ICMR-NICPR ANNUAL REPORT 2021 - 2022

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FROM THE DIRECTOR'S DESK

Dear All,

Greetings and Welcome!!!

ICMR-National Institute of Cancer Prevention and Research – a permanent institute under the aegis of the Indian Council of Medical Research, Department of Health Research, is the country's premier institution for carrying out research in the field of cancer prevention. The institute has made significant strides in developing and validating innovative and improved strategies for cervical, oral, and breast cancer screening in the country. Lately, the institute has expanded its research domain to other cancers including esophageal, gall bladder, head and neck, ovarian, endometrial and prostate as well. The institute regularly undertakes several programs for training the faculty, research scholars and students from across the length and breadth of the nation, and in equipping them for carrying out screening of highly prevalent cancers. Recently, the institute has also started screening for risk factors for non-communicable diseases. Tobacco cessation counselling point is another important feature of our Health Promotion Clinic where behavioral and non-behavioral interventions are carried out to assist individuals to quit tobacco. This report highlights the significant contributions including clinical and molecular research, and other institutional and non-institutional activities undertaken by the institute during the period July 2021 to May 2022.

During the initial few months of the aforementioned period, the country was still grappling with the deadly second COVID-19 (Delta) wave. Our institute continued to support RT-PCR based COVID-19 testing in the High Throughput Viral Diagnostic Laboratory for Western UP and Delhi. As a whole, our institute's contribution during Covid-19 has been multifold including testing, vaccination, follow-up, policy interventions and addressing the concerns of healthcare workers. The institute has also partnered with ICMR to characterize the humoral and cellular immune response in individuals receiving additional third dose of Covishield/Covaxin vaccine from Noida and nearby areas. Besides, the institute has also been involved in carrying out surveys for other infectious diseases like microbiologically confirmed Pulmonary Tuberculosis in the states of Uttar Pradesh and few clusters of Haryana.

ICMR-NICPR has several well-established policy programs, one of which is The WHO FCTC Global Knowledge Hub on smokeless tobacco (SLT). Our institute has been designated as the 'WHO-FCTC Global Knowledge Hub (KH-SLT) on Smokeless Tobacco' by the Government of India and the WHO FCTC Secretariat. This program focusses primarily on generating awareness

about the harms caused by smokeless tobacco use, and augments global smokeless tobacco control efforts through scientific evidence and technical research inputs. During the aforementioned period, several training programs and webinars were organized to develop skilled human resource and also for policy discourse in various global tobacco control best practices. The hub team participated as a resource faculty at "The National Conference on Tobacco or Health (NCTOH) organized by PGIMER, Chandigarh in September 2021.

The institute has also been working proactively in the field of tobacco cessation. Under ASTRA (Addressing Smokeless Tobacco and Building Research Capacity in South Asia) project, several tobacco cessation interventions have been carried out with promising results. Various ongoing studies will likely help policymakers in devising novel strategies aimed at creating awareness among smokeless tobacco product users, and in assisting them towards the cessation of SLT use.

Studies on self-sampling for HPV testing to augment cervical cancer screening on and primary screening using HPV DNA testing are also underway. Effectiveness of Thermalytix (an Artificial Intelligence based software) developed by NIRAMAI Health Analytix, Bengaluru, as a screening tool for breast cancer has also been evaluated at our Institute.

All other flagship programs of NICPR such as the initiatives of the National Tobacco Testing Laboratory (NTTL), the NICPR-ECHO program for training of in-service healthcare providers in cancer screening are continuing efficiently. The NTTL's addition to the World Health Organization's Tobacco Laboratory Network (TobLabNet) has added another feather to its cap. NICPR also houses the Population-Based Cancer Registry for the district Gautum Budh Nagar.

Molecular studies are also being actively undertaken to unravel the genetic and epigenetic signatures for different cancers. Besides, comparative analysis of genetic and epidemiological factors for different cancers are also being explored at the molecular level in the Indian population. Further, the institute has been carrying out cytology -based screening/ early detection of prevalent cancers. Screening for cervical and anal cancer through cytology and HPV testing, is being undertaken in high -risk population (women living with HIV) in an effort to guide policy decisions on screening in such individuals. Training programs focused on cytology based cervical cancer screening through virtual platform and live microscopy sessions are a regular feature at ICMR-NICPR for capacity building of pathologists, especially in remote areas.

On academic front, the scientists have published several high-quality research articles in peer reviewed high impact factor journals. Journal clubs, Colloquia, guest lectures and webinars are regularly held to keep abreast with the latest developments in the field of science.

New staff, both scientific and technical, have joined the Institute during this period, strengthening the research capacity of the Institute. Research infrastructure is also being upgraded with the commissioning of moderate throughput NGS facility at our institute. Besides, other high-end

equipment's including digital PCR, multimode reader, high precision nanodrops, Hybrid Capture 2 (for cervical cancer DNA diagnostics) have also been installed and operationalized. Several other instruments are also being purchased to augment research output.

ICMR-NICPR is further committed to promote interdisciplinary research among institutes, and in this regard, a ICMR National Bio Bank is also being envisaged to be established in its premises which will act as a repository to store annotated biological samples for research and academic activities.

ICMR-NICPR's contributions both in research and capacity building have been significant during this period. The immense support of the scientific, technical and administrative staff of the institute has made it possible to carry out diverse activities in the most efficient manner. The constant guidance of the NCD division at ICMR Headquarters and Department of Health Research for all our activities deserves a special mention.

I wish the entire team a fruitful year ahead and success in all future endeavors.

Dr. Shalini Singh
Director
www.nicpr.icmr.org.in
www.cancerindia.org.in
http://untobaccocontrol.org/kh/smokeless-tobacco/

About the Institute

ICMR-National Institute of Cancer Prevention and Research (ICMR-NICPR), initially established as Cytology Research Centre (CRC) by the Indian Council of Medical Research (ICMR) in 1979, was elevated to the level of an Institute (Institute of Cytology and Preventive Oncology) in 1989. The institute was granted a national status and was rechristened as National Institute of Cancer prevention and Research in 2016 in recognition of its significant contributions towards cancer prevention and control in the country. Earlier, the niche areas of research have been pre-cancer and cancers of uterine cervix, breast and oral cavity with special emphasis on primary and secondary prevention, but as of now, the institute has expanded its research domain to several other cancers including, gall bladder, prostate, head and neck, esophageal, ovarian, endometrial etc.

The institute houses different divisions viz. Clinical Oncology, Cytopathology, Preventive Oncology and Public Health, Molecular Biology, Epidemiology & Biostatistics, and Bioinformatics. Clinical Oncology division focusses primarily on providing comprehensive preventive and diagnostic services and conduct high quality research in major cancers of the country with special reference to cancers of uterine cervix, breast and oral cavity. The division also runs a Health Promotion Clinic at NICPR where screening for breast, oral and cervical cancers are carried out. Besides, counseling regarding diet and risk factors of cancer and tobacco cessation are an important part of the clinic. The Cytopathology division functions to provide cytology-based cancer screening and diagnostic services, and also undertakes high quality research in major cancers in conjunction with the clinical and molecular divisions.

Molecular Biology division focusses on bridging the gaps between the clinical practice and the laboratory expertise by dissecting and deciphering the molecular aspects of cancer biology. The researchers in this group try to answer the fundamental questions in the basic and the translational cancer biology research. Besides, the group also emphasizes on the teaching and training of masters and doctoral students, post-doctoral researchers, and clinical practitioners in the basics of molecular cancer biology.

Preventive oncology and population health division is one of the most important and diversified division covering population health, non-communicable diseases, tobacco control, public health nutrition and maternal and child health. This division lays major emphasis on understanding the interrelationships between health-wellbeing, population characteristics, and the health system.

Division of Epidemiology and Biostatistics supports by creating biostatistical models and assisting in developing research methodology for the research carried out in the institute. In addition, the division has also implemented the high-speed information network "National Knowledge Network (NKN)" with the collaboration of National Informatic Centre (NIC). Bioinformatics division focusses on studying the biological macromolecules and their interactions using structural bioinformatics and computational chemistry tools.

Research at ICMR-NICPR is primarily focused on screening for common cancers, early detection and management of precancers, development and validation of point-of-care screening and diagnostics tests/ devices and deciphering the genomic and epigenomic landscapes in different cancers. Many multidisciplinary extramural as well as intramural comprehensive research programs, amalgamating basic and operational research, are underway to accomplish the research goals of the Institute.

Apart from research, the institute also offers diagnostic and referral services for cancer screening to various government run hospitals across Noida. Organizing extensive community outreach activities for cancer awareness and mass screening camps in Gautam Budh Nagar district, and nearby areas have been one of the major strengths of this institute. The institute also hosts a website "India Against Cancer" to promote cancer awareness and to provide comprehensive India-specific information on prevalent cancers to the general population as well as primary health care workers, in English as well as Hindi. Regular training programs on cancer prevention, screening and early detection are being carried out for different cadre of health providers through ECHO (Extension Community Health Outcomes) platform for facilitating the effective roll out of population-wide screening of common cancers in India as outlined in the "Operational framework document for management of common cancers" by MoHFW, Govt of India.

ICMR-NICPR has affiliation with different universities for Ph.D. program including Delhi University, Banaras Hindu University and Jamia Milia Islamia, and promotes capacity building in different specialties through in-service training workshops, summer training programs, M.Sc. dissertation programs and Ph.D. programs. Recently an MoU has been signed with Govt Institute of Medical Sciences, Greater Noida to facilitate collaborative research programs.
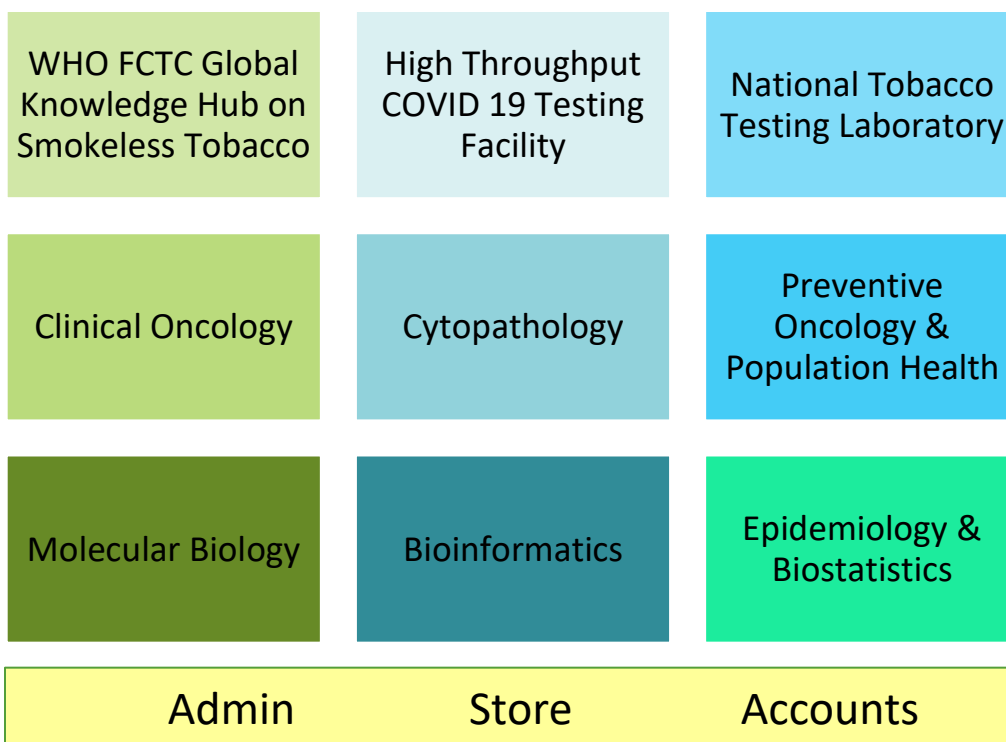
ICMR-NICPR also hosts the prestigious WHO FCTC Global Knowledge Hub on Smokeless Tobacco (SLT) Products which generates and disseminates knowledge on smokeless tobacco and also guides the parties to FCTC in controlling SLT use. The Knowledge Hub is working towards realizing the dream of a tobacco free India through creation of mass awareness, augmenting efforts to stop the use of all types of tobacco products and bringing significant positive changes in implementation of effective prevention and control policies. The Institute also houses the apex-level National Tobacco Testing Laboratory supported by the MoHFW for testing of tobacco samples sent by the states. Recently, NTTL has received the distinction of being added to the World Health Organization's Tobacco Laboratory Network (TobLabNet).

The Institute played a major role in Covid 19 pandemic by testing samples, participating in the Covid-19 serosurveys being conducted by ICMR, and following up the recipients of Covaxin to determine the frequency of adverse events following vaccination. Further, the institute has also partnered with ICMR to characterize the humoral and cellular immune response in individuals receiving additional third dose of Covishield/Covaxin vaccine from Noida and nearby areas.

Several new equipment has been installed and operationalized in Central Instrumentation Facility in order to raise the quality of research output. The Institute recently acquired the NGS equipment and is in the process of operationalizing the facility.

ICMR-NICPR is further committed to promote interdisciplinary research among institutes, and in this regard, an integrated automated ICMR Biobanking facility for storing annotated biological samples for research and academic activities is to be established in ICMR-NICPR, NOIDA. The biobank will be used for the long-term storage of tissues and body fluids at -80°C and cryogenic temperatures.

The institute strives to progress exponentially in order to address the various challenges in the field of cancer prevention, and to work towards betterment of our people and the nation.

WHO FCTC Global Knowledge Hub on Smokeless Tobacco	High Throughput COVID 19 Testing Facility	National Tobacco Testing Laboratory
Clinical Oncology	Cytopathology	Preventive Oncology & Population Health
Molecular Biology	Bioinformatics	Epidemiology & Biostatistics

Admin	Store	Accounts

Strengths of ICMR-NICPR

FACILITIES AT ICMR-NICPR

Health Promotion Clinic

The health promotion clinic is a one-of-a kind clinic which has been functional at NICPR since 2014. It functions in the OPD rooms situated in the Division of Clinical Oncology.

Activities carried out at Health Promotion Clinic:

- Creating awareness of cancer and its risk factors through kiosk displayed in the clinic area.
- Documentation of demographic details
- Screening for hypertension and diabetes
- Height, weight, and BMI estimation
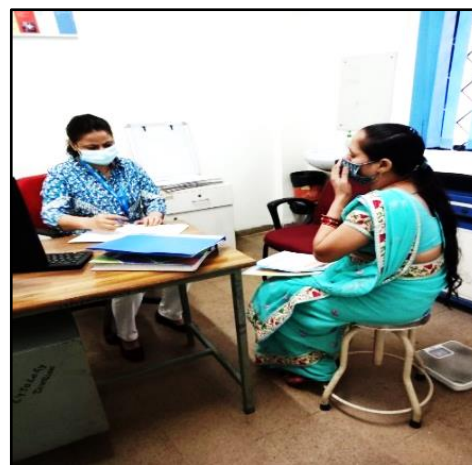- Cancer Screening services
    - **Cervical cancer screening**
        - Visual Inspection with acetic acid,
        - Pap smear
        - HPV DNA testing
    - **Breast Cancer screening**
        - Clinical breast examination
    - **Oral Cancer Screening:**
        - Oral Visual Examination
- Diagnostics services
    - Colposcopy examinations
    - Biopsy
- Treatment Services
    - Thermal Ablation
- Symptomatic treatment

All the patients presenting to the clinic are registered and their data is collected in electronic format. Their comprehensive check-up is conducted and based on the findings they are managed accordingly.

Summary of work done (Jul 2021 – May 2022):

Total number of individuals screened: 1272
(Females- 1176, Males-96)

Pap smears: 1066

Clinical breast examination: 1089
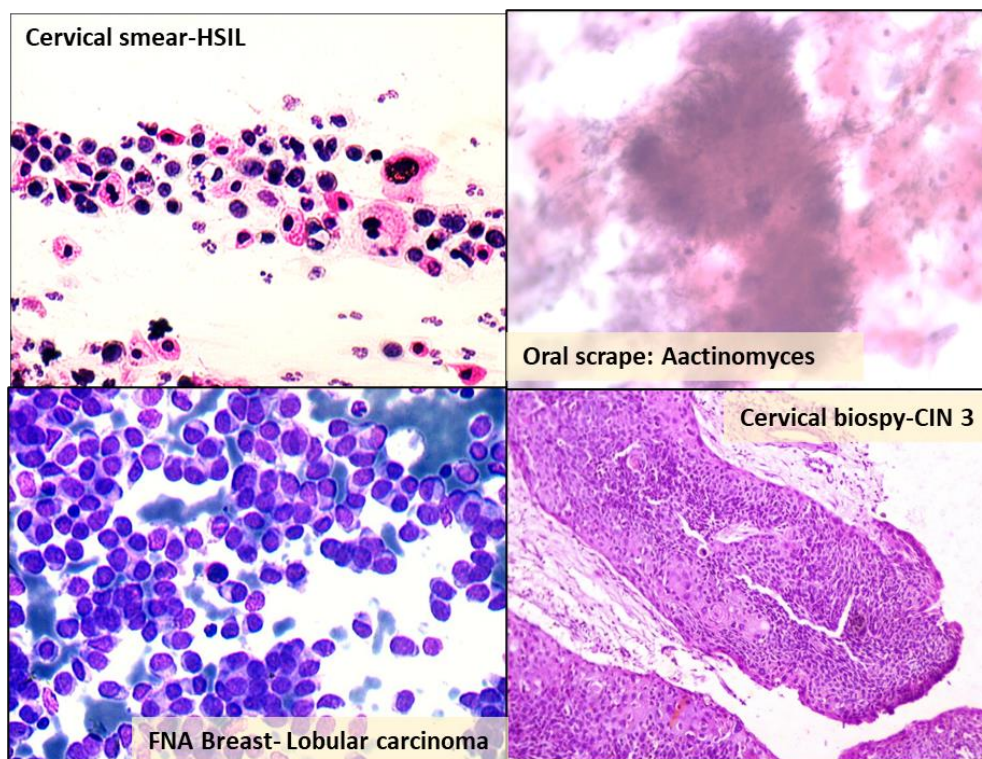
Oral Health Promotion Clinic

- A total of 587 individuals were screened at the Oral Health Promotion Clinic, of which 132 (22.5%) individuals were diagnosed with abnormalities (oral potentially malignant disorders/OPMDs, oral malignancy and other tobacco-related lesions). These patients were referred to higher centers (CDER, AIIMS) for further management.

- 158 (26.9%) individuals reported a habit of using either smoked and/or smokeless tobacco, currently or formerly. They were referred to **tobacco cessation clinic** at NICPR for counselling, further management and follow-up.

Diagnostic and Referral Services

Diagnostic and referral services are provided to District Hospital and ESI Hospitals, Noida, Sai Sansthan and Tuberculosis centres across Noida in the following fields:

Investigation/ Procedure	No. conducted from Jul 2021 – May 2022
Pap smears	1165
Fine needle aspiration cytology (FNAC)	1791
Histopathology (biopsy examination)	174
Colposcopy	57
HPV testing (HC2)	678

Cervical smear-HSIL

Oral scrape: Aactinomyces

FNA Breast- Lobular carcinoma

Cervical biospy-CIN 3

Audit of cervical smear reporting (Jul 2021 – May 2022)

- Total no. of cervical smears: 1165
- Unsatisfactory rate: 11 (0.9%)
- Epithelial cell abnormalities (ECA):   24 (2.07%)

Epithelial cell abnormality	Number of cases	Percentage (N=1154)
ASC-US	3	0.26
ASC-H	1	0.09
LSIL	8	0.69
HSIL	3	0.26
MALIGNANT	6	0.52
AGC-NOS	3	0.26
Total	24	2.07
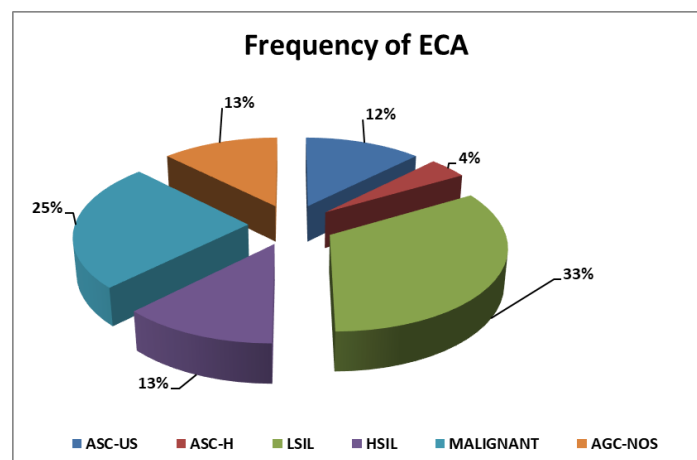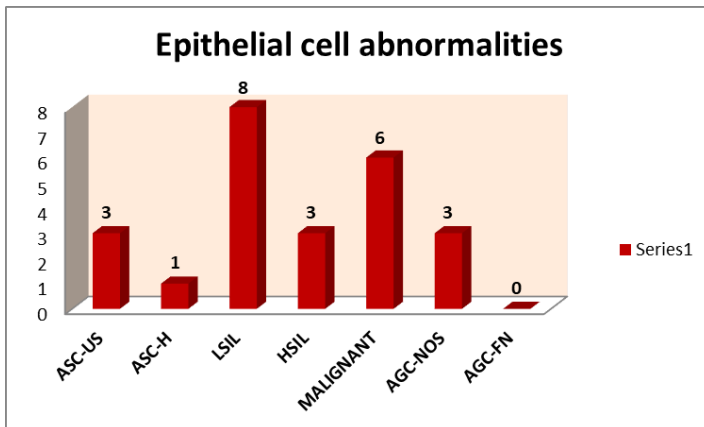
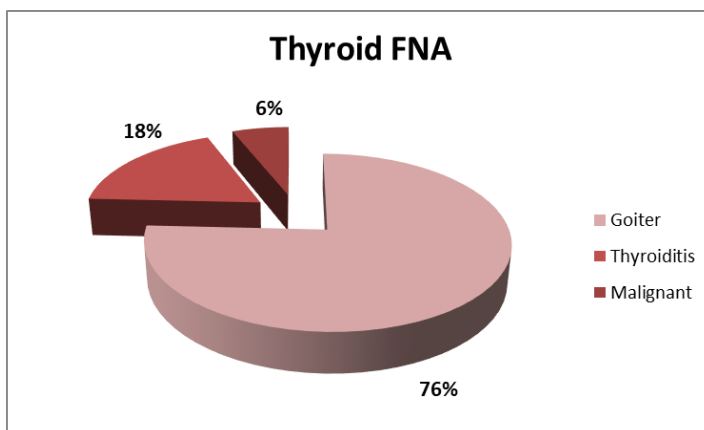**Cyto-histo correlation of cervical abnormalities** *(as per American Society of Cytopathology guidelines 2017)*:

- **Cervical biopsies**:   25
    - Inadequate biopsies: 1
    - Adequate biopsies: 24

- **Cyto-histo concordance**:   18 (75% of 24)

- **Discordance**:
    - Interpretative error on Pap: 6 (minor undercall)
    - No major overcalls/undercalls
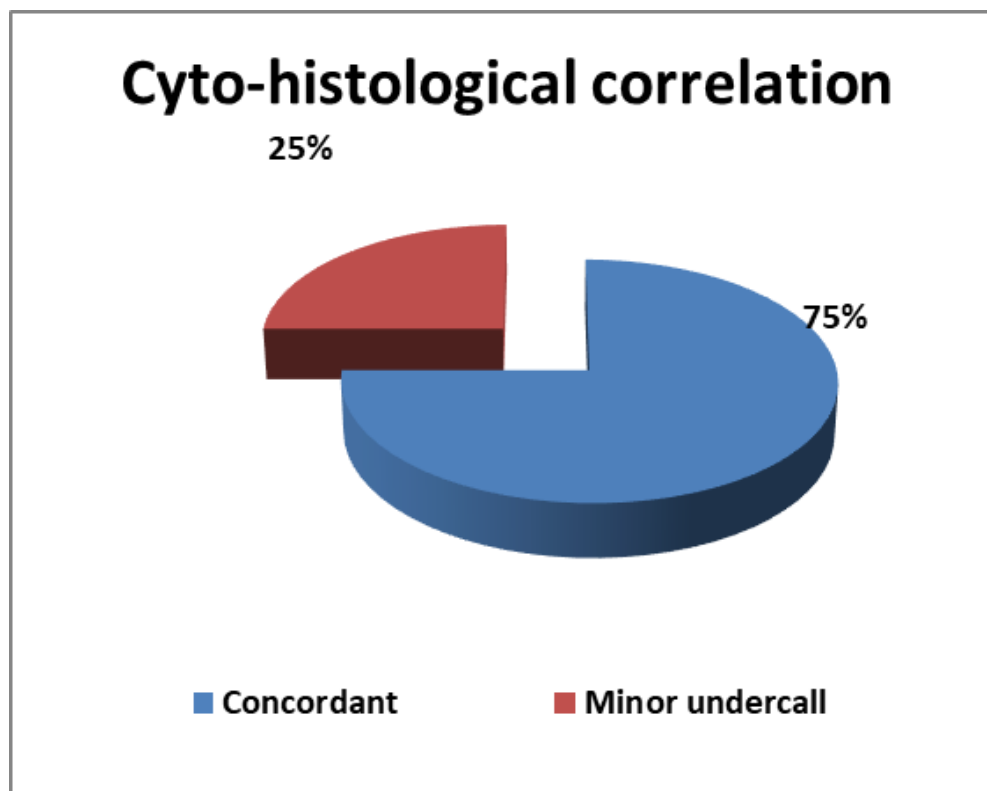
Fine needle aspiration cytology:

- **Total FNACs performed**:   1791
  - o Lymph nodes: 664
  - o Breast: 342
  - o Thyroid: 62
  - o Other sites: 723

Lymph node FNA

- TB - AFB pos
- ?TB - AFB neg
- Reactive
- Malignancies

61%
19%
15%
5%

Breast FNA

- Benign breast dis
- Fibroadenoma
- Malignant
- Others

52%
18%
28%
2%

Thyroid FNA

- Goiter
- Thyroiditis
- Malignant

18%
6%
76%
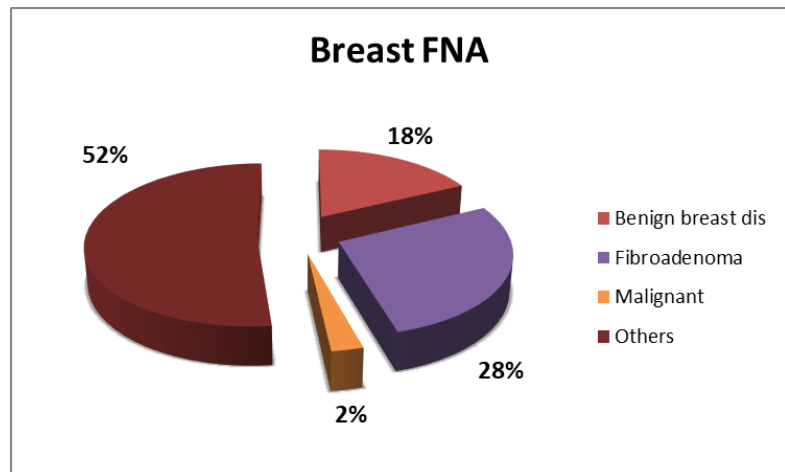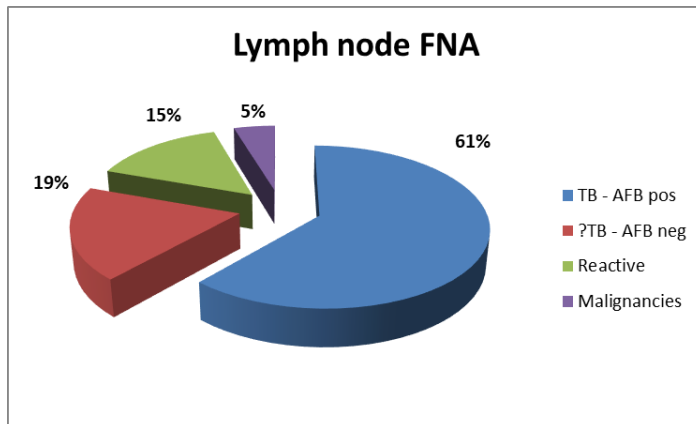
Colposcopy

Colposcopy is a diagnostic procedure that involves examination of the cervix, vagina and vulva with the help of an equipment named 'Colposcope'. It has a powerful light source for illumination of the area to be examined and a variable magnification ranging from 4x to 30x. The evaluation of the screen positive women (Pap smear report ASCUS and above, Hr HPV positive and VIA positive) is done using colposcopy at NICPR. If any abnormal lesion is detected on colposcopic examination, guided biopsy is taken and sent to the Cytopathology Division for reporting. Further management of the woman is undertaken based on the histology report of the biopsy.

High risk HPV detection by Hybrid Capture 2 (*HC2*)

Hybrid Capture 2 (HC2) technology serves as the platform for QIAGEN's nucleic acid hybridization assay for detection of 13 High risk human papillomaviruses (HPV).

Cervical scrapes from 678 women were tested for HR-HPV during the reporting period. All the positive cases are being further analyzed for type specific HPV by PCR using HPV 16 & 18 primers. This information in conjunction with cytology report and colposcopy findings is utilized to guide patient management.

High Throughput Viral Diagnostic Laboratory (HTVDL) for COVID 19 Testing

A High throughput Viral Diagnostic laboratory (HTVDL) for COVID 19 testing was inaugurated at ICMR-NICPR in July 2020. The facility has been catering to the RT-PCR based COVID 19 testing needs of Uttar Pradesh and Delhi with an installed capacity of 6,000 samples per day.

HTVDL has worked tirelessly at the time of surge in COVID 19 cases. During such times, HTVDL adopted various modalities like sample testing with pooling strategies whenever the positivity rate came down less than 5%, adoption of manual extraction procedures and inculcating research using the available resources. NICPR-HTVDL has actively participated with the Indian SARS-CoV-2 Genomics Consortium (INSACOG) by sending positive samples for genomic sequencing.

HTVDL successfully accomplished 21.7 lakh sample testing for COVID 19 till March 2022. HTVDL continued its function by (capacity building) imparting training activities through workshop on "Laboratory diagnosis of SARS-Cov2 by Real-time PCR" with invited lectures on Genomic surveillance and Therapeutics on treatment for covid infection. As the covid cases declined, the lab discontinued its function.

