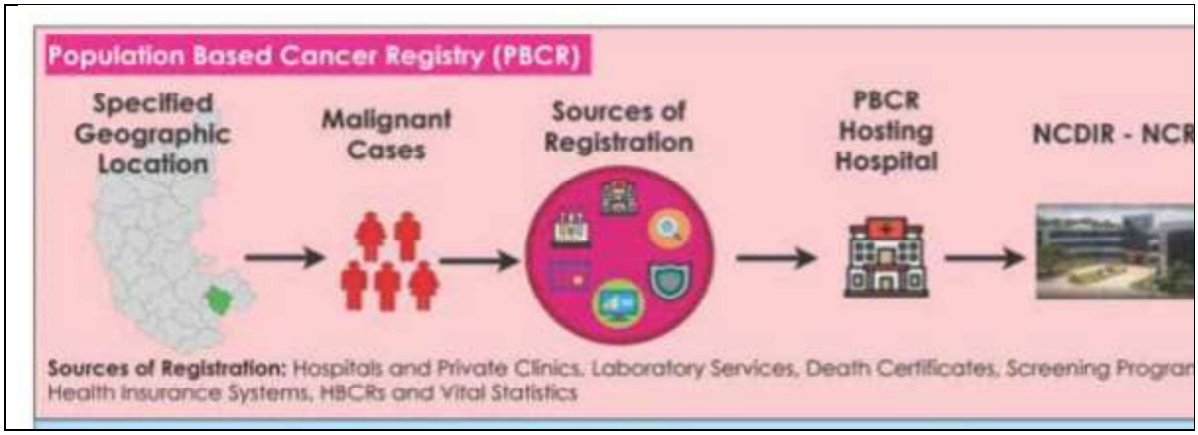
1. POPULATION BASED CANCER REGISTRY:

The PBCR collects data on the new occurrence of cancer and cancer death in a defined geographical area with its known population, there are 38 PBCR under the National Cancer Registry Programme (NCRP). The PBCR covers 10% of the total population and functioning the different cities and districts across the country. This is a long-term Cancer Registry funded by National Centre for Disease Informatics & Research under Indian Council of Medical Research (NCDIR/ICMR) from 1st January 2005, though the Registry was already functioning under IARC, Lyon, France & Chittaranjan National Cancer Research Institute from 1st January, 1997.

The registry covers the population of 9.42 million (Male: 5.08 million & Female: 4.34 million) people within the Kolkata Municipal Corporation area (185 sq.km) under 144 KMC wards.

Incident cancer cases are collected from 58 centers including 2 specialized cancers hospitals, 5 Government hospitals and private hospitals, nursing homes and diagnostic laboratories by active case collection method. The cancer mortality data is also collected from the 'Vital Statistics Department' of KMC at regular intervals.

Process of Data Collection :



Work done by the PBCR staff from 01.04.2021 To 31.03.2022.

Incidence	Mortality	PBCS	E-mort
4026	2269	1384	450

Gender wise case Distribution:

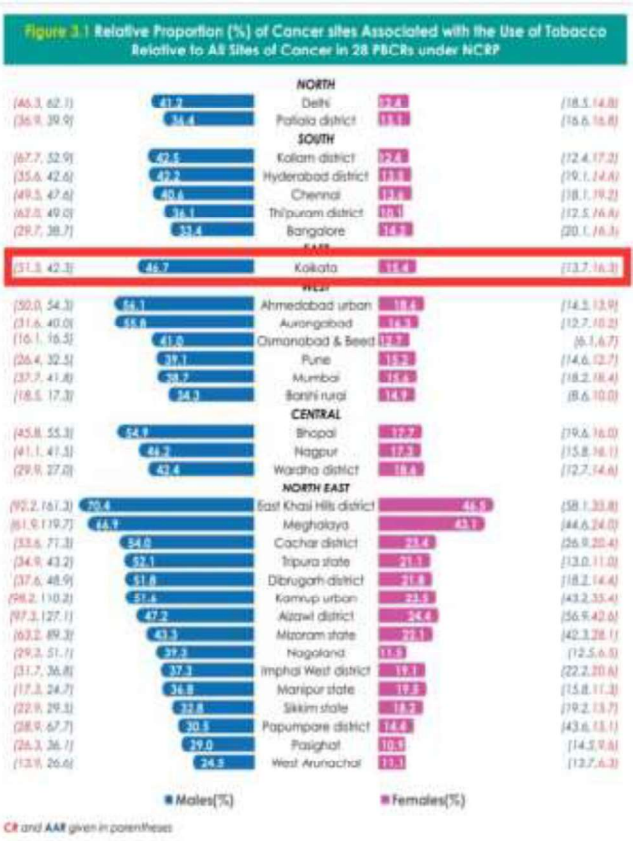
Ten leading sites of Male & Female cancer in Kolkata PBCR *: (Tabulated* **Form)**

4026 (Incidence)		2269 (Mortality)	
Male	Female	Male	Female
2420	2406	1295	974

*CR, AAR given in parentheses.

Male	Relative proportion	Female	Relative Proportion
Lung	20.0(22.0,18.3)	Breast	24.8 (26.3,21.6)
Prostate	6.9 (7.5,6.1)	Cervix Uteri	9.9 (10.4,8.7)
Mouth	6.7 (7.4,5.9)	Ovary	7.6 (8.1,6.8)
Tongue	5.0 (5.5,4.4)	Gall Bladder	7.3(7.7,6.5)
Larynx	4.7(5.2,4.3)	Lung	6.6 (7.0,5.9)
Stomach	4.6 (5.1,4.2)	Corpus Uteri	3.6 (3.8,3.2)
Urinary Bladder	4.2 (4.6,3.8)	Mouth	2.9 (3.1,2.6)
Liver	3.5(3.9,3.2)	Stomach	2.7(2.8,2.4)
Colon	3.4(3.8,3.1)	Colon	2.5 (2.6,2.2)
Gall Bladder	3.4(3.8,3.1)	Liver	2.1 (2.3,1.9)

Relative proportion (%) of Tobacco Associated of Cancer sites :



2 POPULATION BASED CANCER SURVIVAL STUDIES (PBCS)

The project was initiated in 2017 to generate reliable follow-up data on population-based cancer survival in cancers of the breast, cervix and head & neck, also with their clinical stage/extent of disease across the PBCR registry wherever feasible. The study is ongoing in 25 PBCRs across the country, patient diagnosed from the year 2012 have been followed up regularly (at least five years from the date of first diagnosis of cancer). The registries have been submitted the follow-up data to NCDIR-ICMR for the quality checks.

3 Implementation of NCDIR E-Mort Soft-ware to strengthen the Medical Certification of Cause of Death.

Interesting Observation:

PBCR Kolkata report reveals the following Parameters: -

- PBCRs collects record all the new cancer cases in a defined geographical area which reflects the cancer pattern and burden in this area.
- The highest incidence of cancer in India was observed in the north eastern region.
- The highest burden of cancer breast was observed in metro cities.
- The highest incidence rate of childhood cancer was seen in Delhi.
- There is a rise in the trend of Breast cancer, while cancer cervix uteri is on the decline.
- Majority of cancer breast and cervix uteri were diagnosed at locoregional stage.
- Less than 1/5th of lung and stomach cancers were diagnosed as localized only.
- ***Aizawl districts had the highest incidence in cancer lung in Asia among the females (37.9 per 100,000)*** and among males, incidence rate of stomach cancer (44.2 per 100,000) is highest among all PBCRs in India.
- Compared to the past report it has been observed that Cancer Incidence has been rising among both males and females in the present report published by NCDIR (2020). Microscopic diagnosis, the most reliable method of diagnosis has gone up from 89.2% in past report to 90.30% in the present report.
- Leukemia and Lymphoma are common Paediatrics Cancer.
- Frequent awareness drives in the newer therapeutic and diagnostic centers are thought to be the way to increase the number. PBCR has taken some initiatives in this direction. An increase in the number of participating centers would yield more incidence cases.

In December 2010, The Govt. of West Bengal had passed an administrative order that made cancer a Notifiable Disease. However, the general response and compliance had been served optimal so far.

Conferences and other activities.

1. A meeting held on 26th March,2022 at Rajarhat CNCI 2nd campus, The Strengthening PBCR data collection with The Source of Registration.
2. An Online Video Conference held at CNCI on April, 2021, Population Based Cancer Survival on cancers of Breast, cervix & Head & Neck.
3. A Virtual Training Work-shop under the able guidance of NCDIR-NCRP(ICMR), Bangalore on data quality/case abstraction/mortality for the welfare of cancer patients of Punjab.
4. Data Entry of Rural PBCR, Daspur, Paschim Medinipur.

Hospital Based Cancer Registry:

Objectives -

The main objectives of HBCR are as follows:

- To capture all the data regarding patient's identifying, diagnostic and treatment registered in RCC (Regional Cancer center).
- To upload and transmit the data through Electronic Software provided with login id, password.
- To generate quality data after checking, correction and updates performed through online.

Patterns of Care and Survival Studies (POCSS)Breast, Cervix, Head & Neck:

- To obtain the details of clinical stage and types of treatment in the Hospital Based Cancer Registries under the NCRP and in other selected centers and medical colleges across the country;
- To obtain clinical stage and treatment based survival in all registered and treated patients at this centre.

Patterns of Care and Survival Studies (POCSS) Gallbladder:

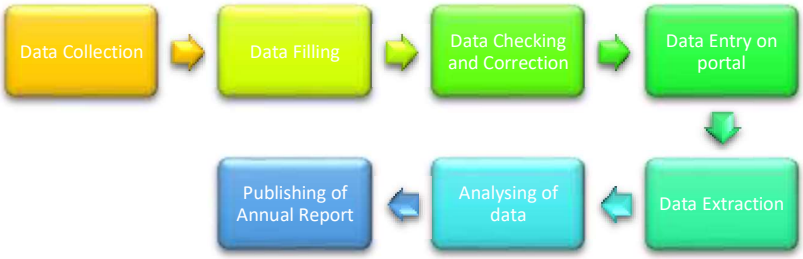
- To obtain details of pattern of care (diagnosis and management).
- Estimating demographic survival for Gallbladder cancer.
- Indentifying the epidemiological and clinical determinants of survival and estimating their effects.

Work Process:

There are seven staffs in this extramural project, named "HBCR & POCSS" Department in CNCI. Among them the four are Social workers and the others are Data Entry Operator. All the issues regarding this project are furnished by all staffs together. And Specific responsibilities are existent with individual staff of HBCR and POCSS.

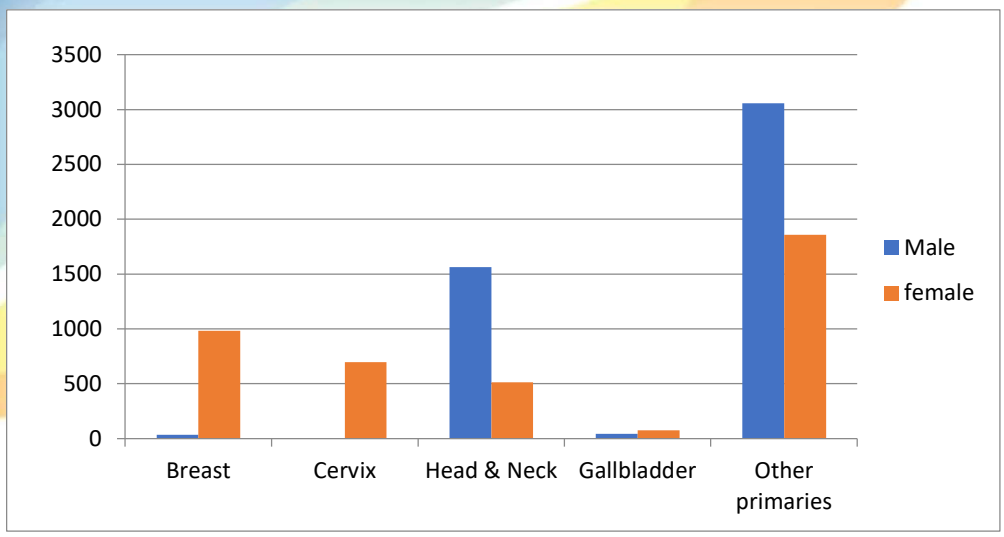
- Social workers are responsible for collecting data from Medical Records, and liable for the interaction with patient and patient party.
- Data filling in accordance with HBCR & POCSS Form done by SI.
- TNM done by Doctors
- Some issues are solved by SI with the help of Doctors.
- After completing the filling, it goes to DEO for uploading in Portal of NCDIR.
- Before entering the data, the DEO creates his/her HBCR REGISTRATION numbers.
- Telephonic Follow-up done by SI.
- Entering of telephonic follow up done by DEO.
- Maintaining records regarding HBCR & POCSS related work.
- Finally accomplished with Analyzing and report writing.

Figure: 1



Total number of cases (2021-2022)- **8822**

Primary sites	Total number of cases	Male	female
Breast	**1015**	**34**	**981**
Cervix	**697**	**-**	**697**
Head & Neck	**2075**	**1564**	**511**
Gallbladder	**121**	**44**	**77**
Other cases	**4914**	**3057**	**1857**



The other leading sites:

Primary sites	Total number of cases	Male	Female
Lung	844	689	155
Stomach	337	214	123

The other activities:

- **Online program attended**
  - Release of report of NCDIR.
  - Review meeting for HBCR conducted by NCDIR.
  - Cancer Epidemiology and surveillance training program.
  - Training on coding using ICD for cancer.

Action Plans:

- To spread awareness among people probable aetiologies of cancer through conducting campaigns.
- To increase the implementation of cancer screening programme.
- Awareness regarding early diagnosis may help out to get treatment properly that kind of campaign should be implemented.

DEPARTMENT OF IMMUNOREGULATION AND IMMUNODIAGNOSTICS

Head of the Department: **Dr. Rathindranath Baral, PhD**
Senior Scientific Officer (in Assistant Director Grade)
Officer-in-Charge (Research)

Team

Name	**Designation**
Prof. Swapna Chaudhuri	Emeretus Medical Scientist (ICMR)
Dr. Anamika Bose	Women Scientist A (DST)
Dr. Tapasi Das	Women Scientist (DHR)
Dr. Saptak Banerjee	Senior Scientific Officer II
Students	
Ms. Juhina Das	Senior Research Fellow, DBT-NET
Ms. Mohona Chakravarti	Senior Research Fellow, UGC-NET
Mr. Anirban Sarkar	Senior Research Fellow, UGC-NET
Ms. Sukanya Dhar	Senior Research Fellow, DST-INSPIRE
Ms. Aishwarya Guha	Junior Research Fellow, CSIR-NET
Ms. Jasmine Sultana	Junior Research Fellow, CNCI
Mr. Saurav Bera	Junior Research Fellow, ICMR
Ms. Pritha Roychoudhuri	Junior Research Fellow, UGC-NET

Departmental Objectives

- To understand the molecular changes in intra-tumor and extra-tumor (systemic) immune functions in cancer host and to modulate altered immunity to obtain maximum anti-tumor benefits.
- To achieve this aim, immunomodulatory role of Neem Leaf Glycoprotein (NLGP) is extensively studied in different murine and human tumor models.
- Understanding the mechanism of cancer progression in tumor hosts with type I/type II diabetes with reference to alteration in cancer immune-surveillance: Correction by NLGP.
- To understand cancer associated regulation in the biology of pericytes, mesenchymal stem cells and cancer stem cells.
- Understanding the metabolic regulation of Breast Cancer Stem Cells (BCSCs) and its impact on immune landscape.
- Elucidating the role of tumor educated platelets in promoting EMT, metastasis and

angiogenesis in breast cancer model: Modulation by 2DG/NLGP.

- Understanding the influence of prolong Statin treatment in antigen presenting cells and its impact on cancer immunoediting process.

Brief description of the work done

•Molecular alterations in various cell types, like, T cells, B cells, monocytes, macrophages, dendritic cells, regulatory T cells, myeloid derived suppressor cells in murine and human cancers are studied with special reference to its modulation by NLGP.

- Role of RGS5 in differential apoptotic behavior of tumor associated pericytes in tumor and non-tumor microenvironment is studied.
- Role of NLGP in intervening the initiation-promotion protocol during 4-nitroquinoline-1-oxide mediated tongue carcinogenesis, especially during epithelial mesenchymal transition are also being evaluated.
- Role of T cells in regulation of cancer stem cells under the immunomodulation of NLGP are under study.
- Molecular mechanisms of cancer progression in tumor hosts with type I/type II diabetes with reference to the alteration in cancer immune-surveillance and its correction by NLGP are being investigated.
- The role of tumor residing immunosuppressor cells in generation of multidrug resistance in murine and human lymphoma and immunomodulation by NLGP are under study.
- Influences of cardiovascular disease-linked statin (s) treatment on cancer immunoediting process and its modulation by NLGP.
- Studies on experimental and human oral carcinogenesis on formation of cancer stem cell niche
- Understanding the metabolic regulation of Breast cancer stem cells (BCSC) and its impact on immune landscape
- Elucidation of the role of tumor instructed platelets on metastasis, angiogenesis and EMT
- Characterization of NLGP using proteomic approaches
- Identification of signaling gateway of NLGP on antigen presenting cells and elucidation of downstream signaling cascade

Extramural projects

1. **Elucidation of the immune rejuvenation of Hematopoietic stem and the progenitor cells by T11TS in glioma bearing rats**
   Emeritus Medical Scientist
   Prof. Swapna Choudhuri
   Sponsor: **ICMR**
2. **Understanding the role of T cell subset(s) in regulation of cancer initiating stem like cells**
   Principal Investigator
   Dr. Anamika Bose
   Sponsor: DST-WOS

3.An attempt to characterize the protein and carbohydrate moieties of Neem Leaf Glycoprotein with special emphasis on structure-function relationship
Principal Investigator
Dr. Tapasi Das
Sponsor: **DHR-ICMR**

4.Understanding of the intra-extra-tumoral trafficking of mesenchymal stem cells and modulation of its immunosuppressive character by neem leaf glycoprotein
Principal Investigator
Dr. Rathindranath Baral
Co-Investigators
Dr. Anamika Bose; Dr. Smarajit Pal

Sponsor: **ICMR**

5. Infiltration of tumor associated macrophages in the breast tumor microenvironment of different molecular sub-variants and their immunological impact on disease process

Principal Investigator

Dr. Saptak Banerjee

Co-Investigator

Dr. Neyaz Alam

Sponsor: **ICMR**

Projects for students

Dr. Rathindranath Baral as PI

1. Intervention by neem leaf glycoprotein on the initiation-promotion protocol during 4-nitroquinoline-1-oxide mediated tongue carcinogenesis: Special emphasis on epithelial mesenchymal transition- by Juhina Das

Sponsor: DBT

2. Understanding the mechanism of cancer progression in tumor hosts with type I/type II diabetes with reference to alteration in cancer immune-surveillance: Correction by NLGP – Anirban Sarkar

Sponsor: UGC

3. Understanding the mechanism of cancer progression in tumor hosts with type I diabetes with reference to the alteration in cancer immune-surveillance: Correction by NLGP – Anirban Sarkar

Sponsor: ICMR

4. Understanding the role of T cells in regulation of cancer stem cells: Influence of NLGP driven immunomodulation- by Mohona Chakravarti

Sponsor: UGC

5. Study of the role of tumor residing Immunosupressor cells of the generation of multidrug resistance in murine lymphoma with the immunomodulation by Neem Leaf Glycoprotein- by Sukanya Dhar

Sponsor: DST

Dr. Saptak Banerjee as PI

1. Understanding the metabolic regulation of breast cancer stem cells and its impact on immune landscape – by Jasmine Sultana

Sponsor: CNCI

2. Understanding the involvement of transcription factors within different molecular subtypes of breast cancer stem cells in remodeling of immune landscape of tumor: Therapeutic intervention by 2DG and NLGP – by Jasmine Sultana

Sponsor: ICMR

3. Elucidating the role of tumor educated platelets in promoting EMT, metastasis and angiogenesis in breast cancer model: Modulation by 2DG/NLGP – by Aishwarya Guha

Sponsor: CSIR

4. Understanding the influence of prolong Statin treatment in antigen presenting cells and its impact on cancer immunoediting process – by Pritha Roy Choudhuri

Sponsor: UGC

Publications

1: Goswami KK, Bose A, Baral R. Macrophages in tumor: An inflammatory perspective. *ClinImmunol.* 2021 Nov; 232:108875. doi: 10.1016/j.clim.2021.108875. Epub 2021 Nov 2.
Impact Factor: 3.96

2: Dasgupta S, Ghosh T, Dhar J, Bhuniya A, Nandi P, Das A, Saha A, Das J, Guha I, Banerjee S, Chakravarti M, Dasgupta PS, Alam N, Chakrabarti J, Majumdar S, Chakrabarti P, Storkus WJ, Baral R, Bose A. RGS5-TGFβ-Smad2/3 axis switches pro-to anti-apoptotic signaling in

tumor-residing pericytes, assisting tumor growth. *Cell Death Differ.* 2021 Nov;28(11):3052-3076. doi: 10.1038/s41418-021-00801-3. Epub 2021 May 19.

Impact Factor: 15.83

3: Goswami KK, Banerjee S, Bose A, Baral R. Lactic acid in alternative polarization and function of macrophages in tumor microenvironment. *Hum Immunol.* 2022 May;83(5):409-417. doi: 10.1016/j.humimm.2022.02.007. Epub 2022 Mar 15.

Impact Factor: 2.85

4: Patidar A, Selvaraj S, Chakravarti M, Guha I, Bhuniya A, Bera S, Dhar S, Roy K, Baral R, Chattopadhyay D, Pal C, Saha B. TLR induced IL-27 plays host-protective role against B16BL6 melanoma in C57BL/6 mice. *Cytokine.* 2022 Jun;154:155871. doi: 10.1016/j.cyto.2022.155871. Epub 2022 Apr 15.

Impact Factor: 3.48

5: Dasgupta S, Saha A, Ganguly N, Bhuniya A, Dhar S, Guha I, Ghosh T, Sarkar A, Ghosh S, Roy K, Das T, Banerjee S, Pal C, Baral R, Bose A. NLGP regulates RGS5-TGFβ axis to promote pericyte-dependent vascular normalization during restricted tumor growth. FASEB J. 2022 May;36(5):e22268. doi: 10.1096/fj.202101093R.

Impact Factor: 4.966

Other academic activities

PhD awarded

1. Ms. Shayani Dasgupta has awarded Ph.D degree for his thesis, entitled, 'Regulation of G-Protein Signalling 5 (RGS5) in Alternations of Pericytes in Alterations of Pericytes in Tumor Microenvironment: Pro-Therapuitic Modulation by Neem Leaf Glycoprotein' from Calcutta University
2. Ms. Akata Saha has awarded Ph.D degree entitled, 'Studies on the Regulation and Novel Role of VEGF in Hypoxic Tumor Microenvironment: Corrective Role of Neem Leaf Glycoprotein' from Calcutta University

Thesis under preparation

Ms. Mohona Chakravarti, Ms. Juhina Das and Ms. Anirban Sarkar, Ms. Sukanya Dhar have been preparing their thesis for Ph.D degree at Calcutta University and Jadavpur University respectively.

Ph.D ongoing

1. Proposed thesis work of Mr. Saurav Bera, Ms. Jesmine Sultana and Ms. Aishwarya Guha have been registered to Jadavpur University. Proposed thesis work of Ms. Pritha Roy Choudhuri has been registered to Calcutta University under faculty of Zoology.

Teaching:

Dr. R. N. Baral was invited to act as a member of the Post Graduate studies in Physiology at Serampore College, Serampore, Calcutta University.

Dr. R. N. Baral was invited to act as a Guest Teacher of the Post Graduate studies in Instrumentation Department, Jadavpur University.

Dr. R. N. Baral was invited to act as an examiner of Ph.D thesis as well as viva voce examination of Calcutta University, Jadavpur University, Vidyasagar University, WB Health University, SP Pune University, Jawaharlal Nehru University.

Dr. R. N. Baral delivered an Invited talk on 4th February to celebrate "World Cancer Day" conducted by Dept Chittaranjan National Cancer Institute, Kolkata.

Dr. R. N. Baral delivered an Invited talk on 7th April to celebrate "World Health Day" conducted by Biomedical Science Center, Kolkata.

Short Term Projects

5 students (B.Sc, M.Sc) from different universities and institutions trained in the department

for 2-6 months duration. In 2021, due to Covid-19 pandemic and Lockdown, summer training was halted for couple of months.

Reviewer of Journals

Dr. Baral acted as an honorary reviewer of several international journals, like, Cancer Research, Int. J. Cancer, PLoS One, Vaccine, Int Immunopharmacol, Tumor Biology, J Cancer Research and Exptl Oncol, Investigations, Cytotherapy, Immunotherapy, Toxicological Letters, Human Immunology, Medical Oncology etc

Dr. Anamika Bose acted as an honorary reviewer of international journals, like, Blood, Melanoma Research, Stem Cell Research & Therapy, J Ethonopharmacology etc.

Dr. Saptak Banerjee acted as an honorary reviewer of international journal, like, Frontiers in Oncology

Reviewer of Projects

Dr. Baral acted as a reviewer of extramural projects submitted in CSIR, ICMR, DBT-Welcome Trust.

Dr. Banerjee acted as a reviewer of extramural projects submitted in SERB.

Resource Person

- Dr. R. Baral acted as Resource person in BD-Flow Cytometry workshop organized by SRM Institute, Chennai on 17th December, 2021.
- Dr. R. Baral acted as Resource person in a Meeting on general awareness on 'COVID-19 & Vaccine' to 'Self help group of Women' at Nagarukhra Gram Panchayate, Haringhata, Nadia, WB on April 19, 2021.
- Dr. R. Baral invited as a resource person in a Webinar on 'Vaccines in Covid-19 Pandemic', organized by Rotary Club of Jiagung, Sripat Singh College, Jiagung, Murshidabad and K K Chatterjee Memorial Association on June 18, 2021.

Conference/Symposium/Workshop

Oral presentation award:

1. Awarded **3rd Prize** to***Mohona Chakravarti*** for Oral Presentation on the work entitled "Tumor Infiltrated Terminally Exhausted PD1^{high}TCF1^{-}CD8^{+}T-Cells Promote Expansion of Aggressive Cancer Stem Cells" on the occasion of **47th** Annual Meeting of the **Indian Immunology Society**, 18-19th December, 2021.
2. Awarded **2nd Prize** to***Mohona Chakravarti*** for Oral Presentation on the work entitled "Tumor Infiltrated Terminally Exhausted PD1 + TCF1 - CD8 + T Cells Promote Generation of Functionally Aggressive Cancer Stem Cells" on the occasion of **National Science Day** at CNCI on 28th February 2022.
3. Awarded **2nd Prize** to***Pritha Roy Choudhuri*** for Oral Presentation on the work entitled "Tumor Infiltrated Terminally Exhausted PD1^{high}TCF1^{-}CD8^{+}T-Cells Promote Expansion of Aggressive Cancer Stem Cells" on the occasion of **National Science Day** at CNCI on 28th February 2022.
4. Awarded **10 BEST ORAL PRESENTATION Prize** to***Anirban Sarkar***for Oral Presentation on the work entitled "Metabolic modulation of CD8+ T cells regulate type-I diabetes associated melanoma growth restriction" on the occasion of **41st International** Annual Conference ~~on: "Cancer & Stem Cells"~~ of the **Indian Association for Cancer Research** (**IACR-2022**) on "Combating Cancer: Biology to Therapy to Drug Resistance" held in the Amity Institute of Molecular Medicine & Stem Cell Research (AIMMSCR), Amity University, Uttar Pradesh, Noida from 2nd to 5th March 2022.

Oral presentations:

1. **Chakravarti M**, Dhar S, Bera S, Roy K, Sinha A, Sarkar A, Bhuniya A, Dasgupta S, Saha A,

Banerjee S, Alam N, Vernekar M, Pal C, Datta D, Baral R, Bose A. PD1-Therapy Resistant Tumour Infiltrated Terminally Exhausted PD1highTCF1-CD8+ T-Cells Promote Expansion of Aggressive Cancer Stem Cells. In: **41st International Annual Conference ~~on: "Cancer & Stem Cells"~~ of the Indian Association for Cancer Research (IACR-2022)** on "Combating Cancer: Biology to Therapy to Drug Resistance" held in the Amity Institute of Molecular Medicine & Stem Cell Research (AIMMSCR), Amity University, Uttar Pradesh, Noida from 2nd to 5th March 2022.

2. **Guha A**, Sultana J, Chakraborti M, Bhuniya A, Choudhuri PR, Dhar S, Sarkar A, Bera S, Baral R, Alam N, Bose A, Banerjee S. Elucidating the role of tumor educated platelets in tumorigenesis promoting emt and stem cell properties in breast cancer. In: **41st International Annual Conference ~~on: "Cancer & Stem Cells"~~ of the Indian Association for Cancer Research (IACR-2022)** on "Combating Cancer: Biology to Therapy to Drug Resistance" held in the Amity Institute of Molecular Medicine & Stem Cell Research (AIMMSCR), Amity University, Uttar Pradesh, Noida from 2nd to 5th March 2022.
3. **Choudhury PR**, Sarkar A, Bera S, Guha A, Sultana J, Chakravarti M, Bhuniya A, Dhar S, Baral R, Bose A, Banerjee S. Statin treatment in hypercholesterolemic mice enhances tumor growth by affecting dendritic cell associated antigen presentation pathway. In: **41st International Annual Conference ~~on: "Cancer & Stem Cells"~~ of the Indian Association for Cancer Research (IACR-2022)** on "Combating Cancer: Biology to Therapy to Drug Resistance" held in the Amity Institute of Molecular Medicine & Stem Cell Research (AIMMSCR), Amity University, Uttar Pradesh, Noida from 2nd to 5th March 2022.

4. **Sarkar A**, Dhar S, Bera S, Chakravarti M, Verma A, Prasad P, Saha A, Bhuniya A, Guha I, Roy SS, Baral R, Datta D, Bose A. Pre-exsistance of type1 diabetes favors murine melanoma growth restriction by metabloic reprogramming of cd8+ t cells. In: **A Symposium** of the **Society of Biological Chemists (I),** Kolkata Chapter. When Science Meets Life' at the Sister Nivedita University, New Town, West Bengal on April 9-10, 2022
5. **Guha A**, Sultana J, Chakravarti M, Bera S, Bhuniya A, Dhar S, Sarkar A, Chowdhury RP, Baral R, Neyaz Alam, Bose A, Banerjee S. Elucidating the role of tumor educated Platelets in tumorigenesis promoting emt and stem cell properties in cancer. In: **A Symposium** of the **Society of Biological Chemists (I),** Kolkata Chapter. When Science Meets Life' at the Sister Nivedita University, New Town, West Bengal on April 9-10, 2022
6. **Bera S**, Das J, Chakravarti M, Sarkar A, Dhar S, Ganguly N, Chakraborty C, Chaudry UR, Ghosh S, Baral R, Bose A. Deciphering the status and function of the Cancer Stem Cells in the Progressive Development of 4-NQO Induced and Human Oral Tongue Cancer: Modulation by NLGP. In: One-day seminar for observing the occasion of **National Science Day** on 28th February 2022 at CNCI.

Poster Presentations:

1. **Guha A**, Bhuniya A, Sultana J, Chakraborti M, Sarkar A, Bera S, Dhar S, Chowdhury PR, Baral R, Alam N, Bose A, Banerjee S. Elucidating the role of tumor educated platelets in tumorigenesis promoting emt and stem cell properties in breast cancer. In: One-day seminar for observing the occasion of **National Science Day** on 28th February 2022 at CNCI.
2. **Sultana J**, Guha A, Chakraborti M, Bera S, Dhar S, Bhuniya A, Sarkar A, Das J, Chowdhury PR, Baral R, Alam N, Bose A, Banerjee S. Understanding the metabolic regulation of Breast cancer stem cells and its impact on immune landscape: Modulation by 2DG. In: One-day seminar for observing the occasion of **National Science Day** on 28th February 2022 at CNCI
3. **Dhar S,** Chakravarti M, Bera S, Ganguly N, Dasgupta S, Sarkar A, Saha A, Banerjee S, Bhaskar Saha, Baral R, Mukherjee KK, Bose A. Tumor-associated monocytic myeloid derived suppressor cells promotes multidrug resistance in NHL patients by modulating IL-6/IL-10/IL-1β axis. In: **41st International Annual Conference ~~on: "Cancer & Stem Cells"~~ of the Indian Association for Cancer Research (IACR-2022)** on "Combating Cancer:

Biology to Therapy to Drug Resistance" held in the Amity Institute of Molecular Medicine & Stem Cell Research (AIMMSCR), Amity University, Uttar Pradesh, Noida from 2nd to 5th March 2022.

4. **Bera S**, Das J, Chakravarti M, Sarkar A, Dhar S, Ganguly N, Chakraborty C, Chaudry UR, Ghosh S, Baral R, Bose A. Role of Cancer Stem Cells in the Progressive Development of 4-NQO Induced and Human Oral Tongue Cancer: Modulation by NLGP. In: **41st International Annual Conference ~~on: "Cancer & Stem Cells"~~ of the Indian Association for Cancer Research (IACR-2022)** on "Combating Cancer: Biology to Therapy to Drug Resistance" held in the Amity Institute of Molecular Medicine & Stem Cell Research (AIMMSCR), Amity University, Uttar Pradesh, Noida from 2nd to 5th March 2022.
5. **Sultana J**, Guha A, Chakravorti M, Dhar S, Guha I, Bhuniya A, Choudhury PR, Sarkar A, Bera S, Baral R, Alam N, Bose A, Banerjee S. The metabolic regulator, 2-deoxy glucose (2-dg), modulates cancer stem cells differentially in luminal a and tnbc breast tumor subtypes. In: **41st International Annual Conference ~~on: "Cancer & Stem Cells"~~ of the Indian Association for Cancer Research (IACR-2022)** on "Combating Cancer: Biology to Therapy to Drug Resistance" held in the Amity Institute of Molecular Medicine & Stem Cell Research (AIMMSCR), Amity University, Uttar Pradesh, Noida from 2nd to 5th March 2022.

6. **Dhar S**, Chakravarti M, Bera S, Ganguly N, Dasgupta S, Sarkar A, Saha A, Banerjee S, Saha B, Baral R, Mukherjee KK, Bose A. Tumor-associated monocytic myeloid derived suppressor cells is a potential prognostic biomarker, promoting multi-drug resistance in NHL patients by modulating il-6/il-10/il-1β axis. In: The European Hematology Association held on Vienna, Austria from 9th June, 2022 to 12th June, 2022

Contribution in Covid pandemic

1. Bose A and Baral R, COVID-19 and NLGP: Lessons from Cancer Research (An opinion article): Under revision, *Cytokine* (2021)

DEPARTMENT OF IN VITRO CARCINOGENESIS AND CELLULAR CHEMOTHERAPY

Head of the department: Dr. Rathindranath Baral, PhD, Senior Scientific Officer (Assistant Director Grade)

Team

Faculty with educational qualification	**Designation**
Dr. Subhasis Barik, Ph D	Senior Scientific Office
Dr. Arpita Chandra, Ph D	Senior Scientific Office
Other Team Members	
Students	
Ms.Kanisha Kar	UGC, JRF
Mr. Bikash Kabi	UGC, JRF
Mr. Soumyadeep Mukherjee	CSIR, JRF
Ms. Paramita Paul	CSIR, JRF
Mr. Subham Bhakat	UGC, JRF
Ms. Diya Ghosh	WBDSTBT, JRF
Ms. Tanima Das	UGC, JRF

Objectives of the department: The department has multidisciplinary approaches to target cancer. The specific areas includes i) Identification of intra-thymic molecular mechanisms coupled with T-cell commitment from stem/progenitor - T cells to target their robust proliferation in T-cell leukemia/lymphoma, ii) Elucidation of the role heterotypic interactions of different immune suppressor cells in T cell tolerance in cancer condition. iii) Targeting cancer cells by application of different customized less toxic inorganic or organic molecules as chemotherapeutic agents iv) Development of drug delivery system that will deliver the existing drug to the targeted location by exploiting hypoxia.

Brief description of the work done during the year (from 1st April 2021 to 31st March 2022):

A. Projects running (Extramural) –

Dr. Subhasis Barik→ Project Title: "Environmental regulation on T cell development and autoimmunity."→ Funding agency: Department of Biotechnology (Ramalingaswami Fellowship).

Dr. Subhasis Barik, Co-PI: Dr. Arpita Chandra and Dr. Soumitra Kumar Choudhuri. →

Project Title: "Targeting the role of serum acute phase proteins to induce peripheral T cell tolerance in breast, ovary and colon carcinoma." →Funding agency: SERB-CRG (SCIENCE & ENGINEERING RESEARCH BOARD - CORE RESEARCH GRANT).

Dr. Arpita Chandra→Project Title: "Cobalt Schiff base complexes as redox activated effectors in targeting lung cancer", →Funding agency: DSTBT,WB.

B. Projects running (Internal) –

- Dr. Subhasis Barik→Project Title: "Identification of intra-thymic mechanisms associated with T-cell commitment from T-stem/progenitor cells and robust T-cell proliferation in T-cell leukemia/lymphoma".
- Dr. Arpita Chandra →Project Title:"Unraveling Chemotherapeutic efficacy of a Novel Cobalt Schiff Base Compound in both in vitro & in vivo."
- Dr. Arpita Chandra →Project Title: "Repression of hypoxia induced angiogenesis by a hydroxamic acid derivative in Cancer".
- Dr. Subhasis Barik→Project Title:"Targeting multipotent nature of early T cell progenitors to inhibit their robust proliferation and lineage diversity: A Microenvironmental fine tuning over genetic mutations in Early Tcell precursor acute lymphoblastic leukemia (ETP-ALL)".
- Dr. Subhasis Barik→Project Title:"Unraveling the involvement of extracellular cytokine signaling in immune suppressive cells to govern their subset heterogeneity and peripheral T cell tolerance in cancer".
- Dr. Subhasis Barik→Project Title:"Unraveling the involvement of molecular dictators in immune suppressive cells to control peripheral T cell tolerance in cancer."

Research Articles (International):

- Mukherjee S, Kar A, Khatun N, Datta P, Biswas A, **Barik S**. 2021Familiarity Breeds Strategy: In Silico Untangling of the Molecular Complexity on Course of Autoimmune Liver Disease-to-Hepatocellular Carcinoma Transition Predicts Novel Transcriptional Signatures. *Cells*.;10(8):1917. Published 2021 Jul 29. doi:10.3390/cells10081917.
- Biswas S, Karim S, Zangrando E, **Chandra A**. 2022. An effortless approach to synthesize two structurally diverse nano copper (II) materials and assessment of their apoptosis-inducing ability on lung cancer cell line. *Applied Organometallic Chemistry*.2022; 36(5):e6659. Published 2022March 2. doi: https://doi.org/10.1002/aoc.6659.

Chapters:

- Mukherjee S, Baidya A, **Barik S**. New Approaches in Cancer Research: Stem Cell Research, Translational Research, Immunotherapy, and Others. in *Cancer Diagnostics and Therapeutics*. doi: http://dx.doi.org/10.1007/978-981-16-4752-9_16

Other academic activities - Paper presented (Oral / Poster)

Ms. Kanisha Kar presented a poster on "A novel cobalt(III) Schiff base complex Induces Cell Cycle Arrest at the G2/M Phase and Promotes Apoptosis in Breast Cancer Cell lines" in "41th Annual Conference of the Indian Association for Cancer Research" on 2nd - 5th March,2022 organized by Amity University (Noida, Uttar Pradesh)

Students undergoing PhD– Seven

Conference / Symposium / Workshop attended

- Mr. Soumyadeep Mukherjee attended the 47th Annual meeting of The Indian Immunology Society on 18th to 19th December, 2021.
- Ms. Paramita Paul attended the 47th Annual meeting of The Indian Immunology Society on 18th to 19th December, 2021.
- MrSubhamBhakat attended the 47th Annual meeting of The Indian Immunology Society on 18th to 19th December, 2021.

- Dr. Subhasis Barik attended the 41st Annual Conference of the Indian Association for Cancer Research (IACR-2022) on "Combating Cancer: Biology to Therapy to Drug Resistance" along with an International Symposium on "Stem Cell and Cancer" from 2nd to 5th March, 2022.
- Mr. Soumyadeep Mukherjee attended the 41st Annual Conference of the Indian Association for Cancer Research (IACR-2022) on "Combating Cancer: Biology to Therapy to Drug Resistance" along with an International Symposium on "Stem Cell and Cancer" from 2nd to 5th March, 2022.
- Ms. Paramita Paul attended the 41st Annual Conference of the Indian Association for Cancer Research (IACR-2022) on "Combating Cancer: Biology to Therapy to Drug Resistance" along with an International Symposium on "Stem Cell and Cancer" from 2nd to 5th March, 2022.
- Mr. SubhamBhakat attended the 41st Annual Conference of the Indian Association for Cancer Research (IACR-2022) on "Combating Cancer: Biology to Therapy to Drug Resistance" along with an International Symposium on "Stem Cell and Cancer" from 2nd to 5th March, 2022.
- Dr. Subhasis Barik, Mr. Soumyadeep Mukherjee, Ms. Paramita Paul and Mr. SubhamBhakat attended a seminar "Integrated Approach in S & T for sustainable future" on National Science Day, 28th February, 2022 organized by CNCI, Kolkata.
- Dr. Subhasis Barik, Mr. Soumyadeep Mukherjee, Ms. Paramita Paul and Mr. SubhamBhakat attended a seminar "World Cancer Day 2022 – Close The Care Gap" on 04th February, 2022 organized by CNCI, Kolkata.
- Dr. Arpita Chandra attended the "41th Annual Conference of the Indian Association for Cancer Research" on "Combating Cancer: Biology to Therapy to Drug Resistance" along with an International Symposium on "Stem Cell and Cancer" held from 2nd March to 5th March, 2022 at Amity University (Noida, Uttar Pradesh).
- Dr. Arpita Chandra attended the Webinar on "Advances in optical microscopy and its biomedical application" held on 26th February, 2022 organized by the Department of Chemistry, Adamas University (Kolkata).
- Dr. Arpita Chandra attended a Seminar on "Integrated Approach in S & T for sustainable future" on National Science Day, 28th February, 2022 organized by Chittaranjan National Cancer Institute, Kolkata (Acted as Jt. Convenor).
- Dr. Arpita Chandra attended a Seminar on "World Cancer Day 2022 - Close The Care Gap" on 4th February, 2022 organized by Chittaranjan National Cancer Institute, Kolkata (Acted as Jt. Convenor).
- Dr. Arpita Chandra attended a Webinar entitled "Bio-VERS'21 on 7th September, 2022 organized by BIORAD.
- Ms. Kanisha Kar attended the Webinar on "Advances in optical microscopy and its biomedical application" held on 26th February, 2022 organized by the Department of Chemistry, Adamas University (Kolkata).
- Ms. Kanisha Kar attended a Seminar on "Integrated Approach in S & T for sustainable future" on National Science Day, 28th February, 2022 organized by Chittaranjan National Cancer Institute, Kolkata.
- Ms. Kanisha Kar attended a Seminar on "World Cancer Day 2022 - Close The Care Gap" on 4th February, 2022 organized by Chittaranjan National Cancer Institute, Kolkata.
- Ms. Kanisha Kar attended a Webinar entitled "Bio-VERS'21 on 7th September, 2022 organized by BIORAD.
- Mr. Bikash Kabi attended the "41th Annual Conference of the Indian Association for Cancer Research" on "Combating Cancer: Biology to Therapy to Drug Resistance" along with an International Symposium on "Stem Cell and Cancer" held from 2nd March to 5th March, 2022 at Amity University (Noida, Uttar Pradesh).
- Mr. Bikash Kabi attended the Webinar on "Advances in optical microscopy and its biomedical application" held on 26th February, 2022 organized by the Department of Chemistry, Adamas University (Kolkata).
- Mr. Bikash Kabi attended a Seminar on "Integrated Approach in S & T for sustainable future" on National Science Day, 28th February, 2022 organized by Chittaranjan National Cancer Institute, Kolkata.
- Mr. Bikash Kabi attended a Seminar on "World Cancer Day 2022 - Close The Care Gap" on 4th February, 2022 organized by Chittaranjan National Cancer Institute, Kolkata.
- Mr. Bikash Kabi attended a Webinar on "Bio-VERS'21 on 7th September, 2022 organized by BIORAD.
- Ms. Diya Ghosh attended the "41th Annual Conference of the Indian Association for Cancer Research" on "Combating Cancer: Biology to Therapy to Drug Resistance" along with an International Symposium on "Stem Cell and Cancer" held from 2nd March to 5th March, 2022 at Amity University (Noida, Uttar Pradesh).
- Ms. Diya Ghosh attended the Webinar on "Advances in optical microscopy and its biomedical application" held on 26th February, 2022 organized by the Department of Chemistry, Adamas University (Kolkata).
- Ms. Diya Ghosh attended a Seminar on "Integrated Approach in S & T for sustainable future" on National Science Day, 28th February, 2022 organized by Chittaranjan National Cancer Institute, Kolkata.
- Ms. Diya Ghosh attended a Seminar on "World Cancer Day 2022 - Close The Care Gap" on 4th February, 2022 organized by Chittaranjan National Cancer Institute, Kolkata.
- Ms. Diya Ghosh attended a Webinar on "Bio-VERS'21 on 7th September, 2022 organized by BIORAD.
- Ms. Tanima Das attended the "41th Annual Conference of the Indian Association for Cancer Research" on "Combating Cancer: Biology to Therapy to Drug Resistance" along with an International Symposium on "Stem Cell and Cancer" held from 2nd March to 5th March, 2022 at Amity University (Noida, Uttar Pradesh).
- Ms. Tanima Das attended the Webinar on "Advances in optical microscopy and its biomedical application" held on 26th February, 2022 organized by the Department of Chemistry, Adamas University (Kolkata).
- Ms. Tanima Das attended a Seminar on "Integrated Approach in S & T for sustainable future" on National Science Day, 28th February, 2022 organized by Chittaranjan National Cancer Institute, Kolkata.