Testing Data (April 2021 to March 2022) = Total 1,178,948 Samples
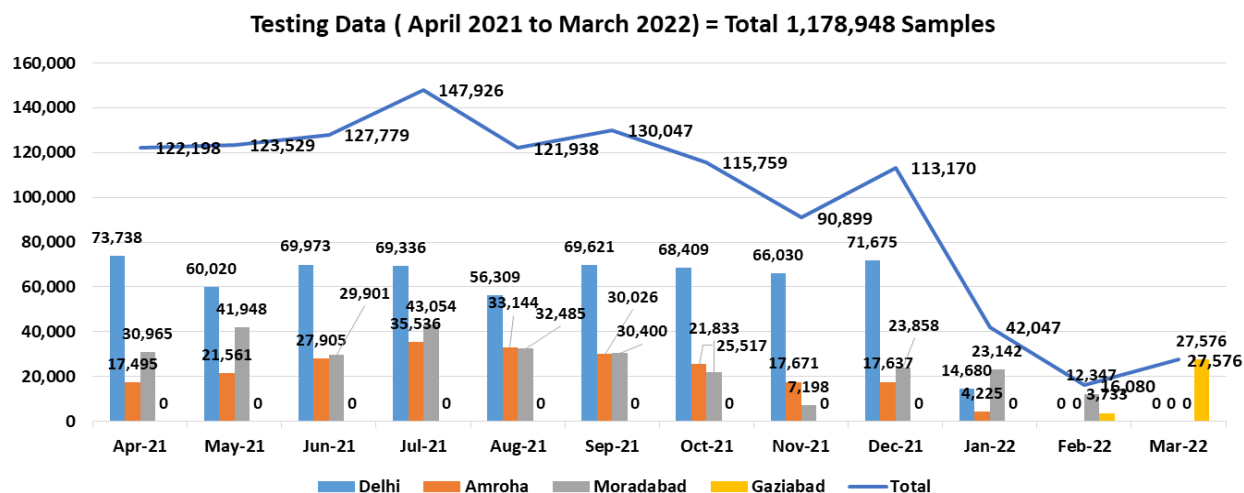
National Tobacco Testing Laboratory

The National Tobacco Testing Laboratories (NTTLs) have been established by the Ministry of Health and Family Welfare, Govt. of India at three centers: ICMR-National Institute of Cancer Prevention and Research (NICPR), Noida; Centre Drugs Testing Laboratory (CDTL), Mumbai and Regional Drugs Testing Laboratory (RDTL), Guwahati for the purpose of Tobacco Research and Testing. The NTTL at NICPR is the apex and coordinating center for the other two labs. the first-of-its-kind in the southeast Asian region. NTTLs are envisaged as world class accredited laboratories providing analytical facilities and advisory for tobacco and tobacco products.

Objectives:

- Achieving best laboratory practices and participative compliance with Govt. recognized accredited agencies and WHO norms for standardization, regulation and monitoring.
- Estimation of toxicants present in smokeless tobacco.
- Sharing of knowledge, Expertise, Experience with world leaders on standard operating procedures, GLP, ISO etc for tobacco testing.
- Adaptation of WHO, ISO and BIS Methods for testing of SLT products for estimation of pH, Moisture, Ammonia, Nitrates/Nitrites, Nicotine, TSNAs, Humectants, Sugars, Chlorides and Trace elements etc.
- To participate in the validation of WHO method for testing of smoked and smokeless tobacco samples.
- Generation of Scientific data for the constituents present in various forms of Smoked & Smokeless Tobacco products.
- To develop sensory materials for the development of sensors strip for detection of tobacco alkaloids.
- Development of methods for the estimation of nicotine in biological samples.

Activities:

NTTL at NICPR has been accepted as a member of World Health Organization's Tobacco Laboratory Network (TobLabNet).

The Lab has participated in WHO TobLabNet method validation for nicotine, moisture and pH analysis of reference SLT samples for developing SOPs for smokeless tobacco products.

NTTL receives samples from various government agencies across the country and also from WHO reference samples for tobacco product analysis.

The lab received approximately 297 smoke & smokeless tobacco samples and performed nearly 1123 tests in the reporting period (~ 3369 test in triplicate).

NTTL is presently working on optimization of new methods for flavoring agent (menthol) analysis in tobacco samples.

The scientific officers at NTTL-NICPR attended the following webinars/ meetings:

- Webinar on Agilent Enhance Your Lab Productivity School Series III - Advanced Chapter on 15th July 2021.
- A webinar on latest trends and developments in coulometric Karl Fischer titration methods for water analysis on 15th July 2021.
- A webinar on Turn-key solutions to tackle pesticide residues in food and feed by Waters on 25th July 2021.
- International Conference on Tobacco Control and Smoking Cessation" held virtually on 20th - 21st August 2021.
- Webinar on Trends in Pesticide Residue Analysis by Shimadzu on 26th August 2021.
- Webinar on "Spectroscopy Virtual Symposium 2021 by Agilent Technologies from 16th & 17th September 2021.
- Drinking Water Series [Direct Injection Method in Drinking Water Analysis] by Waters on 29th September 2021.
- Volumetric titration: A step-by-step guide to correct results, by Merck 2nd November 2021.
- Safer Karl Fischer Titrations with CMR-free reagents and OMNIS by Metrohm on 28th March 2022.
- Applications of mass spectrometry for advance research by Waters on 27th April 2022.

Future Plans:

- Preparation of Standard Operating Procedure (SOP) for analysis of smoked and smokeless tobacco products marketed in India.

- Designing of Research Project on tobacco product analysis.

- Up-gradation of NTTL facility with major and minor equipment.

- Accreditation of NTTL by NABL.

- Development of new methods of tobacco product analysis according to the SLT products available in India.

SCIENTISTS' PROFILE

Name: Dr. Sanjay Gupta, MD

Designation: Scientist G

Division: Cytopathology

Main areas of work: Cervical and oral cancer screening, Cost effective strategies for cervical cancer screening/ early detection, adverse health effects of Smokeless tobacco, Translational research, Oncopathology

Current projects (July 2021-May 2022): 08

- Extramural: 07
- Intramural: 01
- PI/ Co-PI/ Mentor: 06
- Co-I: 02

Total number of publications during the period under report: 09

Cumulative Impact Factor of publications during the period under report: 14.418

Any other significant achievement/honor:

➢ Certificate of Appreciation for Leadership Role and contribution to the Institute during 2020 and 2021 awarded by ICMR-NICPR.

➢ Invited expert for Scientific Research Advisory Committee of PGICH, Noida

Name: Dr. Mausumi Bharadwaj, PhD, FAScT, FNASc

Designation: Scientist G

Division: Molecular Biology Group

Main areas of work: Molecular cancer Biology; Cancer Genetics & Epigenetics; Development of pre-diagnostic marker and DNA based vaccines; cancer microbiome

Current projects (July 2021-May 2022): 07

- Extramural: 07
- Intramural: 00
- PI/ Co-PI/ Mentor: 07
- Co-I: 00

Total number of publications during the period under report: 06

Cumulative Impact Factor of publications during the period under report: 29.356

Any other significant achievement/honor:

➢ Received STE Prerana Samman, 2022 by Save the Environment.
➢ Certificate of Appreciation for Leadership Role and contribution to the Institute during 2020 and 2021 awarded by ICMR-NICPR

Name: Ms. Rekha Saxena, MSc

Designation: Scientist G

Date of Joining NICPR: 01.04.2022

Main areas of work: Geographical Information System (GIS)

Current projects (July 2021-May 2022): Nil

Total number of publications during the period under report: Nil

Cumulative Impact Factor of publications during the period under report: Nil

Any other significant achievement/honor: Nil

Name: Dr. Smita Asthana, MD

Designation: Scientist E

Division: Epidemiology and Biostatistics

Main areas of work: Cancer Epidemiology

Current projects (July 2021-May 2022): 05

- Extramural: 05
- Intramural: 00
- PI/ Co-PI/ Mentor: 05
- Co-I: 00

Total number of publications during the period under report: 04

Cumulative Impact Factor of publications during the period under report: 15.598

Any other significant achievement/honor: Nil

Name: Dr. Subhash M Agarwal, PhD

Designation: Scientist E

Division: Bioinformatics

Main areas of work: Cancer informatics, Structure based drug design, Database development and Machine learning

Current projects (July 2021-May 2022): 02

- Extramural: 02
- Intramural: 00
- PI/ Co-PI/ Mentor: 02
- Co-I: 00

Total number of publications during the period under report: 03

Cumulative Impact Factor of publications during the period under report: 12.04

Any other significant achievement/honor:

➢ Appointed as Member, Area Advisory Board (Bioinformatics) of Amity Institute of Biotechnology, Amity University, Noida

Name: Dr. R Suresh Kumar, PhD

Designation: Scientist E

Division: Molecular Biology Group

Main areas of work: Experimental Chemoprevention strategies in preventing and treatment of cancers , Epigenetics of carcinogenesis, Histone modulation, Drug resistance reversal, Tobacco microbiome, tobacco mediated carcinogenesis

Current projects (July 2021-May 2022): 04

- Extramural: 04
- Intramural: 00
- PI/ Co-PI/ Mentor: 03
- Co-I: 01

Total number of publications during the period under report: 01

Cumulative Impact Factor of publications during the period under report: 6.5

Any other significant achievement/honor:

➢ Worked as Nodal Officer and handled the High throughput Viral Diagnostic laboratory for covid testing , covered the Delhi and UP districts
➢ Contributed a book chapter "Characterization of Tobacco Microbiome by Metagenomics Approach" in Methods in Molecular Biology.

Name: Dr. Suresh T Hedau, PhD

Designation: Scientist E

Division: Molecular Biology Group

Main areas of work: Therapy-resistance in breast cancer; Nano-material based drug delivery system; Metabolic stress linked signal transduction; Epigenetics

Current projects (July 2021-May 2022): 06

- Extramural: 06
- Intramural: 00
- PI/ Co-PI/ Mentor: 06
- Co-I: 01

Total number of publications during the period under report: 03

Cumulative Impact Factor of publications during the period under report: 8.42

Any other significant achievement/honor: Nil

Name: Dr. Ekta Gupta, MD, DNB, PGDDHM

Designation: Scientist E

Division: Clinical Oncology

Main areas of work: Health promotion, wellness and quality of life, public health

Current projects (July 2021-May 2022): 01

- Extramural: 01
- Intramural: 00
- PI/ Co-PI/ Mentor: 00
- Co-I: 01

Total number of publications during the period under report: 02

Cumulative Impact Factor of publications during the period under report: 0

Any other significant achievement/honor:

➢ Contributed a book chapter "Artificial Intelligence and Urban Health" in Urban Health: Emerging Public Health Perspectives.

Name: Dr. Raj Narain, MBBS

Designation: Scientist D

Division: Epidemiology and Biostatistics

Main areas of work: Primary and Secondary preventable risk factors and modification of lifestyle risk factor in prevention of cancer in community

Current projects (July 2021-May 2022): Nil

Total number of publications during the period under report: 01

Cumulative Impact Factor of publications during the period under report: 0

Any other significant achievement/honor: Nil

Name: Dr. Kavitha Dhanasekaran, MD

Designation: Scientist D

Division: Clinical Oncology

Main areas of work: Cervical Cancer Prevention, diagnostics (Colposcopy examination) and treatment (thermal ablation), capacity building of healthcare providers

Current projects (July 2021-May 2022): 04

- Extramural: 02
- Intramural: 02
- PI/ Co-PI/ Mentor: 04
- Co-I: 00

Total number of publications during the period under report: 03

Cumulative Impact Factor of publications during the period under report: 10.883

Any other significant achievement/honor: Nil

Name: Dr. Prashant K Singh, PhD

Designation: Scientist D

Division: Preventive Oncology and Population Health

Main areas of work: Social determinants of health, tobacco control, non-communicable diseases, gender gaps in health and survival, maternal and child health

Current projects (July 2021-May 2022): 05

- Extramural: 04
- Intramural: 01
- PI/ Co-PI/ Mentor: 04
- Co-I: 01

Total number of publications during the period under report: 08

Cumulative Impact Factor of publications during the period under report: 18.1

Any other significant achievement/honor:

➢ Award for Academic Excellence for the highest cumulative impact factor of publications during year 2021, ICMR-NICPR, Noida

➢ Award for Non-academic Contribution to the Institute during the year 2021, ICMR-NICPR, Noida

Name: Dr. Showket Hussain, PhD

Designation: Scientist D

Division: Molecular Biology Group

Main areas of work: Cancer biology, Tumor virology, HPV diagnostics, Cancer signaling pathways, Cancer genomics and immune-oncology

Current projects (July 2021-May 2022): 11

- Extramural: 11
- Intramural: 00
- PI/ Co-PI/ Mentor: 11
- Co-I: 00

Total number of publications during the period under report: 06

Cumulative Impact Factor of publications during the period under report: 18.86

Any other significant achievement/honor:

- ➢ Academic excellence award for highest number of publications for the year 2021
- ➢ Academic excellence award for publication in highest impact factor journal for the year 2021

Name: Dr. Ruchika Gupta, MD, MBA (HA)

Designation: Scientist D

Division: Cytopathology

Main areas of work: Cervical cancer screening, Gall bladder cancer, Oncopathology, Pediatric tumors

Current projects (July 2021-May 2022): 07

- Extramural: 06
- Intramural: 01
- PI/ Co-PI/ Mentor: 05
- Co-I: 02

Total number of publications during the period under report: 12

Cumulative Impact Factor of publications during the period under report: 22.525

Any other significant achievement/honor:

➢ Certificate of Appreciation for non-academic contribution to the Institute for the year 2021, ICMR-NICPR.
➢ 1st place in the International Cytology Quiz at the 17th World Congress of International Federation of Cervical Pathology and Colposcopy (IFCPC 2021), 1st – 4th July 2021.

Name: Dr. Shamsuz Zaman, MD

Designation: Scientist D

Division: Cytopathology

Date of Joining: 26.07.2021

Main areas of work: Immunohematology, fine needle aspiration cytology, oncopathology, infectious diseases

Current projects (July 2021-May 2022): Nil

Total number of publications during the period under report: 01

Cumulative Impact Factor of publications during the period under report: 1.582

Any other significant achievement/honor: Nil

Name: Dr. Nazneen Arif, MD

Designation: Scientist D

Division: Molecular Biology Group

Date of joining: 31.08.2021

Main areas of work: Molecular biology, Covid-19 RT-PCR

Current projects (July 2021-May 2022): Nil

Total number of publications during the period under report: Nil

Cumulative Impact Factor of publications during the period under report: Nil

Any other significant achievement/honor: Nil

Name: Dr. Malasha Kumari, MBBS

Designation: Scientist C

Division: Preventive Oncology & Population Health

Main areas of work: Non-communicable diseases, tobacco-related diseases, women health

Current projects (July 2021-May 2022): Nil

Total number of publications during the period under report: Nil

Cumulative Impact Factor of publications during the period under report: Nil

Any other significant achievement/honor: Nil

Name: Dr. Pramod Kumar, PhD

Designation: Scientist C

Division: Molecular Biology Group

Main areas of work: Microbiome and cancer, Tumor immunology, chronic viral hepatitis in development of hepatocellular carcinoma

Current projects (July 2021-May 2022): 01

- Extramural: 01
- Intramural: 00
- PI/ Co-PI/ Mentor: 01
- Co-I: 00

Total number of publications during the period under report: 03

Cumulative Impact Factor of publications during the period under report: 10.488

Any other significant achievement/honor: Nil

Name: Dr. Anuj Kumar, PhD

Designation: Scientist C

Division: Molecular Biology Group

Main areas of work: Molecular biology

Current projects (July 2021-May 2022): 04

- Extramural: 03
- Intramural: 01
- PI/ Co-PI/ Mentor: 01
- Co-I: 03

Total number of publications during the period under report: 04

Cumulative Impact Factor of publications during the period under report: 10.488

Any other significant achievement/honor: Nil

Name: Dr. Dinesh Kumar, PhD

Designation: Scientist C

Division: Molecular Biology Group

Main areas of work: Drug resistance in cancer cells and Therapeutic use of Regenerative Medicine

Current projects (July 2021-May 2022): 01

- Extramural: 00
- Intramural: 01
- PI/ Co-PI/ Mentor: 01
- Co-I: 00

Total number of publications during the period under report: 01

Cumulative Impact Factor of publications during the period under report: Nil

Any other significant achievement/honor: Nil

Name: Dr. Rakesh Meena, MBBS

Designation: Scientist B

Division: Clinical Oncology

Date of Joining: 23.09.2021

Main areas of work: Oral cancer screening and Tobacco cessation counselling

Current projects (July 2021-May 2022): Nil

Total number of publications during the period under report: Nil

Cumulative Impact Factor of publications during the period under report: Nil

Any other significant achievement/honor: Nil

Name: Dr. Sandeep Kumar, MVSc, PhD

Designation: Scientist B

Division: Molecular Biology Group

Date of Joining: 03.03.2022

Main areas of work: Cancer functional Genomics, Cancer Genetics and Epigenetics, especially involving gynaecological cancers

Current projects (July 2021-May 2022): Nil

Total number of publications during the period under report: 01

Cumulative Impact Factor of publications during the period under report: 2.316

Any other significant achievement/honor: Nil

Name: Dr. Sudhir Tanwar, BDS, MPhil (PSW)

Designation: Scientist B

Division: Preventive Oncology & Population Health

Date of Joining: March 2022

Main areas of work: Psycho-social factors in health, social determinants of health and wellness, socio-behavioural research in preventive oncology

Current projects (July 2021-May 2022): Nil

Total number of publications during the period under report: Nil

Cumulative Impact Factor of publications during the period under report: Nil

Any other significant achievement/honor: Nil

RESEARCH PROJECTS

Cervical Cancer & Reproductive tract infections

Prevalence of concurrent cervical and anal cytologic abnormalities and High-risk HPV infections in HIV infected women: An exploratory study

Principal Investigator: Dr. Sanjay Gupta, Scientist G, Division of Cytopathology

Team: Dr. Ruchika Gupta (Co-PI), Dr Roopa Hariprasad, Dr Showket Hussain, Dr Vineeta Agarwal, District Hospital, Noida, Dr P K Das, District Hospital, Noida

Funding Agency& Budget: ICMR, Rs 25,53,790/-

Project Duration: Jul 2019- Dec 2021 (extended till April 2022)

Brief background & rationale: High risk Human papillomavirus (HR-HPV), the primary cause of cervical cancer, is also associated with the development of anal cancers. Rates of cervical and anal human papillomavirus (HPV) infection and abnormal cytology are higher in HIV-infected women as compared to general population. It is established that HPV infection can be transmitted to women through receptive anal intercourse. HR-HPV subtypes have been detected in 99% of cervical cancers and 80 to 90% of anal cancers It is possible that the pathogenesis of anal cancer is similar to that of cervical cancer, that is, anal HPV infection, in conjunction with other factors, leads to development of high-grade anal intra-epithelial neoplasia (HGAIN), a likely precursor to anal cancer. Despite the considerable data on cervical neoplasia and HPV infection in HIV-infected women in India, there is limited data on anal neoplasia and anal HPV infection in this population. Also, there is no Indian literature on concomitant cervical & anal HPV infections and cytological abnormalities in HIV positive women.

Objectives:
- To determine the prevalence of anal epithelial abnormalities in HIV-infected women, through cytology
- To determine the prevalence of anal HPV infection in HIV infected women
- To identify the risk factors associated with anal HPV infection in the study population.
- To determine the association of anal HPV infection with concurrent cervical HPV infection, and concurrent cytological abnormalities

Brief Methodology: This was an exploratory cross-sectional study including 130 HIV-positive women (cases) and 150 HIV-negative women (control group) attending Integrated Counselling and Testing Centre (ICTC) of District Hospital, Noida
    Eligibility criteria:
- Documented serologic evidence of HIV infection as per National Guidelines
- Absence of any illness that may preclude a pelvic and /or anal examination
- No prior history of screening or treatment for anal neoplasia
- No prior hysterectomy
- No h/o HPV vaccination

After obtaining written informed consent, a detailed sexual and medical history for gynecological health care and risk factors for the development of anal neoplasia was collected. All women underwent sampling for cervical Pap smear and for cervical HPV testing (by HC2). Concurrent sample collection from anal canal for cytology and HPV testing was also done. Samples testing positive for high-risk HPV were further analyzed by PCR for HPV 16/18 genotyping. Additionally, women received a symptom-directed physical examination followed by testing and care as indicated. Women were asked to return to the clinic after a week to receive results of cervical and anal cytological examinations or any other investigations and undergo referrals for any medical/Gynae condition to appropriate tertiary care centers. Women found to have cervical or anal epithelial cell abnormalities were referred for appropriate management.

Work done:

In this study, 135 HIV-positive cases and 160 HIV-negative controls were recruited. Of the HIV-positive women, ASC-US was seen in anal smears from five (3.7%) patients. In HIV-negative women, ASC-US was seen in three (1.8%) participants.

Cervical smears in 19 of 135 (14.1%) HIV-positive women demonstrated cytological abnormalities (7 ASC-US, 8 LSIL, 1 ASC-H and 3 HSIL). Among HIV-negative controls, only five (3.1%) showed epithelial lesions (ASC-US) on cervical smears.

Of the HIV-positive cases, 28 (20.7%) anal and 39 (28.8%) cervical samples tested positive for HR-HPV. Among HIV-negative controls, 14 anal samples (6.1%) and 15 cervical samples (6.9%) were positive for HR-HPV infection.

Table Summary of the anal and cervical cytological abnormalities and HR-HPV testing results in HIV-positive and HIV-negative women

	No. of participants	Cervical cytology	Cervical HR-HPV (HC2)	Anal cytology	Anal HR-HPV (HC2)
HIV-negative (controls)	160	5 ASC-US 155 NILM	15 Positive 145 Negative	3 ASC-US 157 NILM	14 Positive 146 Negative
HIV-positive (cases)	135	3 HSIL 1 ASC-H 8 LSIL 7 ASC-US 116 NILM	39 Positive* 96 Negative	5 ASC-US 130 NILM	28 Positive* 107 Negative

HR-HPV: High risk HPV; ASC-US: Atypical squamous cells – undetermined significance; ASC-H: atypical squamous cells – cannot exclude HSIL; NILM: Negative for intraepithelial lesion or malignancy; LSIL: Low grade squamous intraepithelial lesion; HSIL: High grade squamous intraepithelial lesion.
**22 samples concurrently positive for HRHPV in cervical and anal samples*

Risk factor analysis: Among HIV-infected women, abnormal anal cytology was seen to be associated with receptive anal intercourse (*P=0.001*) and concurrent cervical cytological abnormalities (*P=0.01*). Cervical cytological abnormalities in HIV-positive women showed association with lower education status (*P=0.01*), current STI (*P=0.02*), and multiple sexual partners (*P<0.001*).

Analysis revealed that anal HPV infection was significantly associated with receptive anal intercourse (*P=0.001*), multiple sexual partners (*P<0.001*), abnormal cervical cytology (ASC-US or higher) with a P value of *<0.001* as well as cervical HPV detection concurrently (*P <0.001*). However, no association was found between anal HPV and past or current history of STI in the participant or the spouse.

Among HIV-infected women, cervical HR-HPV positivity showed a significant association with current STI (*P=0.001*), abnormal cervical cytology (*P<0.001*). Cervical HR-HPV infection was lower in HIV-positive women on antiretroviral therapy.

Conclusion: Since cervical cytological abnormalities and cervical HPV infection was found to be more common in HIV-infected women in the present study, cervical cancer screening should definitely be undertaken during follow-up of women living with HIV. Long-term cohort studies with longitudinal follow-up of women with positive anal HPV test are needed to comment upon the utility of anal screening to detect Anal intraepithelial neoplasia.

Cervical smear – HSIL

Anal smear – ASC-US
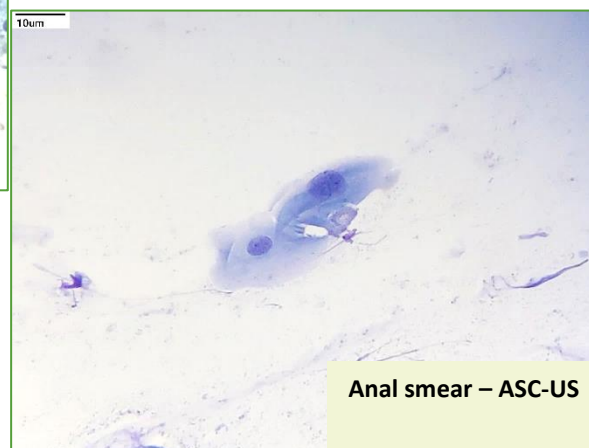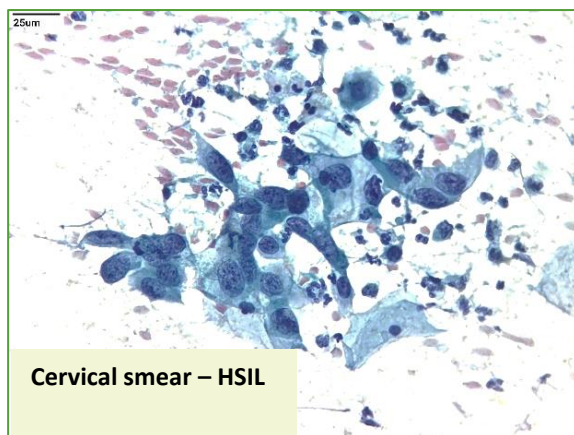
Translational Potential: The study delineated the spectrum of anal and cervical cytologic abnormalities as well as anal and cervical high risk HPV prevalence among women living with HIV. The results mandate inclusion of cervical cancer screening in the routine investigation protocol of these vulnerable high-risk women.

Development of a Low-Cost Automated Screening System for Cervical Cancer (CerviSCAN II) – a collaborative project of CDAC (T) and RCC-T

Site Investigator: Dr. Sanjay Gupta & Dr. Ruchika Gupta, Division of Cytopathology

Other Collaborating Institutes: Centre for Development of Advanced Computing (C-DAC), Regional Cancer Centre Thiruvananthapuram

Funding agency & budget approved: DHR and MeitY, 314 lakhs (NICPR: 17.25 lakhs)

Project Duration: Jun 2018 – Jul 2021. Validation phase Jan – Mar 2022

Brief background & rationale: Cervical cancer is the second most common cancer among females in India. It can be detected early during the precancerous phase by screening through one of the three methods – Pap smear, visual methods, or HPV testing. Organized cytology-based cervical cancer screening program could not be implemented in India due to limited trained manpower, ie cytotechnicians and cytopathologists. The commercially available automated screening systems for cervical cancer are very expensive for resource-constrained countries. C-DAC(T) and RCC-T developed a low-cost automated system, CerviSCAN in their earlier project. However, the slide imaging was manual and wide variation in slide preparation was noted. Hence, this project aims to develop technology for low-cost automated slide scanning system, cyto-centrifuge and auto-stainer as a complete automated cervical cancer screening system with field trials at three centers, including NICPR.

Objectives:

- To develop a low cost and high throughput scanning system with automatic focus control for digitizing the slides
- To develop a low cost cyto-centrifuge for preparing monolayer slides using Mega Funnel Technique
- To develop a low cost auto-stainer for uniform staining of slides
- To enhance the existing algorithms of CerviSCAN and optimize for processing speed
- To conduct multi centre field trials of the complete system at RCC, Thiruvananthapuram and other three identified centres

Work done:

CDAC (T) has developed an indigenous slide digitizer, DiGiSmear AS20, with motorized XY and Z axes along with indigenous auto-stainer and cytocentrifuge for the project. Artificial intelligence-based algorithm for detection of abnormal cells using deep learning approach has been developed and tested against screening of cervical smears by cytotechnologists at RCC-T.

In the validation phase of the project, the indigenously developed system was installed at ICMR-NICPR. For this validation, 250 cervical samples were processed on this system and the interpretation of direct microscopy of the smears prepared through the megafunnel technique (MFT) was compared with that of the digitally scanned smears and the artificial intelligence-enabled selected fields.

A good concordance was found between the direct microscopy of the MFT smear and scanned images for the detection of cervical lesions.

Translational potential: The use of this indigenous low-cost automated device has the potential to scale up the cervical cancer screening in low resource settings with paucity of trained technicians and cytopathologists.

Molecular Evaluation of Anticancer and Antiviral properties of Thuja Occidentalis

Principal Investigator: Dr. R. Suresh Kumar, Scientist E, Molecular Biology Group

Team: Dr. Rana P. Singh, School of Life Sciences, Jawaharlal Nehru University, New Delhi; Dr. Binit Dwivedi, Dr. D.P. Rastogi Central Research Institute for Homeopathy, Noida

Funding agency & budget: Ministry of AYUSH, 45 lakhs

Project Duration: Jan 2017 – Dec 2020 (extended till 2023)

Brief background & rationale: Thuja Occidentalis has been used to treat warts in homeopathy system. Human papilloma virus consists of 8kb genome which contains early and late genes. The E6 and E7 are considered as oncogenes which degrade or inactivate P53, pRb respectively and induce cell cycle and proliferation. The present project intends to assess the anticancer and antiviral potential of Thuja Occidentalis in HPV infected cancer cells and its molecular mechanism in transcriptional regulation in controlling HPV transcription. The rationale is to control the transcription of E6 and E7, thereby controlling the carcinogenesis process. HPV transcription is controlled by host transcription factors like AP1 and NFKb, and these transcription factors can be modulated by many of known phytochemicals. The present study tries to identify whether Thuja could modulate transcription factor and thereby control its transcripts and protein synthesis.

Objectives:

- To study the anti- cancer effect of active component extract/mother tincture of Thuja occidentalis in cervical cancer cell lines infected with HPV.
- To study the phenotypic characteristics, candidate gene signatures, induction of apoptosis, population doubling time in treated cell lines.

Brief Methodology: Antioxidant assay was performed using DPPH (2,2-diphenyl-1-picryl-hydrazyl-hydrate) a free radical method, which is based on electron transfer that initiates development of violet color in ethanol. Total flavanoid was determined by Aluminum Chloride method where 1 ml of test samples, 4 ml of water, 5% sodium nitrite, and 10% aluminum chloride were added. After 6minutes of incubation at RT, 1ml of sodium hydroxide was added to reaction mixture. The final volume was made to 10 ml and the absorbance was measured against Blank at 510 nm using spectrophotometer. Total Phenolic component was estimated by folin Ciocalteau reagent. Thuja extract 0.5ml was taken and was mixed in 1.5 ml Folin ciocalteu reagent (diluted 1/10). After 5 minutes incubation, 5ml of 5% sodium carbonate solution was added. The volume was made to 10 ml with distilled water. Absorbance of samples was measured at 750 nm using spectrophotometer. HeLa Cells were treated with Thuja (30C) for 48 hrs and cells were maintained

in Co2 under standard condition of maintenance. The treated and untreated cells were maintained in parallel. The cells were taken off from the petri dishes under cold condition; the cells were immediately pelleted and stored in -80C. The protein isolation was carried out using commercial kit. The proteins were quantitated and filtered through designated columns. In-solution digestion by trypsin was carried out. The samples were processed by Delhi University South campus proteomics facility.

Work done:

We have assessed Phenolic, flavanoid contents of the Thuja using thin layer chromatography and spectrophotometer methods. In addition, we have tested the alteration of proteomic contents by LC-MS/MS in Thuja-treated cells. We found exclusively expressed genes which are very less in number and need to revalidate the experiments.

Translational Potential: The preliminary study will be elaborated on transcriptional regulation of HPV in treated cells, there by controlling the HPV replication, propagation, and control of cell cycle.