- Ms. Tanima Das attended a Seminar on "World Cancer Day 2022 - Close The Care Gap" on 4th February, 2022 organized by Chittaranjan National Cancer Institute, Kolkata.

Interesting observations, if any–

- Influence of Toll like Receptor (TLR) signaling in thymopoiesis was checked in C57BL/6 murine model. Effects of sustained pro-inflammation induced by TLR activation was assessed on the trafficking, differentiation and activation dynamics of T cell progenitors, both in the thymus and the periphery. The involvement of metabolic perturbations in such processes was checked in vivo. Role of developmentally significant signaling pathways such as the Notch-Delta/Jagged pathway in the observed outcomes was evaluated as well.
- Uniquely expressed genes associated with ETP-ALL were screened out from public gene expression databases, followed by statistical analyses in order to validate their efficacy as transcriptional biomarkers. In addition, hemato-developmental inclinations of the proposed markers were tested by means of dimensionality reduction, erecting a potential platform for the application of precision medicine in ETP-ALL through the focused integration of transcriptome and interactome.
- Expression of key microenvironmental factors was checked in tumor models in vitro and in vivo, as well as in intra- and extra-tumoral immune suppressor cells, in order to deduce a relationship between their expression and cancer progression.
- Expression of serum acute phase proteins were examined in different cancer cell lines (breast, ovary and colon carcinoma) and human breast tissues. Their expression was also studied in bone marrow derived classical as well as alternatively activated macrophages. In vivo experiments were carried out to see whether expression level of serum acute phase proteins can be used as cancer biomarker.
- A new synthetic route was found to synthesize a previously synthesized cobalt Schiff base compound, CoSB-1 in much lesser time. Initially it took 72 hrs. with new approach, it took only 12hrs. A cytotoxic agent (GA) was coordinated with the cobalt Schiff base complex, CoSB-1 to generate, CoSB-1_GA and characterized. Two novel cobalt Schiff bases (CoSB-2, CoSB-3) and a novel thiazole based hydroxamic acid (HA-1) were synthesized and characterized (partially)
- In comparison to the standard chemotherapeutic drug oxaliplatin, the newly synthesized Cobalt Schiff base complex CoSB-1 imparts cytotoxicity with a very low IC50 against MCF-7 and MDA-MB-231 cells without being harmful to human PBMCs. Additional in vitro studies with the same complex and Oxaliplatin with their corresponding IC50 values in breast cancer cells revealed that the complex induced similar extent of apoptosis and G2/M arrest as Oxaliplatin. Additionally, the status of the protein implicated in the signaling cascade of apoptosis was monitored using western blot analysis. This new Cobalt Schiff base complex was tested for purity using HPLC analysis, and the compound was found to be > 99 percent pure. In vivo toxicity experiments on Swiss albino mice revealed that the complex had no significant hematological, nephrotoxic, or hepatotoxic effects (biochemical analysis). The complex's nontoxic effects were confirmed by histopathological investigation of liver and kidney tissue.
- Oxalyl bis(N-Phenyl) hydroxamic acid (OBPHA)is found to be cytotoxic in MCF-7 and MDAMB-231 and non toxic to human PBMCs. The high IC_{50} value of OBPHA indicate that it could be less toxic compared

to other hydroxamic acids. Further *in vitro* studies in MCF-7 cells on different time point, revealed that OBPHA induced apoptosis via down regulation of cellular reactive oxygen species (ROS), moreover cell cycle phase distribution analysis showed that OBPHA induced G0/G1 cell cycle arrest. In addition wound healing assay and colony formation assay in MCF-7 cells demonstrate the anti proliferative and anti invasive property of OBPHA. This synthesized OBPHA was tested for purity using HPLC analysis, and the compound was found to be > 99 percent pure. In vivo toxicity study of OBPHA in Swiss albino mice showed no noticeable hepatotoxicity and nephrotoxicity as observed by the HE stain of liver and kidney tissues.

- The in-vitro cytotoxicity study of HA-1 was evaluated in MCF-7 and MDA-MB-231 by MTT analysis and the IC50 dose determination was done. Flow cytometry analysis was performed in MCF-7 and MDA-MB-231 cells treated with the thiazole-based hydroxamic acid, to determine the cell cycle distribution pattern.

Training Program

- Dr. Subhasis Barik has conducted two short-term training programs during this academic year.
- Dr. Arpita Chandra has conducted three short-term training programs during this academic year.

DEPARTMENT OF NEUROENDOCRINOLOGY & EXPERIMENTAL HAEMATOLOGY

HeadoftheDepartment	**Designation**
Dr.MadhumitaRoy (April2021-Nov2022) DrRathindranathBaral(Dec 2022-March2022)	SeniorScientificOfficerGrade-I(AssistantDirectorGrade)

Team	
Dr. BiswarupBasu (Ph.D)	SeniorScientificOfficerGrade-II
Students	
Mr.SandipGhosh (M.Sc)	UGC-SRF
Mr.SouvikDas (M.Sc)	UGC-SRF
Ms.PratitiBhattacharjee (M.Sc)	CSIR-JRF

Objectives of the Department: Primary objectives of department is to understand dysregulations of neuronal-endocrine-immune axis in progression of cancer and pathophysiology of wound healing. This department also aims to develop affordable and sustainable technologies of biomedical importance like enhancing drug efficacy, drug delivery, immunotherapy and combinational therapy pertaining to cancer care. We also explore nano-bio interfaces for preventive and therapeutic potential of phytochemicals and synthetic drugs for breast and ovarian cancers and identification of genomic biomarkers in oral cancers.

A. Projects running: (Extramural) –

Co-PI Project: "Effect of Hyperthermia on PARP Inhibition and NOTCH Signaling in Homologous Recombination Stratified Epithelial Ovarian Cancer" SERB-CRG (recommended on 9th Dec, 2021).

B. Projects running: (Intramural) –

- Development & Preclinical Evaluation of ECM biomimicking Polymeric Scaffolds for Stimulated Scar-Free Healing of Burns and Pre-Radiation Surgical Wounds.
- Development & Preclinical Evaluation of polysaccharide rich hydrogels to understand metastasis & drug efficacy in 3D triple negative breast tumor models.
- Encapsulation of mesoporous Carbohydrate Nanoparticles on intestinal probiotic cell surface for enhanced efficacy of anticancer drugs.

- Identification of neuronal regulators in cancer progression and potential CIPN inhibitors.
- Study of role of plant extracts on Glioblastoma and associated neurocognitive dysfunction.
- Biomedical evaluation & scaling up of algae derived neutraceuticals towards cancer therapeutics.

C. Student's Ph.D projects:

1. "Study of autophagy signatures as prognostic biomarkers and therapeutic targets in Indian breast cancer patients"(Student: Mr. Sandip Ghosh , UGC-SRF).
2. " A study on molecular signatures and multiregional tumor heterogeneity in ovarian tumors in Eastern India and therapeutic targeting" (Student: Mr. Souvik Das , UGC-SRF).
3. "Study on the role of neuronal regulators in ovarian cancer progression and chemotherapy induced peripheral neuropathy"(Student: Ms Pratiti Bhattacharjee, CSIR-JRF).

D. Publications / Monographs / Patents etc:

Original Articles (International)

1. Kaur P, Ghosh S, Bhowmick A, Gadhave K, Datta S, Ghosh A, Garg N, Mahajan RL, Basu B*, Choudhury D*.2022, Bacterioboat—A novel tool to increase the half-life period of the orally administered drug. Science Advances. 8(10). eabh1419 (Impact factor 14.14, Corresponding Author)
2. Kaur H, Ghosh S, Kumar P, Basu B*, Nagpal K*. 2022. Ellagic acid-loaded, tween 80-coated, chitosan nanoparticles as a promising therapeutic approach against breast cancer: In-vitro and in-vivo study. Life Sciences, 284. 119927 (Impact factor 5.037, Corresponding Author)
3. Sinha M, Chakraborty U, Kool A, Chakravarti M, Das S, Ghosh S, Thakur L, Khuranna A, Nayak D, Basu B, Kar S, Ray R*, Das S*. 2022,In-vitro antiviral action of Eupatorium perfoliatum against dengue virus infection: Modulation of mTOR signaling and autophagy. Journal of Ethnopharmacology, 282. 114627 (Impact factor 4.36)
4. Selvendran S, Das S, Waidha K, Venkatesan S, Balamurali MM, Basu B*, Rajendran S*. 2021, Pyrrole-Fused Benzoxazinones/ Quinoxalinones: Molecular Dynamic Simulation, Antiproliferative and Antibacterial Activities. Chemistry Select, 6(40). 10872-10882 (Impact factor 2.307, Corresponding Author)

Book chapters (International)

1. Basu, B., Ghosh, S., Das, S., Das, A*. (2021). Implications of Phosphoinositide 3-Kinase (PI3K) Signalling in Cellular and Molecular Mechanisms of Respiratory Diseases. In: Dua, K., Löbenberg, R., Malheiros Luzo, Â.C., Shukla, S., Satija, S. (eds) Targeting Cellular Signalling Pathways in Lung Diseases. Springer, Singapore (First Author)
2. Das S., Ghosh S., Bhattacharjee P., Basu B*. (2022) Implications of Oxidative Stress and Epigenetic Drivers in Ovarian Cancer Progression and Therapy. In: Chakraborti S. (eds) Handbook of Oxidative Stress in Cancer: Therapeutic Aspects. Springer, Singapore (Corresponding Author)

E. Other academic activities:

Presentations (Oral / Poster):

1. Dr Basu delivered Invited Oral Presentation on topic entitled "Oral Chemotherapy Drug Delivery Through Nanoparticle encapsulated Intestinal Microflora –Potential in Increased Drug Half -Life and Effectiveness in Tumor Bearing Mice" at 41st International Annual Conference of the Indian Association for Cancer Research (IACR-2022), Noida: 5th March, 2022
2. Dr Basu delivered Oral Presentation on topic entitled "Management of Chemotherapy-Induced Peripheral neuropathy (CIPN) in ovarian cancer with Precision Medicine and Combinational Approach" at KolGo Trg 3rd annual meeting, Kolkata: 27th March, 2022.
3. Mr Sandip Ghosh presented poster on "Bacterioboat—A novel tool to increase the half-life period of the orally administered chemotherapeutic drug" in National Science Day, CNCI: 28th Feb 2022.
4. Mr Souvik Das presented poster on "Sustainable production of yeast-carotenoids using waste hydrolysate and evaluation of anti-breast cancer properties" in National Science Day, CNCI: 28th Feb 2022.
5. Mr Sandip Ghosh presented poster on "Enhanced in vivo efficacy of ellagic acid-loaded, tween 80-

coated, chitosan nanoparticles in potential breast cancer intervention" at Frontiers in Cancer Science, (virtual conference): 1st -3rd Nov,2021.

Students undergoing PhD- 3

Other awards or special achievements-

1. Dr Basu conducted Comprehensive Evaluation as nominated external expert for integrated Ph.D. program at NIBMG, Kalyani: 20th Oct, 2021.
2. Mr Sandip Ghosh has secured 1st prize in poster presentation at National Science Day, CNCI: 28th Feb 2022
3. Dr Basu acted as grant reviewer of Science and Engineering Research Board(SERB-CRG).
4. Dr Basu acted as peer reviewer for journal "Environmental Science and Pollution Research".
5. Dr Basu is selected in Editorial Board of journal "Technology in Cancer Research & Treatment".
6. SERB-CRG extramural grant is recommended for Dr Basu as Co-PI.
7. Dr Basu is selected as academic committee member, CNCI.
8. Dr. Basu acted as judge in oral & poster presentations at prestigious IACR-2021 Conference,
9. Noida: 3rd March, 2022.

Conference / Symposium / Workshop (International / National) attended –

1. Dr Basu attended GCIG Spring 2021 Meeting (virtual): April 30th -May 21st, 2021.
2. Participation in Workshop by Mr Sandip Ghosh & Mr Souvik Das on" Biological Data analysis Workshop using SPSS", Dept. of Zoology, Mahishadal Raj College-: 27th -29th July ,2021.
3. 3. Participation by Mr Sandip Ghosh & Mr Souvik Das "Online Lecture cum Training session on R", IICB True: 19th -20th Nov, 2021.
4. Participation in Workshop by Mr Souvik Das "Workshop: In silico ligand docking" Schrodinger in association with Sikkim Manipal University: 9th Nov, 2021.
5. Virtual Seminar attended by Mr Sandip Ghosh & Mr Souvik Das on "Inherited susceptibility to Breast Cancer" by Global Cancer Consortium: 27th Jan, 2022.

Interesting observations, if any-

Brief description of the work done during the year-

1. Development and preclinical evaluation of Ellagic Acid-Loaded, Tween 80-Coated, Chitosan Nanoparticles as a promising therapeutic approach against Breast Cancer

Collaboration: Amity University, Noida; University of the Witwatersrand, Johannesburg

Study Design: Ellagic acid (EA) is widely reported for its translational potential in vitro but efficient in vivo delivery of EA is a challenge. To overcome the challenges of in vivo delivery, we used a tween 80 coated nano delivery of Ellagic acid in vitro and in vivo for breast cancer. Two batches of chitosan-based nanoformulations of EA (with and without tween 80 coating) were prepared by ionotropic gelation method. Nanoformulations were characterized and further evaluated in breast cancer cells (MCF7) and with EAC tumor-bearing swiss albino mice and we observed significant higher tumor shrinkage and survival through nanodelivery compared to Ellagic acid alone. Best efficacy was observed with tween 80 coating. A quantitative simulation study revealed that the observed antitumor efficacy is due to the synergistic efficacy of the Chitosan- Ellagic acid combination.Furthermore, nanoformulations showed higher apoptosis in tumor tissues with no significant tissue toxicity in vital organs.(Published in Life Sciences ,2022).

Key result:

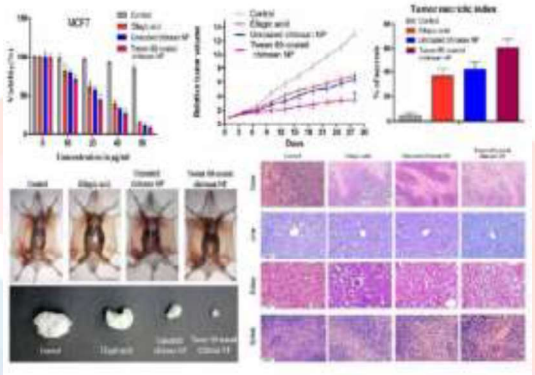


Fig. Ellagic acid loaded, Twen 80 coated encapsulated Chitosan nanoparticles showed higher cellular cytotoxicity in MCF-

7 cells and significantly increased tumor regression in EAC tumor bearing micewithout any histotoxicity to vital organs, compared to control ,Ellagic acid or uncoated Chitosan Ellagic acid nanoparticles

2. Development of Mesoporous Nanoparticle Encapsulated Intestinal Probiotic Microflora as Drug Loading & Delivery Vehicle for Enhanced Efficacy of Oral Anticancer Drugs

Collaboration: Thapar University, Punjab; Bose Institute, Kolkata ; IIT Mandi, Himachal Pradesh; Banaras Hindu University, Varanasi

Study Design: The short half-life in the GI tract necessitates an excess of drugs causing side effects of oral formulations. Here, we developed and deployed "Bacterioboat", which consists of metabolically active Lactobacillus reuteri as a drug carrier suitable for oral administration. We have used cell wall encapsulation using mesoporous carbohydrate nanoparticles, which can absorb a variety of molecules (such as drugs and dye) released in a sustained manner around the microvilli, resulting in efficient intestinal absorption of the drug. Enhanced and prolonged absorption resulted in an increase in the bioavailability of the drug in Sarcoma-180 transplanted swiss mice (following institutional animal ehics approved protocol). We observed increased bioavailability of 5-FU up to 24 hours when applied through Bacterioboat in conventional oral dose while through normal oral dose, traces of the drug was detectable in the serum only up to 8 hours. Increase in bioavailability resulted in solid tumor size reduction and enhanced survival.
Animal data further showed that even at half of the conventional dose, significant tumor size reduction observed when the drug was applied through Bacterioboat, showing better survival and no toxicity to vital organs (Published in Science Advances, 2022).
Key result:

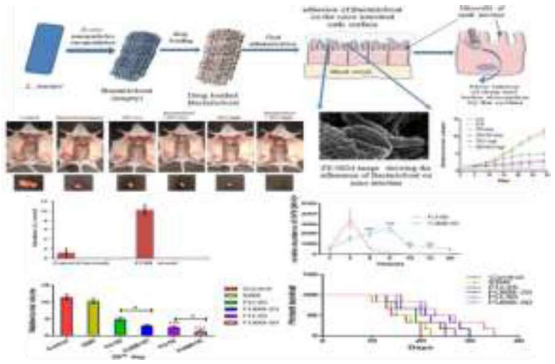


Fig. Surface encapsulated mesoporous nanoparticles on metabolically active Lactobacillus reuteri showed intestine anchorage and sustained oral delivery of 5-FU (5-Fluorouracil) in Sarcoma-180 tumor bearing mice. RT-PCR data showing the presence of L.reuteri in the mice intestine as the signal for the FUBB treated mice is 10 times than the control. LC ESI MS showed detectable amount of the 5-FU drug in the mice plasma up to 8 h when applied alone(FU-50) using oral delivery route and shows detectable amount of 5-FU delivered orally using FUBB up to 24 h (FUBB-50). This higher bioavailavility resulted in higher tumor shrinkage and survival in treated groups even in half the standard doses(FUBB-25).

3. Development and Preclinical Evaluation of- (i) Extracellular Matrix Bio-Mimicking Scaffolds & (ii) Nano-Insulin formulation for Scar-Free Healing of Burn Wounds

Collaboration: Amity University, Haryana
Study Design: We have earlier reported efficacy of insulin in dermal wound healing and better efficacy
when in nano formulation, but no work is reported in burn wound model. Similarly for burn wound ,we, for the first time have developed a bio-synthetic, economic, organic silica (diffused nanoparticles) and antioxidant enriched, Bamboo fibre based 3D scaffolds/ microemultions as ECM bio-mimics. This bamboo-hydrogel composite are rich in silica and antioxidants to modulate angiogenesis and TGFs , stimulating scar free wound healing while also countering infections. Nano insulin and two different hydrogels (HD1 and HD2) were separately evaluated for wound healing capacity in 3rd degree burns (following institutional animal ethics approved protocol) and we achieved accelerated healing in treated groups where HD2 showed better efficacy than HD1 (Unpublished).
Key results:

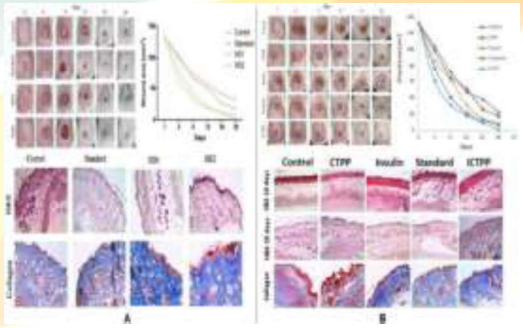


Fig. (A)Hydrogel dressing on burn wound showed accelerated wound healing time (wound contraction arearelated to time)compared to saline treated groups and HD2 showed higher efficacy than HD1 as reflected in higher keratinocyte cellularinfiltration and collagen sysnthesis.(B) Nanoinsulin showed higher wound healing efficacy compared to insulin or covehicletreatedgroupsasevidentfromearlywoundcontractionandhigherepithelizationandcollagensysnthesis.

4. Cross talk of Epidermal Growth Factor Receptor (EGFR) and SMAD4 in Progression of Gallbladder Adenocarcinoma in Eastern Indian Patients

Collaboration: ISI, Kolkata, IPGMER, Kolkata

Study Design: We tried to understand interplay of Epidermal Growth Factor Receptor (EGFR) with SMAD4 and ERBB2 in Gallbladder Adenocarcinoma progression in Eastern Indian Patients with respect to differential expression patterns. 125 patients samples of GB were collected (following institutional approved human ethical norms) and their expression pattern of genes if interest were checked with multivariate analysis for Indian patients.After patten identification representative tissue sections were stained for IHC and analysed. We found interesting correlation between genes of interest (Unpublished).

Key results:

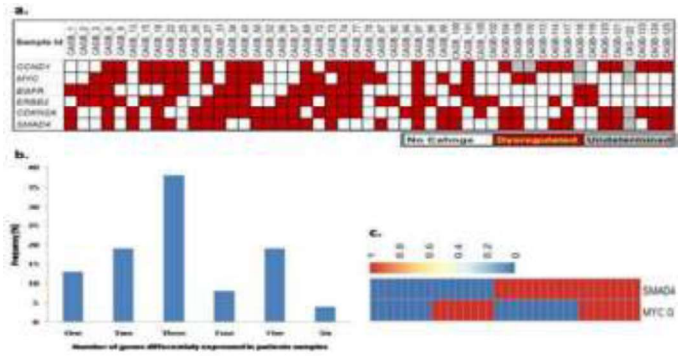


Fig. Spectrum of gene expression in gallbladder cancer patients. (a.) Fold change status of studied 6 genes in all the patients. The red boxes indicate above 2 fold change of gene expression in tumor tissues compared to respective adjacent normal pair samples. White boxes indicate no change (<2 fold) in the tumor tissues compared to adjacent normal pairs and grey boxes indicate un- determined values. (b.) Cumulative grade of gene expression across samples. X axis denotes the combined alteration of genes and Y axis denotes frequency of types of alterations. (c.) Combination of SMAD4 and MYC gene expression alteration in patient samples.

Training Program: 2 Summer Trainees trained

Miscellaneous:

- Department activelyorganized &participated inNationalScienceDay atCNCI :28thF e b r u a r y ,2022.
- Mr. SouvikDashas beenrecommendedtopursueasSeniorResearchFellow.

DEPARTMENT OF ONCOGENE REGULATION

Head of the department: Dr. Jayanta Chakrabarti, MS; DNB; Director

Team

Faculty with educational qualification	**Designation**
Dr. Sankhadeep Dutta, Ph.D.	Senior Scientific Officer, Grade-II
Students	
Dr. Debolina Pal,	Research Associate, NASI
Dr. Rishila Ghosh,	Research Associate, ICMR
Dr. Rituparna Roy,	Senior Research Fellow, ICMR
Ms. Mukta Basu,	Senior Research Fellow, UGC-NET
Mr. Balarko Chakraborty	Senior Research Fellow, UGC-NET
Ms. Debalina Mukhopadhyay	Woman Scientist (A), DST
Ms. Priyanka Dutta,	Senior Research Fellow, DST-INSPIRE
Ms. Farhin Sultana,	Senior Research Fellow, CSIR- NET
Mr. Subhadip Kundu,	Junior Research Fellow, CSIR- NET
Md. Sadi Khan,	Junior Research Fellow, CNCI
Ms. Nilanjana Chatterjee,	Project Assistant, IARC-WHO
Other Team Members	
Dr. Chinmay Kumar Panda, Ph.D., FNASc, FAScT	NASI Senior Scientist Platinum Jubilee Fellow
Prof. Bishnu Pada Chatterjee, Ph.D, FAScT, FNASc, FAMS	Distinguished Honorary Scientist

Objectives of the department:

Our department aims to(a) understand the molecular pathogenesis of tumor development; (b) develop techniques for early detection of tumor; (c) develop precise therapeutic strategies of tumor. Aiming to the above points, we have studied the following objectives:

1) Molecular analysis of some epithelial malignancies to understand molecular pathogenesis of the disease;

2) Development of non-invasive biomarkers for early detection of carcinomas in Head and neck, cervix and liver.

Brief description of the work done during the year (from 1st April 2021 to 31st March 2022):

A. Projects running (Extramural)

1. **Name of the P.I.: Dr. Sankhadeep Dutta**

Project Title: Identification of non-invasive microRNA and proteomic biomarkers in plasma for early detection of Head and Neck Squamous Cell Carcinoma in Indian patients

Funding agency: Indian Council of Medical Research (ICMR)

2. **Name of the P.I.: Dr. Sankhadeep Dutta**

Project Title: Evaluation of population prevalence and oncogenic potential of novel HPV type 217, 218, 223, and 225

Funding agency: IARC, WHO

3. **Name of the P.I**.: **Dr. Chinmay Kumar Panda**

Project Title: Analysis of molecular pathogenesis of uterine cervical carcinoma for the development of targeted therapy

Funding agency: The National Academy of Sciences, India

4. **Name of the P.I.:Dr. Chinmay Kumar Panda**

Name of Co-PI: Prof. Bishnu Pada Chatterjee

Project Title: Use of phosphoprotein biomarkers to develop plasmonic ELISA for predicting chronic hepatitis, liver cirrhosis and hepatocellular carcinoma

Funding agency: Indian Council of Medical Research (ICMR)

B. Projects running (Internal)

1. **Name of the P.I.:** Dr. Sankhadeep Dutta

Project Title: Analysis of non-coding RNA role in deregulation of key cellular pathways associated with HNSCC development: clinical implications

C. **Students' Projects running**

1. **Name of the Student:** Ms. Mukta Basu

Project Title: Molecular analysis of alterations in chromosome 3 in Bladder carcinoma of Indian patients

Funding agency: UGC-NET fellowship scheme

2. **Name of the Student:** Ms. Debalina Mukhopadhyay

Project Title: Analysis of stem cell renewal Notch1 pathway alterations during development of head and neck squamous cell carcinoma of Indian patients

Funding agency: Woman Scientist (A), DST fellowship scheme

D. **Name of the Student:** Mr. Balarko Chakraborty

Project Title: Analysis of alterations of Wnt and hedgehog pathways during development of head and neck squamous cell carcinoma (HNSCC)

Funding agency: UGC-NET fellowship scheme

E. Name of the Student: Ms. Priyanka Dutta

Project Title: Analysis of DNA modifying and DDR (DNA damage response) genes associated with the development of uterine cervical carcinoma (CACX)

Funding agency: DST-INSPIRE fellowship scheme

F. **Name of the Student:** Ms. Farhin Sultana

Project Title: Evaluation of LIMD1-VHL targeting miRNA(s) as biomarker in Uterine Cervical Carcinogenesis

Funding agency: CSIR-NET fellowship scheme

G. **Name of the Student:** Mr. Subhadip Kundu

Project Title: Analysis of the role of non-coding RNA in deregulation of cellular pathways associated with the development of bladder carcinoma: prognostic and therapeutic importance

Funding agency: CSIR-NET fellowship scheme

H. Publications/Monographs/Patents etc.

1. Publication in International Journals:

i. Basu M., Chatterjee A., Chakroborty B., ChatterjeeE., Ghosh S., SamadderS., Pal D. K., Roy A., Chakraborty J., GhoshA., Panda C. K.: High nuclear expression of HIF1α synergizing with inactivation of LIMD1 and VHL portray worst prognosis among the bladder cancer patients: Association with arsenic prevalence. Journal of Cancer Research and Clinical Oncology. https://doi.org/10.1007/s00432-021-03661-z

ii. Roychowdhury A., Jondhale M., Saldanha E., Ghosh D., Panda C. K., Chandrani P., Mukherjee N.: Landscape of Toll-like receptors expression in tumor microenvironment of Triple Negative Breast Cancer (TNBC): distinct roles of TLR4 and TLR8. Gene. https://doi.org/10.1016/j.gene.2021.145728

iii. Roy R., Mandal S., Chakrabarti J., Saha P. and Panda C. K.: Downregulation of Hyaluronic acid-CD44 signaling pathway in cervical cancer cell by natural polyphenols-Plumbagin, Pongapin and Karanjin. Molecular and Cellular Biochemistry, DOI :10.1007/s11010-021-04195-1.

iv. Rosario N. Brancaccio, Alexis Robitaille, Sankhadeep Dutta, Dana E. Rollison, Massimo Tommasino, Tarik Gheit. MinION nanopore sequencing and assembly of a complete human papillomavirus genome. J. Virol Methods. 2021, 294: 114180. doi: 10.1016/j.jviromet.2021.114180

v. Jaiswal A., Satardey R., Datta C., Panda C. and Pal D. K.: Association of BRCA1 and BRCA2 genes in arsenic-induced urinary bladder carcinoma. Journal of Clinical Urology. DOI: 10.1177/20514158211051888

vi. Chakraborty B., Basu M., Mukhopadhyay D., Alam N., Ghosh S., Dutta S., Panda C. K.: Differential promoter usages of PTCH1 and down regulation of HHIP are associated with HNSCC progression. Pathology-Research and Practice 232, 153827, 2022. https://doi.org/10.1016/j.prp.2022.153827.

vii. Maitra S., Chatterjee, M., Roychowdhury A., Panda. C. K., Sinha, S. and Mukhopadhyay K.: Specific dopaminergic genetic variants influence impulsivity, cognitive deficit and disease severity of Indian ADHD probands. Mol. Biol. Reports. 2022. Doi:10.1007/s11033-022-07521-y.

2. Publication in National Journals:

i. Pal D., Sur S., Roy R., Mandal S. and Panda C. K.: Hypomethylation of LIMD1 and P16 by downregulation of DNMT1 results in restriction of liver carcinogenesis by amarogentin treatment. J. Biosciences 46: 53-64, 2021. DOI: 10.1007/s12038-021-00176-0

ii. Bhatia Y., Mondal G., Islam S., Ghosh R., Dutta S., Ghosh S., Duseja A., Panda C. K., Chatterjee B. P.: Serum phospho-zinc finger protein: a promising biomolecule for noninvasive diagnostic marker of chronic hepatitis B among liver diseases including liver cancer. Journal of Radiation and Cancer Research 12:147-158, 2021.

iii. Mohanty G., Singha P., Datta C., Dutta S., Panda C. K.: Association of HPV with other Co-Infections prevailing in abnormal cervical lesions. Journal of Radiation and Cancer Research 12:159-164, 2021.

iv. Roychowdhury A., Basu M., Pal D., Dutta P., Samadder S., Mondal R., Roy A. K., Roychoudhury S. and Panda C. K.: Protein Tyrosine Phosphatase Receptor Type J (PTPRJ) is down regulated in cervical squamous cell carcinoma. J. Genetics (2022) 101:29. https://doi.org/10.1007/s12041-022-01368-9

Book Editor:

"Cancer Diagnostics and Therapeutics: Current Trends, Challenges and Future Perspectives" 2022. Edited by S. K. Basu, Chinmay Kumar Panda, Subrata Goswami, Springer Nature Singapore Pte Ltd.

3. Other academic activities

Paper presented (Oral / Poster):

i. Invited lecture:

Dr. Chinmay Kumar Panda delivered an invited lecture on "Cellular pathways associated with development of uterine cervical carcinoma: Clinical implications" at 41st Annual International

Conference of Indian Association for Cancer Research (IACR): IACR-2022,"Combating Cancer: Biology to Therapy to Drug Resistance"& An International Symposium on: Cancer & Stem Cells; held on March 2-5, 2022 (Hybrid mode) at Amity University Uttar Pradesh (AUUP), Noida.

Oral/ poster presentation:

a) **Dr. Debolina Pal has presented a poster on** "Effect of Cisplatin on Hedgehog pathway antagonist PTCH1 and epigenetic modifier gene DNMT1 in cervical carcinoma cell lines" at 91st Annual session of the National Academy of Sciences, India and symposium "Interface between biological and physical sciences towards Atmanirbhar Bharat", **4-6 December 2021** on WEB.

b) **Ms. Debalina Mukhopadhyay has presented a poster on "**Activated NOTCH1 pathway in basal-parabasal layers of oral epithelium gradually increased during development of head and neck squamous cell carcinoma: clinical significance" at the one-day symposium on 'Integrated Approach in S&T for Sustainable future' on the occasion of National Science Day, 28th February, 2022 held at Chittaranjan National Cancer Institute (CNCI), Kolkata, India.

c) **Ms. Farhin Sultana has presented a poster on** "MiRNA-135b-5p deregulates expression of LIMD1 mRNA during HPV associated cervical carcinogenesis" at the 34th International Papillomavirus Virtual Conference, **November 15-19, 2021** in WEB.

d) **Ms. Farhin Sultana has delivered an oral presentation on** "Molecular triaging of cervical preneoplastic lesions by non-invasive detection of miRNA from cervical swab samples" in the one-day symposium on Integrated Approach in S&T for Sustainable future on the occasion of National Science Day, **28th February, 2022**, held at Chittaranjan National Cancer Institute.

e) **Ms. Nilanjana Chatterjee has presented a poster on** "Evaluation of population prevalence of novel Gamma HPV types 223 and 225" at the 34th International Papillomavirus Conference Virtual Conference, **November 15 -19 2021**in WEB.

f) **Ms. Nilanjana Chatterjee has delivered an oral presentation on** "Prevalence of novel Gamma HPV types 223 and 225 in oral cavity and skin of Indian normal and neoplastic participants" in the one-day symposium on 'Integrated Approach in S&T for Sustainable future' on the occasion of National Science Day, **28th February, 2022**, held at Chittaranjan National Cancer Institute, Kolkata, India.

PhD awarded:

Ms. Mukta Basu was awarded Ph.D (Zoology) degree in the year 2021 from Calcutta University for her thesis entitled "Molecular analysis of alterations in chromosome 3 in bladder carcinoma of Indian patients" under the supervision of Dr. Chinmay Kumar Panda.

Students undergoing PhD:

Mr. Balarko Chakraborty, Senior Research Fellow, UGC-NET
Ms. Debalina Mukhopadhyay, Woman Scientist (A), DST
Ms. Priyanka Dutta, Senior Research Fellow, DST-INSPIRE
Ms. Farhin Sultana, Senior Research Fellow, CSIR- NET
Mr. Subhadip Kundu, Junior Research Fellow, CSIR- NET
Md. Sadi Khan, Junior Research Fellow, CNCI

Other awards or special achievements:

i. **Ms. Nilanjana Chatterjee** has secured the **First position in Oral Presentation** on "Prevalence of novel Gamma HPV types 223 and 225 in oral cavity and skin of Indian normal and neoplastic participants" in the one-day symposium on 'Integrated Approach in S&T for Sustainable future' on the occasion of National Science Day, **28th February, 2022, held at Chittaranjan National Cancer Institute, Kolkata, India.**

ii. **Ms. Nilanjana Chatterjee has won the Best speaker award in the online Debate competition** by speaking against the motion "Covid 19 vaccine should be made mandatory for all" organized by Calcutta Consortium on Human Genetics held on **24th July, 2021.**

iii. **Ms. Debalina Mukhopadhyay secured second position in poster presentation** in the one-day symposium on 'Integrated Approach in S&T for Sustainable future' on the occasion of National Science Day, **28th February, 2022 held at Chittaranjan National Cancer Institute (CNCI), Kolkata, India.**

Conference/Symposium/Workshop (*International/National*) attended:

Dr. Sankhadeep Dutta attended the 4th Annual meeting Organized by Kolkata Gynecological Oncology Trials and Translational Research Group (KolGoTrg) held on 25th-27th March, 2022 at Conclave ECO space, Kolkata and participated in strategic discussion on "Prevention of cervical cancer study with point of care testing (PreCerCa)" session as a member of "Prevention and screening committee".

Interesting observations, if any

Findings from objective 1: Molecular analysis of some epithelial malignanciesto understand molecular pathogenesis of the disease:

I. Frequent upregulation of HIF1α during development of head and neck squamous cell carcinoma

In this study, regulation of HIF1α during development of head and neck squamous cell carcinoma (HNSCC) was evaluated in reference to the HPV infection. Global mRNA expression profiling of HIF1α, its regulatory genes (VHL/LIMD1) and target gene (VEGF) were evaluated from public datasets followed by validation in independent set of HNSCC samples of different clinical stages. Differential expression pattern of HIF1α pathway genes was observed irrespective of HPV infection in the datasets. On the contrary, our HNSCC samples, showed high mRNA expressions of HIF1α and VEGF, particularly in HPV+ve samples. However, VHL and LIMD1 expression was low in tumors, irrespective of HPV infection status. Accordingly, immunohistochemical analysis showed significant high expression of HIF1α and VEGF proteins in basal/parabasal layers in oral epithelium with prevalent high expression in HPV+ve tumors. On the other hand, differential subcellular localisation of VHL and LIMD1 was seen in basal/parasal and spinous layers of oral epithelium. The expression signature of the genes in basal/parabasal layers was translated during tumor development with preferential cytoplasmic expression of VHL in HPV+ve samples. The promoter methylation pattern of VHL and LIMD1 was comparable in different layers of oral epithelium irrespective of HPV infection, with comparatively high methylation frequency in HPV-ve tumors. High/medium expression of HIF1α/VEGF proteins and low VHL expression showed overall poor patient outcome. Thus, our data showed differential regulation of HIF1α in HPV+ve/-ve HNSCC samples, illustrating the molecular distinctiveness of the two groups.

II. Frequent inactivation of Hedgehog pathway antagonists HHIP and SUFU in cervical carcinoma of Indian patients: clinical and therapeutic importance

Cervical cancer (CACX) is still a dreadful threat to women in developing countries. Available conventional chemo-radiation therapies are not sufficient to restrict the disease recurrence. In this study importance of hedgehog self-renewal pathway was evaluated with the development of CACX and after application of chemotherapy. We have analysed the alterations (expression/ methylation/ deletion) of some key regulatory genes (HHIP, SUFU, SHH, SMO, GLI1) of this pathway in cervical lesions at different clinical stages and compared with different datasets, followed by their clinico-pathological correlations. The importance of the genes was evaluated in CACX cell lines after treatment with chemotherapeutic drug cisplatin. Reduced expression of the antagonists, hedgehog interacting protein (HHIP) and suppressor of fused (SUFU) due to promoter methylation and/ or deletion along with upregulation of agonists SHH, SMO and GLI1 was seen in early invasive lesions and subsequent clinical stages. Reduced expression of SUFU showed association with high nuclear expression of GLI1 in the tumors. Alterations of HHIP and/or SUFU showed association with poor prognosis of the patients. It was evident that cisplatin could restrict the growth of CACX cell lines HeLa and SiHa through upregulation of HHIP and SUFU due to promoter hypomethylation in a concentration dependent manner without any significant changes in the expression of SHH, SMO and GLI1, suggesting therapeutic importance of the antagonists. Thus, frequent inactivation of the antagonists mainly leads to the activation of hedgehog pathway in CACX with their prognostic and therapeutic importance.

III. Differential operation of MLH1/MSH2 and FANCD2 crosstalk in chemotolerant Bladder Carcinoma: clinical and therapeutic intervening study

We aimed to understand the crosstalk between mismatch repair (MMR) and FA-BRCA pathway in primary bladder carcinoma (BlCa) samples as well as in chemotolerant cell line. We analysed the genetic alterations of MLH1 and MSH2 (MMR related genes) and after that we correlated it with the nuclear translocation of FANCD2 protein. Next, we evaluated this crosstalk in T24 BlCa cell line in response to doxorubicin treatment. In primary BlCa tumors, infrequent genetic deletion (17-20%) but frequent promoter methylation (28- 55%) of MLH1 and MSH2 was observed, where MLH1 was significantly ($p<0.05$) more methylated among the early staged samples (NMIBC). However, MSH2 was significantly more altered among the NMIBC samples, signifying the importance of MMR pathway during the early pathogenesis of the disease. Furthermore, BlCa samples with under expressed MLH1/MSH2 protein possessed cytoplasmic FANCD2 protein; encouraging that inefficiency of MMR proteins might restrict FANCD2 nuclear translocation. Next, we analysed publicly available data in GEO2R tool where we observed that in response to chemotherapeutic drugs, expression of MLH1, MSH2 and FANCD2 were diminishing. Validating this result in doxorubicin tolerant T24 cells, we found that expression of MLH1 and MSH2 was gradually decreased with increasing dose of doxorubicin. Interestingly, FANCD2 mono-ubiquitination

(L-form) was also reduced in chemotolerant T24 cells. The crosstalk between MMR and FA-BRCA pathway was substantiated in the primary BlCa tumors. Further, in response to doxorubicin, this crosstalk was found to be hampered due to under expression of MLH1 and MSH2 gene, thereby rendering chemotolerance.

VI. Determination of prevalence of novel Gamma-HPV types 223 and 225

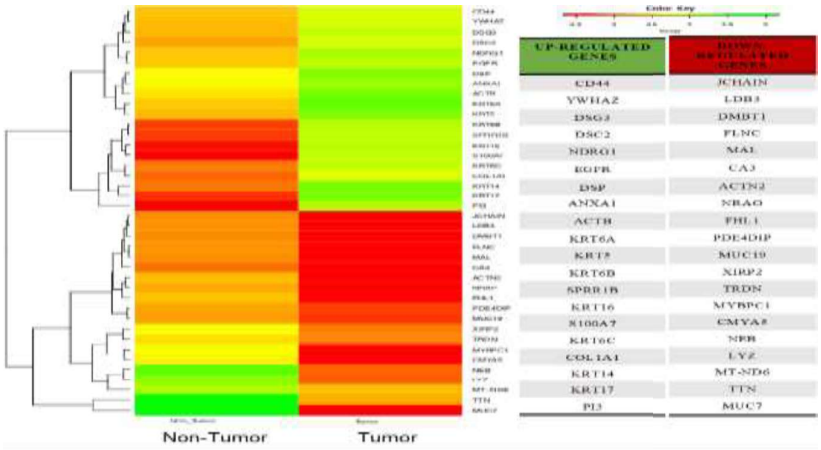
Gamma papillomaviruses are traditionally classified as cutaneotropic. Prevalence of two novel gamma virus HPV 223 and 225 are evaluated in the external skin (keratinized epithelium) along with mucosal epithelium of normal/ asymptomatic and diseased female and male participants of India in a cross-sectional study. To ascertain the tissue specific prevalence of HPV223 and 225, and their viral load in the tissue epithelial samples from oral mucosa and varied skin parts were collected from 226 subjects with or without neoplastic/dysplastic lesions in Oral cavity or cervix. The prevalence of High-Risk HPV was also checked in oral mucosa samples to ascertain co-infection status. Novel HPV 223 DNA present in4.4% (10/226) oral mucosal samples of the study population, interestingly all were female. However, no prevalence of HPV223 was found in their corresponding skin swab samples. Whereas, the prevalence of HPV225 was found both in the skin and oral mucosa of 28.2% female (N=37/131) and 17.9% male (N=17/95) participants. Alongside, the viral load of HPV 223 was found to be significantly higher ($p= 0.02<0.05$) in the oral mucosa of diseased participants, whereas, the HPV 225 viral load was higher in the oral mucosa of normal participants. Thus, our findings suggest that gamma HPV 223 has its prevalence only in the oral mucosal epithelium, whereas, HPV 225 has its prevalence on both mucosal and keratinized skin epithelium, indicating its dual tropism nature.