Scaling up of implementation of primary HPV screening by self-sampling

Principal Investigator: Dr. Kavitha Dhanasekaran, Scientist D, Division of Clinical Oncology

Team: Dr. Sangeetha Pradhan, Dr. Roopa Hariprasad

Funding agency & budget: ICRC-ICMR, 1 crore 47 lakhs

Project Duration: Nov 2020 – Oct 2023

Brief background & rationale: India is working towards achieving the target set by the World Health Organization (WHO) for cervical cancer elimination by 2035. Cervical Cancer is the second common cancer among females in India. Sikkim is the first state in our country which has successfully included HPV vaccination in their immunization program for girls between 9-14 years of age and completed 2 doses of vaccination (first dose in August 2018 and second dose in April 2019). HPV testing is considered the most effective screening approach for cervical cancer. Our study focuses on feasibility of primary HPV DNA testing on self-collected samples in Sikkim.

Objectives:

- To evaluate the acceptance of home-based self-collection by the women, compliance of the women to further assessment.
- To evaluate the acceptance of the home-based screening by the ASHA workers, the facilitators and barriers faced by them to motivate women.
- To assess the feasibility of setting up a centralized HPV test facility in a district hospital with appropriate training of the laboratory technician.
- To assess the feasibility and effectiveness of a referral mechanism, through which the screen positive women will be managed at the district hospital.

Brief Methodology: Women aged 30-65 years, residing in East district of Sikkim would be offered HPV test on the self-collected samples. ASHAs shall collect the self-collected HPV samples and transport it to district hospital where the HPV testing facility would be placed. One rural and one urban PHC in this district have been selected; eligible women would be about 6000.

Work done: Of the 1138 samples that have been collected, 10% were positive for HPV. All screen test positive women underwent VIA and precancerous lesions were treated as per the guidelines. The healthcare providers involved in the study are trained periodically.

Translational Potential: The results of this implementation study can be used to replicate in other states who are ready for primary HPV screening and the various challenges faced in the implementation will become clearer and help GoI and the states to make necessary changes during implementation of the population cancer screen.

Identification of rare variants in Pattern recognition receptors (PRRs) and their crosstalk with Interleukins and NF-kB to understand the functional Implications in Reproductive Tract Infections (RTIs)

Principal Investigator: Dr. Mausumi Bharadwaj, Scientist G, Molecular Biology Group

Team: Dr. Shalini Singh, Dr. Sanjay Gupta, Dr. Ruchika Gupta, Dr. Kavitha Dhanasekaran

Funding agency & budget: ICMR, 50 lakhs

Project Duration: 2021 –2024

Brief background & rationale: According to the World Health Organization (WHO), each year around 499 million cases of curable RTIs occur throughout the world in the age group of 15-49 years, of which 80% cases occur in developing countries and about 79 million cases occur in India annually. Despite the fact that India contributes a significant percentage of global burdens of disease, there are no large-scale screening programs in the country or public health policies aiming at effective integration of awareness and screening in any region of India. Improved awareness, infrastructure, and efficient health services, for early detection and treatment of RTIs is fundamental for women health control.

Objectives:

- Detection of the major reproductive tract infections (RTIs) from cervical scrape samples.
- Identification of rare variants in cytokines/interleukins and their membrane-bound receptors
- Analysis of the functional implications of identified variants and their interactions
- Correlation of the above findings in the progression of RTIs.

Brief Methodology: In the present study we will recruit a total of 2000 married women who will visit the OPD of NICPR. All the women will be interviewed on the basis of questionnaire. Cervical scrapes of all recruited women (symptomatic and asymptomatic) will be collected using cytobrush. All collected samples will be screened for RTIs through cytology & PCR. Women who will be found to be positive for any reproductive tract infection will be subjected to molecular analysis by using Next generation Sequencing platform.

Work done: Project has initiated on 1st Dec 2021. Recruitment of project staff is done. According to inclusion criteria patients are getting recruited and standardization of molecular screening methods are ongoing.

Translational Potential: This proposed project will be helpful in better management of RTIs by contributing in the designing of molecular targeted therapies especially in Indian scenario.

Anal cytological abnormalities and human papillomavirus infection in women living with HIV: A systematic review and meta-analysis

Intramural Research Study by Division of Cytopathology, NICPR

Objective: To provide a summary estimate of the prevalence of anal cytological abnormalities and human papillomavirus (HPV) infection as well as their covariates in women living with HIV (WLHIV).

Methods: Four databases –PubMed, Cochrane Library, ProQuest and Web of Science –were searched up to 31 May 2021 for studies reporting on the prevalence and/or covariates of abnormal anal cytology and/or anal HPV infection in WLHIV. The data were extracted independently by two authors using standardized extraction forms. Random effect models were used to estimate the summary effect sizes.

Results: A total of 29 studies were included in the analysis. The overall prevalence of anal cytological abnormalities in WLHIV was 28.5% [95% CI 22.8–35.5]. High-grade cytological lesions were seen in 12.1% (95% CI 8.5–17.2) of the abnormal smears. High-risk HPV infection was found in 44.0% (95% CI 37.6–51.5). A positive association was seen between anal cytological abnormality and factors such as receptive anal intercourse [meta-risk ratio (meta-RR) = 1.6, 95% CI 1.3–1.8], having multiple sexual partners (1.6, 95% CI 1.0–2.5), CD4 count < 200 cells/μL (4.6, 95% CI 3.0–6.9), anal HPV (4.6, 95% CI 2.4–8.8), abnormal cervical cytology (2.3, 95% CI 2.0–2.8), and cervical HPV (meta-RR 4.6, 95% CI 2.2–9.8). Anal HPV infection was significantly associated with cervical HPV positivity (2.5, 95% CI 1.2–5.3).

Conclusions: Our results highlight the high prevalence of abnormal anal cytology and HPV infection in WLHIV. The positive association of anal cytological abnormality with parameters such as abnormal cervical cytology, cervical HPV infection and low CD4 count suggests that anal sex history and examination may be considered in WLHIV undergoing screening for sexually transmitted infection and possessing any of these risk factors.

Impact of highly active antiretroviral therapy (HAART) on outcome of cervical lesions and high-risk HPV in women living with HIV (WLHIV): a global systematic review and meta-analysis

Intramural Research Study by Division of Cytopathology, NICPR

Objective: To summarize the available evidence of the impact of highly active antiretroviral therapy (HAART) on the outcome of cervical lesions or human papillomavirus (HPV) infection among women living with HIV (WLHIV).

Methodology: PubMed/ Medline, Embase, clinicaltrials.gov database and Cochrane Database were searched between January 1, 1996 and January 31, 2022. Twenty-two (22) cohort studies that reported on the association of HAART with any of the outcomes: incidence, progression or regression of cervical lesions or acquisition or clearance of HPV infection in WLHIVs. Relevant data was extracted by one author while senior author performed random check of 25% of the studies' data to detect errors, if any. Review Manager (RevMan) version 5.3 was used for quantitative analysis.

Results: The summary estimate of incident cervical lesions was lower in WLHIVs on HAART (0·81, 95% CI 0·60-1·08). HAART was associated with lower risk of cervical lesion progression (0·76, 95% CI 0·64-0·92, I^2 55·6%) and higher regression rate of these lesions (1·43, 95% CI 1·06-1·94, I^2 81%). Though HPV acquisition was not significantly lower in HAART users (0·83, 95% CI 0·40-1·70), the clearance of HPV infection was higher in WLHIVs on HAART (1·41, 95% CI 1·14-1·76, I^2 2·4%).

Conclusion: This review provides evidence that HAART assists in reducing the incidence and progression of cervical lesions and enhancing their regression in women living with HIV. Hence, HAART regime should be recommended to all WLHIVs with an advice for adherence to allow for early immune reconstitution.

Comparative Study on Endometrial and Cervical Cancer with special reference to Human Papillomavirus type 16

Principal Investigator: Dr. Mausumi Bharadwaj, Molecular Biology Group
Research Scholar: Heena Gautam (SRF)

Funding Agency: CSIR
Duration of Project: 2018-2022

Background: Cancer of the uterine cervix and cancer of the corpus uteri are some of the most common gynaecological cancers worldwide. According to Globocan 2020, the global incidence of cancer cervix was 604,127 cases (3.1%) and corpus uteri accounted for 417,367 (2.2%) cases. Death due to cancer cervix accounted for 341,831 (3.4%) and corpus uteri accounted 97,370 (1.0%) cases. In 2020, cancer cervix accounted for 1,23,907 cases while corpus uteri for 16,413 cases in India. Human Papillomavirus (HPV) is considered one of the major etiological factors in addition to other host genetic factors for the development of cervical cancer. But the role of HPV in endometrial cancer is quite controversial. No study has been reported so far from India regarding the role of HPV in endometrial cancer.

Objectives:

- Comparative analysis of prevalence of HPV in cervical and endometrial cancer.
- Functional analysis of gene polymorphisms in endometrial and cervical cancer.
- Evaluation of HPV 16 DNA construct in murine model.
- Correlation of above findings.

Work done:

Our results suggests that the mean age among control, hyperplasia and cancer groups were 44.5, 48.375 and 58.5 respectively. Mean Body mass index in kg/m2 among control, hyperplasia and cancer groups was 26.6, 34 and 29.75 respectively. The genotypic distributions of AA, GA, and GG of IL-10 -1082 A/G locus were 15, 85, and 0% for cancer patients; 30, 65 and 5% for hyperplasia; and 11.5, 70, and 18.5% for controls, respectively. The frequency of CC, CT, and TT genotype of IL-10 -819 C/T locus was 21, 69, and 10% in cancer patients; 20, 80, and 0% in hyperplasia; and 10, 55, and 35% in controls, respectively. For -1082 A/G locus of IL-10 gene, we have found higher genotypic frequency of AA and low frequency of GG in cancer patients and hyperplasia cases whereas in control group the genotypic frequency of GG was higher than in cases. For -819 C/T locus of IL-10 gene, higher genotypic frequency of CC and low frequency of TT in cancer patients and hyperplasia cases whereas in control group the genotypic frequency of TT was higher as compared to cases.

By using various tools and algorithms we have reported 8 most deleterious nsSNPs (P139H, R257C, C265Y, L283P, G514D, L544Q, H566Y and W670R) in human TLR9 gene as potentially damaging SNPs. Our study identifies two nsSNPs G514D and W670R, specifically associated with severity to Uterine corpus endometrial carcinoma.

To understand the mechanism of aberrant expression of miRNAs and their crosstalk with drug resistance in cervical cancer cells

Principal Investigator: Dr. Showket Hussain, Molecular Biology Group
Research Scholar: Mr. Atul Chikara, SRF

Funding Agency: ICMR – SRF
Duration of Project: 2019-2022

Background: Cervical cancer is ranked as one of the most common cancers among women worldwide and in many low-income countries, it is the most common female cancer. There are an estimated 528,000 new cases annually worldwide out of which 266,000 women succumb to their disease. To find the targeted biomarker specific in cervical cancer, we have aimed our study towards an "OncoMir" miRNA-21, which is found to play a very significant role in cancer.

Objectives:

- To evaluate the effect of miRNA-21 on epigenetic modulations of targeted gene promoters in cervical carcinoma.
- To test the role of miR-21 induced cancer drug resistance (Paclitaxel and Cisplatin) through its targeted genes in cervical cancer cells

Brief Methodology:

Cell culture, protein isolation, western blotting DNA isolation, RNA isolation, cDNA preparation, cell culture assays, qRT-PCR, bisulphate sequencing polymerase chain reaction method

Work done:

Mir-21 transfection in HeLa, SiHa and C33a cells has confirmed its effect on cancer cell proliferation activity through wound healing assay. The difference in cell proliferation rate post miRNA mimic and inhibitor treatment at 0h & 48h when compared with untreated cells among SiHa and C33a cell lines is given in Fig.
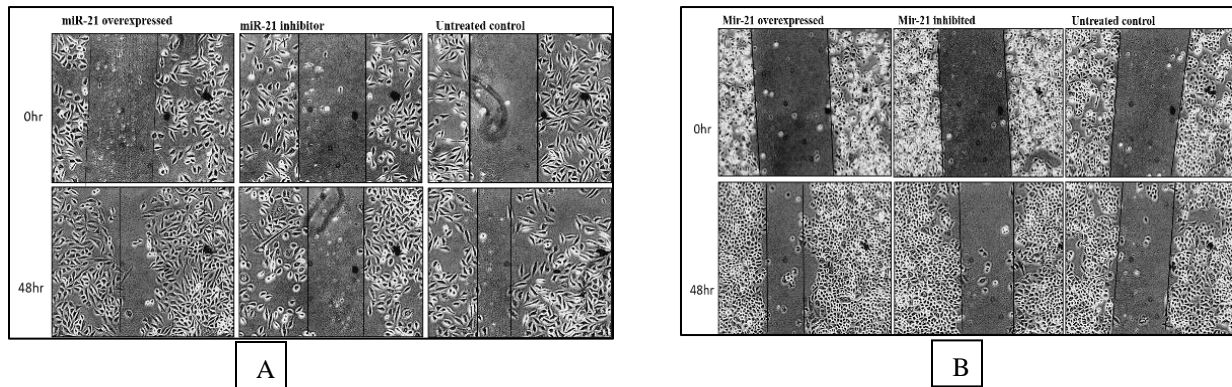
Fig: Representative images showing cell proliferation in cervical cancer cell lines. The cell proliferation rate was assessed by performing wound healing assay post miRNA mimic and inhibitor treatment at 0h & 48h in (A) SiHa and (B) C33a cell lines

IC50 values post drug treatment have been calculated through MTT Assay confirming different drug concentrations affecting the cell viability. Relative miRNA- 21 expression at post inhibitor and mimic transfection have also been calculated through qRT-PCR assay (Fig.).
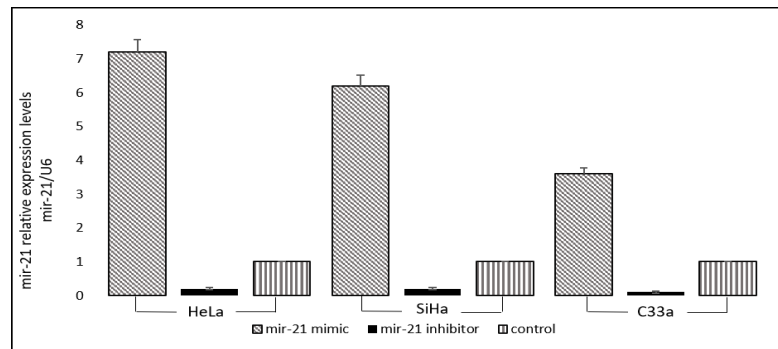
Fig: Relative miRNA-21 expression levels post inhibitor and mimic transfection by qRT- PCR assay

Translational Potential: The stated study would help to understand the role of miRNAs in the regulation of cervical cancer progression. In addition, this study may identify novel diagnostic/ prognostic biomarkers to develop better cervical cancer therapeutics. The study shall also identify the epigenetic mechanisms by which miRNAs probably regulate the expression of their target genes (oncogenes).

To Understand the Role and Mechanism of HPV E4 And E5 Oncoproteins in Cervical Cancer Cells

Principal Investigator: Dr. Showket Hussain, Molecular Biology Group
Research Scholar: Ms. Jyoti Rani, SRF

Funding Agency: ICMR – SRF
Duration of Project: 2019-2022

Background: Cervical cancer is the most common cancer as compared to other types of cancer in women. Many types of HPV are responsible for cervical cancer such as HPV types 16, 18, 31,33, 35, 39 and 45. High-risk HPV types are HPV 16 and 18. Many scientists are working on HPV E, E2, E6 and E7 ORFs. But little knowledge is available on HPV E4 and E5 ORFs. Both these ORFs play a very important role in cell proliferation, propagation of HPV and increase the HPV E6, E7 activity thereby contributing to development of cervical cancer.

Objectives:

- To study the expression pattern of HPV E4 and E5 proteins in HPV cell lines.
- To understand the mechanism by which HPV E4 and E5 regulate cervical carcinogenesis.
- To explore the target molecules of E4/E5 proteins of HPV 16 and 18 to design better therapeutics

Brief Methodology: Cell culture, protein isolation, RNA isolation, cDNA preparation, MTT spectrophotometric dye assay, qRT-PCR, primer designing, In-silico analysis

Work done:

The data demonstrated lower expression of E4 and E5 in HPV positive cervical cancer cell lines in comparison to HPV E1 and E7 oncoproteins (Fig).
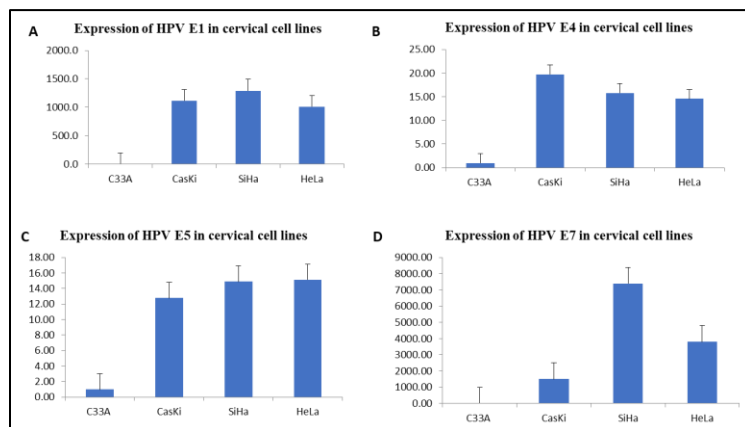
Fig: Representative images showing the expression of E1, E4, E5 and E7 at mRNA level in cervical cell lines. The amplification plot showing the HPV (A) E1, (B) E4, (C) E5 and (D) E7 expression in HeLa, SiHa, CasKi in comparison of C33a cell lines represented through normalized fold changes

In silico analysis of microarray data GSE26888, GSE26511, GSE9750, GSE5787 and GSE7803 retrieved from Gene Expression Omnibus (GEO) and targeted by HPV E5 onco-protein showed DEGS1 gene to be a significantly upregulated in cervical cancer cell lines. Expression of this gene was checked by qRT-PCR. This gene was observed to be slightly over expressed than housekeeping gene (Fig).
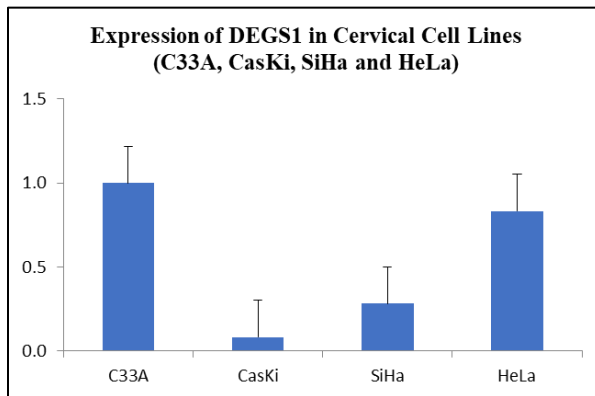
Fig: Representative image showing the expression of DEGS1 at mRNA level in cervical cell lines performed by qRT-PCR. The amplification plot showing the DEGS1 expression in HeLa, SiHa, CasKi in comparison to C33a cell lines represented through normalized fold changes (y- axis)

Translational Potential: HPV E4 and E5 oncoproteins make a complex with E6 and E7 and increase the efficiency of E6 and E7 oncoproteins in developing cervical cancer. So, this study would help in better understanding of the mechanisms of HPV E4 and E5 oncoproteins in developing cervical cancer. Furthermore, this study is expected to provide direct evidence of the influence of HPV E4 and E5 oncoproteins in developing cervical cancer. Thus, it might serve as a helpful biomarker in the detection of cervical cancer after proper exploration and validation.

Development and Evaluation of CRISPR/Cas13 based diagnostic system for HPV detection

Principal Investigator: Dr. Anita Kumari, PDF
Mentor: Dr. R Suresh Kumar, Molecular Biology Group

Funding Agency: ICMR – PDF
Duration of Project: Jan 2021 – Jan 2023

Background: The diagnosis of HPV relies greatly on molecular biology-based detection techniques. The major disadvantage of these methods is the time consumption, possibility of false positive results, sensitivity fluctuations and accessibility. So, a diagnostic test which can minimise the above-mentioned limitations would be useful for better diagnosis of HPV. To overcome these limitations, detection techniques based on Clustered regularly interspaced short palindromic repeats (CRISPR) have emerged as widely accessible and versatile method for early and easy diagnosis of HPV.

Objectives:

- In silico designing of gRNA(crRNA) against 2 targets in HPV (L1, E6) and evaluation off targets.
- Recombinase polymerase reaction (RPA) and T7 based invitro transcription of crRNA targeting HPV genes.
- Cloning and expression of Cas13a and cleavage of In-vitro transcribed HPV targets
- To validate the detection of multiple HPV genes by flurophore-biotin based Reporter assays.
- Comparative analysis with RT-PCR for validating the CRISPR detection system

Brief Methodology: Cervical scrape samples shall be collected from patients diagnosed as cervical and categorized based on age, sex and stage of the disease. *In silico* target site selection shall be done and crRNA selected for the target sequences by using suitable software. Cas13a shall be expressed and purified. RPA reaction would be performed using commercially available kit. Final detection assay would be set up for detecting HPV in the samples. The efficiency of the developed diagnostic technique using Cas13 shall be validated against HPV detection by PCR.

Work done:

The gRNA for HR-HPV has been designed using bioinformatics software and off-targets of the same has been analyzed. CRISPR-RT is a web application that allows a user to upload an RNA sequence, set specifications according to experimental goals, and receive target candidates for the CRISPR-Cas13 System. The conserved region on L1 gene from different HR-HPVs were fed separately for the generation of gRNA sequence. Multiple L1 sequence of HPV-16 was obtained from NCBI and MSA was done for the same. Similarly, MSA was done for all the HR-HPV.

LwCas13 was successfully transformed in BL21 cells. Cas13 protein has been cloned, expressed and purified. The protein is being purified from bulk cultures.

Breast Cancer

Comparative study of Genetic, Clinical and Epidemiological factors of Breast Cancer in Indian population (National Task Force project)

Principal Investigator: Dr. Showket Hussain, Scientist D, Molecular Biology Group

Team: Dr. Roopa Hariprasad, Dr. Pranay Tanwar, AIIMS, New Delhi, Dr. Usha Agrawal, ICMR-NIP, New Delhi, Dr. Aleyamma Mathew, RCC, Trivandrum

Funding agency & budget: ICMR, Rs 1,01,45,200

Project Duration: Mar 2017 – Mar 2022

Brief background & rationale: Breast cancer is a leading cause of cancer related deaths among women in India. The incidence of breast cancer is high in urban India whereas it is low in rural areas. There are several reasons for breast cancer although the exact cause is not known. It is likely to be due to differences in lifestyle, hormonal, reproductive and nutritional habits that differ between rural and urban India. Various reports have documented alterations in some of the oncogenes and tumor suppressor genes; however, the exact molecular and genetic basis of breast cancer remains unclear.

In India, the incidence of breast cancer is increasing day by day and near future it will be major health issue among women. The proposed study will help in bringing awareness about breast cancer in India. In addition, it will help in framing the policies for breast cancer prevention and for the discovery of efficient biomarkers.

Objective: To study of various clinical, hormonal, and other factors associated with breast cancer, and identification of the mutational landscape of breast cancer.

Brief Methodology:

Whole exome sequencing, RNA sequencing, DNA isolation, sanger sequencing, RNA isolation, cDNA preparation, qRT-PCR, protein isolation, immunoblotting and immunohistochemistry (IHC).

Work done:

The transcriptomic data unraveled three differentially expressed dysregulated genes- Gene1, Gene2 and Gene3 among four different subtypes of breast cancer. Our western blot analysis revealed an overexpression of these 3 genes in > 80% of the breast tumor samples as compared with their normal adjacent tissues, suggesting their important role in carcinogenesis (Fig).
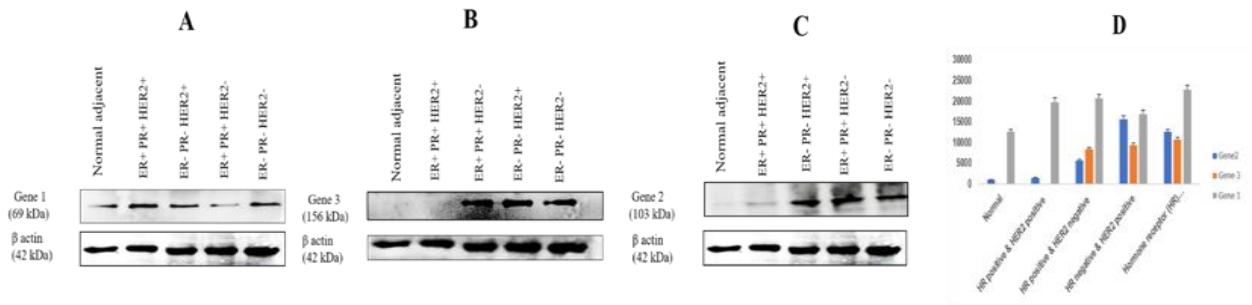
Fig: Representative western blot showing expression pattern of Gene1, Gene2 and Gene3 in breast cancer biopsies. Protein was extracted from breast cancer tumor and Normal adjacent biopsies, separated on 8-10% SDS-PAGE and detected by specific antibodies (KTN1, DDX5, ACTN1) as indicated and probed for β-actin levels to confirm equal loading. The quantification of bands were performed densitometrically using ImageJ software (NIH, MD)

Further, a significant higher expression of these 3 genes were observed with respect to different subtypes of breast cancer on validating of immunoblotting results by IHC (Fig).
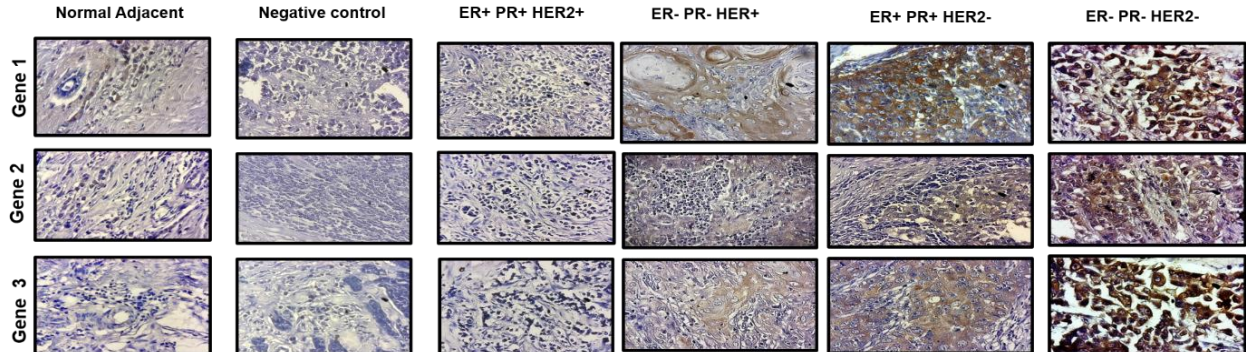
Fig: Representative image showing the differential expression pattern of Gene1, Gene2 and Gene3 in breast tumor tissues at protein level. The immunohistochemical staining was performed using specific antibodies against Gene1, Gene2 and Gene3. The image was captured at 40X magnification

Both the techniques showed good concordance. Similarly, qRT-PCRs were performed to check the mRNA level expression of these genes which also showed de-regulation among different subtypes of breast cancer (Fig).
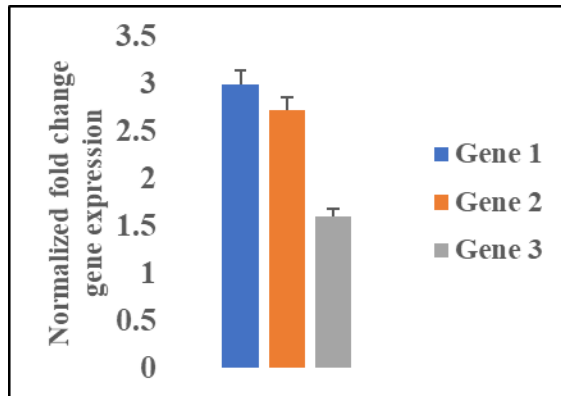
Fig: Representative image showing comparison of mRNA level expression of Gene1, Gene2 and Gene3 in breast tissue biopsies by qRT-PCR. The fold change gene expression was calculated by considering ΔΔCt values which is shown on y axis

In addition. mutational landscape of breast cancer patients is being validated through Sanger Sequencing.

Translational Potential: This study may pave the way for developing indigenous diagnostic and/ or prognostic biomarkers in Indian breast cancer patients. In addition, both clinical and epidemiological data may also provide key insights about breast cancer patients in Indian population.

To decipher and target the metabolic signatures associated with Epirubicin-resistant triple negative breast cancer

Principal Investigator: Dr. Suresh T Hedau, Scientist E, Molecular Biology Group

Team: Dr. Mausumi Bharadwaj

Funding agency & budget: ICMR, Rs 35.42 lakhs

Project Duration: Nov 2021 – Nov 2024

Brief background & rationale: Triple negative breast cancer is more aggressive subtype and account for 20% among the breast cancer worldwide. Lack of receptors in TNBCs patients, endocrine therapy and the HER-2 receptor targeted therapies are not applicable. Epirubicin (Epi) is a chemotherapeutic drug is being used as first line of treatment. It is a semi-synthetic doxorubicin derivative intercalates into DNA and inhibits Topoisomerase-II enzymes results in inhibition of DNA and RNA synthesis and cell death. The aim of this study to understand the molecular mechanisms associated with metabolic changes behind Epi-resistance in TNBCs and further identify drug candidates for the treatment of disease.

Objective:

- To develop an Epirubicin-resistant in triple negative breast cancer cell models.
- To access the transcriptome profile for Epi-sensitive and Epi-resistance cells.
- To identify mi-RNA and proteome profiles, and their comparative study of Epi-resistant TNBC cells with sensitive cells.
- To validate transcriptome and proteome profiles at mRNA as well as protein level.

Brief Methodology:

MDA-MB-231 and MDA-MB-468 breast cancer cell lines would be used. Chemicals and plastic wares were procured.
Maintenance of cell lines- Cell lines were maintained in DMEM with supplement 10% FBS, 1% Pen/Strep at 37^0C with 5% CO2 in CO2 incubator.
Protocol Standardization - Protocols related to cell culture and drug treatment to fulfill the first objective were standardized.
Cell viability assay – MTT cell viability assay was performed to check efficacy of Epirubicin drugs on MDA-MB-231 cell line.
Developing resistant cell models- MDA-MB-231 cell lines were treated with 250 nM concentration of Epirubicin

Work done:

The proposed sample collection has been achieved. 75-85 % of the proposed objectives have been achieved. The next generation sequencing (NGS) based data have demonstrated some of the novel genetic alterations among breast cancer patients in Indian population. Furthermore, the whole exome sequencing and transcriptome data is being validated in order to identify the potential biomarkers and explore their clinical application in breast carcinogenesis among Indian women.

Translational Potential: The present study will understand the molecular mechanism of epi-resistance in TNBC as well as discover the new potential prognostic marker, using the information from epi-resistant TNBC cells.