Findings from objective 2: Development of non-invasive biomarker for early detection ofcarcinomas in Head and neck, cervix and liver

I. Identification of deregulated microRNA in plasma as non-invasive biomarkers for early detection of Head and Neck Squamous Cell Carcinoma (HNSCC) in Indian patients

We performed RNA sequencing-Transcriptome analysis of 10 HNSCC samples (5 sets of primary tumor and their adjacent normal) and identified 704 statistically significant Differentially Expressed Genes (DEGs). From these

a



b

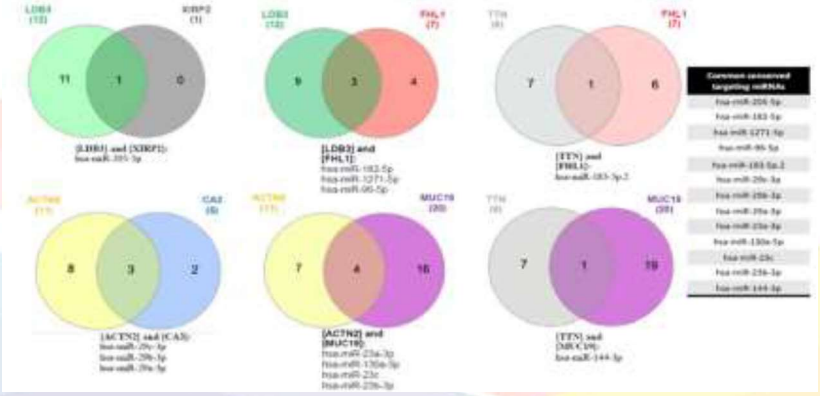


Figure 1: *Heatmap representing the top 20 up and down regulated genes in primary HNSCC vs adjacent normal samples (a). The shortlisted 12 common conserved targeting miRNAs and their common targets predicted to be deregulated in the HNSCC samples (b).*

DEGs, we have picked up top 20 upregulated and 20 downregulated genes and generated a heatmap for pooled adjacent normal vs tumor samples (Figure 1a). From these top 20+20 DEGs, we have found few cellular pathways deregulated (e.g. pathways associated with cytoskeletal organization, keratinization, and epidermis formation were upregulated and the pathways associated with actin cytoskeletal organization and protein metabolism were downregulated) in these HNSCC samples. Apart from this, we have also identified 88 different conserved targeting miRNAs against the downregulated genes, among which 12 miRNAs were found to be common among 2 or more genes (Figure 1b). Upon validation with TCGA database, it was found that 7/12 targeting miRNAs have reported to be significantly upregulated in HNSCC tumor. As the downstream target genes of these 7 conserved miRNAs were found to be significantly downregulated in the tested HNSCC samples, we are further aiming to individually validate these 7 miRNAs' expression deregulation in the corresponding plasma samples of HNSCC patients by quantitative Real Time PCR for their application as non-invasive biomarker.

II. Identification of novel/altered glycoproteins expressed in plasma of HNSCC patients in India

Cluster of Differentiation 44 (CD44) is a multi-structural and multi-functional single pass transmembrane glycoprotein, also known as P-glycoprotein, homing cell adhesion molecule (HCAM) etc. CD44 is a key cell-surface marker of cancer stem cell (CSC) in HNSCC. CD44 is found in different isoforms called CD44 variants (CD44v). The roles of CD44v are reported in different cancers. Alongside, the serum level of soluble CD44 forms that results from CD44 cleavage has also been reported in many cancers. Upon analysis upregulated CD44 glycoprotein expression in plasma samples of primary HNSCC patients (N=6) along with plasma samples of normal individual (N=2), it was found that the expression of CD44 was significantly higher in HNSCC patients in comparison to normal subject. On further profiling of Hyaluronic Acid (HA), the principal ligand of CD44, in plasma we found a differential High molecular weight (HMW) HA and Low molecular weight (LMW) HA pattern among the patients and also among patients and normal individuals. It was found that the expression of pro-tumorigenic LMW HA level was higher in HNSCC patients' plasma than the normal subjects. On the other hand, the anti-tumorigenic HMW HA level was higher in the plasma of normal subjects. These findings are indicative of the role of glycoprotein-CD44 and CD44-HA pathway in HNSCC development.

III. Evaluation of LIMD1-VHL targeting miRNA(s) as biomarker in Uterine Cervical Carcinogenesis

Cervical cancer (CACX) is the 4th largest malignant tumor type in women world-wide and also ranks 4th in the cancer related deaths of women each year. Now-a-days, miRNAs play an important role by promoting cancer progression where they act either as an oncogene or as a tumor suppressor gene by regulating their target gene expression, mostly by pairing with complementary nucleotide sequences at the 3' UTR region of their target gene. Activation of cellular oxidative stress response pathway plays an important role in HPV associated Cervical Carcinogenesis, via deregulation of two key genes, viz. LIMD1 and VHL and through their ability to regulate HIF-1α expression. Through *in silico* analysis, we have identified four LIMD1-VHL targeting miRNAs: miR-135b-5p and miR-224-3p for LIMD1 and miR-21-5p and miR-590-5p for VHL. First, we aim to examine the expression profiles of LIMD1, VHL, and their targeting miRNAs (miR-135b-5p and miR-21-5p) in both cervical cancer and normal cervical tissue samples, followed by validation of these two miRNAs' expression in cervical swab samples, with the future perspective of using these miRNAs as biomarkers in self-collected cervical specimens. The results showed under expression of LIMD1 and VHL mRNA as well as protein in cervical cancer tissue in comparison to normal cervical tissue samples. However, the expression of LIMD1/VHL targeting miRNAs was found to be upregulated in cervical cancer tissue compared to normal cervical samples. The results were then validated in cervical swab samples of different clinical stages where significant upregulation of these two miRNAs were found in the CIN and CACX stages in comparison to normal cervical swab samples. Thereafter, miR-135b-5p and miR-21-5p have shown higher sensitivity and specificity in discriminating CIN from unrelated normal, indicating their potential diagnostic value. Furthermore, the effect of miR-135b-5p on various cellular phenotypes was investigated by treating cervical cancer cell line SiHa with miR-135b-5p inhibitor to revert its expression. The result, in turn, showed reduced cell viability, migration and invasion as well as cell cycle arrest at G_0/G_1 phase resulting induction of apoptosis.

Thus, this study indicates that miR-135b-5p and miR-21-5p could be used as non-invasive molecular triage markers for early detection of cervical cancer. Moreover, the analysis of the effect of miR-135b-5p on cell viability, migration and invasion as well as cellular apoptosis are is indicative of an important role of this 'OncomiR' in cervical cancer metastasis.

IV. Development of non-invasive biomarker for prediction of liver lesions at different clinical stages

Previously, we have found a novel 122Kd zinc-finger protein highly present in serum of hepatocellular carcinoma (HCC) patients, indicating its diagnostic and prognostic potential. Now, our aim is to develop novel plasmonic ELISA method for early detection liver lesions using antibody of the zinc-finger protein and serum

of the patients with different types of liver lesions. For this reason, at first antibody against the zinc-finger was developed from M/s AbGenex, Bhubaneswar, Odisha. Then, serum samples of chronic hepatitis (CHB,n=23), hepatitis B induced cirrhosis (CHB-LC, n=14), CHB related hepatocellular carcinoma (CHB-HCC,n=27) and healthy volunteers as control (HV, n=27) were collected from Liver Clinic/Gastro Clinic of PGIMER, Chandigarh (our collaborating Institute) with proper consent from each individual. The optimization of the ELISA was done using different concentrations of serum proteins with different incubation times (15, 30, 45 and 60 min) in presence of primary ZNF antibody and secondary antibody (IgG-HRP). We have found highest expression of ZNF in the serum of liver cirrhosis patients with 100% sensitivity and 90% specificity. Further study on this line is in progress.

Training Program: Two M.Sc. students from different universities have completed their internship training programme from this department, under the supervision of Dr. Sankhadeep Dutta.

Miscellaneous:

i. **Dr. Sankhadeep Duttais acting as a co-editor** in the special issue "Genetic regulation of mitosis and ploidy in cancer" of the journal "Frontiers in Genetics".

ii. **Dr. Chinmay Kumar Panda is acting as member of the editorial board** in the "International Journal of Human Genetics".

iii. **Dr. Chinmay Kumar Panda is acting as Academic Editor** in the journal "Scientific Reports".

iv. **Dr. Chinmay Kumar Panda acted as External examiner of Ph.D thesis** under i) Indian Institute of Technology, Madras, ii) Bhaba Atomic Research Centre (BARC) Mumbai; iii) Presidency University, Kolkata; iv) Guru Nanak Dev University, Amritsar.

v. **Dr. Chinmay Kumar Panda reviewed 40 scientific papers of different peer-reviewed journals** like AAPS PharmaSciTech, Scientific Reports, Indian Journal of Medical Research, Oncology Letters, Plos One, J. Int. Med. Res., Genetic Testing and Mol. Biomarkers, , Oral diseases, Future Oncology, J. of Genetic and Mutation Disorders, Technology in Cancer Research & Treatment, 3Biotech, Exp. Cell Research, Gene Reports, BMC Medical Genomics, J. of Hematology & Oncology, Toxicology, Medical Science Monitor, , BMC Cancer, Molecular and Clinical Oncology, Experimental and Therapeutic Medicine, J. Med. Virology, Int. J. Mol. Med., Biochemistry and Biophysics Reports, Infectious Agents and Cancer, Clinical Medicine Insights: oncology, Biological Research, Frontiers in Oncology, Expert Opinion on Therapeutic Targets, Oncology Letters, Experimental Therapeutics and Medicine, Human Genetics, Academia Letters, Clinical and Translational Oncology, Cancer Investigation, European J. Of Obstretics& Gynecology & Reproductive Biology, Environmental Research, J. of Radiation and Cancer Research, Archives of Medical Research, Molecular and Clinical Oncology.

DEPARTMENT OF PATHOLOGY AND CANCER SCREENING

Head of the Department: Dr Partha Nath

Team Members

Faculty with educational qualification	Designation
Dr. Partha Nath	HOD
Dr. Vilas D. Nasare	SSO II
Dr Sutapa Mahata	DHR Woman Scientist
Miss Sinjini Sarkar	DHR Young Scientist
Miss Ranita Pal	DST Woman Scientist
Mr. Pranab Kumar Sahoo	Senior Research Fellow
Tanuma Mistry	Senior Research Fellow
Sushmita Ghosh	Senior Research Fellow
Trisha Choudhary	Junior Research Fellow

Objective

The department of Pathology and Cancer Screening is catering to comprehensive cancer screening and awareness program for last 39years. The program covers both rural and urban areas of west Bengal and adjoining states. In addition this department is also engaged in basic cancer research program for last 28 years and has published many fundamental research papers in national and international journals.

Project running (Extramural)

1. **Study on MAD and BUB1 genes of Spindle Assembly Checkpoint with response to primary adjuvant chemotherapy in advanced ovarian cancer patients.**
   Principal Investigator: Sinjini Sarkar (Young Scientist)
   Mentor: Dr Vilas D. Nasare
   Funding Agency: Department of Health Research
2. **MicroRNAs as prognostic biomarkers of chemoresistance and chemosensitivity in ovarian cancer patients undergoing combinational therapy**
   Principal Investigator: Ranita Pal (Women Scientist A)

Mentor: Dr Vilas D. Nasare

Funding Agency: Department of Science and Technology

3. **A pharmacogenetics study on cytochrome P450 enzyme and transporter gene implicated in response to paclitaxel, cisplatin, and 5-fluorouracil in oral cancer patients**
   Principal Investigator: Dr Vilas D. Nasare
   Funding Agency: Indian Council of Medical Research
4. **Investigation of PIM1/STAT3 association as a regulator of EMT in triple negative breast cancer**
   Principal Investigator:
   Dr Sutapa Mahata (DHR Women Scientist)
   Mentor: Dr Vilas D Nasare
   Funding Agency**:** Department of Health Research
5. **Study on CYP2D6 and ABCB polymorphisms with respect to tamoxifen adjuvant treatment in ER and PR receptor breast cancer patients**
   Principal Investigator: Dr Vilas D. Nasare
   Funding Agency: Council of Scientific and Industrial Research
6. **Study the potential role of DEK as a therapeutic target in ovarian Carcinoma**
   Principal Investigator: Dr Vilas D. Nasare
   Funding Agency: Council of Scientific and Industrial Research
7. **A study on SMARCA-4, DICER-1, RAD51C/D mutations, their expression and associated miRNAs in ovarian cancer (Technically Approved 28th March 22)**
   Principal Investigator: Dr Vilas D. Nasare
   Funding Agency: Indian Council of Medical Research
8. **Regenerative Medicine: Identification of effective novel anticancer components from human placenta in cervical cancer models (Technically Approved 28th March 22)**
   Principal Investigator: Dr Vilas D. Nasare
   Funding Agency: Indian Council of Medical Research
9. **Investigating the role of PLK1 on glutamate receptor and cystine glutamate antiporter as regulator of proliferation and migration in ovarian cancer (Technically Approved 28th March 22)**
   Principal Investigator: Dr Vilas D. Nasare
   Funding Agency: Indian Council of Medical Research

Project running (Internal)

1. **Assessment of the knowledge and attitude about cervical cancer, HPV infection, HPV vaccine, its acceptability among cervical cancer patients and associate visitors at regional cancer centre, Chittaranjan National Cancer Institute, Kolkata**
   Principal Investigator: Dr Vilas D Nasare
2. **Assessment of the perception about breast cancer symptoms, risk factors, treatment and prevention among breast cancer patients and associated visiting members**
   Principal Investigator: Dr Vilas D Nasare
3. **Awareness, perception, risk factors, treatment regarding oral cancer among oral cancer patients and their attendants in Eastern population: a hospital based cross sectional study**
   Principal Investigator: Dr Vilas D Nasare
4. **A study on sorcin mediated pathway of Multidrug resistance in Gastric Carcinoma**
   Principal Investigator: Dr Vilas D. Nasare

DNB Students

5. **Clinicopathological study of gastric carcinoma with special reference to erk-1/erk-2 and bcl2: an observational study in a tertiary care cancer hospital**
   Student Name: Dr Raya Banerjee (Submitted)
6. **Studies on clinico-pathological profile of head and neck squamous cell carcinoma with special reference to ki67**
   Student Name: Dr. Shubhadeep Panda (Submitted)

Publications (as Corresponding Author)* (2021-2022)

Published Papers

1. Sarkar S, Sahoo PK, Mahata S, Pal R, Ghosh D, Mistry T, Ghosh S, Bera T, **Nasare VD**. Mitotic checkpoint defects: en route to cancer and drug resistance. **Chromosome Res.** 2021 Jun;29(2):131-144. **(Impact Factor -5.239)***
2. Mahata S, Sahoo PK, Pal R, Sarkar S, Mistry T, Ghosh S, Nasare VD. PIM1/STAT3 axis: a potential co-targeted therapeutic approach in triple-negative breast cancer. **Medical Oncology.** 2022 May 15;39(5):74. doi: 10.1007/s12032-022-01675-2. PMID: 35568774. **(Impact Factor-3.738)***
3. Sarkar S, Pal R, Mahata S, Sahoo PK, Ghosh S, Chatterjee P, Vernekar M, Mandal S, Bera T**, Nasare VD**. Evaluation of numerical rating scale and neuropathic pain symptom inventory pain scores in advanced ovarian carcinoma patients undergoing surgery and first-line chemotherapy. **J Clin Transl Res.** 2022 Jan 25;8(1):54-60. PMID: 35187290; PMCID: PMC8848755.**(Impact Factor- 3.794)***
4. Bhavna Saroha, Gourav Kumar, Suresh Kumar, Meena Kumari, Manishita Rani, Neera Raghav, Pranab Kumar Sahoo, Sushmita Ghosh, Sutapa Mahata, **Vilas D. Nasare,** Ultrasound assisted a one pot multicomponent and greener synthesis of 1,2,3-triazole incorporated aurone hybrids: Cathepsin B inhibition, anti-cancer activity against AGS cell line, and in-silico docking evaluation, **Current Research in Green and Sustainable Chemistry**, Volume 5,2022,100295,ISSN 2666-0865,https://doi.org/10.1016/j.crgsc.2022.100295**(Impact Factor-4.71)**
5. Mahata S, Behera SK, Kumar S, Sahoo PK, Sarkar S, Fazil MHUT**, Nasare VD**. In-silico and in-vitro investigation of STAT3-PIM1 heterodimeric complex: Its mechanism and inhibition by curcumin for cancer therapeutics. **Int J Biol Macromol**. 2022 May 31;208:356-366. doi: 10.1016/j.ijbiomac.2022.03.137. Epub 2022 Mar 26. PMID: 35346675. **(Impact Factor—8.025**.)*
6. Bhavna Saroha, Gourav Kumar, Suresh Kumar, Meena Kumari, Manishita Rani, Neera Raghav, Pranab Kumar Sahoo, Sushmita Ghosh, Sutapa Mahata, **Vilas D. Nasare**, Novel 1,2,3-triazole-aurone hybrids as cathepsin B inhibitors: One-pot synthesis, anti-proliferative, and drug modeling studies, **European Journal of Medicinal Chemistry Reports**, Volume 5,2022,100056,ISSN 2772-4174,https://doi.org/10.1016/j.ejmcr.2022.100056.
7. Sahoo, P. K., Sarkar, S., Mahata, S., Pal, R., Mistry, T., **Ghosh, S**., Choudhury, T., Bhowmick, A. K., Mukherjee, K. K., Datta, S., & Nasare,V. D. (2022). Clinical Efficacy and Quality of Life of Oral Cancer Patients Treated With Paclitaxel/Cisplatin/5-FU Vs Paclitaxel/Carboplatin Chemotherapeutic Regimens in a Tertiary Cancer Center in Eastern India, **Journal of the National Comprehensive Cancer Network**, 20(3.5), CLO22-081-CLO22-081. Retrieved Apr 7, 2022, from https://jnccn.org/view/journals/jnccn/20/3.5/article-pCLO22-081.xml**(Impact Factor 12.693)***
8. Sarkar S, Sahoo PK, Mahata S, Pal R, **Ghosh S**, Bera T, **Nasare VD**. Mad1l1 and Mad2l1 Polymorphisms In advanced ovarian carcinoma patients and its clinical impact The XXIII FIGO World Congress of Gynecology & Obstetrics (Volume 155, Issue S2 Special Issue**) Int J Gynecol Obste**t VL - 155 IS - S2 SN - 0020-7292 **(Impact Factor-4.447)***
9. Sahoo PK, Sarkar S, Ghosh D, Mahata S, Pal R, Mistry T, Ghosh S, Roy A, Bucha H, Mandal

S, **Nasare VD.** Premalignant and malignant lesions of oral cavity in eastern India: a hospital-based study. **Eur J Cancer Prev**. 2021 Sep 1;30(5):393-399. doi: 10.1097/CEJ.0000000000000640. PMID: 33252366. **(Impact Factor- 3.031))***

10. Sarkar S, Sahoo PK, Pal R, Mistry T, Mahata S, Chatterjee P, Vernekar M, Mandal S, Bera T, **Nasare VD**. Assessment of quality of life among advanced ovarian cancer patients in a tertiary care hospital in India. **Support Care Cancer.** 2022 Apr;30(4):3371-3378. doi: 10.1007/s00520-021-06735-3. Epub 2022 Jan 6. PMID: 34988703. **(Impact Factor- 3.359)**
11. Nath A, Mitra S, Mistry T, Pal R, **Nasare VD.** Molecular targets and therapeutics in chemoresistance of triple-negative breast cancer. **Medical Oncology**. 2021 Nov 23;39(1):14. doi: 10.1007/s12032-021-01610-x. PMID: 34812991**(Impact Factor- 3.738)***.

Other Academic Activities

Workshop Attended

1. one-day International Seminar on "**Targeted oncology in therapeutics and diagnostics**", dated **23rd** April (Saturday), 2022 from 1pm to 9pm at CII-Suresh Neotia Centre of Excellence for Leadership (DC-36, Sector – I, Salt Lake City, Kolkata) to announce the inauguration of the Research and Development Wing (R&D) of Suraksha Diagnostic Pvt. Ltd.
2. Webinar Attended **GCIG Virtual Autumn Meeting dated** 25th June 2021 using Virtual Mode (Zoom Video Conferencing App)
3. Webinar Attended **GCIG Virtual Autumn Meeting dated 24 - September, 2021** using Virtual Mode (Zoom Video Conferencing App)
4. Virtual Meeting **European Journal of Cancer Prevention** dated October 16, 2021 using Virtual Mode (Zoom Video Conferencing App)

Conferences Attended

5. 4th annual meeting Organized by Kolkata Gynecological Oncology Trials and Translational Research GroupDate: 25th-27th March 2022 ;Venue: CNCI 2nd Campus, Conclave ECO space Kolkata and Virtual (IST)

Poster Presentation

1. Sinjini Sarkar, Ranita Pal, Sutapa Mahata, Pranab K Sahoo , Sushmita Ghosh , Puja Chatterjee, Manisha Vernekar, Partha Nath, Kalyan K Mukherjee, Tanmoy Bera , **Vilas D Nasare**. Pain experienced to ovarian carcinoma patients at diagnosis and while receiving first-line treatment therapy By Virtual Mode (Zoom Video Conferencing App) January 28-29, 2021
2. Sinjini Sarkar, Ranita Pal, Sutapa Mahata, Pranab K Sahoo , Sushmita Ghosh , Puja Chatterjee, Manisha Vernekar, Partha Nath, Kalyan K Mukherjee, Tanmoy Bera , **Vilas D Nasare**. Pain experienced to ovarian carcinoma patients at diagnosis and while receiving first-line treatment therapy dated January 28-29, 2021 using By Virtual Mode (Zoom Video Conferencing App)

Oral Presentation

3. **Sinjini Sarkar**, Dipanwita Ghosh,Sutapa Mahata,, Pranab Kumar Sahoo, Tanuma Mistry, Sushmita Ghosh, Ranita Pal,, Asoke Roy, Manisha Vernekar, Karabi Datta, Syamsundar Mandal, Vilas D. Nasare Sociodemographic factors and clinical presentation of women attending Cancer Detection Centre, Kolkata for breast examination dated July 14-15, 2021 using by Virtual Mode (Zoom Video Conferencing App)
4. **Puja Chatterjee,** Sinjini Sarkar, Sreeya Bose, Debapriya Banerjee, Pranab Kumar

Sahoo, Ranita Pal, Sutapa Mahata, Tanuma Mistry, Sushmita Ghosh, Trisha Chowdhury, Manisha Vernekar, Ranajit Mandal,Vilas D Nasare. Cervical cancer and HPV infection awareness among patients and associated visitors at a regional tertiary care cancer center AOGIN INDIA 3rd to 5th December 2021 by virtual mode (Zoom video conferencing app)

5. **Conference Attended as Panellist**
   e-NATCONPH 2021 (11TH International Conference(Online) 26th August 2021
   Titles: Drug Repurposing and repositioning in perspective of COVID 19 treatment as Panalist dated August 26-29, 2021using By Virtual Mode (Zoom Video Conferencing App)

Advisory Committee Members

6. National Conference on **Environmental Toxicology "Impact on Human Health"** Department of Life Sciences Vivekananda Global University, Jaipur included name as **Advisor Committee Members** dated 25th-26th November, 2021

Student Undergoing PhD

Four students are undergoing, their PhD curriculum in the Department.

Students Undergoing DNB

Two students are undergoing, their DNB curriculum in the Department.

Students Training Completed: 4

As a reviewer reviewed the research article academic year 21-22:

1. Medical Science Monitor (IF- 3.386)
2. Quality of Life Research (QURE) (Springer) (IF- 3.440)
3. Current Oncology (Springer) (IF- 3.109)
4. Cell Communication and Signalling (Springer Nature group) (IF- 7.525)
5. World Journal of Surgical Oncology (IF- 3.253)
6. Current Oncology (ISSN 1718-7729) MDPI (IF-3.109)

DEPARTMENT OF RECEPTOR BIOLOGY & TUMOR METASTASIS

Team

Name	Designation
Dona Sinha, Ph.D	**Senior Scientific Officer, (SSO-I Grade) and Head, Receptor Biology and Tumor Metastasis**
Nabanita Chatterjee, Ph.D	Senior Scientific Officer-II
Suchisnigdha Datta	ICMR-SRF
Sraddhya Roy	UGC-SRF
Ananya Das	CSIR-SRF
Priyanka Saha	CNCI-JRF
Sukanya Ghosh	WBPCB -JRF
Anurima Samanta	DSTBT, JRF
Aparajita Bairagi	CNCI-JRF
Rupa Chaudhuri	WBPCB - Project Assistant
Srikanta Barua	Lab Attendant

Objectives of the Department:

- Health impact of air pollution especially particulate matter2.5 in an asymptomatic population of Kolkata and surrounding areas
- Redox regulation and drug resistance in lung adenocarcinoma
- EMT, cancer stemness, and drug resistance in oral cancer
- Immuno-inflammatory response in cancer
- Metabolic and immunological changes of different biomolecules involved in cancer progression, metastasis, and drug resistance.
- Dysregulations in various metabolic pathways and identifying different biomolecules in order to target them as a mode of anti-cancer therapy.

Brief description of the work done during the year (from 1st April 2021 to 31st March 2022):

A. Extramural Projects

PI	Project Title	Funding Agency	Status
Dr. Dona Sinha	Impact of air quality on human health: Exploration of probable PM2.5 triggered pathways associated with lung cancer in exposed population of Kolkata	West Bengal Pollution Control Board	Ongoing
Dr. Dona Sinha	Crosstalk of delta Np63 alpha with cancer stemness and epithelial mesenchymal transition: a study during two different neo adjuvant chemotherapeutic regimens in oral cancer	Dept. of Science and Technology and Biotechnology, Govt. of West Bengal	Ongoing
Dr. Dona Sinha	Redox regulation of nuclear factor erythroid-245 (NF-E2) related factor Nrf2 in lung cancer by green and black tea polyphenols: Implication in cancer therapeutics	Indian Council of Medical Research	Ph Ph.D work completed; paper publications in process

B. Students' Projects

PI	Student	Project Title	Funding Agency
Dr. Dona Sinha	Priyanka Saha	Effects of anesthetic agents on immune-inflammatory response of breast cancer (pilot project for 1yr)	CNCI, Ministry of health and Family Welfare, GOI
Dr. Dona Sinha	Suchisnigdha Datta	A study on the prognostic significance of Nrf2 mediated chemoresistance in lung adeno carcinoma	Indian Council of Medical Research-SRF
Dr. Nabanita Chatterjee	Sraddhya Roy	Exploring the roles of exosomes in the metabolic regulations of metastatic ovarian cancer	UCG, India
Dr. Nabanita Chatterjee	Ananya Das	Effect of Tumor Associated Macrophage Polarization on immune profile modulation in Tumor microenvironment of Breast Cancer subtypes	CSIR, India

C. Intramural Project

PI	Project Title	Funding Agency	Status
Dr Dona Sinha Jt-PI: Dr Deepa Chakrabarti	Effects of anesthetic agents on immune-inflammatory response of breast cancer (pilot project for 1yr)	CNCI, Ministry of health and Family Welfare, GOI	Project completed

D. Interesting Observations

Air pollutant, especially particulate matter <2.5µm in diameter (PM2.5) is an impending threat to public health and the majority of the Indian metropolitan cities are engulfed by this problem.

- The present study screened 553 individuals from the high particulate matter (PM)2.5 area

(Jadavpur, Kolkata, daily mean PM2.5-105 µg/m^3) and 326 individuals from the moderate PM2.5 area (Mejia, daily mean PM2.5-83 µg/m^3) of which only 75 and 88 individuals respectively were asymptomatic (without any reported chronic disease) and without the addiction of smoking tobacco/ chewing tobacco/beetle nut/pan/ alcohol.

- It was observed that high PM2.5 exposure depleted Hb and lung function parameters in the asymptomatic cohort of Jadavpur, Kolkata.
- Moreover, these people incurred upregulation of cell proliferating machinery EGFR/PI3K/AKT/mTOR signaling axis in the systemic and pulmonary environment.
- At present these alterations are at a subclinical level but after a long period of latency, these may manifest as non-carcinogenic airway diseases or carcinogenic transformation of lung epithelium.

Lung adenocarcinoma is often threatened with chemoresistance owing to the constitutive expression of Nrf2**.** Phytochemicalsincluding black tea are known for modulation of nuclear factor erythroid 2-related factor 2 (Nrf2). Therefore, it was hypothesized that Nrf2-deregulated chemoresistance in lung adenocarcinoma may be counteracted by black tea extract (BT).

- Black tea extract (BT) was observed to sensitize resistant lung cancer cells (A549) towards cisplatin by suppression of redox-sensitive transcription factor, Nrf2.
- BT-mediated Nrf2 reorientation was observed to be dependent on concentration and duration of treatment as well as on the mutational profile of Nrf2 in the lung adenocarcinoma cells (Fig.1).
- Low-dose transient BT(0.46µg/ml/6h) hormetically downregulated Nrf2 and its downstream antioxidants and drug efflux transporter.
- BT also influenced the Keap1-dependent and independent [EGFR- Ras- Raf-Erk] Nrf2-regulations in Keap1-suppressed A549 cells that in turn enhanced chemotherapeutic outcome.

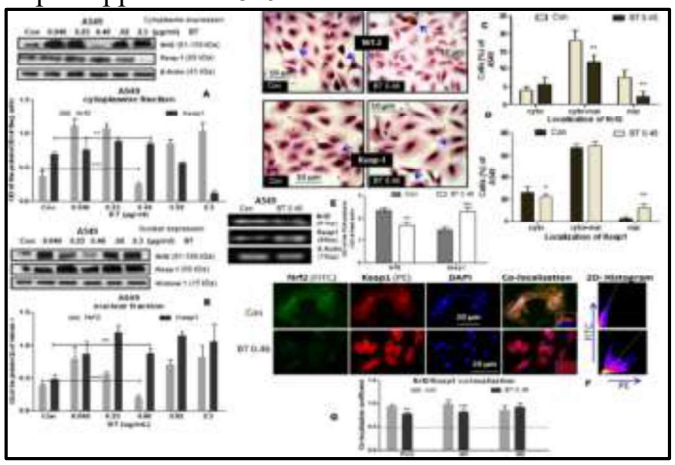


Fig.1: Regulation of Nrf2-Keap1 axis in A549 lung cancer cells by black tea extract (BT). BT 0.46µg/ml significantly downregulated nuclear expression of Nrf2 and upregulated that of Keap-1 as evidenced by immunoblots (a, b); ICC (b, c, d); RT-PCR (e); and immunofluorescence localization (f, g).

Oral cancer in India is the second most prevalent cancer across both sexes accounting for 30% of all cancers. It was hypothesized that theoncogene p63 is involved with epithelial morphogenesis and stemness might serve as an important biomarker for cancer progression in oral squamous cell carcinoma (OSCC).

- OSCC tumor samples were observed with the dominant expression of p63 isoform, ΔNp63α than their adjacent normal counterparts.
- Tumor samples were sorted on the basis of cancer stemness marker (CD44) and epithelial cell adhesion molecule, EpCAM, epithelial-mesenchymal transition (EMT), and stemness marker (CD326). CD44+/CD326- cells positively correlated with cancer stemness (Oct4), hybrid EMT (E-cadherin/N-cadherin/TGF-β), and drug resistance proteins (MRP1, Pgp).
- Though the predominant overexpression of ΔNp63α was observed with crosstalk of EMT, cancer stemness, and drug resistance, further investigations are warranted to validate this p63 isoform as an important biomarker for

OSCC progression.

Onco-anesthesia is challenged with the selection of suitable anesthetic agents with minimal side effects conducive to oncological surgeries. A pilot study was conducted to compare the immune-inflammatory effect of inhalation anesthetic-isoflurane and intravenous anesthetic-propofol in perioperative breast cancer patients.

- It was observed that in comparison to propofol, isoflurane elicited an inhibitory effect on helper T cells (Th), B cells as well as NK cells during the intra and post-operative period.
- Inflammatory cytokines IL-6 and IL-10 were significantly altered with isoflurane but not with propofol during the intra and post-operative period of breast cancer surgery.
- Therefore, propofol might have an advantage over isoflurane against T cell, B cells, and NK cell anergy which needs further investigations during the intra and post-operative period of breast cancer surgery.

Ovarian cancer (OvCa) confronts a major drawback of late diagnosis, so we were inclined to derive a relation between metabolic and metastatic markers with CA-125, which is the potent diagnostic marker.

- SIRT1, a master metabolic regulator is a downstream target for HIF-1α both of which were high in tumor tissues than in normal along with glycogen deposition and exosomal level. This helped to establish the correlation with segregated levels of CA-125.
- Thus, we can conclude that the levels of CA-125 at the diagnostic level may depict the chances of metastasis after analyzing the metabolic and metastatic markers in individual patients' samples.
- Moreover, upon higher Ki-67 expression, an analysis of KLF8 expression in OvCa cells and tissues was done. Upon TGF-β1 activation, phosphorylated Smad2 increased the KLF8 promoter activity and vice-versa. Thus, targeting this pathway can be a novel therapeutic approach.

Breast cancer (BC) is the most frequently occurring malignancy among females worldwide. The pathogenicity and survival rate vary highly among different subtypes. In the tumor microenvironment (TME) immune cells play diverse roles as antitumor and pro-tumor effectors under the stimulation of specific cytokines.

- Macrophage profile in different subtypes of BC was evaluated along with changes in CD11b+ T cell profile. TNBC, ER+PR+, and HER2+ have a significantly higher percentage of Cd11b+CD206+ TAMs compared with CD11b+CD80+ that anti-tumorigenic M1 population in the peripheral blood and tissues, analyzed by flow cytometry and immunofluorescence.
- NACT treated patients have significantly ($p<0.001$) decreases the percentage of CD11b+CD206+ TAM population in peripheral blood as well as in TME. NACT also decreases the percentage of exhausted CD4+/CD8+ T cell population in both TME and peripheral blood.
- Taken together, TAMs play a huge pro-tumorigenic role in various subtypes of BC. Thereby, targeting the TAM population in BC can be proven as a novel therapeutic approach.

E. Publications

1. Datta S, **Sinha D***. Low dose epigallocatechin-3-gallate revives doxorubicin responsiveness by a redox-sensitive pathway in A549 lung adenocarcinoma cells. **J Biochem Mol Toxicol**. **2022;** 36(4): e22999. doi: 10.1002/jbt.22999. **[IF:3.6]**
2. Saha P, Das A, Chatterjee N, Chakrabarti D, **Sinha D***. Impact of anesthetics on oncogenic signaling network: a review on propofol and isoflurane. **Fundam Clin Pharmacol. 2021;** 36(1):49-71. doi: 10.1111/fcp.12732. **[IF:2.748]**
3. Ghosh S, Samanta A, Prasad P, **Sinha D*.** Therapeutic implications of long noncoding RNA in lung cancer in Book "Handbook of Oxidative stress"; Eds Chakrabarti S; **Springer Nature 2021** (In press)
4. Ghosh S, Ghosh P, **Sinha D***. Particulate matter 2.5 as the pivotal player of lung carcinogenesis. IACR Newsletter 2021, 1(2): 9-22
5. Cherukunnath A, Davargaon RS, Ashraf R, Kamdar U, Srivastava A K, Tripathi P, **Chatterjee N**, Kuma S. KLF8 is activated by TGF-β1 via Smad2 and contributes to ovarian cancer progression. **J Cell Biochem**. **2022**; 123(5):921-934. **[IF: 4.429]**
6. Banerjee S, Bose D, Das S, **Chatterjee N**, Mishra S, Das Saha K. Leishmania donovani infection induce Extracellular signal-regulated kinase ½ (ERK½) mediated lipid droplet generation in macrophages. **Mol Immunol**. **2022**; 141:328-337. doi:10.1016/j.molimm.2021.12.008. [**IF: 4.407]**
7. Das A, Roy S, Swarnakar S, **Chatterjee N**. Understanding the immunological aspects of SARS-CoV-2 causing COVID-19 pandemic: A therapeutic approach. **Clin Immunol.2021**; 231:108804. doi:10.1016/j.clim.2021.108804. [**IF: 3.969]**

F. Other academic activities

1. Saha P presented an e-poster at the 41st IACR Annual Convention. Mar 4-6,2022. Saha P, Chakrabarti D, Chatterjee N, Koley D, Ray S, Das D, Sinha D. A hospital-based pilot study on the impact of anesthetics: Isoflurane and propofol, on the immuno-inflammatory response of perioperative breast cancer patients.
2. Samanta A gave an oral presentation and secured 3rd prize on National Science Day, Chittaranjan National Cancer Institute, 28th Feb 2022. Samanta A, Nanda DP, Guha RP, Hajra S, Sinha D. Interplay of EMT, stemness and chemoresistance in oral squamous cell carcinoma.
3. Datta S gave an oral presentation on National Science Day, Chittaranjan National Cancer Institute, Feb 28, 2022. Datta S and Sinha D. Black tea extract selectively reorients Nrf2 for anticancer response in lung adenocarcinoma cells.
4. Sinha D acted as a resource person for the Refresher course organized by the Dept. of Environmental Science, University of Calcutta in 2021.
5. Das A presented her work on National Science Day, Chittaranjan National Cancer Institute, Feb 28, 2022 (Poster Presentation) on Feb 28, 2022. Won 1st prize. Das A, Roy S, Nanda DP, Chatterjee N. Study the Role of Neoadjuvant chemotherapy (NACT) in Immune Modulation of Breast Cancer Patients.
6. Bairagi A presented her work at the 38th Society for Biological Chemist (I), Kolkata Chapter. Bairagi A, Roy S, Das A, Jain S K, Chatterjee N. Functionalized Advance liposomes for the treatment of Ovarian Cancers.

Integrative Course Work Taught to Ph. D students:

- Cell cycle regulation
- Tumor Microenvironment
- Enzyme and drug kinetics in Cancer Research

The number of students awarded Ph.D: Mr. Hirak Saha was awarded Ph.D by University of Calcutta in 2021. Sinha D was Mr. H. Saha's associate supervisor.

Number of UG/PG students who completed summer training projects: 4

G. Miscellaneous

Patient care service: Pulmonary function test performed for CNCI hospital patients

Sinha D as a reviewer of peer-reviewed journals:

- Elsevier: Clean Soil Air Water; J Hazardous Mat; J Oral Biol Craniofacial Res; Int Immun Pharmacol
- BMC, Springer Nature: J Exp Clin Cancer Res; Springer: Env Sc Pollut Res
- Royal Pharmaceutical Society: J Pharmacy Pharmacol
- Dove Press: Int J Gen Med
- Frontiers: Front Pharmacol

Membership:

Sinha D

Life Member and executive body member of All India Congress of Genetics and Genomics; Life Member of Indian Association of Cancer Research; Life member of Zoological Society of India; Life Member of Environmental Mutagen Society of India

Chatterjee N

International Society for Advancement of Cytometry USA, American Association for Cancer Research-USA, Canadian Society for Molecular Biosciences-Canada, American Society of Hematology-USA, Indian Immunology Society- India, Life Member of Indian Association of Cancer Research.

Administrative responsibilities of Sinha D: Chairperson of Central Instrumentation Research Facility, Member of Standing Selection Committee, Member of Purchase Committee Research, Member of Biosafety Committee

DEPARTMENT OF SIGNAL TRANSDUCTION AND BIOGENIC AMINES

Head of the department: DR. NABENDU MURMU, Ph.D., SSO, Assistant Director Grade,

Team

Faculty with educational qualification	**Designation**
Dr. Avik Biswas, Ph.D	SSO Gr II
Dr. Gaurav Das, Ph. D	DST- Inspire Faculty
Other Team Members	
Samir Banerjee	Technical Officer
Students	
Debarpan Mitra	SRF, CNCI
Depanwita Saha	SRF, ICMR
Rimi Mukherjee	JRF,CNCI
Debojit Talukdar	JRF, UGC
Aritri Bhattacharjee	JRF, DST-INSPIRE
Subhabrata Guha	Project Assistant, DST-INSPIRE faculty project
Najma Khatun	SRF,UGC
Arpita Kar	SRF,UGC
Abhisekh Samanta	Project fellow, DST-SERB (SRG scheme)

Objectives of the department:

i. To decipher the correlation between vasculogenic mimicry, angiogenesis and tumour invasiveness in the light of molecular signaling in different cancers.
ii. To determine the molecular mechanism of cancer therapeutic and chemopreventive agents in signaling pathways, mRNA transcription and post transcription.
iii. To examine the role of Ephrin pathway in vasculogenic mimicry in breast and oral cancer progression.
iv. Isolation , extraction and purification of active components from the flowers of *Madhuca indica* to check its cyto-toxic potential on breast cancer and oral cancer cells
v. Green synthesis of silver, zinc and gold nano-formulations with the extracts of the flowers of *Madhuca indica* and study its efficacy on breast cancer cells.
vi. Development of peptide based nano-delivery vehicles for targeting breast and oral cancer stem cells.

vii. To investigate the complex role of protein-protein and protein-RNA interactions during viral as well as non-viral cancer development and progression.