Identification of prognostic marker for mTOR kinase inhibitor and their mechanisms of therapeutic resistance in breast cancer

Principal Investigator: Dr. Suresh T Hedau, Scientist E, Molecular Biology Group

Team: Dr. Shalini Singh, Dr. Ruchika Gupta

Funding agency & budget: DHR, Rs 46.62 lakhs

Project Duration: Dec 2021 – Dec 2024

Brief background & rationale: Everolimus is a synthetic small molecule mTOR kinase inhibitor arresting cell cycle in G1-phase being used for advanced stage breast cancer treatment. Although efficacy of everolimus is highly variable in breast cancer subtype. Lack of biomarker in breast cancer's tumor subtype and poor understanding of molecular mechanisms of acquired resistance in breast cancer are limiting factors in the successful therapy.

Objective:

- Efficacy of everolimus will be evaluated in BC cell lines originate from breast cancer subtype tumor cells.
- Everolimus resistance cell models will be developed and evaluate the regulatory mechanisms at transcription and translation levels.
- Further validation study will be done in breast cancer clinical samples.

Brief Methodology:

1. **Procurement of consumables**- MDA-MB-231 and MCF-7 cell lines were obtained from NCCS, Pune. Chemicals, drugs Everolimus, Rapamycin and plastic wares were procured.
2. **Cell lines**- MDA-MB-231 and MCF-7 cell lines were maintained.
3. **Protocol Standardization**- Protocols needed to fulfil the first objective were standardized.
4. **Cell viability assay-**MTT assay for Everolimus and Rapamycin drugs on MDA-MB-231 cell line was performed.
5. **Drug-Resistant model-**Treatment of everolimus and rapamycin was 1µM on MDA-MB-231 cells and 250 nM on MCF-7 cells.

Clinical Sample Collection- 30 fresh breast cancer samples (FNAC) were collected from cancer clinic of NICPR, Noida

Work done:

The cell culture of MDA-MB-231 and MCF-7 cell lines has properly maintained. According to the MTT assay results, IC50 value of Everolimus drug on MDA-MB-231 cell lines was found to be 12µM and the IC50 value of Rapamycin drug was 1µM. However, in other cell lines it is in the process. MDA-MB-231 and MCF-7 cell lines are being treated with Everolimus and Rapamycin to generate drug-resistance cell models.

Translational Potential: This study may help to find out the potential biomarker and an efficient co-drug to re-sensitize the breast cancer cells against everolimus drug which will enhance the effect of chemotherapy of HR+, HER+ and TNBC breast cancer patients.

Evaluation of modified thermography as a tool for early detection of breast cancer in women attending breast clinic at NICPR

Intramural Research Project by Division of Clinical Oncology

Background: Breast cancer has emerged as the leading sites of cancer among women in India with an incidence of 25.8/100,000. Clinical Breast Examination (CBE) is recognized as a cost-effective measure to screen for breast cancer in LMICs. However, the major drawback of CBE is the high false positivity rate which leads to burdening of the tertiary facilities in the country. Infrared imaging of the breast or thermography is a radiation-free imaging technique which detects malignancy based on thermal changes in the body. Due to increased blood circulation and metabolic activity of the tumor, the temperature distribution around the regions of a tumor produces unique hot and warm patterns which can be used for clinical interpretation of abnormal breast conditions. However, manual interpretation of thermal images is error prone and subjective. NIRAMAI has developed Artificial Intelligence-based software (Thermalytix) to automate the analysis of thermal images and improve sensitivity and specificity of thermography. A novel algorithm is used to distinguish benign vs malignant conditions. As a final step, a machine learning classifier calibrated with results of mammography/sono-mammography and biopsy is used to generate a breast health score which can be used for automated triaging of patients in mass screening camps and the detailed report with annotated images can be used by radiologists for further diagnosis and prognosis of the disease.

Objectives: To estimate the sensitivity, specificity, and predictive values of Thermalytix© in detecting breast cancers in the women attending breast clinic at NICPR against the age appropriate 'gold-standard' test USG/mammography and/or tissue diagnosis.

Brief Methodology: This was a prospective, comparative blinded study to evaluate the effectiveness of the Thermalytix© compared to the standard screening modalities. All women attending the breast clinic underwent non-invasive Thermalytix® test by a trained technician, followed by CBE. Women found to have suspicion of breast abnormalities in either of the tests were referred for mammography or sono-mammography correlation. All the results including FNAC and/ or biopsy were recorded for final comparison.

Main Findings:

Total Niramai done: 335
Total mammogram done: 318
Total ultrasound breast done: 330.

Identification of molecular landscape in Familial/Sporadic breast cancer

Principal Investigator: Dr. Ved Vrat Verma (RA)
Mentor: Dr. Mausumi Bharadwaj, Molecular Biology Group

Funding Agency: ICMR – RA
**Duration of Project**: 2021 – 2024

Background: Breast cancer is one of the most commonly diagnosed cancers among women worldwide. Breast cancer forms in either the lobules or the ducts of the breast. Hereditary breast cancer caused by germline pathogenic mutations in the BRCA1 or BRCA2 genes are recently characterized as an increased risk for breast, ovarian, pancreatic, and other cancers. Differences in types of mutation and the site of mutation may partially impact cancer risk. Therefore, the following study has designed to understand the disease pathology by using In-silico tools further validated experimentally.

Objectives:

- Comprehensive literature survey and data collection on Familial/Sporadic breast cancer.
- Whole Exome Sequencing (WES) data analysis.
- Identify different novel mutations and their effect on cancer progression.
- In-silico validation specific mutations by using various in-silico approaches.
- Drug designing against highly altered and up-regulated genes identified from the proposed study.

Work done:

The well-known hereditary breast cancer genes BRCA1/BRCA2 were searched as query genes in STRING database. The outcomes of BRCA1/BRCA2 queries searched in STRING database revealed that BRCA1/BRCA2 genes are directly/indirectly associated with many of the crucial genes and form a network with their 24 neighbor genes in homo sapiens genome (Figure 1 A). MD Simulations of PARP family of proteins for 100 ns has been performed using GROMACS platform. Further, comparative root means square deviations fluctuation curve of simulated protein backbone have been analysed (Figure 1B). The RMSD curve analysis suggested that all system attain equilibrium before the end of simulations. The detailed analysis of MD simulations outcomes and comparative structural analysis under progress.

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A

B
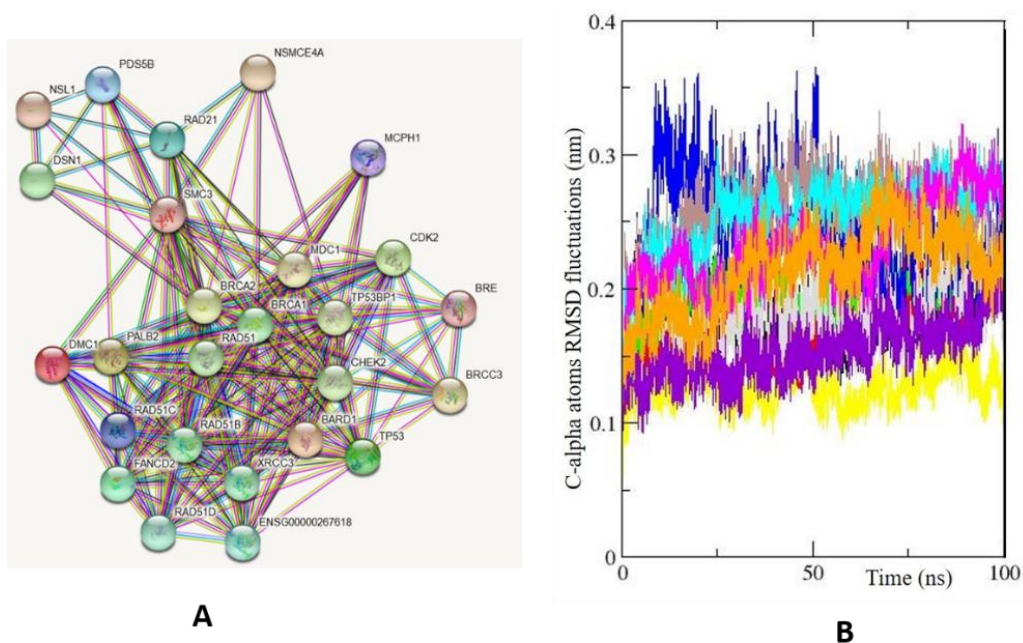
Fig: Gene network analysis of Familial breast cancer genes BRCA1/BRCA2 associated with other crucial genes responsible for breast cancer (A). Comparative C-alpha atoms root mean square deviations (RMSD) trajectory profile analysis of all simulated PARP protein systems (B)

Development of Folate Targeted Biocompatible Nanocarrier: Controlled Drug Delivery System in Combination for Breast Cancer Treatment

Principal Investigator: Dr. Ragini, PDF
Mentor: Dr. Suresh T. Hedau, Molecular Biology Group

Background: Chemotherapy, a very common treatment, delivers anticancer drugs systemically to patients for quenching the uncontrolled proliferation of cancerous cells. The main challenge of cancer therapeutics is to differentiate the cancerous cells and the normal cells. Nanotechnology-based drug-delivery system should possess large loading capacity, biocompatibility, less toxicity, easily degraded by the body's metabolism, and nano scale in order to facilitate the release of drugs by intravenous administration in a controlled manner. Combinatorial therapy shows three types of mechanism; to inhibit DNA and RNA synthesis by intercalating between base pairs of the DNA/RNA strand, thus preventing the replication of rapidly growing cancer cells, to inhibit topoisomerase II, preventing the relaxing of super-coiled DNA, and thus blocking DNA transcription and replication, and to create iron-mediated free oxygen radicals that damage the DNA and cell membranes.

Objectives: To design a hybrid nano-carrier by using inorganic metal node and organic linker (metal organic framework, MOF), modified with folic acid decorated graphene oxide layer (MOF@GO-FA) as a targeted and combinatorial drug delivery system for breast cancer treatment.

Brief Methodology: Graphene oxide layer has been synthesized via modified Hummers' method and then functionalized with FA by using EDC/NHS coupling reaction. For further synthesis of drug loaded MOF@GO-FA, a room temperature synthesis has been used, by using zinc as a metal node, 2- methylimidazole as linker, GO-FA as covering sheet and drug molecule. Drug molecules encapsulated in situ into the micropores of framework during crystal growth via weak coordination bonds between drug molecules and zinc ions. Final drug loaded MOF@GO-FA has been collected via centrifugation.

Work done: A comparative study has been carried out for refinement of nanocarriers and, finally, ZIF@GO-FA has been taken for dual drug delivery of DOX and CP (Anthracycline regimen) for breast cancer treatment. The obtained results are illustrated below.
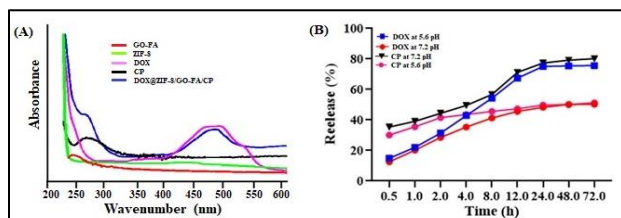
Fig: (A) UV−vis spectra of GO-FA, ZIF-8, DOX, CP, and DOX@ZIF-8@GO-FA/CP suspensions. (B) In vitro drug release profiles of DOX and CP from DOX@ZIF-8@/ GO-FA/CP in phosphate buffer saline (PBS) at pH 7.2 and 5.6 separately
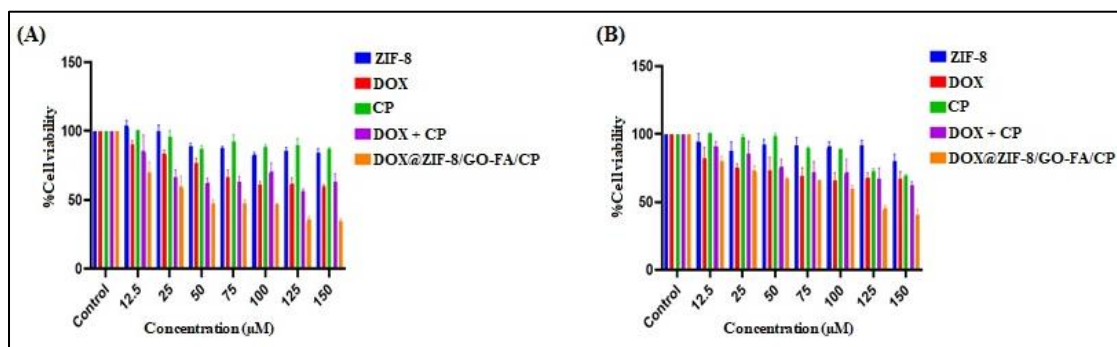
Fig: Cell viability of MCF-10A cells after incubation with MOF@GO-FA nanocarrier at different concentrations as measured using a MTT assay.
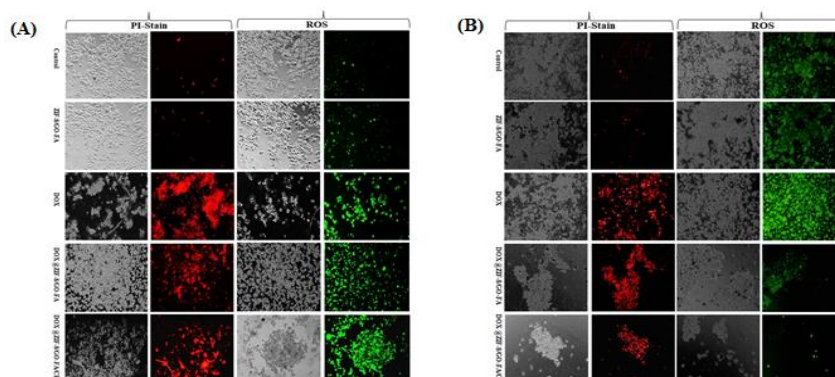

Fig: Fluorescence microscope images of PI-staining and ROS-generation after 24h incubation with control, ZIF-8/GO-FA, DOX, DOX@ZIF-8/GO-FA, and DOX@ZIF-8/GO-FA/CP at 20X magnificationin (A) MCF-7 and (B) MDA MB-231 cell-lines

In summary, an ingenious method was developed as GO-FA functionalized MOF (ZIF-8) based nanosystem and successfully used for delivery of DOX and CP in combination (DOX@ZIF-8/GO-FA/CP). This MOF/GO-FA system showed negligible cytotoxicity and excellent biocompatibility. More interestingly, the FA-modification enhanced the drug uptake in cancer cells and the DOX@ZIF-8/GO-FA/CP nanosystem showed clear selection towards cancer cells and avoid healthy cells. This nanosystem showed their synergistic cytotoxic effect on MCF-7 and MDA MB-231 cells, due to controlled release of DOX and CP on a specific site under an acidic condition. We also expect that the design of the pH-responsive nanosystem can give new inspiration to the synthesis of nanoparticles with multifunctional application.

Role of HDAC1 in the regulation of BRCA1 & p16 gene expression by methyl-CpG binding protein MBD2 in breast cancer cell line

Principal Investigator: Dr. Suresh T. Hedau, Molecular Biology Group
Research Scholar: Mr. Ram Krishna Sahu, SRF

Funding Agency: ICMR – SRF
Duration of Project: 2018-2021

Background: Breast cancer is the most commonly diagnosed cancer and the leading cause of cancer related death in female worldwide. The BRCA1 protein is involved in DNA repair and transcriptional regulation in response to DNA damage. p53 protein that regulates the cell cycle and act as a tumor suppression. MBD proteins play a major role in coordinating crosstalk between DNA methylation, histone modifications and chromatin organization to achieve a coherent transcriptional program. The canonical role of MBD2 as a transcriptional repressor through interactions with other binding proteins such as the histone deacetylase complexes NuRD/Mi-2 and Sin3A has been demonstrated. HDAC1 has regulatory role in the transcription of genes involved in cell cycle and cancer progression. Histone acetylases and HDACs are responsible for the reversible acetylation of histone protein, transcription factors, DNA repair enzymes, various nuclear and cytoplasmic proteins.

Objectives:

- To understand the molecular mechanism of HDAC1 in regulation of BRCA1 and p16 gene in breast cancer

Brief Methodology: Three breast cancer cell lines (MCF-10A, MCF-7, MDA-MB-231) have been used to see the effect of resveratrol. Cell viability was measured and IC50 value was expressed as µM of resveratrol. RNA was isolated by Tri-Zol method and quantified, cDNA prepared by cDNA preparation Kit and used for Real time PCR. SDS- polyacrylamide gel electrophoresis was run to separate the proteins using tris-glycin running buffer. An electrophoretic mobility shift assay (EMSA) was used to study protein–DNA or protein–RNA interactions. Clonogenic assay was done in 6-well cell culture plate and cells were counted and seeded and allowed to attach to the plate/dish in CO_2 incubator. Cells were treated with resveratrol and incubated in a CO_2 incubator at 37 °C for 1-3 weeks until cells in control plates formed colonies of a substantially good size. Cell migration assay was done in 6 well plates by scratch method.

Work done:

In this study we have calculated the 30µM IC_{50} value of resveratrol on breast normal MCF-10A and MCF-7, T47D & MDA-MB-231 Breast cancers cell lines however there is no significant effect of resveratrol was found on MCF-10A breast control cell line. Further EMSA analysis

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revealed that these MBD's proteins have binding affinity on BRCA1 promoter however there is no binding affinity was observed for p16 gene promoter of above-mentioned cell lines. In cell migration assay in the above-mentioned cell lines, migration was significantly reduced after 24hrs treatment of resveratrol. However, after 2µg SAHA treatment prior to resveratrol treatment for 24hrs cell line migration inhibition was increased along with increasing concentration of resveratrol as compared to resveratrol alone treatment. In Clonogenic assay, after 24hrs of resveratrol treatment the colony formation was significantly reduced. However, in MDA-MB-231 triple negative breast cancer cell line, the colony formation increased with increasing drug concentration. But after treatment with 2µg SAHA along with resveratrol survival frequency was significantly reduced in all cell lines. Further we have done gene expression analysis for MBD1, MBD2, MeCP2, HDAC1, BRCA1 & p16 genes at mRNA as well as protein level by real time-PCR and western blotting respectively in resveratrol treated and resveratrol + SAHA treated cell lines and found that MBD2 gene expression negatively correlated with BRCA1 gene expression. And after resveratrol + SAHA treatment HDAC1 gene expression significantly reduced and altered the BRCA1 gene expression in MCF-7 cell line as compared to resveratrol alone. This confirms that HDAC1 mediated the regulation of BRCA1 gene expression by MBD2 gene.
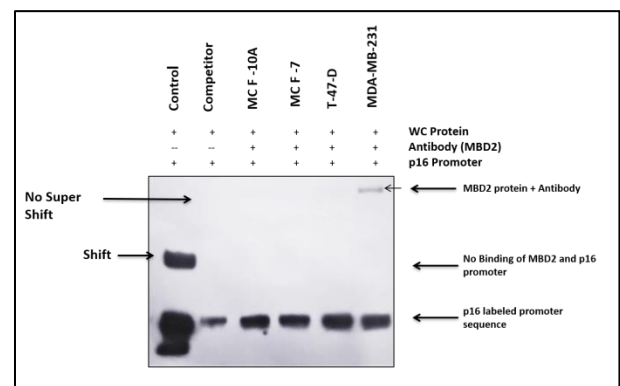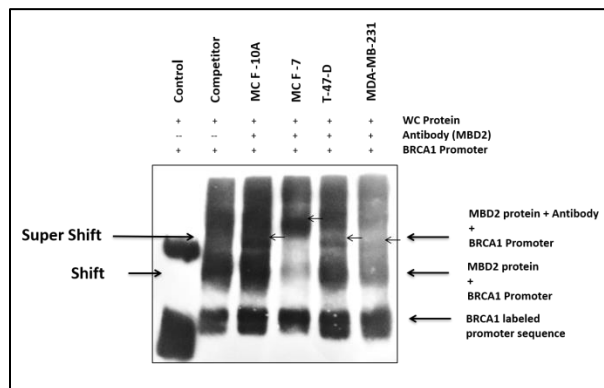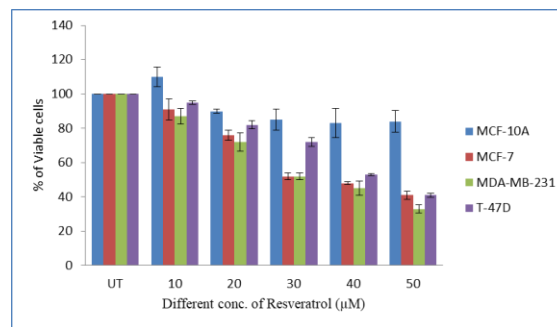
Role of SOX2, OCT4, KLF4 and NANOG genes in therapy resistance against multi-kinase inhibitors and their post-transcriptional regulation in Breast cancer

Principal Investigator: Dr. Binayak Kumar, Young Scientist
Mentor: Dr. Suresh T. Hedau, Molecular Biology Group

Funding Agency: DHR
Duration of Project: 2020-2023

Background: Breast cancer is one of the most common cancers worldwide. It is number one ranked in Indian female population. Various therapies are being used to cure the breast cancer but emergence of drug resistance is the major obstacle. Accumulating evidence suggest that most of the anti-cancer drug kills bulk population of tumor cells but fails to target cancer stem cells (CSCs). Eradication of cancers requires the elimination of CSCs. CSCs have self-renewal capacity and ability to differentiate into diverse progenies of tumor cells. SOX2, OCT4, KLF4 and NANOG genes are considered as pluripotency-associated transcription factors. The role of SOX2, OCT4, KLF4 and NAOG genes in iPSCs generation are well studied but in cancer therapy resistance is poorly studied. miRNA as a target candidate for these genes are studied well in context of iPSCs generation but still need to study for targeting cancer stem cells. In an earlier ICMR-PDF project of our group, Abemaciclib and Palbociclib resistant MCF-7 and MDA-MB-231 breast cancer cell models were developed. In this project, we shall evaluate the expression of SOX2, OCT4, KLF4 and NANOG genes at transcriptional level.

Objectives:

- To understand the oncogenic role of SOX2, OCT4, KLF4 and NANOG genes in therapy resistance in Breast cancer.
- To identify mi-RNAs as post-transcriptional regulatory candidates to inhibit the SOX2, OCT4, KLF4 and NANOG gene expressions which might be help to eliminate the CSCs.

Work Done:

In the continuation of ICMR-PDF project where Abemaciclib and Palbociclib resistance MCF-7 and MDA-MB-231 breast cancer cell models were developed, we attempt to evaluate the expression of SOX2, OCT4, KLF4 and NANOG genes at transcriptional level. As shown in Figure below, we found elevated level of all these stem cell transcription factors in resistant cells as compared to the control (drug-sensitive) cells on simulation.
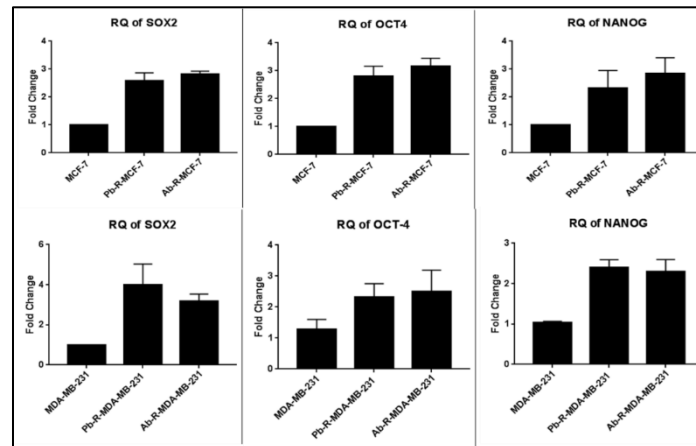
Fig: mRNA expression of SOX2, OCT4 and NANOG genes in the Ab and Pb resistant cell models.

miR-DB database tools and the massive literature search using PubMed literature search engine were used for the regulatory role of miRNAs on above-mentioned stem cell transcription factors. Network analysis of miRNAs for other target genes as well as transcription factors was performed. A few interesting miRNAs such as miR-429, miR-107, miR-300 and miR-200 etc. were found that need to be studied in detail.
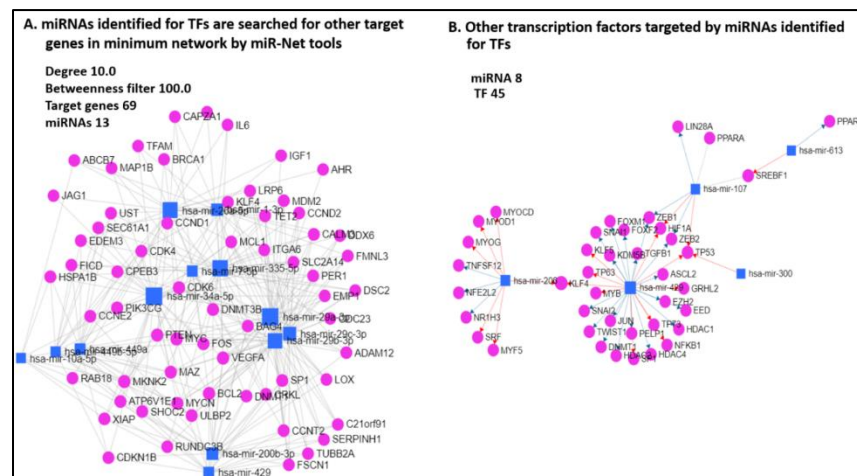

Fig: Network analysis of identified miRNAs for (a) Gene regulation and (b) other transcription factors along with SOX2, OCT4, KLF4 and Nanog.

Elevated expression of Stem cells markers: Real-time qPCR showed elevated expression of CD44, CD133, ALDH1 genes and non-significant differential expression of CD24 and EpCAM gene expression.

Expression of Apoptosis signalling gene: BAX, PARP, CASP3 and CASP9 genes were elevated in MDA-MB-231 treated with Abemacilib and Palbociclib. However, in Ab/Pb-resistant-MDA-MB231 cells, these genes were found suppressed in real time qPCR experiment.

Elevated expression of Stem cells transcription factors: OCT4, KLF4,NANOG and SOX2 genes were found elevated in drug resistant MDA-MB-231 as compared to the drug-sensitive cells.

Expression of cell proliferation and survival genes: GSK3 and PTEN, negative regulators of PI3K-AKT signalling, were found to be suppressed in drug resistant cells while PIK3CA, CyclinD1 and PCNA expression were higher in drug resistant cells as compared to the drug-sensitive MDA-MB-231 cells.

G1-phase cell cycle regulation: Both Abemaciclib and Palbociclib drugs target G1 Phase of cell cycle. We found an elevated expression of Rb and E2F1 gene and suppressed expression of p16 genes in drug resistant cells as compared to the drug sensitive MDA-MB-231 cells.

To explore the SALL transcription factor family in breast carcinogenesis

Principal Investigator: Dr. Showket Hussain, Molecular Biology Group
Research Scholar: Mr. Sandeep Sisodiya, SRF

Funding Agency: ICMR – SRF
Duration of Project: 2020 – 2023

Background: Breast cancer is among the top ranked cancers in women worldwide including India. It is classified into several sub-types based on the histological markers or various gene expression profiles. There are several genetic factors associated with breast carcinogenesis. Among them, transcription factors are molecules that can directly regulate cancer cells by expressing or repressing certain proteins that are associated with breast carcinogenesis. The SALL family of transcription factor family consists of SALL1, SALL 2, SALL3 and SALL 4, but SALL2 is an emerging transcription factor that controls expression of various cell cycle events including apoptosis and regulation of key genes. Recent studies have suggested that SALL2 acts as a tumor suppressor that inhibits breast and ovarian cancer progression.

Objectives:

- To investigate the role of SALL2 transcription factor in ER+ PR+ and ER- PR- breast cancer cell lines.
- To study the role of SALL2 downstream target gene p21 in breast carcinogenesis.

Brief Methodology: Breast cancer cell lines (ER+ PR+ and triple negative), PCR, western blotting and promoter binding techniques (ChIP and EMSA) shall be performed.

Work done:

Sall2 transcription factor expression profiles were determined in ER+ PR+ (MCF-7 & T47D) and ER- PR- (MDA-MB-453 & MDA-MB-231) breast cancer cell lines. The data demonstrated that Sall2 expression was higher in ER+ PR+ (MCF-7 & T47D) as compared to ER- PR- (MDA-MB-453, MDA-MB-231) (Fig.).
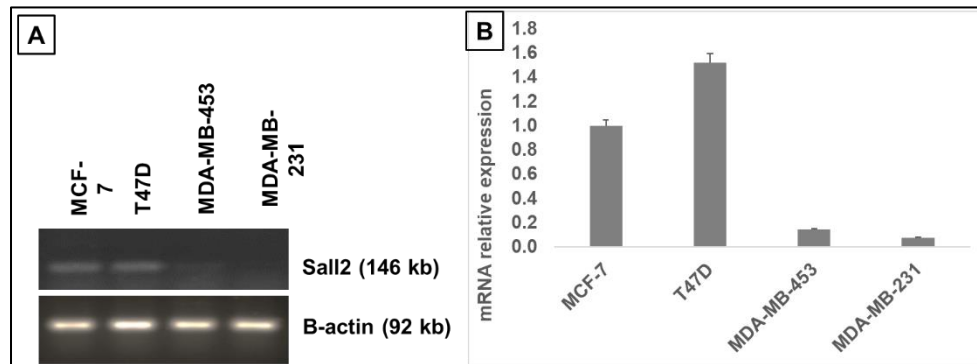
Fig: mRNA expression pattern of Sall2 transcription factor in breast cancer cell lines ER+ PR+ (MCF-7 & T47D), ER- PR- (MDA-MB-453, MDA-MB-231). (A) Sall2 expression checked by semi-quantative PCR, B-actin was used as housekeeping gene. (B) Relative fold change in mRNA expression of Sall2 expression by real time PCR experiments of the same cell lines
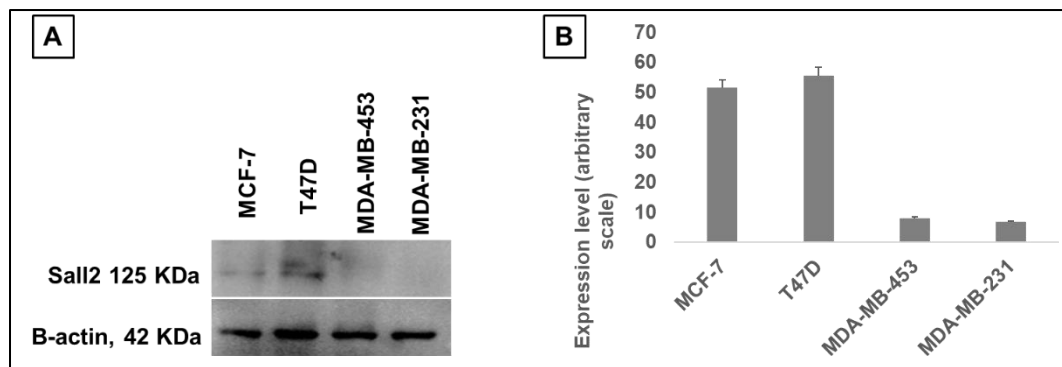
Fig: Western blots showing expression pattern of Sall2 proteins in ER+ PR+ (MCF-7 & T47D), ER- PR- (MDA-MB-453, MDA-MB-231) breast cancer cell lines. (A) Protein extracts (whole cell lysates) from Breast cancer cell lines were separated in 8-10% SDS-PAGE and detected by specific antibodies of Sall2 protein as indicated. β-actin was used to confirm the equal loading. (B) Quantitative analysis of Sall2 using ImageJ software

Translational Potential: This study may provide several insights and the role of transcription factor Sall family in breast cancer. It may be utilized as a diagnostic marker for breast cancer

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Validating the Role of MCT-4 in Transcriptional Regulation of Breast Carcinogenesis

Principal Investigator: Dr. Showket Hussain, Molecular Biology Group
Research Scholar: Ms. Neha Singh, SRF

Funding Agency: ICMR – SRF
Duration of Project: 2021 – 2024

Background: Breast cancer is the leading cause of death in the world. In cancer cells, pyruvate is mainly converted to lactate-by-lactate dehydrogenase A (LDH-A). The lactate is recognized as angiogenic promoter and increases intracellular and extracellular acidity. The accumulated lactate in cancer cells is transported to the extracellular matrix through MCT-4, whereas it is transported intra-cellularly through MCT-1 transporters in normal cells to act as an energy source. Lactate enhances the expression of MCTs and up regulates the genes for angiogenesis, metastasis, invasiveness, metabolic reprogramming (glucose and lipid) and resistance to chemotherapy. Hence, we aimed to target the inhibition of MCT-4 by specific gene silencing therapy, potentially predicted SiRNA(h) interaction.