Brief description of the work done during the year (from 1st April 2021 to 31st March 2022):

Projects running (Extramural) –

Name of P.I.	Project Title	Funding agency
Dr. Avik Biswas	Development of therapeutic peptides for blocking interactions between Hepatitis B and host cellular proteins related with regulatory signaling pathways in hepatocellular carcinoma: A proteomic approach deciphering host-pathogen protein interactive network	**DST-SERB (SRG scheme)**
Dr. Gaurav Das	To Develop Novel Peptide Based Nano-delivery system to deliver Potent Inhibitors into the Cancer Stem Cells	**DST-INSPIRE**

Students' Projects running –

Name of the Student	Project Title	Funding agency
Debarpan Mitra	The role of Ephrin and HGF/cMet pathway in regulating vasculogenic mimicry in Breast cancer and possible effects of phytochemicals.	**Institute funded, CNCI**
Depanwita Saha	Molecular signaling mechanism in oral cancer: Effect of Lupeol in oral squamous cell carcinoma at transcription and post- transcription level.	**SERB**
Rimi Mukherjee	Investigation on the anti-cancer potential of natural products and their subsequent nano-formulations on various cancer models	**Institute funded, CNCI**
Debojit Talukdar	Unravelling the Therapeutic potential of Natural products isolated from *JusticiaAdhatoda* leaves and its nano-formulations on various cancer models	**UGC**
Subhabrata Guha	To develop novel peptide based nano-delivery system to selectively deliver potent inhibitors into the cancer stem cells	**DST-INSPIRE Faculty project**
Aritri Bhattacharjee	Elucidation of anti-cancer activity of *Madhuca indica* flower and its active components on various cancer models	**DST**
Arpita Kar	Deciphering the mechanistic involvement of Hepatitis B virus (HBV) proteins in the progression and regulation of human hepatocellular carcinoma (HCC)	**UGC**
Abhisekh Samanta	Excavating the functional roles of different regulatory motifs / domains of heterogeneous nuclear ribonucleoprotein E1 (hnRNPE1) and heterogeneous nuclear ribonucleoprotein K (hnRNPK) in human cancers	**DST-SERB (SRG scheme)**
Najma Khatun	Molecular characterization of complex functional roles of heterogeneous nuclear ribonucleoprotein G (hnRNPG) and heterogeneous nuclear ribonucleoprotein K (hnRNPK) in human hepatocellular carcinoma (HCC)	**UGC**

C. Collaborative Projects:

	Name of Scientist	Designation	Affiliation	Name of Project
1	Dr. Prasanta Kumar Maiti	Ex-HOD & Professor	IPGME&R/SSKM Hospital, Kolkata	Evaluation of antimicrobial and anticancer property of bio-compatible novel silver nanoparticles. (Student's Name: Rehana Parveen; Funding Agency: DST)
2	Dr. Pradip Majumder	Co-founder and Advisor	CanFinis Therapeutics	Development of custom immunotherapies against cancer
3	Dr. Tapan Kumar Mondal	Associate Professor	Dept. of Chemistry, Jadavpur university, Kolkata	Application of novel palladium complex in biological field via live cell imaging.
4	Dr. S. M. Rahman.	Director	Cradle Fertility Centre, Joka, Kolkata	Effect of environmental carcinogens on male fertility and pre-cancerous cellular state in Kolkata and neighbouring areas.
5	Dr. Chirantan Kar	Assistant Professor	Amity University, Kolkata	Evaluation of anticancer property of bio-conjugated macromolecules and their nano-formulations
6	Dr. Chittaranjan Sinha	Professor	Dept. of Chemistry, Jadavpur university, Kolkata	Application of novel complex molecules in biological field via live cell imaging and anti-cancer effect
7	Dr. Abhijit Saha	Assistant Professor	Dept. of Chemistry, SRM Institute of Science and Technology, Chennai	Effect of liposomal nano-formulation of zinc conjugated molecules in breast cancer cell lines

D. Interesting Observations:

I. Project Name: Combined regimen of Lupeol and 5FU decreases mammosphere forming capability and the stemness of TNBC cells in vitro

Name of PI : Dr. Nabendu Murmu

Name of student : Mr. Debarpan Mitra

Project highlights: Upon treatment with HGF, the MDA MB 231 cell formed more number of mammospheres as compared to untreated vehicle control. Subsequent treatment with Lupeol and 5FU alone or combination showed that the combination treatment group significantly abrogated the mammosphere forming capability of the cells more than the individually treated groups. Immuno-fluorescence staining was performed to probe for the expression of the established cancer stem cell marker, namely CD133. It revealed that HGF treatment increased the expression of CD133 in MDA MB 231 cells. The combined regimen of Lupeol and 5FU helped to reduce the expression of CD133 significantly more than the individually treated groups.

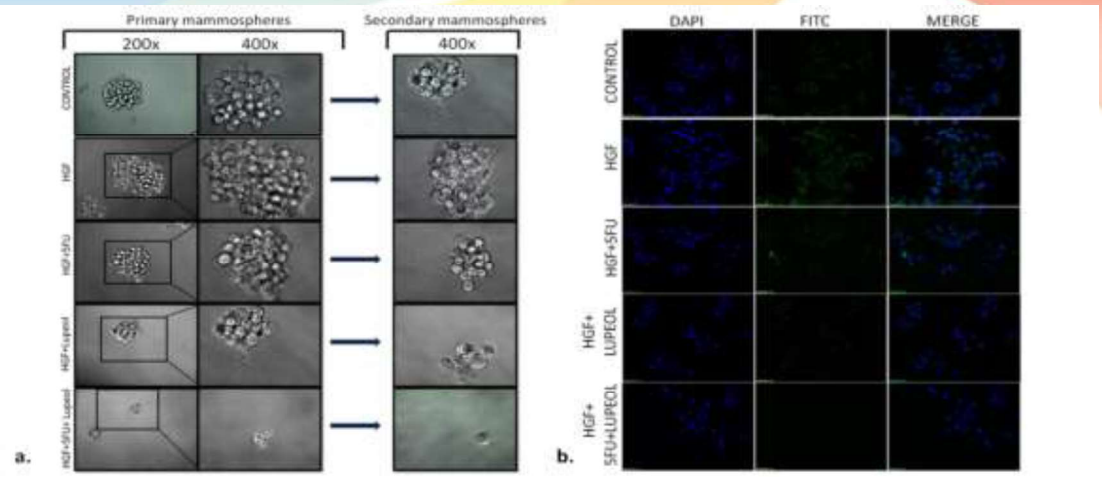


Fig. : Evaluation of mammosphere formation and CD133 expression post treatment with Lupeol or 5FU or both on MDA MB 231 cells.

II. HIF-1α escalates Vasculogenic Mimicry forming ability in oral cancer in-vitro and positively regulates VM associated EphA2/Laminin 5γ2 axis

Name of PI : Dr. Nabendu Murmu

Name of student : Ms. Depanwita Saha

Project highlights: To investigate the role of HIF-1α in the enhancement of VM formation, the tube forming ability of OSCC cell lines in 3D tumor culture was monitored by stabilizing HIF-1α under hypoxia and also silencing HIF-1α expression with HIF-1α siRNA. The hypoxic condition triggered the formation of vascular architecture in all the OSCC cell lines used in this study. Further, the cells transfected with HIF-1α siRNA significantly inhibited the tube forming capacity of OSCC cell lines in both normoxia and hypoxia compared to the non-transfected cells and control siRNA transfected cells. The expression of VM associated signaling molecules was evaluated following induced and genetically silenced expression of HIF-1α using western blot analysis.

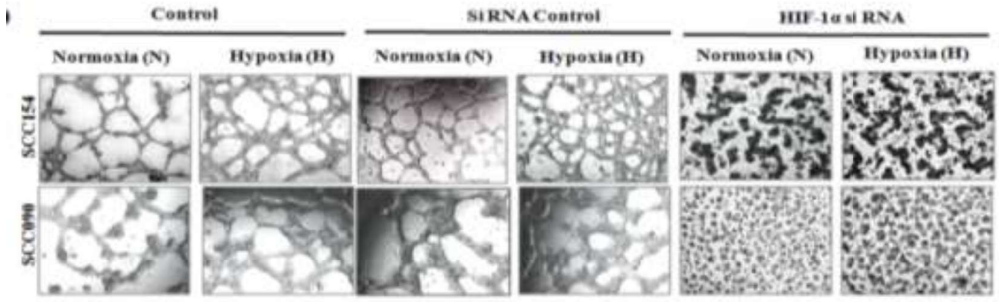


Fig : siRNA against HIF-1α inhibits vasculogenic mimicry formation and expression of vasculogenic mimicry related genes in-vitro

III. Investigation on the anti-cancer potential of *Carica papaya* leaf extract and its subsequent nano-formulation on breast cancer model

Name of PI : Dr. Nabendu Murmu

Name of student : Ms. Rimi Mukherjee

Project highlights: We have prepared ethanolic extracts of *Carica papaya (*CP) by maceration process. Anticancer activity of the extracts were confirmed from MTT assay which showed a IC 50 value of around 782.1µg/ml in a breast cancer cell line. On further *in-vitro* analysis, we have performed the Wound Healing Assay which revealed that the rate of cell migration as well as invasion has decreased with the administration of higher dose of the crude extract. 48 hrs post treatment, the extract inhibited the closure

of the wound.

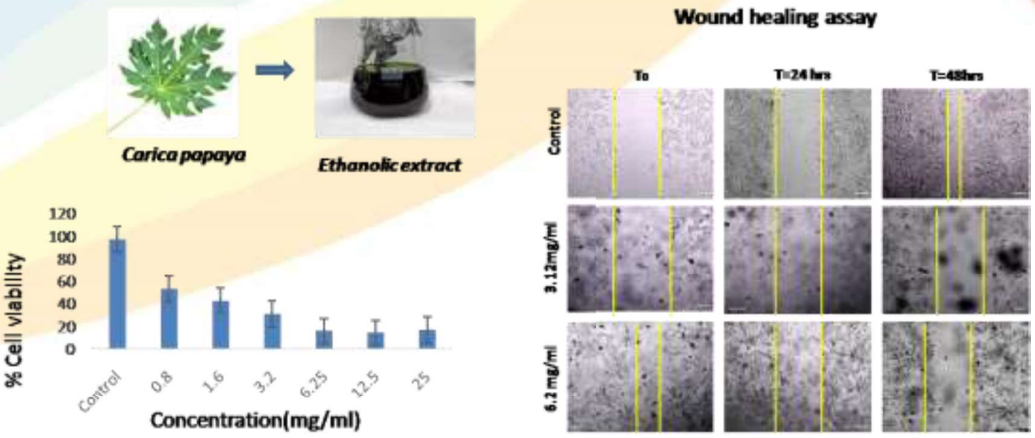


Fig: Preparation of ethanolic extract of Carica papaya and its anticancer effect in CaBr cell line

IV. Unraveling the therapeutic potential of natural products isolated from *Justiciaa dhatoda* leaves and their nano-formulations on Head and Neck Squamous cell Carcinoma (HNSCC) model

Name of PI : Dr. Nabendu Murmu

Name of student : Mr. Debojit Talukdar

Project highlights: The extraction of the crude leaf extract of *Justicia adhatoda* was done in distilled water to prepare an aqueous extract. We have checked for the cytotoxicity of the crude extract on HNSCC cell lines by MTT assay and the IC_{50} was calculated which came out to be around 1 mg/ml, providing us an insight of its cytotoxic effect on HNSCC. After getting the cytotoxicity profile, the effect of the extract on cell proliferation was examined by Colony Formation Assay(CFU) and a decrease in the colony forming units have been found with the increase in the dose of the treatment compared to the control.

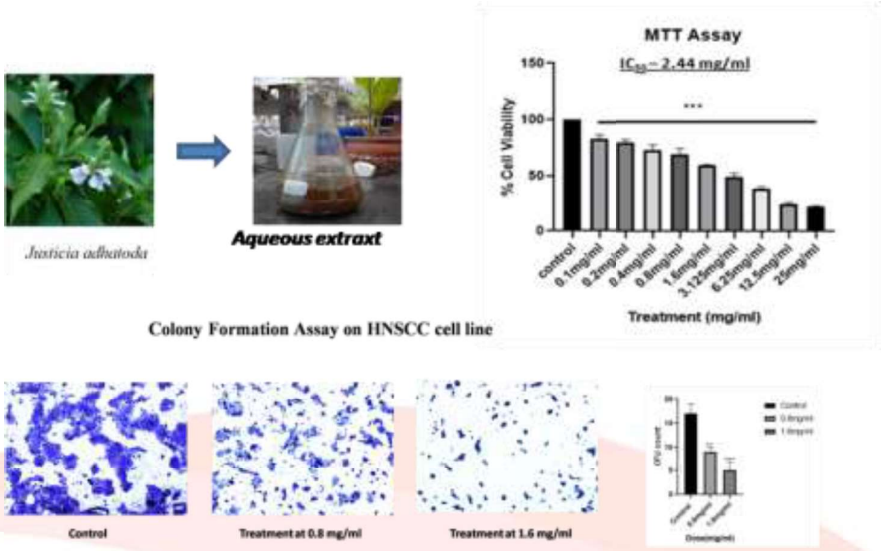


Fig: Preparation of aqueous extract of Justicia adhatoda and its anticancer effect in HNSCC cell line

V. Elucidation of anti-cancer activity of *Madhuca indica* flower and its active components on various cancer models

Name of PI : Dr. Nabendu Murmu

Name of student : Ms. Aritri Bhattacharjee

Project highlights: In this research, we aim to elucidate bioactive constituents of the flower of *Madhuca indica* and to understand its medicinal potential in cancer therapy. We will be studying its activity on different cancer models namely melanoma, oral cancer, and breast cancer. The isolation work of bioactive compounds is going on from the organic crude extract of the Mahua flower using HPLC-based activity profiling. The isolated compound will be further analysed to understand its action in suitable *in vivo* and *ex vivo* cancer patient samples.

VI. Development of therapeutic peptides for blocking interactions between Hepatitis B and host cellular proteins related with regulatory signaling pathways in hepatocellular carcinoma: A proteomic approach deciphering host-pathogen protein interactive network

Name of PI: Dr. Avik Biswas

Project highlights: This study will provide a comprehensive map of the potential HBV host interactions at the highest possible nodes of protein interactive signaling pathways related with HCC. These findings will provide insight into mechanisms of HBV induced HCC. We hypothesize that blocking the HCC related key interactions between particular HBV protein and cellular tumor suppressor proteins will restore their natural anti-tumor functions. We anticipate to identify numerous interacting host factors with key functions in HCC.

Different HBV proteins were cloned with in-frame FLAG tag and currently affinity purification process is underway. Soon, the primary host interactors will be identified.

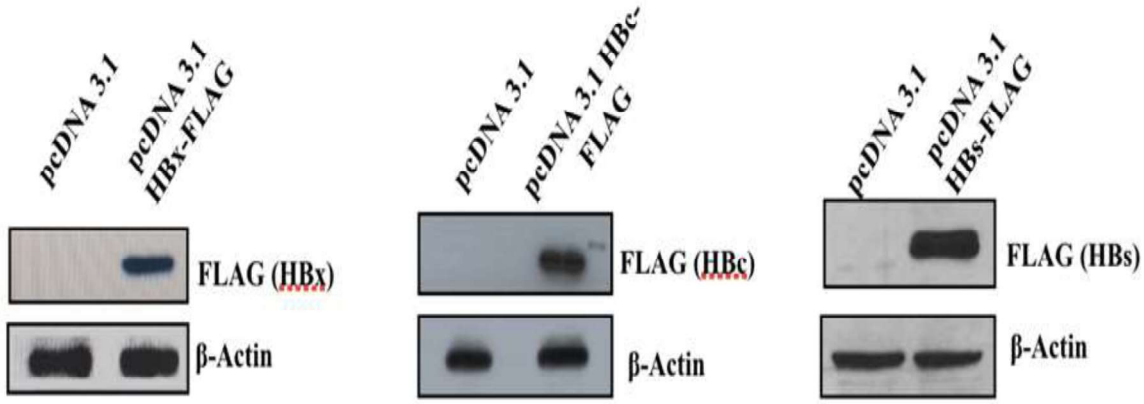


Fig: Expression of cloned viral proteins tested with western blots.

VII. Investigating the role of hetergeneous nuclear ribonucleoprotein (hnRNP) family members in Human Hepatocellular Carcinoma (HCC)

Name of PI: Dr. Avik Biswas

Project highlights: Heterogeneous nuclear ribonucleoproteins (hnRNPs) are protein-RNA complexes and the recognition of the RNA targets are highly specific, where the specificity can easily be attributed to particular RNA structural motifs depending upon specific sequences. The hnRNP family consists of about 20 major candidates, hnRNPs A1–U, which range in size from 34 to 120 kDa. HnRNPs bind to nascent transcripts to form functional hnRNP complexes, and have a wide range of roles in DNA repair, telomere biogenesis, cell signaling, and regulating the gene expression both at the level of transcription and translation. Many hnRNPs regulate the expression of various oncogenes. This study aims to uncover the regulatory functions of different hnRNPs in the regulation of different oncogenes. As part of the project work, currently, development of different hnRNPs over-expression systems are in progress.

VIII. Molecular characterization of complex functional roles of heterogeneous nuclear ribonucleoprotein G (hnRNPG) and heterogeneous nuclear ribonucleoprotein K (hnRNPK) in human hepatocellular carcinoma (HCC)

Name of PI: Dr. Avik Biswas

Name of student : Ms. Najma Khatun

Project highlights: This project highlights the altered RNA metabolism during HCC development and progression. The complex role of hnRNPG and hnRNPK in the altered RNA metabolism is under study. Currently, work is going on to elucidate the role of two mentioned proteins in the expression of different transcript variants (p53, p21 and p16) in the context of human HCC.

IX. Deciphering the mechanistic involvement of Hepatitis B virus (HBV) proteins in the progression and regulation of human hepatocellular carcinoma (HCC)

Name of PI: Dr. Avik Biswas

Name of student : Ms. Arpita Kar

Project highlights: Despite the availability of safe and effective vaccine, Hepatitis B virus (HBV) infection still continues to be a global health burden with significant morbidity and mortality. The role of different HBV proteins during the development and progression of hepatocellular carcinoma is still scanty. This study will be aimed to decipher the modulatory effect of different HBV proteins (P,C, S etc. including X), will provide information regarding HCC associated complex signaling networks. Thus, as part of the project, HBx and p53 interaction study with structure-function approach in the context of HCC is under study.

X. Excavating the functional roles of different regulatory motifs / domains of heterogeneous nuclear ribonucleoprotein E1 (hnRNPE1) and heterogeneous nuclear ribonucleoprotein K (hnRNPK) in human cancers

Name of PI: Dr. Avik Biswas

Name of student : Mr. Abhisekh Samanta

Project highlights: Generation of over expression construct for hnRNPE1 and hnRNPK are going on. By using *in-vitro* experimental platform the role of hnRNPE1 and hnRNPK proteins is under study with special emphasis on different domains/motifs of the two proteins in the context of human cancers with genetics / reverse genetics experiments.

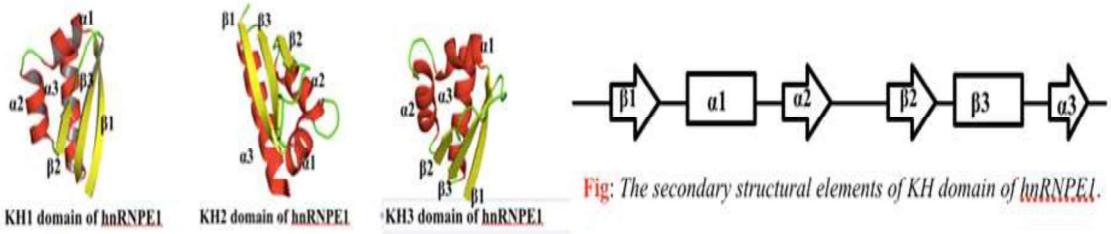


Fig: *The NMR structure of KH domain of hnRNPE1.*

Fig: *The secondary structural elements of KH domain of hnRNPE1.*

Fig: The NMR structure of three KH domains of hnRNPE1 and a cartoon representation of canonical KH domain.

E. Publications / Monographs / Patents etc. (*please mention international and national publications separately*)

International Publications:

- Mitra S, Patra T, Saha D, Ghosh P, Mustafi SM, Varghese AC, **Murmu N**. Sub-chronic cadmium and lead compound exposure induces reproductive toxicity and development of testicular germ cell neoplasia in situ in murine model: Attenuative effects of resveratrol. ***J***

Biochem Mol Toxicol. 2022 Apr 1:e23058. doi: 10.1002/jbt.23058. Epub ahead of print. PMID: 35362238.

- Ghosh P, Mandal S, Mitra Mustafi S, **Murmu N**. Clinicopathological Characteristics and Incidence of Gastric Cancer in Eastern India: A Retrospective Study. ***J Gastrointest Cancer***. 2021 Sep;52(3):863-871. doi: 10.1007/s12029-020-00478-w. PMID: 32809138.
- Parveen R, Maiti PK, **Murmu N**, Datta A. Preparation of serum capped silver nanoparticles for selective killing of microbial cells sparing host cells. ***Sci Rep***. 2021 Jun 2;11(1):11610. doi: 10.1038/s41598-021-91031-7. PMID: 34078983; PMCID: PMC8172638**.**
- Ray S, Saha D, Alam N, Mitra Mustafi S, Mandal S, Sarkar A, Majumder B, **Murmu N**. Exposure to chewing tobacco promotes primary oral squamous cell carcinoma and regional lymph node metastasis by alterations of SDF1α/CXCR4 axis. ***Int J Exp Pathol***. 2021 Apr; 102(2):80-92. doi: 10.1111/iep.12386. PMID: 33655604; PMCID: PMC7981595.
- Bhattacharyya S, Ray S, Saha D, Mustafi SM, Alam N, Sarkar A, **Murmu N**. Chewing tobacco may act as a risk factor for dysplastic transformation of squamous cells in Oral leukoplakia- A cytochemistry based approach. ***Pathol Res Pract***. 2021;218:153287. doi: 10.1016/j.prp.2020.153287. PMID: 33454586.
- Murmu N, Mitra D, **Das G.** Increasing incidence of colorectal cancer among Indians: Concerns and the way forward. ***Cancer Research, Statistics & Tratment***, 2021, Dec; 4:771-772. doi:10.4103/crst.crst_258_21
- Mukherjee S, Kar A, Khatun N, Datta P, Biswas A, Barik S. Familiarity Breeds Strategy: In Silico Untangling of the Molecular Complexity on Course of Autoimmune Liver Disease-to-Hepatocellular Carcinoma Transition Predicts Novel Transcriptional Signatures. Cells. 2021 Jul 29;10(8): 1917.

F. Other academic activities

a) Paper presented (Oral / Poster) –

- Presented poster on "***A New Perspective of Vascular mimicry: changing the therapeutic pattern in cancer***" in 41st Annual Conference of Indian Association for Cancer Research (IACR) organized by Amity Institute of Molecular Medicine and Stem Cell Research, Amity University, Noida from 2nd to 5th March, 2022

b) Ph.D awarded –4 (Under supervision of Dr Nabendu Murmu).

Ms. Sudipta Ray was awarded PhD (Science) degree in the year 2021 from Jadavpur University for her thesis entitled " HGF-cMet and EGFR Signaling in Oral Squamous Cell Carcinoma and Lymph Node Metastasis: Effect of Lupeol on the Signaling Pathways *invitro*" under the supervision of **Dr Nabendu Murmu**

Mr. Sayantan Bhattacharyya was awarded PhD (Science) degree in the year 2021 from Jadavpur University for his thesis entitled "Molecular Signalling Mechanism of Risk Factor Induced Carcinogenesis in Head and Neck Cancer: Synergistic Effect of Lupeol and Ionizing Radiation at Post-Transcription Level in Head and Neck Cancer Cells" under the supervision of **Dr Nabendu Murmu**

Ms Paramita Ghosh was awarded PhD (Science) degree in the year 2021 from Jadavpur University for her thesis entitled "Study of mTOR signaling molecules on risk factor associated with gastric carcinoma: Effect of dietary phytochemical on gastric carcinoma cells" under the supervision of **Dr Nabendu Murmu**

Ms Sreyashi mitra was awarded PhD (Science) degree in the year 2022 from Jadavpur University for her thesis entitled "Ameliorative Effects of Natural Compound against the Deleterious Impact of Environmental Carcinogens in Male Infertility and Testicular Cancer:A Comprehensive Study" under the supervision of **Dr Nabendu Murmu**

c) **Students undergoing PhD-** **4 (Under supervision of Dr Nabendu Murmu)**
2 (Under supervision of Dr Avik Biswas)

d) **Conference / Symposium / Workshop (*International / National*) attended –**

- Dr. Nabendu Murmu attended 41st Annual Conference of Indian Association for Cancer Research (IACR) organized by Amity Institute of Molecular Medicine and Stem Cell Research, Amity University, Noida from 2nd to 5th March, 2022
- Dr. Nabendu Murmu, Dr. Gaurav Das & Dr. Avik Biswas attended a National seminar on World Cancer Day 2022 – Close The Care Gap" on 4th February, 2022 organized by CNCI, Kolkata
- Dr. Nabendu Murmu, Dr. Gaurav Das &Dr. Avik Biswas attended a National seminar on "Integrated Approach in S & T for sustainable future" on National Science Day, 28th February, 2022 organized by CNCI, Kolkata.

e) **Miscellaneous-**

1. Dr. Nabendu Murmu acted as reviewer for various international peer reviewed journals.
2. Dr. Nabendu Murmu reviewed several extramural projects submitted to Science and Engineering Research Board, New Delhi.
3. Dr. Avik Biswas has reviewed several papers for multiple international journals like, Plos One, Scientific Reports, Journal of Advanced Research, etc.

ACADEMIC CELL

Academic Coordinator: **Dr. Sutapa Mukherjee (till 30.11.2021)**
Dr. Ugir Hossain Sk (1.12.2021 – 31.03.2022)

Contribution of Other Scientists (Team Members):

Sl No	Name	Designation	Department
1.	Dr. Subhadip Hajra **(till 30.11.2021)**	SSO-II	Cancer Chemoprevention
2.	Dr. Biswarup Basu	SSO-II	Neuroendocrinology & Experimental Haematology
3.	Dr. Avik Biswas	SSO-II	Signal Transduction and Biogenic Amines
4.	Dr. Sankhadeep Dutta	SSO-II	Oncogene Regulation
5.	Dr. Subhasis Barik	SSO-II	In Vitro Carcinogenesis & Cellular Chemotherapy

Some major noteworthy activities going on in Academic Cell at regular basis are**: i)** Conducting and coordinating PhD course work classes; **ii)** Placement of students (coming from different institutions and universities) to different departments of CNCI for their internship training programme; **iii)** Conducting monthly meeting of the Academic Committee (Research) to resolve Academic issues and to promote good research practice; **iv)** Evaluation of project proposals by the members of Academic Committee (Research) before submission for extramural funding; **v)** Provide guidance and assistance to the research fellows on fellowship related issues; **vi)** Organizing seminars on a regular interval to promote scientific exchanges.

DEPARTMENT OF ANIMAL CARE AND MAINTENANCE

Head of the Department: Abhijit Rakshit, M.V.Sc. Technical Officer-Animal House

Team

Name	**Designation**
Shri Shibashis Das	Laboratory Helper
Shri Sambhu Halder	Laboratory Helper

Objectives

- To maintain laboratory animals in a clean and hygienic environment
- To produce good quality, healthy animals by adopting scientific breeding techniques
- To provide healthy, disease-free animals to various departments of this Institute for their research work
- To provide technical help in animal experiments
- To organize the Institutional Animal Ethics Committee (IAEC) meetings to scrutinize and guide the animal experimentation projects conducted by different research departments of this Institute
- To supervise ethical aspect of animal experimentation

Brief description of the work done during the year

The Animal Care and Maintenance Department is the central animal facility of the Institute, where Swiss albino and C57BL/6J mice are maintained.

This Animal Care and Maintenance Department is registered with the CPCSEA (Committee for the Purpose of Control and Supervision of Experiments on Animals), Department of Animal Husbandry and Dairying, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India, having its Registration No. 1774/GO/RBi/S/14/CPCSEA. Following CPCSEA guidelines the IAEC meeting was held on 25th September 2021. The Annual Inspection of Animal House by CPCSEA Nominee was held on 05th March 2022.

Following is the chart of animals produced and supplied to various departments of the institute in the year 2021-22:

Production

Species	Strain	Male	Female	Total
Mouse	Swiss	150	246	396
	C57BL/6J	96	130	226

Supply

Species	Strain	Male	Female	Total
Mouse	Swiss	227	191	418
	C57BL/6J	132	97	229

DEPARTMENT OF CENTRAL RESEARCH INSTRUMENTATION FACILITY (CRIF)

Staff members: Dr. Madhumita Roy, HOD, Officer in-charge (Research) (01.4.2021 – 30.11.2021)

Team: Dr. Supratim Ghosh, Scientific in- charge, SSO II,
Mr. Diptendu Ghosh, Technical in-charge, S S A,
Mr. Sourin Maity , SSA

The department of CRIF established in the year of 1996 with objective that costly and technologically intricate instruments for advanced cancer research of this institute will be kept and maintained in one central place.

For advanced research on cancer, the department has following facilities like:

(1) Microbiology, (2) Molecular and cell biology, (3) DNA sequencing, (4) Cold room, (5) Flow cytometry, (6) Liquid Nitrogen plant, (7) Quantitative RT PCR, (8) Laser capture micro dissection (9) Radio isotope, (10) In vivo imaging system.

The following is a list of scientific instruments of the department:

1.- 86-degree Deep Freezer: Kaltis, Blue Star2. Atomic Absorption System 3. Nitrogen Generator 4. Blue Star Her Con Unit 5. Flow Cytometer - FACS Calibur 6. Flow Cytometer- FACS LSRFORTESSA X-207. Fluorescence Carry Eclipse System8. Gel Doc: Bio Rad, Invitrogen 9. GENEAMP PCR SYSTEM 2700.96 WELL10. Genetic Analyzer, ABI11.GS 800 Densitometer12. Cold Centrifuge: Sigma, Sartorius, Hermle, Thermo13. Sonicator 14. Hidex 300 SL TCDR Beta Counter15. PCR INSTRUMENTS16. Laser capture micro dissection System17. Fine Balance: Sartorius, Mettler, Shimedzu18. Laminer Air Flow Hood, Klenzaides 19. Leica Brand Histology Equipments 20. Microscope: Bright Field, Fluorescence 21. Leica Microtome and Cryo microtome22. Liquid Nitrogen Plant 23. Mycycler Thermal24. Nikon Eclipse E600F 1 Microscope25. Real Time PCR System: Roche, ABI26. Shaker27. Chemidoc System Thermo28. Tecan ELISA Multimode Reader29. Ultra-Centrifuge: Thermo, Beckman Coulter30. Chemical Fume Hood 31. Spectrometer: UV-VIS Cary 100, UV-VIS 35032. Hybridization Oven33.Millipore Water Purification System 34. LCMS System35. Gamma Counter Wallac36. In vivo imaging system, Parkin Elmer37. Liophilizer Scan Vac, Speed Vac38. UV Transilluminator 39. UV Crosslinker 40. Ice Flaker etc.

Activities:

The above instruments are maintained, AMC/CAMC regularly done.
Discussion with the company engineers about the instruments for repairing and maintenance.
Arrangement of demonstration of new instruments.

LIBRARY

(Research Library, Hospital Library and Rajarhat campus Library)

Officer with educational qualification	**Designation**
SANMOY CHAKRABORTY, MLIS, M. Phil.	Assistant Library & Information Officer
GANESH GORAI, MCA, MLIS, M. Phil.	Assistant Library & Information Officer
Other Team Member	
GITA KHATUA	GDA(Retired on 30/11/2021)

The library service is the pivot of all the academic and clinical activities of the Institute. In one-hand there are Research work carried on in the Research section by the Scientist and Ph. D Fellows and on the other hand there are many academic courses and clinical Researches are conducted in the Hospital site. To cater the needs of all of the above-mentioned areas library plays a vital role. The readers and consumers from the above-mentioned sectors prefer to get the library service available in all working days.

Objectives of the department

- To collect, organize & disseminate printed & digital information.
- To provide information to the users.
- To develop knowledge house.
- To create and update a comprehensive database of cancer literature.
- To provide online and print journals;
- To provide print and e-books;
- Library offers Online Public Access Catalogue (OPAC) which allows user to browse library collection by author, title, subject, classification number, etc. through web OPAC.
- For help to better research work for Scientist and to better treatment for doctor.
- In addition, it also extended its facilities to other institutions and universities.

Brief description of the work done during the year (from 1st April 2021 to 31st March 2022)

1. Library has procured **UpToDate database** for clinical decision-making online database and **I-Thenticate**, for checking plagiarism for clinical and research purpose.
2. Library automation software KOHA, and institutional repository software DSPACE are running successfully.
3. Library is well equipped with sufficient number of computers with internet connectivity through LAN and wireless networking facility for laptop users. Library is having access to plenty of electronic journals, e-books, archives at institutional level. Online journals are also accessible within the campus through campus LAN.
4. Classification, Cataloguing, Indexing and data entry of more than 260 new books, which were procure during this period, have been successfully completed through Library Management Software KOHA for creating online catalogues for users' access.
5. As a member of NCG library provides access to the **Global Clinical Decision** support tool of Elsevier.
6. The library provided the photocopying services to the users.
7. Library provides the newspaper clipping service on news related to cancer.
8. Library also provides e-mail service to the users.
9. The library shares its resources with all important academic/research institutions in India.
10. Hon'ble Prime Minister inaugurated the 2nd campus with 460 beds of CNCI at Rajarhat on 7th January, 2022. There was no library provision. So, library has been set up for clinician and other staff users. The library provides online and offline facilities for launching clinical education courses at CNCI 2nd campus.
11. Like previous years, this year also focus was on the strengthening of collection and implementation of latest information and communication technologies in its services. 24/7 reading facility for online books, e-journals out of library hours through VPN service.

Library Resources					
	Total nos. of Books	No. of Journals 2021- 2022 (Online & Print)	No. of Bound Journals	E-Books	Electronic Resources
Research Library	3538	29	13824	54	212
Hospital Library	6551	22	2100	119	25
CNCI 2nd campus, Newtown	199	12	-	-	-

General Administration, Accounts & Ancillary Departments

Dr. Jayanta Chakrabarti, MS, DNB (Surgical Oncology), Director

Dr. Tapas Maji
Additional Director In-charge

Dr. Sankar Sengupta
Medical Superintendent

Dr. Rathindranath Baral
Officer-in-Charge (Research)

Dr. Rup Kr. Saha
Officer-in-Charge (Hospital)

Dr. D. P. Jena
Administrative Medical Officer

Administrative Officer
Shri Debanjan Sarkar
Shri Santanu Haldar

Director's Section
Shri Awadhesh Kumar Singh, Personal Assistant
Shri Prabhakar Kumar Sinha, Stenographer
Shri Basanta Mahapatra, Lab. Helper

General Administration
Smt. Jyoti Singh, Hindi Officer
Shri Jayanta Sikder, Office Superintendent
Shri Sumit Kr. Majumdar, Office Superintendent
Smt. Moumita Chatterjee Social Welfare Officer
Shri Syed Imdad Hossain, Social Welfare Officer
Shri Ujjwal Kr. Barui, Head Clerk
Smt. Pallabi Ghosh, Stenographer
Shri Sailesh Kr. Singh, LDC (PwD)
Shri Malay Das, Daftari
Smt. Arati Dey, GDA
Shri Monojit Das, UDC
Shri Koushik Dey, UDC
Shri Jagannath Das, Gardener

Accounts Section
Shri Chandan Kumar Sinharay, Accounts Officer
Shri Shaibal Bhaduri, Assistant Accounts Officer
Shri Debraj Das, Assistant Accounts Officer
Shri Atal Behari Mahanti, Accountant
Shri Sunil Kr. Jha, Accountant
Shri Animesh Nath, Accountant
Shri Prasanta Sarkar, Sr. Caretaker
Shri Rambilash Yadav, Lab. Helper
Shri Ujjal Roy, UDC
Shri Dipak Malik, GDA
Smt. Punia Devi, GDA

Ward Master's Section
Shri Bhola Pal, Lab. Helper
Shri Sarju Das, GDA
Shri Asim Kumar Chakravarty, GDA
Smt. Saraswati Nayak, GDA
Smt. Sumitra Routh, GDA
Shri Purnendu Roy, GDA.
Shri Karunakar Nayak, GDA
Smt. Sumitra Das, GDA
Smt. Rekha Gachhit, GDA
Shri Rabin Pramanik, GDA
Shri Krishan Mallik, GDA
Shri Tapan Saha, GDA
Shri Shankar Naskar, GDA
Smt. Munni Hela, GDA
Smt. Jhuma Lama, GDA
Shri Dipak Biswas, GDA
Shri Sara Nayak, GDA

Maintenance Department
Bappa Mondal, Maintenance Supervisor
Sudipta Biswas, Maintenance Supervisor
Shri Swarup Ghosh, AC Attendant
Shri Bidesh Roy, Electrician (PwD)
Shri Ranjit Singh, Telephone Operator

Store and Purchase
Shri Subhasish Chakraborty, T.O.-(Store & Purchase)
Shri Debpratim Chakraborty, Pharmacist
Shri Somnath Nandi, Pharmacist
Shri Samson Soren, Store Supervisor
Smt. Soma Das, Storekeeper

Academic and Computer Facility
Dr. Sutapa Mukherjee, Academic Coordinator

Nursing Staff
Smt. Malika Barui(Mukherjee), Asst. Nursing Supdt.
Smt. Dalia Biswas, Nursing Sister
Smt. Krishna Dey, Nursing Sister
Smt. Bandana Chakraborty, Nursing Sister
Smt. Rita Rana, Nursing Sister
Smt. Krishna Roy Chowdhury, Nursing Sister
Smt. Japamala Maity, Nursing Sister
Smt. Rita Dutta, Nursing Sister
Smt. Uma Majumder, Nursing Sister
Smt. Priya Bhattacharya, Nursing Sister
Smt. Tanu Ghosh (Chanda), Nursing Sister
Smt. Swati Ghosal, Nursing Sister
Smt. Alpana Maity, Nursing Sister
Smt. Tapati Burman, Nursing Sister
Smt. Sujata Majumder, Staff Nurse
Smt. Debjani Dutta (Debangshi), Staff Nurse
Smt. Purnima Mondal (Sarkar), Staff Nurse
Smt. Kabita Ghosh (Bali), Staff Nurse
Smt. Soma Chatterjee (Mukherjee), Staff Nurse
Smt. Piyali Bandyopadhyay, Staff Nurse
Smt. Kabita Bera (Maity), Staff Nurse
Smt. Sandhya Das, Staff Nurse
Smt. Tapati Ghosh, Staff Nurse
Smt. Manjula Tudu, Staff Nurse
Smt. Runa Sanyal, Staff Nurse
Smt. Sonali Bhunia, Staff Nurse
Smt. Sharmila Das, Staff Nurse
Smt. Sarbani Das, Staff Nurse
Smt. Arpita Dey (Das), Staff Nurse
Smt. Rumi Dutta (Sarkar), Staff Nurse
Smt. Chirosree Sarkar (Mukherjee), Staff Nurse
Smt. Bijali Mondal, Staff Nurse
Smt. Samita Saha, Staff Nurse
Smt. Banhishikha Das, Staff Nurse
Smt. Sarmila Kora, Staff Nurse
Smt. Kakoli Bhattacharjee, Staff Nurse
Smt. Moushumi Chakraborty(Choudhuri), Staff Nurse
Smt. Baranali Sarkar, Staff Nurse
Smt. Soma Jana, Staff Nurse
Smt. Krishna Singha, Staff Nurse
Smt. Kumkum Sarkar (Bhowmick), Staff Nurse
Smt. Pamela Maity (Chowdhuri), Staff Nurse
Smt. Rekha Sardar, Staff Nurse
Smt. Sipra Pal, Staff Nurse
Smt. Chaitali Mondal (Guha), Staff Nurse
Smt. Ratna Karmakar, Staff Nurse
Smt. Jayita Das, Staff Nurse
Shri Om Prakash, Staff Nurse
Shri Kamal Singh Choudhury, Staff Nurse
Smt. Sudeshna Bag, Staff Nurse
Smt. Sikha Jana, Staff Nurse
Smt. Beauty Pradhan, Staff Nurse
Smt. Arpita Mukherjee, Staff Nurse
Shri Suresh Kumar, Staff Nurse
Shri Naveen Tailor, Staff Nurse
Shri Mukesh Kumar, Staff Nurse
Smt. Nitu Kumari, Staff Nurse
Smt. Sonali Nath, Staff Nurse
Shri Rajpal Raigar, Staff Nurse
Shri Sitaram, Staff Nurse
Shri Kuldeep Meena, Staff Nurse
Shri Murari Kumar Jha, Staff Nurse
Shri Suraj Mal, Staff Nurse
Smt. Nagamani Gudala, Staff Nurse
Shri Kuldeep, Staff Nurse
Smt. Rupa Dey Dutta, Staff Nurse
Smt. Archana Tudu, Staff Nurse
Shri. Narpat Ram, Staff Nurse
Shri. Ajay Kumar Chaudhury, Staff Nurse
Shri. Manoj Kumar Sheshama, Staff Nurse
Smt. Mamta Bhaskar, Staff Nurse
Shri. Hansraj Kodiya, Staff Nurse
Shri. Lokesh Kumar Saini, Staff Nurse
Shri. Yogesh Kumar Reshwal, Staff Nurse
Shri. Ranjeet Singh Mavaliya, Staff Nurse
Shri. Jagdish, Staff Nurse
Shri. Mahaveer Prasad Godara, Staff Nurse
Shri. Rajesh Kumar Yadav, Staff Nurse
Shri. Shiv Prasad Rav, Staff Nurse
Shri. Gajraj Singh, Staff Nurse
Shri. Monu Kumar Darji, Staff Nurse
Smt. Monika Narwal, Staff Nurse
Shri. Jitendra Kumar, Staff Nurse
Shri. Surendra Kumar Gurjar, Staff Nurse
Shri. Sita Ram, Staff Nurse
Shri. Ram Chandra, Staff Nurse
Smt. Shonali Singh, Staff Nurse

Smt. Neha, Staff Nurse
Shri. Alokdeep Singh, Staff Nurse
Shri. Krishan Kumar, Staff Nurse
Smt. Kajal Rani, Staff Nurse
Shri. Prem Raj Meena, Staff Nurse
Smt. Khileshwari, Staff Nurse
Smt. Anshita Banshiwal, Staff Nurse
Smt. Ajantharani T, Staff Nurse
Shri. Lalit Kumar Mandrawal, Staff Nurse
Smt. Monika Godara, Staff Nurse
Shri. Ved Prakash, Staff Nurse
Shri. Ravi Goyal, Staff Nurse
Shri. Ankush Choudhary, Staff Nurse
Shri. Robin Chaturvedi, Staff Nurse
Shri. Mohanlal, Staff Nurse
Shri. Khemraj Meena¸ Staff Nurse
Smt. Sangita Dey, Staff Nurse
Smt. Alka Kumari Singh, Staff Nurse
Smt. Sweety, Staff Nurse
Smt. Versha, Staff Nurse
Shri. Dharmendra Choudhary, Staff Nurse
Smt. Aashi Chauhan, Staff Nurse
Smt. Nitika Garg, Staff Nurse
Smt. Mousumi Pramanik, Staff Nurse
Smt. Ananya Biswas, Staff Nurse
Smt. Madhurima Mondal, Staff Nurse
Smt. Sapna Goutam, Staff Nurse
Smt. Sanchita Patra, Staff Nurse
Smt. Moumita Atha, Staff Nurse
Shri. Anil Poonia, Staff Nurse
Shri. Santosh Kumar Meena, Staff Nurse
Shri. Lakkhi Ram Saini, Staff Nurse
Shri. Dharamveer Singh, Staff Nurse
Shri. Sahi Ram, Staff Nurse
Smt. Roshni M Shaji, Staff Nurse
Shri. Kartik, Staff Nurse
Shri. Sunil Kumar Choudhary, Staff Nurse
Smt. Rajni Pal, Staff Nurse
Smt. Kajal Mahendra Walde , Staff Nurse
Shri. Avdesh Jatav, Staff Nurse
Shri. Trilok Chand Choudhary, Staff Nurse
Smt. SWATILEKHA DAS, Staff Nurse
Smt. PREETI, Staff Nurse
Smt. Pushpanjali, Staff Nurse
Shri. Sugan Lal Prajapati, Staff Nurse
Shri. Smt.Reenashri Niyogi, Staff Nurse
Shri. Anil Kumar, Staff Nurse
Shri. Hitesh Khatri, Staff Nurse
Shri. Rishikesh Meena, Staff Nurse
Shri. Kristamsetti Sreenivasa Rao, Staff Nurse
Shri. Vinod Kumar, Staff Nurse
Smt. Suman Satpathy, Staff Nurse
Shri. Mahendra Singh, Staff Nurse
Shri. Dinesh Singh Gurjar, Staff Nurse
Shri. Satendra Singh, Staff Nurse
Shri. Surendra Kumar, Staff Nurse
Smt.Ruhi Fatma, Staff Nurse
Shri. Om Veer Singh, Staff Nurse
Shri. Naresh Kumar, Staff Nurse
Smt.Sandhya Pal, Staff Nurse
Shri. Umesh Yadav, Staff Nurse
Shri. Parakash Kumar, Staff Nurse
Shri. Ashok Kumar, Staff Nurse
Shri. Subhash Chand Yadav, Staff Nurse
Smt.Swagata Ghosh, Staff Nurse
Shri. Yogendra Singh Ranawat, Staff Nurse
Shri. Gordhan Lal Hinoniya, Staff Nurse
Shri. Girvar Singh, Staff Nurse
Shri. Manoj Patidar, Staff Nurse
Smt. Munesh, Staff Nurse
Shri. Vikram Singh Yadav, Staff Nurse
Smt.Moumita Dey, Staff Nurse