Objectives:

- To design and synthesis physiologically and thermodynamically stable MCT-4 siRNA(h).
- To study the transcriptional and translational effects of MCT-4 siRNA(h) on in ER+ MCF-7cells.
- To study the transcriptional and translational effects of MCT-4 siRNA(h) on cellular in ER-MDAMB-231 cells.
- To validate the effects of MCT-4 siRNA(h) on the markers of metastasis.

Brief Methodology: A set of in-silico tools will be employed to design a set of specific siRNA(h)'s towards MCT-4 transporter [MCT-4 SiRNA(h)]. The off targets for the MCT-4siRNA(h)'s will be eliminated using "Phenovault" tool designed by SiTools. The designed MCT-4 SiRNA (h) will be synthesized and used to transfect the ER+MCF-7 and ER-MDAMB-231 cells. The MCT- 4 SiRNA (h) with best transfection efficacy will be used in further studies. The transcriptional and translational effects of MCT-4 SiRNA(h) will be studied on hypoxia mediated cellular proliferation and metastasis.

Work done:

The primers specific for siRNA(h)'s towards MCT-4 transporter were designed and synthesised.

To study the role of Kinesin-3 family associated with paclitaxel drug resistance in breast carcinogenesis

Principal Investigator: Dr. Showket Hussain, Molecular Biology Group
Research Scholar: Ms. Shagufta, SRF

Funding Agency: ICMR – SRF
Duration of Project: 2022 – 2025

Background: Several genetic factors control breast carcinogenesis by either promoting or preventing breast cancer progression. Among them, the KIFs genes play an important role to predict diagnosis and prognosis markers in many tumors. Recent studies suggested that KIF's may have major roles in the resistance to anti-cancer drugs. However, there is dearth of reports elucidating the role of kinesin 3 in chemotherapeutic drug resistance. The proposed study is designed to investigate the role of kinesin-3 members against chemotherapeutic drug resistance in breast cancer.

Objectives:

- To check the expression of kinesin 3 family members in ER+ PR+ and ER- PR- breast cancer cell lines.
- Understanding the role of kinesin 3 family members with paclitaxel drug resistance in ER+ PR+ and ER- PR- breast cancer cell lines.

Brief Methodology: To achieve the proposed breast cancer cell lines using molecular tools such as PCR, western blotting and proliferation assay/ methylthiazolyl blue tetrazolium (MTT) assay techniques.

Work done: The project has been sanctioned in May 2022 and work is in progress.

HEAD & NECK CANCER

Bioinformatics based analysis of head and neck cancer RNA-seq data for developing a database on alternative splicing events

Principal Investigator: Dr. Vishwas Sharma, RA
Mentor: Dr. Sanjay Gupta, Division of Cytopathology

Background: Alternative splicing (AS) is a regulatory process during gene expression that allows a single gene to code multiple proteins. The major subtypes include cassette exon skipping (ES), intron retention (IR), mutually exclusive exon (MXE), and alternative 5′ and 3′ splice site (ASS). Sequencing of RNA (RNA-Seq) is a high throughput technology, which has been used by various studies to identify AS events in head and neck cancer (HNC). Role of AS in HNC is still not completely known. A systematic review is required to understand the role of AS in HNC. Besides, the analysis of RNA-seq data in this aspect will also help us to identify the important regions in the genome of HNC patients that could influence the biology of HNC.

Objectives:

- To identify alternatively splicing events via analysis of head and neck cancer RNA-seq dataset freely available in next generation sequencing data repositories.
- To develop a database based on the alternatively splicing events identified through literature search and analysis of RNA-seq dataset of head and neck cancer.
- To rank the identified genes and select the top candidates for functional validation as a drugs target.
- To design TaqMan probe for the top ranked candidate genes.

Brief Methodology:

A systematic literature search was performed following PRISMA guidelines to determine the AS events in HNC identified through RNA-seq. Briefly, records were screened on PubMed and Web of Science databases. A total of 323 records were obtained from PubMed, 887 records from Web of Science. The validation of AS events as seen in multiple records was performed. Additionally, the list of RNA-seq data of HNC patients from next-generation sequencing data repository GEO, SRA, ENA is being carried out. Forty-eight (48) RNA-seq oral cancer samples were analyzed. The quality of reads was assessed using FastQC program. The software Trimmomatic was used for trimming the sequences and removing the adapter content. For trimming the data, HEADCROP:12 TRAILING:1 SLIDINGWINDOW:4:20 MINLEN:50 was used. The alignment, assembly, and differentially spliced gene identification was done through Tuxido pipeline. Briefly, the mapping was done through Tophat software and assembly through Cufflinks software. The program Cuffdiff was used for identifying DF genes.

Work done:

The genes MLL3 and RPS9 were found to be repeatedly associated with HNC. While analyzing the freely available RNA-seq data of the OC, it was observed that the AS events vary considerably in gingival and tongue locations of OC. Briefly, eighty-three genes were identified to be significantly alternatively spliced when comparison was made between RNA sequences from normal tissues and tumor tissues from the gingiva region. Similarly, 39 genes were found to be significantly alternatively spliced when comparison was made between normal tissues and tumor tissues from tongue region of OC. Of these, only 4 genes i.e. AHR, AL356488.2, KREMEN1, SH3TC1 were similar in gingiva and tongue, whereas others were unique to their location (Figure 1). Further, the list of AS genes from the literature and from our analysis was combined to develop a database 'DS-HNC' (https://bmi.icmr.org.in/df-hnc).
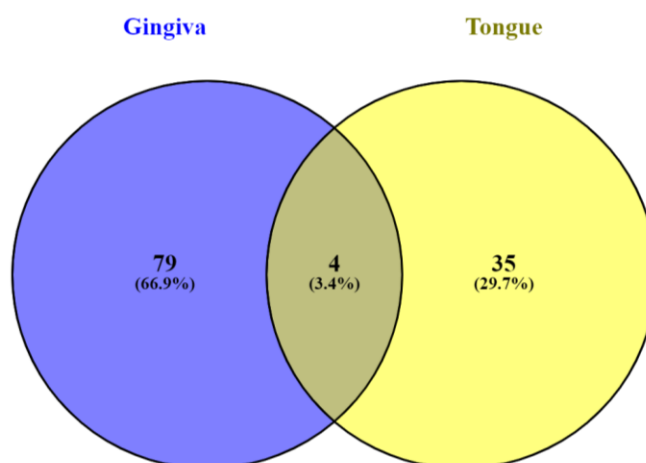
Fig: Number of differentially spliced genes in samples obtained from gingiva and tongue region of oral cancer

Conclusions: Alternatively splicing events vary considerably at gingival and tongue locations of OC. These events need to be thoroughly investigated for defining appropriate treatment strategy. The 'DS-HNC' is a standalone platform to obtain and collate information of alternatively spliced genes in HNC. This database would be a useful tool for the researchers to better understand the etiopathogenesis and genetic signatures that may serve as prognostic predictors for HNC.

Translational Potential: Genes *MLL3* and *RPS9* could be used as a biomarker, if validated by larger studies. Alternatively spliced events vary considerably in gingival and tongue locations of oral cancer and need to be thoroughly investigated for defining the appropriate treatment strategy. The 'DS-HNC' database may serve as a standalone platform to obtain and collate information of alternatively spliced genes in HNC.

Investigation of Salivary Exosomal miRNAs Differential Expression in Oral Cancer

Principal Investigator: Dr. Gaurav Verma, PDF
Mentor: Dr. Sanjay Gupta, Division of Cytopathology

Funding Agency: ICMR, PDF
Duration of Project: 2019-2021

Background: Oral cancer is the second most prevalent cancer in India among both sexes, accounting for an estimated 1,19,992 new cases and 72,616 deaths in 2018. India alone accounts for 34% of incidence and 40% of mortality of oral cancer world-wide. Interestingly, it is one of the most manageable cancers if diagnosed at an early stage. Recent scientific data suggest that "salivary exosomal miRNAs" are promising bio-molecular candidates in diagnostic and prognostic approaches for several diseases.

Objectives:

- To assess the differential expression of salivary exosomal miRNAs in normal, OPMDs and cancer by small RNA Next Generation Sequencing.

- To validate the significant differentially expressed salivary exosomal miRNAs in oral pre-cancer and cancer by qRT-PCR.

- To elucidate the correlation of differentially expressed salivary exosomal miRNAs with clinical/histopathological parameters through statistical analysis.

Brief Methodology:

Un-stimulated saliva/oral rinse samples was collected following informed consent from normal (clinically declared), OPMDs and oral cancer subjects and stored at -70°C until further processing. Samples were subjected for exosome isolation using Exosome Isolation Kit as per manufacturer's instructions. Subsequently, miRNA was isolated using miRNA Isolation Kit according to manufacturer's protocol. Qualitative/Quantitative screening of samples was performed by qRT-PCR (miR-24 as internal control). Selected normal, OPMDs and cancer samples would be processed for Small-RNA NGS to analyze differential expression of salivary exosomal miRNAs. Further, validation of differential expression by qRT-PCR would be performed in all the samples. Statistical correlation of differentially expressed salivary exosomal miRNAs would be done with clinical/ histopathological parameters.

Work done:

Small RNA Next Generation Sequencing QC data of salivary exosomal miRNAs demonstrated that integrity of the isolated salivary exosomal miRNAs remained intact during downstream processing of the samples, thus indicating the potential utility of salivary exosomal miRNAs as a diagnostic marker.

Salivary exosomal miRNAs small-RNA sequencing data revealed a significant difference in the fold change of exosomal miRNAs expression profile with respect to the categories of samples i.e. normal, OPMD and oral cancer. Total 217 differentially expressed miRNAs were found significantly dysregulated between the normal, OPMD and oral cancer cases. Out of these 9 miRNAs were found out to be common to all three categories. Differential expression analysis revealed that ~21% of the miRNAs were significantly down-regulated, while 8% were up-regulated in the oral cancer cases as compared to that in OPMD sample. Further narrowing resulted in selection of hsa-mir-215-5p and hsa-mir-375-3p as candidate miRNAs.

The validation analysis showed a concomitant rise in relative expression of hsa-mir-215-5p and hsa-mir-375-3p miRNAs in different categories of normal, OPMD and oral cancer; thus, clearly demonstrating the up-regulation in their expression with the severity of the disease.

Statistical analysis with the clinic-epidemiological and demographical parameters revealed an interesting and significant association of the increase in expression of miRNAs with the tobacco chewing habit.

Other Cancers

Genomics of Gall Bladder Carcinoma in Indian Population

Principal Investigator: Dr. Showket Hussain, Scientist D, Division of Molecular Biology

Team Members: Prof G K Rath, AIIMS, New Delhi, Dr. Pranay Tanwar, AIIMS, New Delhi, Dr. Sundeep Singh Saluja, GB Pant Hospital, New Delhi, Dr. Musharraf, Jamia Hamdard University, New Delhi, Dr. Sabina Khan, Jamia Hamdard University, New Delhi

Funding agency & budget: ICMR, Rs 55,34,000

Project Duration: May 2018 – May 2023

Brief background & rationale: Gallbladder carcinoma (GBC), a type of hepato- biliary tract cancer (BTC), is highly prevalent in Indian population. There are very few reports on genetic mechanism in etiopathogenesis which are restricted to inadequate sample size and lacked further validation based on their gene expression profile.

The proposed study aims to elucidate the genetic alteration in GBC etiopathogenesis using NGS platform followed by validation, in Indian population. The result of this study will help to obtain a greater insight into thegenetic mechanism(s) during GBC pathogenesis which would further elucidate specific genetic signatures involved in the etiopathogenesis of GBC in Indian population.

Objectives:
- Exome/Transcriptome sequencing of GBC cases
- Identification of candidate genes.
- Correlating the findings with disease progression

Brief Methodology:
- Collection of gall bladder tumor tissue, normal tissue, inflammatory tissue & blood sample with consent and questionnaire.
- DNA/RNA extraction through Qiagen extraction kit.
- Quality check & library preparation for downstream application.
- Whole Exome and transcriptome sequencing for collected samples.
- Data analysis, validation and establishment

Work done:

Whole exome sequencing was performed in 57 paired samples. The data demonstrated the highest occurrence of missense mutations followed by nonsense mutations and frame shift deletions (Fig). The RNA sequencing data found a total of 29837 genes to be differentially expressed. After

filtering the genes on the basis of log2 fold change and p value, a total of 238 genes were found to be upregulated and 166 genes to be downregulated in tumor samples (Fig).
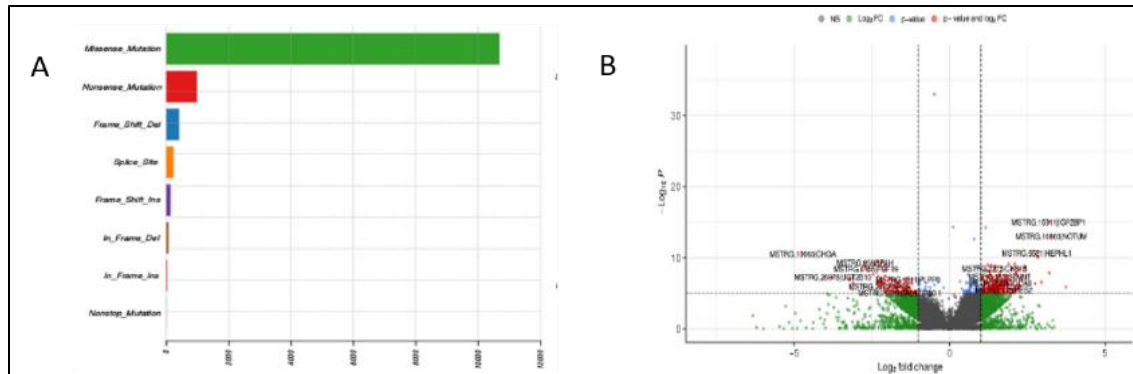
Fig: Representative image showing A) Variant classification of mutations, B) Up regulated & down-regulated genes in gallbladder cancer patients

Translational Potential: The project has potential to develop the India specific cancer gene panel for diagnosis and prognosis of GBC. The outcome of this proposed study will be to find the novel mutational patterns and dysregulated gene expression profile among GBC patients.

Brain derived neurotrophic factor (BDNF) and its receptor, TrkB in gall bladder carcinoma: potential biomarkers and prognostic markers

Principal Investigator: Dr. Ruchika Gupta, Scientist D, Division of Cytopathology

Other Collaborating Institutes: GB Pant Institute of Postgraduate Medical Education & Research, Delhi; Hindu Rao Hospital, Delhi

Funding agency & budget: ICMR, Rs 30,08,631/-

Project Duration: Mar 2021 – Mar 2024

Brief background & rationale: Gall bladder cancer (GBC) is the most common biliary tract malignancy and fifth commonest cancer of the digestive tract with a high morbidity and mortality. Serum tumor markers like CA19-9 and CEA are commonly utilized to support a clinical diagnosis of GBC. However, these markers are usually elevated only in advanced stages and their specificity in early stages of the cancer is very low. Brain derived neurotropic factor (BDNF), a member of neurotrophin growth factor family, has been demonstrated to be overexpressed in tissues of GBC. Benign lesions such as adenomas and polyps exhibiting BDNF positivity have demonstrated moderate to severe dysplasia of the epithelium, suggesting that BDNF might play a role in the early phases of gall bladder tumorigenesis. BDNF exerts its effects through its receptor, tropomyosin-related kinase B (TrkB) and this binding leads to downstream activation of the PI3K/Akt pathway. TrkB expression has been reported in more than 90% of GBC specimens with correlation of expression at the invasive front of the tumor with clinical staging and lower overall survival. TrkB is also being explored as a target for newer anticancer drugs.

Objectives:
- To evaluate the tissue expression of BDNF, TrkB, PI3K, Akt and EGFR in chronic cholecystitis, gall bladder showing epithelial dysplasia and GBC.
- To quantitate the pre-operative serum levels of BDNF and TrkB in these three study groups.
- To correlate the tissue expression and serum levels with diagnostic markers (CEA, CA19-9) and prognostic factors (tumor grade, stage, hepatic invasion, lymph node metastasis) and patient survival.

Brief Methodology:
A total of 150 cases comprising of 60 cases of gall bladder carcinoma, 60 tissues from chronic cholecystitis samples and 30 from cases with epithelial dysplasia of gall bladder shall be included in this study. Written informed consent shall be taken from all participants.
- Detailed clinical history, including demographic data and presenting complaints shall be noted. Investigations, including serum tumor markers (CEA, CA 19-9) and radiological evaluation (ultrasound/ CT scan/ MRI) shall be recorded.

- Pre-operative blood sample of patients undergoing choelcystectomy shall be collected, serum separated and appropriately stored.
- The surgical procedure with significant intra-operative finding shall be noted from the case records. The final histopathological diagnosis shall be noted for categorization of the participant into one of the three groups: chronic cholecystitis, epithelial dysplasia or GBC.
- H&E-stained sections of cases diagnosed as GBC shall be reviewed for tumor grade, extent of invasion into the gall bladder wall, local infiltration into liver parenchyma (if included) and lymph node metastasis.
- Immunohistochemistry on paraffin-embedded sections for BDNF, TrkB, PI3K, Akt and EGFR shall be performed as per the protocol. The immunostained sections shall be evaluated for cytoplasmic (PI3K, Akt, TrkB), cytoplasmic and/or membranous (BDNF) and membranous (EGFR) positivity. For PI3K and Akt, cases with ≥50% cells staining for the antibody shall be considered as positive while at least 25% positive staining will be taken for BDNF and TrkB. And 10% for EGFR.
- Serum BDNF and TrkB shall be estimated using the sandwich ELISA technique following the kit protocol.
- Follow-up data: Further clinical work-up of the cases diagnosed as epithelial dysplasia or adenocarcinoma shall again be recorded along with the status at the last available follow-up or completion of the study, whichever is earlier.

Work done: Till date, 40 cases have been recruited in the study. Formalin-fixed paraffin-embedded tissues have been collected for all these cases. Fresh tissue sample for RNA (RNA later) and protein (PBS) related work has been collected in 28 cases and stored at -80°C. The age of the patients ranged between 18-70 years with male:female ratio of 1:4. Histopathologically, 37 cases showed features of chronic cholecystitis with or without cholesterolosis while three cases were diagnosed as gall bladder carcinoma.

Total RNA was isolated from the 20-samples by Trizol method/RNeasy®Plus Mini Kit. The first strand cDNA synthesis was performed using high capacity cDNA reverse transcription kit (Invitrogen, USA) according to the manufacturer's protocol. Quantitative RT-PCR was performed with 2× SYBR Green PCR master mix (Bio-RAD, USA) according to the manufacturer's protocol using gene specific primers (PI3K, AKT, and BDNF) and 18s (as an internal control) expression primers.

We considered chronic cholecystitis as a reference control and 18S gene was used as an internal control. The three cases of gall bladder carcinoma showed a 19-fold, 17-fold, and 17-fold, amplification for BDNF gene (Fig).
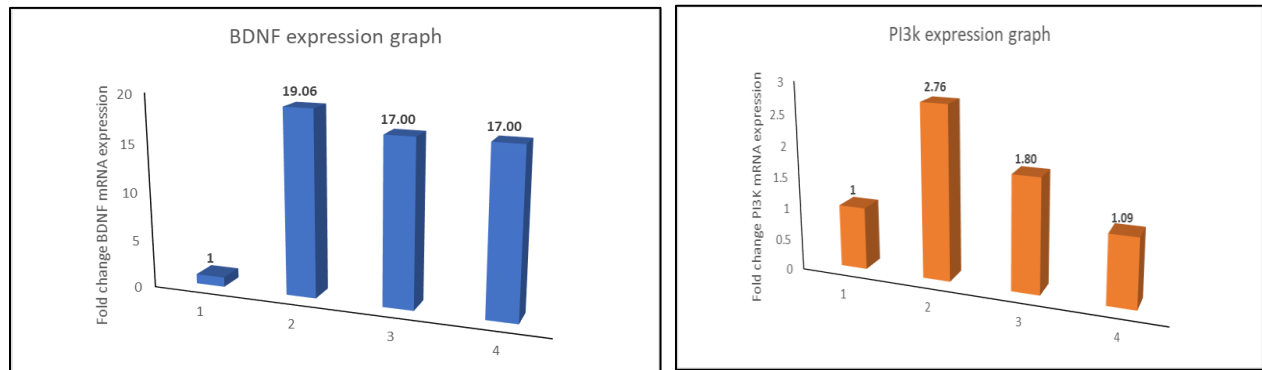
Fig: Bar graph depicting the fold-change in BDNF gene and PI3K gene expression in chronic cholecystitis (1) and three cases of gall bladder carcinoma (2, 3, 4)

Immunohistochemistry for two proteins, Akt-1 and PI3K was performed in 20 cases. Cases of chronic cholecystitis showed less than 50% epithelial cells staining for these proteins and hence, were classified as negative. The three cases of gall bladder carcinoma showed positive staining for Akt-1 and PI3K in the tumor cells.

Investigating potential modulation of p21 (Cip1/ Waf1) mediated autophagy via ROS-induced endoplasmic reticulum stress

Principal Investigator: Dr. Mayank Maheshwari, PDF
Mentor: Dr. R Suresh Kumar, Molecular Biology Group

Funding Agency: ICMR, PDF
Duration of Project: 2021-2023

Background: Autophagy is cellular self-degradation system that occurs constitutively at steady-state level in all the cells and is activated in response to multiple stress conditions. Autophagy generally induced through oxidative stress and endoplasmic reticulum stress factors. The proposed study has been designed to explore the mechanistic aspects involved in p21 mediated modulation of autophagy. This study will enhance the understanding on mechanism of action of p21 in regulating autophagy and the association between this biological function with cancer progression which could provide a clue how to explore p21 for potential therapeutic applications.

Objectives:

- Investigation of relationship between p21 depletion and autophagy induction.
- Investigating influence of p21 modulated oxidative stress in cell proliferation and autophagy.
- Investigation of ER stress in p21 mediated autophagy.

Methodology:

HCT116 p21+/+ and its derivative isogenic p21-/- cells would be cultured in McCoy's 5A medium. During preliminary investigation, we studied the growth behaviour of experimental cells by multiple methods i.e., brightfield microscopy, cell proliferation assay, dye exclusion assay, colony formation assay, wound healing assay. Cells were exposed with inhibitors for p21 and UPR inhibition and cultured in EBSS for starvation. For ROS evaluation cells were stained with DCFDA and analysed by fluorescence microscopy. Role of ER stress in p21 mediated autophagy was explored by immunoblotting by checking expression of UPR signaling molecules.

Work done:

Microscopic observation indicated higher growth rate of p21-WT cells than p21-KO cells and exposure of p21-WT cells with inhibitor resulted in cell growth inhibition. MTT assay revealed that proliferation of p21-KO cells was slower than parental cells and inhibitor-treated p21-WT cells also showed a reduction in cellular proliferation compared to untreated control. Further, p21-KO cells showed reduced colony formation potential as compared to p21-WT cells. Despite a reduced growth potential, wound healing assay indicated a strong coordinated migratory potential of p21-KO cell as they heal faster than p21-WT cells. Further p21 inhibition resulted in an increase in DCFDA fluorescence establishing intracellular ROS generation.
Western blotting demonstrated that p21 deletion induces ER stress and activates UPR pathway to

promote autophagy as it is evident from the upregulated LC3 (autophagic marker), BiP/GRP78 (ER chaperone), IRE1 α, ATF 6, PERK (UPR sensors), CHOP (GADD153), p-eIF2α (transcription factors) in p21-KO cells. Further reduced expression of calreticulin (CRT, an abundant ER protein) in p21-KO cells confirmed about the reticulophagy (autophagy of ER). We also noticed that UPR induction upon p21-inhibition contributes to the pro-death nature of autophagy. Further nutrient deprivation induced additional autophagy and reduced cell growth in both p21 variant which supports our previous finding of retardation in proliferation because of p21 inhibition induced autophagy.

LSD1 ablation regulates dsRNA and IFN responses, targeting LSD1 in combination with anti-PD-(L) 1 immunotherapy in gastric cancer cell lines & B16 cells

Principal Investigator: Dr. Soni Kumari, Young Scientist
Mentor: Dr. Suresh T. Hedau, Molecular Biology Group

Funding Agency: DHR
Duration of Project: 2020-2023

Background: Chromatin regulators play a broad role in regulating gene expression and when gone awry, can lead to variety of disease including cancer. The roles of chromatin regulators in cancer have been investigated both at the levels of cancer cell proliferation and impact on human immune system. However, the relative effects of chromatin regulation on cancer cell- intrinsic functions versus T cell functions, as well as on the overall responses to tumor to immune system, are unexplored. In this study we target the histone H3K4 demethylase LSD1 (KDM1A) which play a critical role in suppressing endogenous double stranded RNA (dsRNA) levels and IFN responses in tumor cells and demonstrate that dsRNA stress resulted from LSD1 inhibition leads to potent anti-tumor T cell immunity. LSD1 in regulating dsRNA and IFN responses, targeting LSD1 in combination with anti-PD-(L)1 may prove to be a broadly applicable new strategy in cancer immunotherapy.

Objectives:

- To investigate the role of TLR3, MDA5, RIG 1, AGO2, DICER, TRBP2, IFN, IL-28, ISG115, OASL and endogenous retroviruses in sh-control and sh-LSD1 gastric cancer cell line.
- To confirm the methylation status and stability of AGO2 in cell treated with cyclohexamide (CHX) in the presence or absence of GSK-LSD1(LSD1 inhibitor) in gastric cancer cell line.
- To investigate the Anti-tumor T cell immunity and survival rate in scramble, LSD1 KO, TCRα KO, IFN-β KO and LSD1/ TCRα DKO, LSD1/MDA5 DKO, and LSD1/ IFN-β in B16 cells.

Brief Methodology: Cell culture will be maintained as per standard protocols, gene knockdown by shRNA, RNA extract and RT-qPCR, strand specific PCR, DsRNA analysis by J2 immunoblot, protein extraction and immunoblot analysis, Protein immunoprecipitation, ELISA, Cell colony formation assay, Chip-sequencing.

Work done: In the present study we found significantly up-regulation of OASL (5.76 fold) (p=<0.000); HERV1 (3.309 fold) (p=<0.0001); IFNB1(2.025 fold) (p=<0.0001); IL-28 (5.906 fold) (p=<0.0001); TLR3 (50026 fold) (p=<0.0001) and significantly down regulation of AGO2 (0.0750 fold) (p=>0.0001); DICER1 (0.0070 fold) (p=<0.0001); TRBP2 (0.0475 fold) (p=<0.0001); ISG15 (0.550 fold) (p=<0.0001); MAD5 (0.0931 fold) (p=<0.0001); RIG1(0.1032 fold) (P=<0.0001); as compared to scramble control when AGS cell treated with siLSD1. qRT-PCR data suggest that the down regulation of AGO2, DICER1, TRBP2, ISG15, MAD5 and up

regulation of OASL regulated by LSD1. Therefore, current study indicates that LSD1 positively regulate AGO2, DICER1, TRBP2, ISG15, and MAD5 and negatively regulate OASL, HERV1, IFNB1, IL-28, and TLR3. The frequent over expression of these genes in cancer cells may prove to be a broadly applicable new strategy in cancer immunotherapy.

Hence, the current study suggests that inhibition of histone H3K4 demethylase LSD1 (KDM1A) activates expression of HERV1. Activated HERV1 enhance the expression of IFNB1, TLR3, OASL, and IL-28. Activated immune cells play a critical role in T cell immunity that leads to tumor interferon pathway activation and increase response to cancer immunotherapy. Further study will suggest how those genes involve in cancer immunotherapy

Study on expression profile of miRNA in Prostate Cancer

Principal Investigator: Dr. Mausumi Bharadwaj, Molecular Biology Group
Research Scholar: Mohd Mabood Khan (SRF)

Funding Agency: ICMR
**Duration of Project**: 2018 – 2023

Background: Prostate cancer is one of the most prevalent malignancies worldwide among males. Adoption of the western lifestyle appears to promote prostate cancer development in India. Cancer of prostate is a multifactorial, multistep genetic transformation. Prostate Specific Antigen (PSA) is a serum biomarker widely used in prostate cancer screening. However, an increase in PSA levels can be related to non malignant disorder too. Depending upon their relative expression and its biological importance, miRNAs are presumed to be valuable diagnostic, predictive and prognostic biomarkers. miRNA may be used as a reliable diagnostic tool for prostate cancer. Prostate cancer miRNA expression profiling will give some clues about cancer pathogenesis and their correlation with the risk factors in the development of prostate cancer.

Objectives:

- Identification of miRNAs and their expression in prostate cancer.
- Validation of selected miRNA.
- Analysis of translated product of target genes.
- Correlation of the above findings.

Work done:

During this particular time some bioinformatic tools were used for identification and classification of DEGs to know about the functional annotation of gene through STRING, GEPIA and Cytoscape. Furthermore, to find out key genes associated with pathogenesis, degree of network interaction as well as the module of the most related gene; are used to discover hub genes that may work as key targets for treatment.
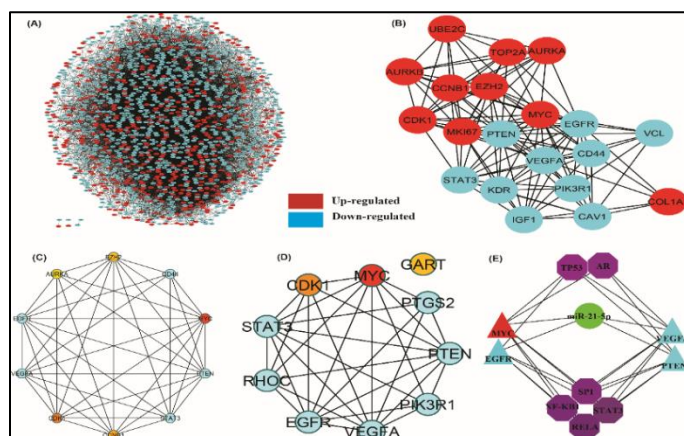
Fig: Most significant genes PPI network map. (upregulated genes-red; downregulated genes-blue) (B) Top 10 most connected genes associated with prostate cancer (upregulated genes-red; downregulated genes-blue) (C) Top 10 hub significant genes extracted by PPI Cyto-hubba network (D) Top 10 bottleneck significant genes excavated from PPI Cyto-hubba network (E) Deep network extraction showing the key genes, TF and miRNA interaction with each other

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Genome Wide Methylation Profiling of North Indian Gall Bladder Cancer Patients

Principal Investigator: Dr. Sonam Tulsyan, RA
Mentor: Dr. Showket Hussain, Molecular Biology Group

Funding Agency: ICMR, RA
Duration of Project: 2021 – 2024

Background: Gallbladder carcinoma (GBC) is a highly aggressive cancer prevalent in North Indian population. There are very few reports on epigenetic mechanisms in GBC etiopathogenesis which are restricted to inadequate sample size and lacked further validation on the basis of their methylation/ expression status.

Objectives:

- To elucidate the methylation profile of GBC in north Indian population by whole genome bisulphite sequencing followed by validation using quantitative methylation specific PCR.
- To correlate the methylation profile with clinicopathological characteristics of GBC patients.

Brief Methodology:

DNA isolation, reduced representation bisulphite sequencing, quantitative methylation specific PCR.

Work done:

A total of 26 surgically resected tissue specimens comprising of 13 tumour tissues and 13 adjacent non-tumor tissues were collected in 1% PBS from collaborating hospital. The DNA was extracted from all the collected tissue samples. The quality and quantity of DNA were also checked. The five matched tumor and adjacent non-tumor tissue samples are under processing for whole-genome bisulfite sequencing.

EPIDEMIOLOGY

Setting up of Population Based Cancer registry at ICMR-National Institute of Cancer Prevention & Research covering GautamBudh (GB) Nagar

Principal Investigator: Dr Smita Asthana, Scientist E, Division of Epidemiology & Biostatistics

Team Members: Dr. Shalini Singh

Funding agency & budget: ICMR-NCDIR, yearly budget of Rs 34.79 lakhs

Project Duration: 2017 - 2023

Brief background & rationale: Cancer registries are essential part of any national program of cancer control ranging from etiological research through primary and secondary prevention to health care planning and patient care, to benefit individual and society at large. As there is no registry in Uttar Pradesh and ICPO is located at Gautam Budh Nagar district of U.P and the mandate of ICPO includes primary and secondary prevention of cancer through etiological research, it is proposed to set up a population-based cancer registry for covering GB Nagar district of Uttar Pradesh in UP.

Objectives:

●   To set up a population-based cancer registry at National Institute of Cancer Prevention & Research (ICMR-NICPR) covering the rural and urban population of Gautam Budh Nagar (G.B. Nagar) district of Uttar Pradesh.

Brief Methodology: Information from various sources where the cancer cases are reported were obtained from Government hospitals, community health centres, private hospitals and private laboratories of the selected district. Demographic details of the cancer patient recorded and arranged in alphabetic order and thoroughly checked for duplicity. Duplicate data excluded and submitted online to NCRP on regular basis. Report preparation is being done at NCRP Bengaluru by using morbidity & mortality coding proforma. The staff attended a training workshop on Population Based Cancer Registry held on 26th March 2018 at National Centre for Disease Informatics and Research (NCDIR), Bengaluru.

Work done:

Total cancer incidence cases registered from different hospitals in Population Based Cancer Registry, G.B. Nagar during reporting period (July 2021– May 2022) till date is 3115 for the year 2019 and 2020. For the year 2020, data collection and data entry are going on.

Total registered incidence cases registered during reporting period:

Sr No	Name of the Hospital	Incidence (%)
1.	All India Institute of Medical Sciences, Ansari Nagar, New Delhi	221 (7.09)
2.	Apollo Hospital, Noida	103 (3.31)
3.	Batra Hospial, New Delhi	28 (0.91)
4.	Bhardwaj Nursing and Maternity Home Pvt. Ltd.	2 (0.07)
5.	BLK Super Specialty Hospital, Karol Bagh	43 (1.38)
6.	Chief Medical Office (CMO), Noida	43 (1.38)
7.	Delhi State Cancer Institute, Delhi	82 (2.63)
8.	Dharamshila Cancer Hospital & Research Center	569 (18.27)
9.	Fortis Hospital, Noida	126 (4.05)
10.	Indraprastha Apollo Hospital, New Delhi	216 (6.93)
11.	Jaypee Hospital, Noida	133 (4.27)
12.	Kailash Hospital, Noida	156 (5.01)
13.	Lok Nayak Hospital, MAMC, Medical College, New Delhi	14 (0.45)
14.	Max Superspecialty Hospital, Vaishali	134 (4.30)
15.	Metro Heart Institute and Metro Multi Specialty Hospital	46 (1.48)
16.	Mohan Swaroop Hospital	17 (0.55)
17.	Neo Hospital, Noida	76 (2.44)
18.	Rajiv Gandhi Cancer Hospital, New Delhi	310 (9.95)
19.	Safdarjung Hospital and Medical College, New Delhi	114 (3.66)
20.	Shanti Mukund Hospital, Delhi	218 (7.00)
21.	Sharda Hospital, Greater Noida	144 (4.62)
22.	Sumitra Hospital, Noida	7 (0.22)
23.	Surabhi Hospital Pvt. Ltd.	16 (0.51)
24.	Yashoda Hospital, Ghaziabad	62 (2.00)
25.	Yatharth Hospital, Noida	131 (4.21)
26.	Others	104 (3.34)
	Total	**3115**

Mortality data: Total cancer mortality cases registered during reporting period: **269**

Distribution of cancer data for different sites under the reporting period:

Location of Cancer	ICD10	Incidence
Lip, Oral Cavity and Pharynx	C0-C14	424
Digestive Organ	C15-C26	531
Respiratory System and Intra-thoracic Organs	C30-C39	379
Hematopoietic and Reticuloendothelial System	C42	257
Breast	C50	537
Female Genital Organs	C51-C58	300
Male Genital Organs	C60-C63	200
Urinary Tract	C64-C68	146
Lymph Node	C77	104

National survey for state-wise prevalence of microbiologically confirmed pulmonary tuberculosis in India

Site Investigator: Dr Smita Asthana, Scientist E, Division of Epidemiology & Biostatistics

**Funding agency & budget:** Ministry of Health and Family Welfare, ICMR-WHO Collaborative project

Project Duration: 2018 – Aug 2021

Brief background & rationale: It is important to know the disease burden of tuberculosis at national level for monitor the progress towards TB control with the aim to 'End TB' as per sustainable development goals (SDGs). There is a diversity and variation of burden of disease across the country, so it is equally important to know state level prevalence of Tuberculosis. ICMR-NICPR is one of the Nodal institutes for Delhi and UP clusters.

Objectives:

- To estimate the point prevalence of microbiologically confirmed pulmonary TB among persons ≥15 years of age in India at national level
- To estimate the point prevalence of microbiologically confirmed pulmonary TB among persons ≥15 years of age for 20 individual states / state groups.

Brief Methodology:
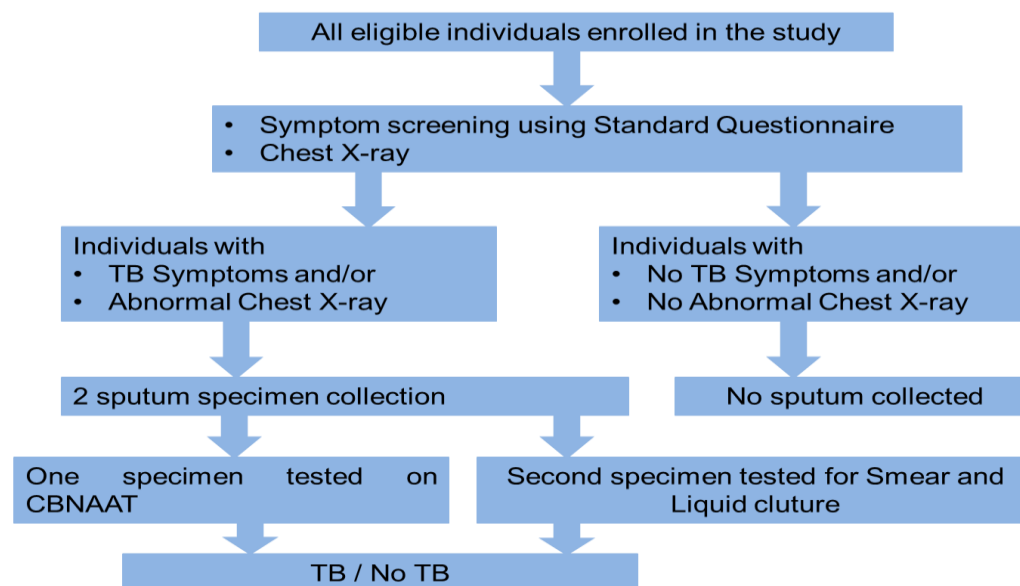
No. of clusters covered/ Total No. of clusters envisaged: Total clusters proposed at Delhi were 9, and all the clusters from Delhi was completed. At UP, total clusters were 34.

Work done so far:

During the reporting period, a total of 2 clusters of Haryana state were completed.

S. No.	Cluster Name	Total Enumeration	Total Eligible	Total Interviewed	Total X-ray	Total TB Diagnosed
1.	Gurgaon, Haryana	909	800	708	694	02
2.	Lagarpur, Haryana	936	800	711	700	02

Summary of survey work done during reporting period.

Total Enumeration: 1845

Total Eligible Participants: 1600

Total Interviewed: 1419

Total X-ray Done: 1394

Total TB Patient Diagnosed: 04

Translational Potential: The last Nationwide Survey was conducted during 1955-1958 and several surveys in geographically defined areas conducted earlier confirmed that the disease was highly prevalent throughout the country. TB disease prevalence surveys carried out in last few decades in geographically defined areas only. The prevalence of TB continued to be high, though varied, in different parts of the country. Through this survey the burden of tuberculosis in Uttar Pradesh will be estimated.

Assessing the prevalence of Risk Factors for Non-Communicable Diseases Including Common Cancers among Nurses in Delhi NCR Using Digital Community Based Assessment Checklist: A Pilot Study

Intramural Research Study by Division of Clinical Oncology

Background: Majority of deaths due to non-communicable diseases (NCDs) occur in low and middle-income countries. In India, NCDs account for 63% of all deaths. Of these 27% is due to cardiovascular disease, 11% is due to chronic respiratory disease, 9% is due to cancer. Nurses are a significant workforce in healthcare. As part of their daily work, nurses experience much occupational stress, burn out, and alteration in the circadian rhythm, which predisposes them to NCDs. Hence, we planned a study to assess the risk factors for non- communicable diseases; including the three common cancers among the nurses working in government hospitals in Delhi NCR using a web based survey in this study.

Objectives:

- To assess the prevalence of NCD risk factors including three common cancers (cervical, breast and oral cancers) among nurses aged 30 years and above in Delhi NCR using a digital community-based assessment checklist.
- To educate nurses on the risk factors of three common cancers, hypertension, diabetes, obesity using pre-recorded short educational videos.

Brief Methodology: This is a descriptive cross-sectional web-based survey. Consenting nurses of age 30 years and above, working in Delhi NCR, and registered members of TNAI Delhi branch were included. A web-based, self-administered questionnaire was used for data collection. A mobile-friendly digital consent form and a validated questionnaire was sent via what's app/email to all the nurses of eligible age group. If the participants consented to participate in the study, then the questionnaire was displayed.

Work Done: Total recruitment:682
Male: 196
Female: 484
As per our preliminary analysis, we observed the NCD score is higher (≥4) among our female participants than in our male participants.

120

CAPACITY BUILDING PROJECTS

Establishment of a Model Rural Health Research Unit (MRHRU) at CHC Khotpura, Panipat, Haryana

Team: Dr. Shalini Singh, Dr. Sanjay Gupta, Dr. Ruchika Gupta

Funding agency: DHR

Brief background & rationale: MRHRU Scheme was approved by the Govt of India in 2013 as an initiative to develop/strengthen the health research infrastructure in the country and make the relevant health research facilities available across the country.

Objectives:

- Create infrastructure at the periphery for transfer of technology to the rural level for improving the quality of health services to rural population.
- To ensure an interface between the new technology developers (Researchers in the Medical Institutions; State or Centre), health systems operators (Centre or state health services) and the beneficiaries (communities in rural areas)
- Ensure the much-needed geographical spread of health research infrastructure in the Country.

Work done

DHR designated ICMR-NICPR as the Mentoring Institute for the MRHRU at CHC Khotpura, Panipat, Haryana.

- Land transfer for the construction of MRHRU at Khotpura, Panipat, Haryana has been approved by the Hon'ble Chief Minister of Haryana. Further process is being followed.

- Two research projects are ongoing under the aegis of MRHRU:

    o *Antimicrobial resistance surveillance in view of one health concept*

    o *Sero-prevalence of Aspergillus in patients with Chronic Obstructive Pulmonary Disease and their clinical co-relation*

.

Basic Molecular Biology Techniques Relevant to Cancer Research- Tissue Culture related Techniques

Principal Investigator: Dr. Mausumi Bharadwaj, Scientist G, Molecular Biology Group

Team: Dr R Suresh Kumar, Dr Suresh T Hedau

Funding agency & budget: DHR, Rs. 80 lakhs

Project Duration: 2019 – 2024

Brief background & rationale: Globally, cancer is one of the major public health issues. Therefore, research in preventive oncology is very important. The main aim of this project is therefore to develop human resource development towards it through bridging the gap between clinical practice and laboratory expertise. Hence, hands-on training on different basic molecular biology techniques relevant to cancer research to the faculties/students of Medical Colleges/ Research Institute / Universities relevant to cancer research will help to train manpower towards cancer research.

Objectives:

- Workshop in Research Methodologies (4 days)
- Short term training (4-8 weeks) in Molecular Biology Techniques-
- Long term training (6-10 Months)

Brief Methodology: The trainees and participants were included in different programs. Sixteen (16) trainees were enrolled for short time training. Six (6) participants were enrolled for long time training. In case of *hands-on* workshop of research methodologies (4 days) with 19 participants was conducted during 30th Nov-3rd Dec 2021. To assess the effectiveness (improvement in knowledge) of the workshop, a multiple-choice question (MCQ)-based practice was carried out. A total of 20 MCQ questions were designed related to basic knowledge of cancer and also the basic molecular techniques which was taught during the workshop.

Work done (Jul 2021 – May 2022): During workshop, the participants were exposed to several molecular biology techniques like western blot, immunohistochemistry, methylation specific-PCR, qPCR, tissue culture methods, Hybrid-Capture assay, and learned several molecular biology applications such as *in-silico* methods (molecular modelling and structural analysis), and NGS data handling. A significant improvement in the knowledge of participants was observed in the question related to techniques learned during the workshop.

Capacity building of healthcare providers in screening & early detection of common cancers using a hybrid model as a part of the population-based cancer screening program in India

Principal Investigator: **Dr. Kavitha Dhanasekaran, Scientist D, Division of Clinical Oncology**

Team: Dr. Shalini Singh, Dr. Roopa Hariprasad

Funding agency & Budget: ECHO India – Rs 28 lakhs

Project Duration: Aug 2019 – Aug 2024

Brief background & rationale: Cancer Screening was introduced to the Indian Public Health services in August 2016. Since then, NICPR has been training interested individuals in cancer screening online through the NICPR-ECHO Program. Curricula have been designed for medical officers, gynaecologists and dentists. In May 2019 this program was approved by the MoHFW for training MOs in the public sector. All those who successfully complete the online program are eligible for our hands-on workshop at NICPR, Noida campus.

Objectives:

- To evaluate the knowledge, skills and practice of the trainees by:
- Pre and post training knowledge, attitude and practice (KAP) before and after the course.
- Skills evaluation during workshops on the cancer screening procedure
- To evaluate the implementation of cancer screening services in primary care settings among Medical Officers receiving ECHO training.

Brief Methodology: All health care providers (Medical Officers, Gynecologists, Dentists, Nurses) nominated by the State Nodal officers or self-registered through the online registration link in the course advertisements on the NICPR and ICMR websites of the NICPR-ECHO's cancer screening training program (online and hands-on training were trained online in three preventable cancers of cervix, breast and oral cavity. Sessions were held once a week for 1 hour with didactics from experts and case presentations from the participants. Pre and post training evaluation survey was conducted to track their interest and application of this training, along with pre and post session, weekly quizzes to track knowledge gain.

Work done during Jul 2021 – May 2022: Five courses (two each for Medical Officers and Nurses and one for healthcare providers in Africa) were conducted during the period under report.

Translational Potential: This would assist in enhancing the capacity of trained health professionals to undertake cancer screening.

TOBACCO-RELATED RESEARCH

WHO FCTC Global Knowledge Hub on Smokeless Tobacco

Principal Investigator: Dr. Shalini Singh, Director, ICMR-NICPR

Nodal Officer: Dr Prashant Kumar Singh, Scientist D

Funding agency & budget: ICMR, Rs. 3 crores 33 lakhs

Project Duration: Jan 2019 – Dec 2021

Brief background & rationale: At sixth session of the Conference of the Parties (COP) of WHO-FCTC treaty (in Moscow 2014), smokeless tobacco use was recognized as a global health problem. Parties felt the need to establish a global knowledge hub to identify and support the work of controlling smokeless tobacco use, with its center based at India. The Government of India along with WHO FCTC Secretariat designated the National ICMR-Institute of Cancer Prevention & Research, Noida to serve as the 'WHO-FCTC Global Knowledge Hub (KH) on Smokeless Tobacco' with a formal launch of the hub on 6 April 2016.

Objectives:

1. To generate and share expertise, information, knowledge and provide training, regionally and globally on SLT
2. To promote and facilitate communication among the Parties to the Convention and other stakeholders on SLT
3. To support the Convention Secretariat in hosting meetings, prepare technical materials and participate in technical and subsidiary body meetings on SLT.

Activities:

- Organized a *"National Consultation on Global Youth Tobacco Survey (GYTA)-4: Emerging Challenges and Way Forward"* in September 2021. The main aim of this consultation was to discuss the results of newly released factsheet of GYTS by the Ministry of Health and Family Welfare, Govt. of India and its short and long term implications for tobacco control strategies in the country.
- The hub team participated as a resource faculty at "*The National Conference on Tobacco or Health (NCTOH) 25th-27th September 2021"* organised by PGIMER, Chandigarh for different sessions/symposiums at the conference and covered various themes including; Utilizing epidemiology for tobacco control advocacy and Pictorial Health Warnings: Is COTPA amendment an opportunity to take the last leap?
- Organized three day webinar on *"Role of dental health professionals in smokeless tobacco cessation"* during November 30 – December 2, 2021. Altogether more than 100 participants

from across the globe attended all sessions.

- During October-November 2021, the Government of India proposed amendments to the Food law i.e. "Food Safety and Standards (Labelling and Display) Amendment Regulations, 2021 relating to the warning on the label of Pan Masala Products and nomenclature of various bread." The KH-SLT supported the proposed amendments regarding warning on Pan Masala packages and submitted a detailed suggestion to the proposed amendment relating to the warning on the label of Pan Masala Products.

- In the light of sporadic evidence that is available on the association of consuming multiple substances with the risk of hypertension among adults in India where there is a substantial rise in cases. This study assesses the mutually exclusive and mixed consumption patterns of alcohol, tobacco smoking and smokeless tobacco use and their association with hypertension among the adult population in India. Nationally representative samples of men and women drawn from the National Family and Health Survey (2015–2016) were analyzed. A clinical blood pressure measurement above 140 mmHg (systolic blood pressure) and 90 mmHg (diastolic blood pressure) was considered in the study as hypertension. Finding indicates that daily consumption of alcohol among male smokeless tobacco users had the highest likelihood to be hypertensive (OR: 2.32, 95% CI: 1.99–2.71) compared to the no-substance-users. Women who smoked, and those who used any smokeless tobacco with a daily intake of alcohol had 71% (OR: 1.71, 95% CI: 1.14–2.56) and 51% (OR: 1.51, 95% CI: 1.25–1.82) higher probability of being hypertensive compared to the no-substance-users, respectively. In order to curb the burden of hypertension among the population, there is a need for an integrated and more focused intervention addressing the consumption behavior of alcohol and tobacco.

- To establish the adverse health impacts of exposure to secondhand smoke (SHS) on the risk of acute respiratory infections (ARI) among children aged 0–59 months; a secondary analysis using nationally representative data from 2015-16 was conducted. Four mutually exclusive groups based on the type of cooking fuel usage and SHS exposure was created. At the national level, 10.5% prevalence of ARI was reported during 2015–2016. About 47.9% (95%CI 47.7–48.2) of households was exposed to SHS and used solid biomass fuel for cooking. Nearly, 20.7% of households with clean fuel usage were exposed to SHS. Regression analysis suggests that the likelihood of ARI among children who were living in households with solid biomass fuel usage and exposed to SHS was 11% (95%CI 1.06–1.17) greater than children living in households with clean fuel usage with no SHS exposure. Moreover, our results further revealed that the odds of ARI among children living in households with clean fuel but exposed to SHS were 19% (95%CI 1.13–1.25) higher than the children living in the household with no SHS exposure and clean fuel use. Children living in households exposed to SHS are at higher risk of ARI.

Addressing Smokeless Tobacco and Building Research Capacity in South Asia (ASTRA)

Principal Investigator: Dr. Shalini Singh, Director, ICMR-NICPR

Co-PI: Dr Prashant Kumar Singh, Scientist D

Other Collaborating Institutes: University of York, Maulana Azad Medical College Delhi, ARK Foundation Bangladesh, Aga Khan Medical University Karachi.

Funding agency & budget: National Institute of Health (UK), Rs 1 Crore 80 Lakhs

Project Duration: Apr 2019 – Mar 2022 (extended till Jun 2022)

Brief background & rationale: To date, a range of interventions have been tested to achieve tobacco cessation in different groups of ST users; these approaches include the use of behavioral interventions, pharmacologic treatment, or a combination of the two. Prospective cohort and quasi experimental studies in ST users of South Asian origin based in the UK have demonstrated nicotine replacement therapy (NRT) to be effective in achieving short-term ST cessation, however no evidence is available from South Asia itself. Similarly, culturally tailored behavioral interventions may be practical to deliver in low resource settings, but there is little evidence demonstrating its benefit in these populations. This study aims to address this research gap by testing both NRT and behavioral support (BISCA) as part of a feasibility trial.

Objectives: The main objectives of this trial are to assess feasibility of:

1. Delivering the interventions (NRT and BISCA),
2. Recruitment, randomisation and retention,
3. Methods to measure and collect the following:
    a. Baseline participant information (demographics, ST use and related behavior)
    b. ST cessation at 6, 12 and 26 weeks (using self-reported and validated abstinence)
    c. Mediators of ST cessation
    d. Adverse events and withdrawal symptoms
    e. Economic data (health resource use, quality of life)
4. Process evaluation data (context, mechanisms of impact and implementation)

Brief Methodology: The study is a 2 x 2 factorial design trial which will test the feasibility of delivering two interventions [Nicotine replacement therapy (Treatment A), and a behavioral support intervention for ST cessation-BISCA (Treatment B)] alone and in combination. The trial will be individually randomized, with and embedded process evaluation and preliminary economic

assessment. Eligible and consenting individuals will be randomised to one of the following four trial arms:

Arm 1: No Intervention [VBA + self-help material on quit planning]

Arm 2: Intervention A only [8-week NRT in addition to standard VBA + self-help material (arm 1)]

Arm 3: Intervention B only [Behavioural support intervention for ST cessation-BISCA (incorporating VBA and self-help)]

Arm 4: Treatments A & B described above

Work done: The study has been completed and data analysis is in progress. The preliminary finding suggests that 50% SLT users have declared that they have quit tobacco after completing the 26th week follow-up.

- Based on initial findings of the study, we developed a short video showing participants who quit smokeless tobacco, their experiences during the study period and what motivated them to quit SLT. The video has been uploaded to the official YouTube link of ICMR-NICPR for wider dissemination with the motivation that this video would encourage other SLT users to quit. The title of the video is "Quitters are Winners: Smokeless Tobacco Cessation @ICMR-NICPR" https://www.youtube.com/watch?v=uqKk_Qr-6_o

- The **reasons of relapse** among the study participants who were unable to quit tobacco included prevailing myths such as improved concentration and ease in bowel movement, strong dependency to fulfil occupational demands i.e., to remain active in night shifts/long working hours, relapse due to advice given by the traditional healer/quacks to chew tobacco for tooth problems, and stress due to the uncertainties in employment during Covid 19.

- Few participants showed **disinterest in NRT use** due to excessive salivation with the usage of NRT, dislike for the sweet taste of the various flavours of NRT being offered, and inability to receive NRT due to migration to their native places during lockdown leading to relapse.

Translational Potential: The study would provide evidence to SLT cessation in Indian setting with combination of behavioral interventions, pharmacologic treatment, or a combination of the two. Results of the trail will provide critical inputs towards tobacco control efforts in the country.

ICMR Task Force Study on Smokeless Tobacco and reproductive & Maternal Health (ICMR SLT-RMH Study)

Principal Investigator: Dr. Prashant K Singh, Scientist D, Division of Preventive Oncology & Population Health

Team: Dr. Shalini Singh, Dr. Sanghamitra Pati, ICMR-RMRC, Bhubaneswar, Dr. Anna S Kerketta, ICMR-RMRC, Bhubaneswar

Funding agency & budget: ICMR, Rs 1 Crore 39 Lakhs

Project Duration: 2019 – 2022

Brief background & rationale: Smokeless Tobacco (SLT) and areca nut use remains to be neglected among females, especially pregnant women, despite causing much preventable morbidity in mothers and the neo-nates. Hence, this study aims to understand SLT use among women of reproductive age as a means to develop training and behaviour change intervention models for cessation.

Objectives:

- To examine the socioeconomic factors associated with SLT and areca nut use among women of reproductive age and adverse pregnancy outcomes using Demographic and Health Surveys in selected south Asian countries.
- To understand the socioeconomic and cultural norms along with inter-generational linkages of SLT and areca nut use among women of reproductive age group in two study sites (Noida, Uttar Pradesh and Bhubaneswar, Odisha).
- To develop Behavioural Change Intervention (BCI) strategies for SLT and areca nut cessation among women belonging to reproductive age group

Brief Methodology:

o   For the first objective, data from latest rounds of Demographic and Health Surveys (DHS) on the consumption of SLT among the women from the reproductive age group (15 - 49 years) from Afghanistan, Bangladesh, India, Nepal and Pakistan were included.

o   For the second objective, an attempt to understand the socio-cultural context and determinants of SLT and areca nut use among target population would be undertaken. It would examine the role of social network, family history, occupation on current use along with knowledge and awareness regarding its adverse effects and quitting intentions.

o   For the third objective, utilising the insights obtained from the above two studies, SLT cessation behavioural change intervention (BCI) tool shall be developed using Information,

Education and Communication (IEC) strategy which shall be tested for cultural acceptability at a local cessation centre.

Work done:

Findings from Primary Data Collection

Factors influencing initiation, continuation and cessation of Smokeless tobacco among pregnant and lactating women: A qualitative study in urban slums of India

Using snowball and purposive sampling techniques, in depth interviews were conducted with 22 lactating and 20 pregnant women who currently use smokeless tobacco. Data was analysed using thematic analyses with the help of QSR NVivo software.

- Friends and relatives had major influence during premarital stage, while in-laws, especially elderly female relatives along with women in the community had more influence in post-marriage period.

- Perceived health benefits, urge to consume mud during pregnancy, social influences turned out to be the major factors of initiation. Women were found more aware of its harmful effects during pregnancy in comparison to lactation.

- There is a need to develop Behavioural Change Intervention tools which are culturally and locally appropriate and follow gender sensitive approach. Different socio-cultural factors which are found to be associated with initiation at different life stages should also be catered while developing these tools.

Table: Factors associated with Initiation and Cessation of SLT

| Themes	Initiation	Cessation
Predisposing Factors		
Psychological and behavioural	Curiosity, craving of mud,	Self-motivation, harm to the child
Biological	Pregnancy, oral health issues, fragrance	Complications in delivery, face aesthetics, oral health consequences
Social and cultural	Social acceptance, rituals and ceremonies, usage by elderly	Gender based differential treatment for usage, social stigma

Awareness Factors		
Knowledge	Existence of SLT products, perceived benefits of usage	Aware about adverse health consequences (via advertisement, health workers, community members)
Cues to action	Someone close offering the product	Counselling during ANC visits/ health check-ups, advice from community members/ family members
Risk perception	In recessive phase, risk perceptions ignored despite awareness of harmful effects, remote possibility of harm	Harmful for the child
Motivational Factors		
Attitude	Positive due to normalised SLT usage	Negative towards SLT usage
Social influences	Usage by family/friends/community members	Family unacceptance of SLT usage
Economic influences*	Affordability	Financial crisis especially during lockdown
Ability Factors		
Implementation plans	Easily procurable, variety of products available thus preferences based on prices	Lack of cessation programs
Barriers	Lack of cessation centres and extrinsic motivational factors to quit	Rationalizing behaviour of usage, defence and coping mechanism

Secondary data analysis

Smokeless Tobacco Use among Pregnant Women in India: The Tale of Two Nationally Representative Surveys
o The aim of this article was to understand the extent of deviation in SLT use estimates among Indian pregnant women based on two nationally representative surveys, namely GATS (2016-17) and the DHS-NFHS (2015-16).

o Both the surveys utilise multi-stage sampling techniques and have collected self-reported information related to SLT use among pregnant women aged 15-49 years. The findings from this article showcased quiet evident differences in SLT use patterns among pregnant women between these two large-scale nationally representative surveys. Overall, the prevalence of SLT use among pregnant women was reported to be higher in GATS than NFHS and this pattern remains similar between age groups of 15 to 34.
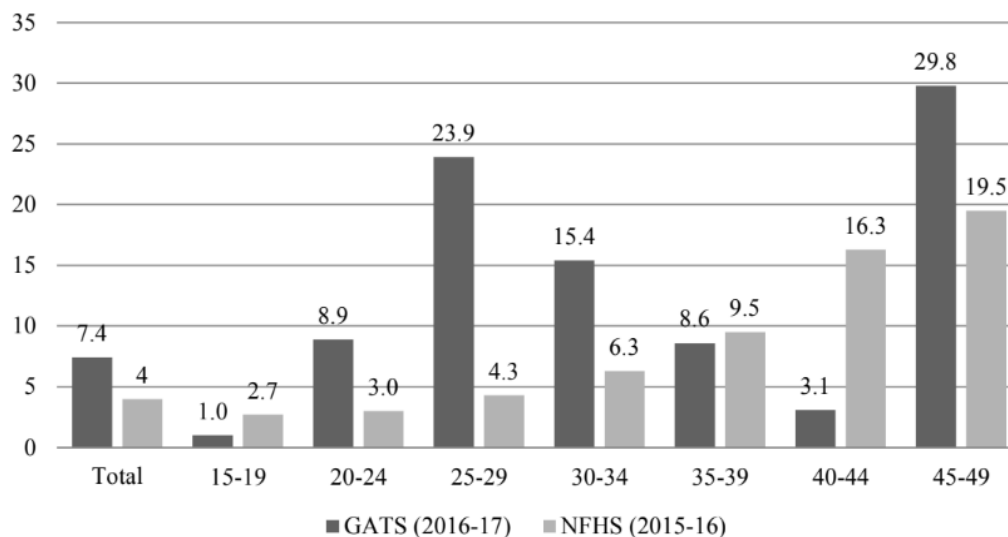
Fig: Percentage of pregnant women reported any form of smokeless tobacco use, India

This study suggests that there is need for more reliable estimates of SLT usage among the pregnant and lactating population. Subsequently, the reported difference could have significant implications for both reproductive, maternal and child health policies and tobacco control efforts in India and other Southeast Asian countries with high prevalence of SLT use. Hence, this issue needs to be acknowledged and addressed in a targeted manner.

Translational Potential: The study will provide scientific understanding about the usage of SLT and areca nut among the reproductive age women including its associated cultural and socio-economic determinants. The study would also contribute towards development of a behaviour change intervention tool that is culturally sensitive and locally contextualised with the help of relevant stakeholders.

Feasibility of integrating tobacco use screening and tobacco cessation services with routine antenatal care services: a pilot study in district hospital of Gautam Budh Nagar

Principal Investigator: Dr. Shalini Singh, Director, NICPR

Team: Dr Ekta Gupta, Dr. Prashant K Singh

Funding agency & budget: ICMR, Rs 40 lakhs

Project Duration: Mar 2021 – Feb 2024

Brief background & rationale: Studies have shown that women start using tobacco during pregnancy to overcome their morning sickness. In India, as per the latest Global Adult Tobacco Survey (GATS) 2016-17, prevalence of tobacco use among pregnant women was as high as 7.5%. However, nearly 14% pregnant women use tobacco (both smoked and smokeless forms) in Uttar Pradesh. Tobacco use during pregnancy (both smoking and smokeless tobacco) is considered to be harmful. It has been associated with anaemia1 and is an important risk factor for intrauterine growth restriction, placenta previa, abruptio placentae, decreased maternal thyroid function preterm premature rupture of membranes low birth weight, perinatal mortality and ectopic pregnancy. There are no special services for supporting women to quit tobacco use during pregnancy or lactation. It is also reported that women often are not aware of the fact that some of the products which they use contain nicotine. This study is designed is the first study to test the feasibility of integrating tobacco use screening and tobacco cessation services with routine antenatal care services in the public health system of India.

Objectives:

- To assess the feasibility of integrating tobacco cessation services with antenatal care services
- To measure the prevalence of tobacco use (smoking and smokeless form) among pregnant women
- To study the pattern of use of tobacco products during pregnancy and lactation
- To develop a comprehensive behavioral intervention module for tobacco cessation in women
- To assess the tobacco quit rate during pregnancy using behavioral intervention
- To study adverse pregnancy outcomes among tobacco users (including in mothers and newborns)

Brief Methodology:

The study would be carried out in the District Hospital Noida, in the antenatal clinic as a mixed methods study. The quantitative part of the study will be a case-control study. Women registered in the antenatal clinic shall be screened for tobacco use and their anthropometric and biochemical parameters and followed up till delivery for pregnancy outcomes. The tobacco users shall be administered a tobacco cessation intervention plan to support quitting tobacco use and followed up for quit rate documentation using urine cotinine levels and breath analysis. The qualitative part of the study would include Focus Group Discussions (FGDs) among the pregnant women (both users and non-users) to understand the knowledge, awareness, triggers for initiating use, risk perception of harms from tobacco use, support women need to help quitting tobacco use. In-depth interviews (IDIs) of doctors, nurses, and FGDs of ANMs and ASHAs would also be carried out among the health care providers for designing suitable intervention which can be integrated easily into the health care system. This data would provide inputs for the special needs of pregnant women on support needed for quitting and will be used in the behavioural intervention.

Work done:

Total number of patients enrolled till date: Tobacco Users: 72
Tobacco Non-Users: 65

Complications during pregnancy	N	Tobacco intake status	Exposure to second hand smoke
Antepartum hemorrhage Placenta Previa	4 2	Decreased	1
Intrauterine Growth retardation (Microcephaly)	2 (Pregnancy terminated)	Decreased	0
Miscarriage	2	Same	0
Total	8 (13%)		

Focus Group Discussions were held with Community Health Workers (ASHA). Most of the ASHAs had knowledge regarding tobacco products and their harmful effects on women in general and pregnant women. They routinely did not screen pregnant women for tobacco use and also had limited knowledge regarding how to manage a tobacco user and where to refer them for cessation counseling.

In-depth Interviews with Gynecologists revealed that majority of the gynecologists reported not asking tobacco use status of the pregnant women. They had knowledge regarding the adverse effects of tobacco on baby's and mother's health but they did not apply that knowledge in routine antenatal care.

Most of the gynecologists opined that health workers can play a big role in assessing and reporting tobacco use amongst pregnant women and motivating them to quity.

Translational Potential: The study will demonstrate the feasibility of incorporating tobacco cessation services in antenatal clinics in public healthcare settings and this model can be replicated in other hospitals and in the national program. The study would also provide the evidence for risk factors for adverse pregnancy outcomes (if any) recorded during the tenure of the study. The behavioral intervention developed during the study can be translated into other Indian languages for use in the Indian context.

Strengthening, biochemical, research policy, capacity building and cessation support to advance and smokeless tobacco control in India

Principal Investigator: Dr. Mausumi Bharadwaj, Scientist G, Molecular Biology Group

Team: Dr Roopa Hariprasad, Dr Prashant K Singh, Dr Anuj Kumar

Funding agency & budget: ICMR, 4.3 crores

Project Duration: May 2019 – May 2023

Brief background & rationale: Due to use of smokeless tobacco (SLT), a non-combustible form of tobacco, more than 3.5 lakh SLT users die every year globally. But currently in India SLT use is also one of the major health issues. Hence, control of SLT use is now needs specific strategies to deal with. Though there are various challenges but effort has been initiated to curb the SLT menace. Therefore, given the extent and multiple faces of the SLT use epidemic in the country, a comprehensive study has been designed for better understanding of the mechanism

Objectives: For better understanding of the mechanism a holistic approach will be involved including microbiological, chemical and behavioural aspects of SLT products

Brief Methodology: In this study, we have applied next generation sequencing to identify microbial population in various STPs popularly consumed in India and also determine the oral microbiome status of the SLT users. The gDNA was isolated using PowerSoil DNA isolation kit. For bacteria identification, 16S V_3-V_4 region, and for fungi, the ITS1 region of gDNA was selected for library preparation. QIIME workflow was performed using UNITE and SILVA database to identify at the bacteria and fungus at genus level. All the statistical analysis was performed using MicrobiomeAnalyst tool. Further, using similar approach, oral microbiota of smokeless tobacco users was also determined.

Work done: The predominant bacterial genera in STPs were *Acinetobacter*, *Bacteroides*, *Bacillus*, *Prevotella*, *Faecalibacterium*, and *Pseudomonas*. STP-associated bacteriome is predicted to carry genes of nitrogen metabolism, antibiotic resistance genes, proinflammatory and toxins genes. *Moist-snuff*, *Qiwam, Gul* and loose STPs like *Mainpuri Kapoori* contain a high abundance of these genes. The prevalent fungal genera in STPs were *Pichia*, *Sterigmatomyces* and *Mortierella*. Saprotrophic fungi were high in number in STPs that can ferment the constituents of STPs and convert them into carcinogens like TSNAs. Further, the oral microbiome analysis showed that the core oral bacteriome of SLT users having oral lesions were dominated by *Prevotella*, *Streptococcus*, *Veilonella*, *Haemophilus*, *Neisseria*, *and Fusobactrium*. The fungi belonging to *Pichia* genus were in higher relative abundance in the oral swab of the SLT users having oral

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lesions than that of the non-users. SLT users having oral lesions had high bacterial and low fungal α-diversity along with distinct β-diversity compared to non-users. Aqueous extract of STPs like *Mainpuri Kapoori* and *Ghudakhu* caused serious damage to the cell lines via the production of ROS, inducing cell death pathways, and stimulating the migratory potential of cells.

Translational Potential: The identification of harmful microbes and toxins in STP will provide information to concerned scientific and regulatory bodies regarding the processing and storage of STPs. Further, identification of changes in the microbial profile of STP users as compared to healthy (non-users) will lead to the identification of putative microbes (probiotics) or their products (prebiotics) for the prevention or treatment of oral diseases in STP users.

Identification of oral microbial genes as potential molecular diagnostic markers of tobacco exposure

Intramural Research Study, Dr. Anuj Kumar, Molecular Biology Group

Background: Oral cancer is the third most common cancer in India and use of tobacco is main and preventable cause of oral cancer. Tobacco is mainly used in two forms – smoked tobacco and smokeless tobacco (SLT). As the number of smoked tobacco users is declining, the number of SLT users are reported to be rising in India, as per GATS, 2017. Though a range of intervention studies have been published, there is a need for South-east Asia-specific interventions. The interventions need to be assessed by markers, such as cotinine. However, cotinine as a tobacco marker has limitations like marker of short-term exposure, individual differences, need of expensive instruments. Thus, there is need to investigate other markers of tobacco exposure. Approximately 256 chemical compounds have been associated with smokeless tobacco. These compounds enter the mouth of SLT user and are metabolized by the enzymes and oral microbiome during mastication. Nicotine and cotinine are mainly accumulated in the saliva. In this study, we aim to investigate the binding of nicotine and cotinine to these enzymes. Several studies have enlisted the microbiome of the oral cavity, however there is a lack of knowledge on the metabolism of tobacco alkaloids by the oral microbes.

Objectives:

- To investigate and compare the bacterial population in oral cavity of SLT users and non-users.
- To delineate the genes involved in the metabolism of tobacco compounds through comparison between SLT users and non-users.

Brief Methodology: Aliquoted of saliva samples were collected and stored in cryovials stored at -20 C. For determining the cotinine level in aliquoted salivary samples, samples were thawed at room temperature. Samples were thoroughly vortexed and then spun to settle debris. Then diluted 10 times as per the protocol of the commercial. The standard curve was prepared in the pilot experiment. The level of cotinine in each samples was determined by commercially available kit.

Main Findings:

Cotinine level was determined in saliva samples of subjects, who have self-reported tobacco exposure (smokeless tobacco level). The level of cotinine was found higher than average. The level of cotinine showed significant variation among self-reported tobacco exposure status of subjects.

Studies on the Impact of Microbial Treatment on Tobacco Specific Nitrosamines in Indian Smokeless Tobacco Products

Principal Investigator: Dr. Nivedita Mishra, WOS
Mentor: Dr. R. Suresh Kumar, Molecular Biology Group

Funding Agency: DHR – WOS
Duration of Project: 2019-2022

Background: Smokeless tobacco products are highly injurious to health causing various types of cancers and many other non-communicable diseases. As successful quitting percentage is very low among tobacco users, reducing the harmful contents of products can be a better approach.
The microbial populations are responsible to a large extent for generation of carcinogenic Tobacco Specific Nitrosamines in tobacco products. We propose to elucidate the possible role of microbes in reducing the amount of carcinogenic chemicals among ready-to-use Indian smokeless tobacco products.

Objectives:

- To identify and characterize the microflora present in different Indian ready-to-use smokeless tobacco products using conventional microbiological and molecular methods.
- To generate and compare the chemical profiles of different Indian ready-to-use smokeless tobacco products.

Brief Methodology: Initial identification would be done using conventional microbiological procedures such as colony and cell morphology followed by various biochemical tests. Molecular methods for microbial identification would be employed using universal primers for species level identification, the sequences shall be compared with the GenBank database using BLAST. Community dynamics study shall be done using appropriate PCR primers and analysed using available software (eg. PEAR, PANDAseq etc.).

Chemical contents of different smokeless tobacco products such as nitrite, various TSNA compounds and other chemicals would be estimated on LC-MS/MS. Statistical analysis will be performed using ANOVA followed by suitable post-hoc analysis to compare chemical profiles of various tobacco products. The selected microbial strains will be sprayed on tobacco products and after enrichment the chemical contents will be determined.

Work done:

Twenty-four (24) SLT products were tested and 35 Nitrate reducing bacteria were isolated as pure culture from these different SLT products. All bacterial isolates were found to be good nitrate reducers except one and 12 isolates were found to be good nitrite reducers. Detailed metagenomic analysis and community structure study of 5 samples has been completed. Metagenomic analysis and community structure study for remaining samples is under progress.

PHYTOCOMPOUND RESEARCH

Predicting the anti-cancer potential of phytomolecules against different cancers using knowledge of natural products

Principal Investigator: Dr Subhash Agarwal, Scientist E, Division of Bioinformatics
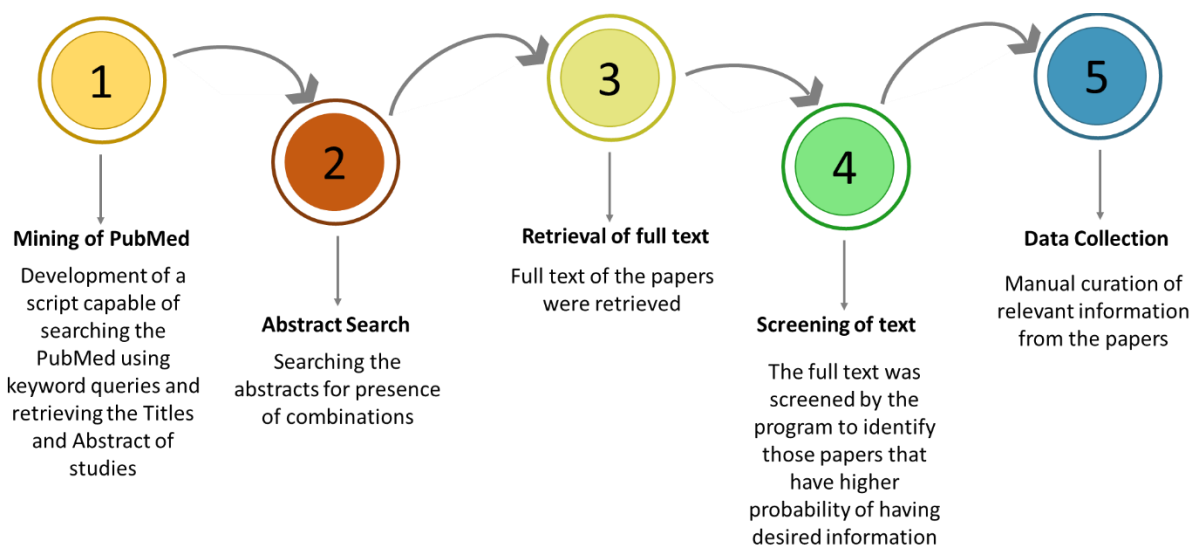
Funding agency & budget: ICMR, Rs. 21 lakhs

Project Duration: Jan 2020 – Jan 2023

Brief background & rationale: Continuous efforts are being made globally by researchers and pharmaceutical companies to discover and develop anti-cancer therapeutic agents from phytomolecules as they represent one of the richest sources of high chemical diversity and provide novel scaffold structures that can serve as starting points for rational drug design. This has necessitated the need for developing computational knowledge resources which enable discovering leads from phytomolecules.

Objectives:

Collection and compilation of phytomolecules with their anticancer activity from literature.

Brief Methodology: To identify the plant-derived naturally occurring compounds with reported anti-cancerous activity, we have searched PubMed and collected the relevant literature. A number of journals pertaining to medicinal plant and natural product research were collected and we have read through the full text of each article to catalogue information like compound name, information pertaining to its in vitro/in vivo biological activity (IC_{50} etc), the cell line used for in vitro cytotoxicity assays, the model system in case of in vivo experiments and the protein target as documented in the references along with its tracking number (PMID).

Work done:

- Two molecular features, (i.e. MACCS keys and Morgan2 fingerprints) and four different machine learning algorithms (i.e. KNN, SVM, RF and XGBoost) were used for building eight models for both the cancers.
- In breast cancer dataset, the model built with MACCS descriptor and SVM classifier (i.e. MACCS_SVM model) performed the best (**Fig. 1**). The MACCS_SVM model on the training set showed 72.8% sensitivity, 79.6% specificity, and 76.2% balanced accuracy with 0.53 MCC. On the test set the models shows 82.4% sensitivity, 79.7% specificity and 81 % accuracy with 0.62 MCC.
- In Lung cancer the models developed with Morgan2 fingerprint and SVM classifier performed better (i.e. Morgan2_SVM model). The model on the training set showed 71.0% sensitivity, 74.7% specificity, and 72.8% balanced accuracy with 0.46 MCC. On the test set the models show 73.2% sensitivity, 79.4% specificity and 76.3 % balanced accuracy with 0.53 MCC.
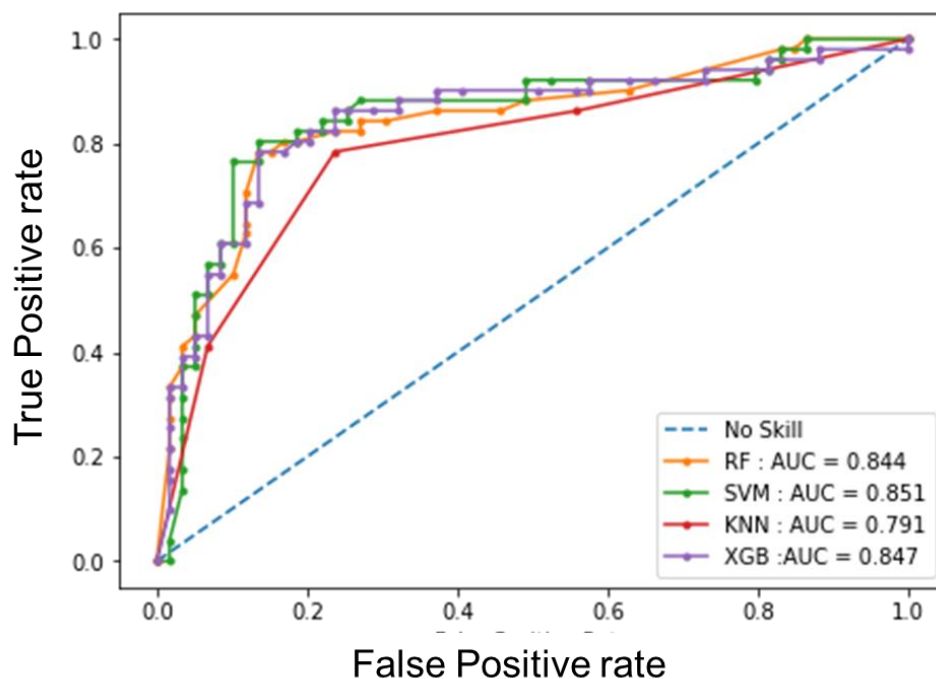
Fig: ROC curve of models generated using MACCS fingerprint. The model generated with SVM shows the best performance

Translational Potential: We have collected a number of naturally occurring plant based molecules with anticancer activity and utilized this information to derive structure-activity relationship for Breast and Lung cancer inhibiting molecules. It is expected that the developed machine learning models for these two cancers, which are number one in males and females of India will allow screening large library of phyto-molecules derived from traditional source in a cost-effective manner so as to identify a few potential leads against Cancer for experimental testing.

Identifying anti-cancerous phytomolecule combinations against cancers for leveraging traditional drug discovery

Principal Investigator: Dr Subhash Agarwal, Scientist E, Division of Bioinformatics

Funding agency & budget: ICMR, Rs. 10 lakhs

Project Duration: Oct 2021 – Oct 2023

Brief background & rationale: While cancer treatment using chemotherapeutic agents has progressed significantly in recent decades but drug resistance remains one of the key problems. This has necessitated the development of combination therapy. In this regard the use of natural products in combination therapy is an interesting avenue of research that has its roots in the traditional medicinal system. Therefore, knowledge of plant based natural product combinations having anti-cancer effect may provide opportunity for alternate therapeutics.

Objectives:

To identify anticancer phytomolecule combinations from published literature using text mining.

Brief Methodology: We have developed a computer program using python for automated screening and retrieval of relevant information using keywords from the abstracts and text.

1 — Mining of PubMed
Development of a script capable of searching the PubMed using keyword queries and retrieving the Titles and Abstract of studies

2 — Abstract Search
Searching the abstracts for presence of combinations

3 — Retrieval of full text
Full text of the papers were retrieved

4 — Screening of text
The full text was screened by the program to identify those papers that have higher probability of having desired information

5 — Data Collection
Manual curation of relevant information from the papers

Work done:

Using the script we have retrieved and screened nearly 20,000 research articles associated with the study of combinations in cancer and are identifying a few articles that provides the necessary information.

Identification of natural product inhibitors against EGFR double mutant

Intramural Research Study by Division of Bioinformatics

Background: Double mutated Epidermal Growth Factor Receptor is a clinically important target for addressing drug resistance in lung cancer treatment. Therefore, discovering new inhibitors against the T790M/L858R (TMLR) resistant mutation is a global requirement. Also, Natural products (NPs) have been used to treat various diseases for centuries. Despite the several advantages, the pharmaceutical companies had abandoned their natural product drug discovery programs in the early 1990s. This resulted in a significant reduction in identifying new NCE's which has forced the industry to refocus its attention on natural products. Thus, discovering new compounds from natural products as leads against anti-cancer targets is essential for drug discovery.

Objectives: To predict a few ADMET adherent natural product molecules that exhibit high affinity against the double mutated drug-resistant EGFR.

Brief Methodology: A novel computational approach has been employed wherein the rules for constrained-based docking was developed using known X-ray crystal structure information so that the screened inhibitors mimic interactions similar to that of co-crystallized ligands. Simultaneously, the NP library was screened using a machine learning based binary classification model which categorizes molecules based on their anti-cancer potential. Also, the binding affinity and stability of ligands to the TMLR mutant protein was validated based on HYDE scoring function as well as molecular dynamics simulations.
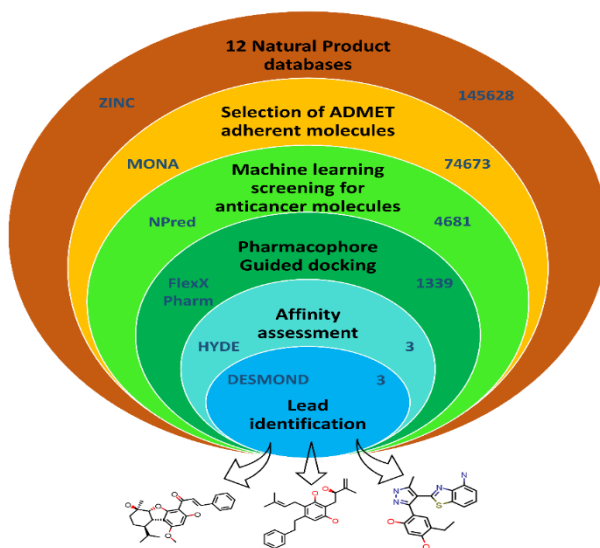
Main Findings:

- Identified three ligands (Zn03, Zn05 and Zn35) that not only show high affinity with the mutated receptor but also are ADMET adherent i.e. follow Lipinski's "Rule of Five" (Ro5) and Ghose Rule of Three (Ro3) as well as are non-toxic.
- The molecular dynamics based interaction analysis of the ligand-receptor complexes revealed that the leads Zn03 and Zn05 form hydrogen bonds with the protein backbone via Gln791 and Met793 same as in the case of co-crystal ligand.
- As hydrogen bonding is crucial for forming stable protein-ligand complexes, the analysis of number of hydrogen bonds throughout the simulation shows that on average the standard ligand (5N3) shows three hydrogen bonds, comparable to the Zn05 ligand. In the case of Zn03 and Zn35, two hydrogen bonds are observed during the simulation.
- Overall, the analysis indicated that the Y-shaped molecule (Zn05) is stabilized by the above interactions and is similar to the co-crystal ligand (5N3) interactions.

Translational Potential: We have integrated machine learning based virtual screening, molecular docking and molecular dynamics simulations to identify inhibitors against EGFR mutant protein from natural products libraries which may overcome resistance in cancer.

COVID-19 RELATED RESEARCH

National population-based sero-surveillance for SARS-CoV-2 infection transmission in India: Fourth round (June-July 2021)

Institutional Coordinator: Dr. Shalini Singh, Director

Team Leader: Dr Smita Asthana, Scientist E, Division of Epidemiology & Biostatistics

Funding agency & budget: ICMR

Project Duration: 28th June 2021 – 4th July 2021 (Round 4)

Objective: To estimate the sero-prevalence for SARS-CoV-2 infection in the general population at the national level and determine the trend over time among general population above 10 years of age and health workers. During fourth round of serosurvey a subset of samples was also collected from 6 to 10 years children.

Work Done:

Results of sample collected during fourth round of sero survey

Sr. No.	District	General Population		Health Care Worker	
		Sample Tested	Positive	Sample Tested	Positive
1.	Gautam Buddha Nagar	399	266 (66.7%)	100	86 (86%)
2.	JyotibaPhule Nagar	400	205 (51.3%)	100	89 (89%)
3.	Saharanpur	399	275 (68.9%)	100	91 (91%)
	Total	**1198**	**746 (62.27%)**	**300**	**266 (88.67%)**

Immune response to precautionary third dose of COVISHIELD/COVAXIN among healthy adult population: an ICMR Cohort study, India (Task Force)

Site Principal Investigator: Dr. Pramod Kumar, Scientist C, Molecular Biology Group

Team: Dr. Shalini Singh, Dr. Anuj Kumar

Funding agency & budget: ICMR, Rs 1.8 lakhs (NICPR budget)

Project Duration: Mar 2022 - Mar 2023

Brief background & rationale: The present study is designed to understand immune response of additional third dose of COVISHIELD/COVAXIN vaccine using homologous regimen. In this context, it is proposed by ICMR to establish a cohort in ICMR institutes receiving additional third dose to characterise the humoral and cellular immune response. As participating institute, ICMR-NICPR will be conducing this study in NICPR, Noida, while other ICMR centers has been assigned to conduct the study in their respective institutes. The study follows similar methodology and tools across all the participating institutes.

Objectives:

- To characterise SARS-CoV-2 specific humoral and cellular immune response after homologous precautionary third dose of COVISHIELD/COVAXIN vaccine at different time points
- To estimate the incidence of SARS -CoV-2 symptomatic infection post third dose of COVID-19 vaccine.

Brief Methodology:
Collection of 5 ml blood, serum separation from all the participants at the baseline (Pre-vaccination), 4 weeks, three months, six months and one year after the third dose. Estimation of antibodies quantity against the vaccine.

Work done: Work is in progress.

ACADEMIC ACTIVITES

JOURNAL CLUB PRESENTATIONS

Date	Presenter	Mentor	Title of paper presented
08.07.2021	Dr. Vishwas Sharma	Dr. Sanjay Gupta	Development and validation of a multigene variant profiling assay to guide targeted and immuno therapy selection in solid tumors
08.07.2021	Dr. Ved Vrat Verma	Dr. Mausumi Bharadwaj	Molecular evolutionary and structural analysis of familial exudative vitreoretinopathy associated FZD4 gene
22.07.2021	Dr. Shikha Saxena	Dr. Prashant K Singh	Altered nutrition behavior during COVID-19 pandemic lockdown in young adults
22.07.2021	Ms. Heena Gautam	Dr. Mausumi Bharadwaj	ALDH1 expression predicts progression of premalignant lesions to cancer in Type I endometrial carcinomas
05.08.2021	Dr. Vineeta Sharma	Dr. Mausumi Bharadwaj	Health behaviours of young adults during the outbreak of the Covid-19 pandemic – a longitudinal study
05.08.2021	Dr. Sonam Tulsyan	Dr. Showket Hussain	Impact of COVID-19 on cancer care in India: a cohort study
26.08.2021	Dr. Upma Sharma	Dr. Mausumi Bharadwaj	The effect of omega-3 fatty acid supplementation on clinical and biochemical parameters of critically ill patients with COVID-19: a randomized clinical trial
26.08.2021	Ms. Jyoti Rani	Dr. Showket Hussain	Population-level impact and herd effects following the introduction of human papillomavirus vaccination programmes: updated systematic review and meta-analysis
09.09.2021	Dr. Preeti Shukla	Dr. Shalini Singh	Chemical characterization of smokeless tobacco products from South Asia: Nicotine, unprotonated nicotine, tobacco-specific N'-Nitrosamines, and flavor compounds
09.09.2021	Ms. Vishakha Kesherwal	Dr. Showket Hussain	Chemotherapeutic Drug Delivery and Quantitative Analysis of Proliferation, Apoptosis, and Migration in a Tissue-Engineered 3D Microvessel Model of the Tumor Microenvironment
23.09.2021	Ms. Anam Mursalin	Dr. Ruchika Gupta	Extracellular vesicle-shuttled miRNAs as a diagnostic and prognostic biomarker and their potential roles in gallbladder cancer patients
07.10.2021	Dr. Pragya Sharma	Dr. Mausumi Bharadwaj	Nicotine exposure induces the proliferation of oral cancer cells through the a7 subunit of the nicotinic acetylcholine receptor
07.10.2021	Ms. Varsha Pandey	Dr. Prashant K Singh	A study on tobacco use in women with major mental illnesses- schizophrenia, bipolar disorder and recurrent depression
11.11.2021	Dr. Shahid	Dr. Shalini Singh	Estimation of available nicotine content of six smokeless tobacco products
11.11.2021	Dr. Nishikant Singh	Dr. Prashant K Singh	Tobacco Use and Subsequent Cessation Among Hospitalized Patients in Mumbai, India: A Longitudinal Study

PhD/ MD/ MS Thesis Enrolled/ Completed

Dr. Smita Asthana, Division of Epidemiology & Biostatistics

- **PhD Thesis**

S.No.	Name of student	Title of Thesis	
1	Pawan Kumar	Effect of Ambient air Pollution on lung function among population of Delhi/NCR	2019-2022

Dr. Subhash Agarwal

- **PhD Thesis**

S.No.	Name of student	Title of Thesis	
1	Mr Agneesh Pratim Das	Identification of Inhibitors Targeting Epidermal Growth Factor Receptor (EGFR) Mutants: A Therapeutically important Target in Cancer	2020-2024

Dr R Suresh Kumar, Molecular Biology Group

- **PhD Thesis**

S.No.	Name of student	Title of Thesis	
1	Sanchita Roy Pradhan	Identification and Evaluation of Lead compounds for endometrial carcinoma through targeting Enhancer of Zeste Homolog2	2022-2025

Dr. Showket Hussain, Molecular Biology

- **PhD Thesis**

S.No.	Name of student	Title of Thesis	
1	Vishakha Kesharwal	Functional role of NF-kB and HPV infection in esophageal carcinoma	2020–2024
2	Ms. Shagufta	To study the role of kinesin 3 family associated with paclitaxel drug resistance in breast cancer	2021-2025

Dr. Kavitha Dhanasekaran, Clinical Oncology

● **PhD Thesis**

S.No.	Name of student	Title of Thesis	
1	Jyoti Sharma	Cervical cancer control in India: Enquiries into Health System Challenges	2020 – 2026

Post-doctoral fellows/ Research Associates/ Trainees/ Dissertations

Dr Mausumi Bharadwaj

S. No.	Name of student	Fellowship	Project
1.	Dr. Upma Sharma	ICMR-RA	Evaluation of Functional role of Identified Novel SNPs of IL-10 gene and their interaction with miRNAs (miR-27a/mir-98) in Oral Carcinoma
2.	Dr. Ved Vrat Verma	ICMR-RA	Identification of molecular landscape in Familial/Sporadic Breast cancer

Dissertation Trainees under Dr. Mausumi Bharadwaj:

S. No.	Name of student	University enrolled	Duration
1.	Chinari Sameer Kumar	SRM University, Chennai	8 months
2.	Ishita Vaishkiar	Amity University	6 months
3.	Anjali Pathak	VIT Vellore	6 months
4.	Raheja	Amity University	6 months
5.	Ananya	Hemvati Nandan Bahuguna Garhwal Central University	6 months
6.	Elaf Ateeque	Jamia Millia Islamia University	6 months
7.	Khyati Shukla	Amity University	2 months

Dr Smita Asthana

Dissertation Trainees:

S. No.	Name of student	University enrolled	Degree pursuing
1.	Dr Neha Vilas Nimkarde	IIHMR	PGDHM
2.	Dr SaimaZubair	IIHMR	PGDHM
3.	Mr. Ahmed Siddique	IIHMR	PGDHM
4.	Dr Shabnam	IIHMR	MPH
5.	Mr. Panwar	IIHMR	PGDHM
6.	Dr RenuDofe	IIPH, Gandhinagar, Gujarat	PGDHM

Dr. Subhash Agarwal

Dissertation Trainees under Dr. Subhash Agarwal:

S. No.	Name of student	University enrolled	Duration
1.	Ms. Jhanak Saxena	Amity University	5 months
2.	Mr. Ateendra Dubey	Amity University	5 months
3.	Ms. Kumari Astha Rupali	Amity University	5 months

Summer Trainees:

S.No.	Name of student	University enrolled	Duration
1	Ms. Kumari Yukta	Jaypee Institute of Information Technology Noida	2 months
2	Ms. Sameeksha Bhatia	University School of Biotechnology, GGSIPU, Delhi	2 months
3	Ms. Shubhra Issar	University School of Biotechnology, GGSIPU, Delhi	2 months
4	Ms. Tanishka Watts	University School of Biotechnology, GGSIPU, Delhi	2 months

Dr R Suresh Kumar

S. No.	Name of student	Fellowship	Project
1.	Dr. Nivedita Mishra	DHR-WOS	Studies on the Impact of Microbial Treatment on Tobacco Specific Nitrosamines in Indian Smokeless Tobacco Products
2.	Dr. Anita Kumari	ICMR-PDF	Development and Evaluation of CRISPR/Cas13 based diagnostic system for HPV detection
3.	Dr. Mayank Maheshwari	ICMR-PDF	Investigating potential modulation of P21 (Cip/Waf1) mediated Autophagy via Ros induced endoplasmic stress

Dissertation Trainees under Dr. R Suresh Kumar:

S. No.	Name of student	University enrolled	Duration
1.	Rupal Sarup	Amity University	4 months

Dr Suresh T Hedau

Dissertation/ Summer Trainees:

S. No.	Name of student	University enrolled	Duration
1.	Shreyasi Chaudhary	Bharti Vidyapeeth, Pune	6 months
2.	Arjun R Nair	Vellore Institute of Technology, Bhopal	1 month

Dr Ekta Gupta

Dissertation/ Summer Trainees:

S. No.	Name of student	University enrolled	Duration
1.	Dr. Udit Chhetri	-	3 months

Dr Showket Hussain

Dissertation/ Summer Trainees:

S. No.	Name of student	University enrolled	Duration
1.	Tenzin	Amity University, Noida	6 months
2.	Khando	Amity University, Noida	6 months
3.	Aradhita	Jamia Milia Islamia, Delhi	6 months
4.	Dutta	Jamia Milia Islamia, Delhi	6 months
5.	Fabeha	IMS, Ghaziabad	6 months
6.	Fatima	Banasthali University, Jaipur	6 months
7.	Nida	Amity University, Noida	1 month
8.	Saima	Amity University, Noida	1 month

Dr Prashant Kumar Singh

Dissertation Trainees:

S. No.	Name of student	University enrolled	Duration
1.	Ms. Kanika Jain	Faculty of Allied Health Sciences, Manav Rachna International Institute of Research and Studies, Faridabad	5 months

Dr Pramod Kumar

. No.	Name of student	Fellowship	Project/ Study title
1	Dr Sristy Shikha	ICMR-PDF	Preparation, encapsulation of recombinant multiepitope protein/peptides of SARS-CoV-2 in nanoparticles and their immunogenic studies

Dissertation/ Summer Trainees under Dr. Pramod Kumar:

S. No.	Name of student	University enrolled	Duration
1.	Sharun Kumar Bhenwal	Chaudhary Charan Singh University	6 months
2.	Prashant Kumar	Chaudhary Charan Singh University	6 months
3.	Sachin Sharma	Amity University Uttar Pradesh	6 months
4.	Shivashish Dobhal	Amity University, Noida	5 months
5.	Ananya Shrivastva	Amity University, Noida	6 months

Dr Anuj Kumar

Dissertation/ Summer Trainees:

S. No.	Name of student	University enrolled	Duration
1.	Piyush Kumar	Jaypee Institute of Information Technology, NOIDA	2 months
2.	Ritu Kumari	Jaypee Institute of Information Technology, NOIDA	2 months
3.	OSK Pavaana	Amity University, NOIDA	6 months
4.	Anuradha Sharma	Amity University, NOIDA	6 months
5.	Sonam Mallik	Delhi Institute of Pharmaceutical Sciences and Research	6 months

PUBLICATIONS

1. Adsul, P, Nethan S. T, deCortina S. H, Dhanasekaran K, Hariprasad R . Implementing Cancer Screening Programs by Training Primary Care Physicians in India—Findings from the National Institute of Cancer Prevention Research Project ECHO for Cancer Prevention. Global Implementation Research and Applications 2022;2: 34–41.

2. Agarwal SM, Nandekar P, Saini R. Computational identification of natural product inhibitors against EGFR double mutant (T790M/L858R) by integrating ADMET, machine learning, molecular docking and a dynamics approach. RSC Advances. 2022;12(26):16779-89. **IF 3.36**

3. Bondhopadhyay B, Sisodiya S, Alzahrani FA, Bakhrebah MA, Chikara A, Kasherwal V, Khan A, Rani J, Dar SA, Akhter N, Tanwar P, Agrawal U, Hussain S. Exosomes: a forthcoming era of breast cancer therapeutics. Cancers. 2021;13(18):4672 **IF 6.67**

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6. Das AP, Saini S, Agarwal SM. A comprehensive meta-analysis of non-coding polymorphisms associated with precancerous lesions and cervical cancer. Genomics. 2022:114(3):110323. **IF 5.74**

7. Deoshatwar A, Salve D, Gopalkrishna V, Kumar A, Barve U, Joshi M, Katendra S, Dhembre V, Maheshwari S & Viswanathan R. Evidence-Based Health Behavior Interventions for Cholera: Lessons from an Outbreak Investigation in India. American Journal of Tropical Medicine and Hygiene 2021:106(1) 229-232 **IF 2.45**

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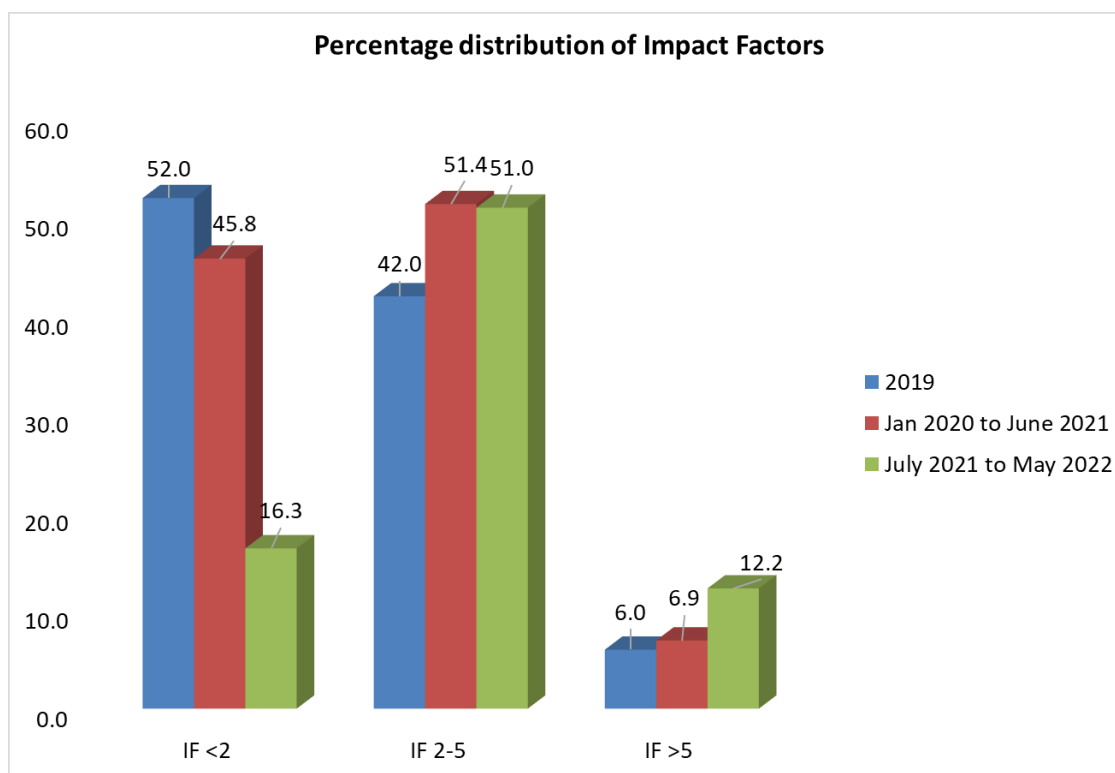
Percentage distribution of Institute's Publication Impact Factors over given periods

WORKSHOPS ORGANIZED

DIVISION OF CYTOPATHOLOGY

- **1st Virtual Workshop on Cervical Cancer Screening for Pathologists, 26th -30th July 2021**
Participants: 50
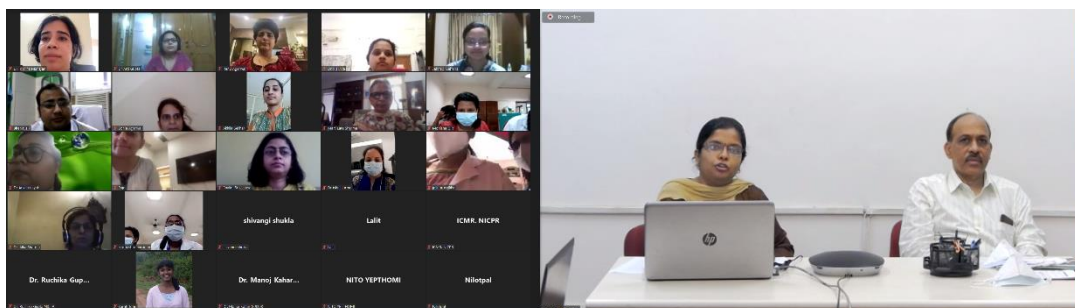
- **NICPR-ECHO Online Certificate Course On Cervical Cancer Screening For Pathologists, 23rd Feb – 29th Apr 2022**
Participants: 42

DIVISION OF CLINICAL ONCOLOGY

- **Hands-on training on Cervical cancer screening and treatment of precancer for Medical officers (in association with MCH Wing, NPCDCS, Chhattisgarh), 15-17 December 2021**
  Participants: 60

- **Hands-on training on Cervical cancer screening and treatment of precancer for Medical officers (in association with MCH Wing, NPCDCS, Chhattisgarh), 02-04 March 2022**
  Participants: 75

- **Webinar on Awareness on Common cancers (Organized to celebrate World Cancer Day in association with MCH Wing, NPCDCS, Chhattisgarh), 04 February 2022**
  Participants: 270
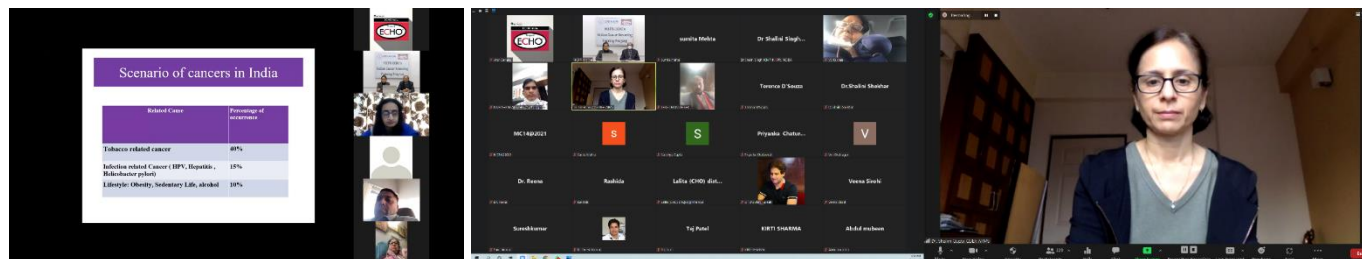
- **Oral Cancer Screening Workshop for Healthcare Workers, 28 – 29 March 2022**
Participants: 18

DIVISION OF EPIDEMIOLOGY AND BIOSTATISTICS

Awareness workshop on cancer prevention for ICMR-NICPR house-keeping staff, 7th Feb 2022, ICMR-NICPR.

DIVISION OF BIOINFORMATICS

- **Hands-on Workshop "Molecular Docking, Pharmacaphore modeling and Machine Learning", 15-16 March 2022**

  Participants: 106

MOLECULAR BIOLOGY GROUP

- **Basic Molecular Biology Techniques Relevant to Cancer Research – Hands on Training - Tissue Culture related Techniques, 30 Nov – 3 Dec 2021**

  Participants: 19

DIVISION OF PREVENTIVE ONCOLOGY

- **National Consultation on Global Youth Tobacco Survey (GYTS)-4: Emerging Challenges and Way Forward, September 02, 2021**

  Participants: 120

- **Webinar on the topic "Role of dental health professionals in smokeless tobacco cessation", November 30 – December 02, 2021**

HIGH THROUGHPUT VIRAL DIAGNOSTIC LABORATORY

- **Workshop on "Laboratory Diagnoses of SARS COv-2 by Real time PCR", 22 – 24 March, 2022**

    Participants: 7

AWARDS, FELLOWSHIPS & RECOGNITIONS

AWARDS, FELLOWSHIPS & RECOGNITIONS

- **Dr. Shalini Singh** received Corona Warrior Award from the Gramin Kshetra Adhikari Kalyan Parishad, UP in recognition of providing exceptional COVID 19 testing facilities in Uttar Pradesh and carrying out COVID 19 Sero-surveys in Western UP. She was invited as Chief Guest for the Annual function of the Parishad.

- **Dr. Sanjay Gupta** received Certificate of Appreciation for Leadership Role and contribution to the Institute during 2020 and 2021 by ICMR-NICPR

- **Dr. Mausumi Bharadwaj** received Certificate of Appreciation for Leadership Role and contribution to the Institute during 2020 and 2021 by ICMR-NICPR

- **Dr. Subhash M Agarwal** appointed as Member, Area Advisory Board (Bioinformatics) of Amity Institute of Biotechnology, Amity University, Noida

- **Dr. Prashant Kumar Singh** received Award for Academic Excellence for the highest cumulative impact factor of publications during 2020 and 2021, ICMR-NICPR

- **Dr. Prashant Kumar Singh** received Award for Non-academic Contribution to the Institute during the during 2020 and 2021, ICMR-NICPR

- **Dr. Showket Hussain** received an academic excellence award for highest number of publications for the year 2020-2021, ICMR-NICPR

- **Dr. Ruchika Gupta** was awarded the Certificate of Appreciation for non-academic contribution to the Institute during the during 2020 and 2021, ICMR-NICPR

- **Dr. Ruchika Gupta** secured 1st place in the International Cytology Quiz at the 17th World Congress of International Federation of Cervical Pathology and Colposcopy (IFCPC 2021), 1st – 4th July 2021.

CONFERENCES/ WORKSHOP ATTENDED

Dr Shalini Singh

Memberships of scientific bodies:

- Member of Bureau of Indian Standards (BIS) for Obstetric and Gynaecological Instruments and Appliances Sectional Committee MHD 03

- Member of MOHFW's Expert Group on Delayed Cord Clamping

- Member of DBT's Technical Expert Committee (TEC) of Maternal and Child Health-Developmental and Disease Biology

- Member of the Scientific Advisory Committee for the National Institute of Heath Research (UK), Research and Innovation for Global Health Transformation (RIGHT) Program: "Prevention of Epilepsy by reducing perinatal brain injury in low and middle-income countries" (PREVENT) study

- Member of Ethics Committee of The George Institute for Global Health, New Delhi

- Member of Ethics Committee of Armed Forces Medical Services Central Ethics Committee, New Delhi for evaluating research projects undertaken by institutes other than Armed Forces with the participation of Armed Forces personnel.

- Member of MOHFW's Technical Review Group (TRG) on Maternal health. Attended meetings organized by Ministry to discuss proposals submitted for implementation research by various agencies.

- Member of DBT-ICMR Collaboration for Maternal and Child Health. Reviewed concept proposals submitted under the call.

- Member of Review Group, MoHFW to examine the concept note for judicious use of Caesarean section and Caesarean section audit form

- Member of Trial Steering Committee titled "Comprehensive Anaemia Programme and Personalised Therapies (CAPPT) a multinational study funded jointly by DBT India and MRC UK

- Member of HPV Working Group of NTAGI Secretariat.

- Member of Expert Group on Grand Challenges India on HPV Diagnostics, DBT-BIRAC-BMGF-Wellcome Trust

- Chairperson of the Local Research Advisory Committee (LRAC) of Multi-disciplinary Unit of Government Institute of Medical Sciences (GIMS), Greater Noida

- Member of Technical Advisory Group of India Cancer Research Consortium (ICRC)

Support for activities of ICMR Hqrs / Preparation of documents/ Reports

- Chairperson of ICMR's Content Management Committee (CMC) for ICMR Website and Social Media Handles created to make ICMR website more user-friendly, easy to access, having accurate/required data – Several meetings were held and flow and display of contents were streamlined. A help-desk was created to allow e-interaction of public with ICMR.

- Coordinator for redesigning online process of submission, review and management of ad-hoc projects. I conceptualized and redesigned the fellowship and ad-hoc proposal formats and the online programme which will facilitate the process of submission of fellowship and ad-hoc projects. This work is being done in collaboration with Division of ISRM and CDAC.

- Nodal Officer for coordinating activities of the Division for the 'Communication Group' set up at ICMR Hqrs.

- Member of the ICMR Hqrs Committee to evaluate proposals submitted for Financial assistance to ICMR/Non- ICMR Scientist for attending International Conference/workshops/Training programme

- Member of the Selection Committee for ICMR-DHR International Fellowships for 2020-21

- Member of 1st Level Screening Committee to review concept proposal submitted to Grant-in-Aid (GIA) scheme of DHR. Attended meetings and reviewed several concept proposals.

- Member of ICMR Committee to evaluate the work of CDAC, NOIDA

- Review of Short-term Studentship (STS) proposal and their reports online - A total of 529 proposals were reviewed by the NICPR scientists in a time bound manner.

- Framing of suitable responses to the time bound Parliament Questions related to Reproductive and Maternal health, Cancer screening and prevention.

- Preparation of answers to queries received from grievance cell, RTI cell and audit cell of ICMR.

- Preparation of Monthly significant report for submission to ICMR Hqrs every month

- Preparation of Dashboard for Analytical Review of Projects Across Nation (DARPAN) report for submission every quarter to ICMR Hqrs.

- Preparation of Annual report for ICMR Hqrs and DHR.

- Preparation for Outcome budget giving achievements of extramural research projects, ongoing activities and thrust areas of research activities for extramural funding in 2019-2020.

- Preparation of Minutes of various Divisional/Institutional meetings like Project Review Group, Project Review Committee, Scientific Advisory Committee etc.

- Evaluation of reports submitted by organizers of ICMR supported conferences, workshops and seminars.

- Member of ICMR's Project Review Committee on Tobacco control.
- Member of ICMR's Screening Committee of MACP Scheme.
- Member of ICMR Financial Assistance Committee to support ICMR/Non-ICMR Scientists for their participation in International Conferences/Meetings/ Workshops
- Reviewer of National Health Research Policy drafted by DHR

Resource person for Technical Committees / Expert Groups / Conferences/ Meetings

- Resource Faculty for plenary session on Cancer Control: Towards Impact at the 65thAnnual National Conference of Indian Public Health Association –IPHACON 2021, organized by JIPMER, Puducherry, 23 – 26 September 2021.
- Keynote speaker "Gynecological Cancers- Understanding The Need Of The Hour" for observing Gynaecologic Cancer Awareness Month, organized by Voice of Healthcare, 24 September 2021.
- Expert in Brain-storming meeting to Develop a Synergy Model between National AIDS Control Programme (NACP) and Non-Communicable Diseases Programmes, organized by National AIDS Control Organization, MoHFW, 01 November 2021.
- Talk titled "Status and Scope of Preventive Oncology" at a webinar on Cancer situation and Preventive Oncology in India, organized by AIIMS Bhubaneswar and IAPSM, India, 10 November 2021.
- Chaired a session titled "Training and Education" at AGOICON 202One organized by Association of Gynaecologic Oncologists of India, organized by Tata Medical Center, Kolkata, 12 – 14 November 2021.
- Expert at a Panel Discussion on Elimination of Cervical Cancer: From Research to Practice", organized by 10th National Conference of AOGIN (Asia Oceania Research Organization on Genital Infections and Neoplasia), 3 – 5 December 2021.
- Talk titled "Epidemiology and Prevention of Head & Neck Cancers", organized by All India Institute of Ayurveda, New Delhi, 6 December 2021.
- Talk titled "Research study on disrespectful behaviours towards women during delivery in public hospitals of India" at Safdarjung Hospital, New Delhi, organized by Nursing Division of the MoHFW/ DGHS, Govt of India Midwifery Initiative in collaboration with WRAI, 14 December 2021.
- Expert in Technical Meeting for Rolling Out Hospital Based Cancer Registry (HBCR) and Community Based Cancer Registry (CBCR) in Odisha, organized by Directorate of Health Services, Odisha, Bhubaneswar, 30 December 2021.
- Talk on "Awareness and Prevention of Cervical Cancer" for observing Cervical Cancer Awareness Month – January 2022, organized by ASSOCHAM, New Delhi, 28 January 2022.

- Expert on a Panel Discussion titled "Empowering Women Against Tobacco Outrage", organized by ICanCare Foundation, 6 March 2022.

- Resource person for Faculty Development Programme on Pandemic: Experiences and Implications, organized by School of Liberal Studies Director, Outreach and Extension Division Dr BR Ambedkar University, Delhi, 25 March 2022.

- Webinar on 'Preparedness, Progress and Challenges In Implementation Of The Protocol To Eliminate Illicit Trade In Tobacco Products', organized by The International Union Against Tuberculosis and Lung Disease (The Union) South-East Asia Office, New Delhi, 31 March 2022.

Dr. Sanjay Gupta

- Two Days Online Training on "Advance Course on Preventive Vigilance" held during 6 – 7 July 2021, organized by NPC.

- IAC Jewel 50 Series Lecture, by Dr Domanski on "Soft tissue Cytopathology" The Lund Sarcoma group Experience, organized by IAC, 24 July 2021.

- We Hope Seminar on Diagnostic Non- Gyne Cytology using BD Surepath LBC- Case Based discussions, Organized by BD India, 27 July 2021.

- 1st Virtual National Workshop on Cervical Cancer Screening for Pathologists being organized by the Division of Cytopathology, ICMR-NICPR, Noida from 26 - 30 July 2021.

  Talks delivered:

  'Cytology of squamous epithelial lesions of the cervix – 'ASC' and 'Low grade lesions': patterns & pitfalls'

  'Cytology of 'High grade squamous lesions of the cervix'

- IAC Jewel 50 Series Lecture "Thyroid Cytopathology- opinions, discussions and controversies" organized by IAC, 7 August 2021

- "International Conference on Tobacco Control and Smoking Cessation" organized by Indian Society of Clinical Oncology (ISCO) and Lady Hardinge Medical College and Associated Hospitals, Delhi held virtually on 20 and 21 August 2021.

- Webinar titled "Lifestyle and Non-communicable diseases" organized by ICMR-NCDIR, 26 August 2021.

- Webinar on 'Quality in Medical Laboratory' organized by NAPM, 26 August 2021.

- 'National Consultation of Global Youth Tobacco Survey (GYTS-4): Emerging Challenges and Way Forward", organized by SLT-KH ICMR-NICPR, 02 September 2021.

- Webinar on 'HPV and Liquid based Cytology" organized by 360 Diagnostics, Noida, 10 September 2021.

- Pearls, Perils, and Pitfalls in Bone and Soft Tissue Tumor Pathology, organized by RMLIMS, Lucknow, 18-19 September 2021.

- 'Sensitization Workshop on Pharmacovigilance'. Organized by ICMR-NICED, 21-22 September 2021.

- Webinar on Oral Cancer and its prevention by Dr. Isha Preet Tuli, organized by ICMR-NICPR on the occasion of World Cancer Research Day, 24 September 2021.

- Webinar on Digital Pathology organized by Digilab Bio Analytical Instruments, 25 September 2021.

- 5th Prof PP Talwar Oration on "Big –Data and Big – Ideas in discovery and application in the Life Sciences" by Prof, K Vijay Raghavan, 27 September 2021.

- CME on Tumors and Mimics of GIT & Hepatobiliary Tract: Revisiting the Past & Exploring the Future, organized by GIMS, Greater Noida, 08 October 2021.

Chaired a session on neuroendocrine tumors of GIT and Keynote lecture on carcinoma of colon

- Webinar on "Preventive Vigilance in Good Governance" by Mr RK Juneja, organized by ICMR-NICPR, 29 October 2021 during observance of Vigilance Awareness Week.

- 5th Annual International Precision Oncology and IBC virtual conference 2021, organized by State Cancer Institute, SMS Medical college, Jaipur, 22-24 October 2021.

- Webinar on "Open Science: a multifaceted framework to improve science and health outcomes" organized by 'ICMR-Elsevier Publishing Workshop Series, 29 October 2021.

- Regional meeting on eliminating cervical cancer as a public health problem in the South East Asia Region (virtual) organized by WHO Regional Office for South East Asia, Delhi, 9-11 November 2021.

- 8th Dr. Sriramachari Young Scientist awards, at ICMR-NIP 10 November 2021.

Invited as Judge for Oral presentations

- Webinar on "Evolution of Pathology" by Dr Puja Sakhuja, GB Pant Hospital Delhi

- Webinar on "Pathology of Tobacco Addiction" by Dr Pawan Gupta, MAX Inst of Cancer Care, Delhi, on the occasion of International Pathology Day, organized by ICMR-NIP, 11 November 2021.

- Webinar on "Ethics of Publication" organized by 'ICMR-Elsevier Publishing Workshop Series, 23 November 2021.

- 50th online Annual Conference of Indian Academy of Cytologists, hosted by AIIMS New Delhi, 19-21 November 2021.

Poster presented: High-grade squamous intraepithelial lesions (HSIL) in cervical smears: an audit of 12 years for reasons of undercalls on cytology

Invited as judge for a session on Oral Presentations

- Webinar on role of Dental Health Professionals in smokeless tobacco cessation, organized by SLT- KH (ICMR-NICPR) 30 November – 2 December 2021.

- Webinar on "Effective writing skills for promoting research-what do we need to know?" by 'ICMR-Elsevier Publishing Workshop Series, 13 December 2021.

- ICMR-NICPR Annual Day lecture – Primary prevention of Cancer By Dr Sonu Subba Prof, Dept of PSM, AIIMS Bhubaneshwar, ICMR-NICPR, 14 January 2022.

  Panel Discussion – Wellness: an antidote to cancer and other NCDs

- WE HOPE Webinar "Updates in Cervical Cancer Screening & Case Based Discussions" organized by BD India, 27 January 2022.

- Webinar on "CAHO CDE Series - Theme 7: Cervical Cytology and HPV" organized by CAHO, 28 January 2022.

- Web seminar: ASSOCHAM Conference on "Awareness and Prevention of Cervical Cancer" organized by ASSOCHAM India, 28 January 2022.

- Webinar titled "Awareness on Common Cancers" organized by ICMR-NICPR, 04 February 2022.

- राष्ट्रीय हिंदी संगोष्ठी-''कोविड 19 और मानव स्वास्थ्य'' organized by ICMR-NIOH, 15 फरवरी 2022.

- Online Certificate Course on Cervical Cancer Screening for Pathologists through ECHO platform 23 February – 29 April 2022 (Twice-a-week sessions, 1.5 hrs each session).

  Talks delivered:

  'Cytology of squamous epithelial lesions of the cervix – 'ASC' and 'Low grade   lesions': patterns & pitfalls'

  'Cytology of 'High grade squamous lesions of the cervix'

  Case-based discussions on colposcopic-histologic correlation of screen-positive case

  Virtual interactive slide sessions on cytology of normal, infections and SIL lesions of uterine cervix

- 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" organized by Amity Institute of Molecular Medicine & Stem Cell Research (AIMMSCR), Amity University, Uttar Pradesh, Noida, 2-5 March 2022.

Poster presented: Knowledge, practice and skills in Cytology-based cancer screening: Impact assessment of training workshops for the Pathologists

- International HPV awareness day and International Women's Day, 08 March 2022, organized by ICMR-NICPR

  o Webinar on 'What causes cervical cancer and how can it be prevented" by Dr Doris Benbrook, Univ of Oklohama USA

  o Webinar on 'Cancer is preventable and curable if detected early.' By Dr GK Rath, Head, NCI India.

- WE HOPE webinar "Towards Elimination of Cervical Cancer- Translating Guidelines to Practice", organized by BD India in association with AOGD), FOGSI, ISCCP & Royal College of Obstetricians and Gynecologists India North, 19 March 2022.

- WE HOPE webinar "Towards Elimination of Cervical Cancer-Translating Guidelines to Practice, Session 2: TRIAGE" organized by BD India in association with AOGD, FOGSI, ISCCP & Royal College of Obstetricians and Gynecologists India North, 23 April 2022.

Dr. Mausumi Bharadwaj

- Invited Lecture in 41st Annual Conference of the Indian Association for Cancer Research (IACR-2022) "*Combating Cancer: Biology to Therapy to Drug Resistance*" International Symposium on "*Stem Cell and Cancer*", organized by Amity Institute of Molecular Medicine & Stem Cell Research, Amity University, 2 – 5 March 2022.

- Invited lecture on "Molecular basis of Human Papilloma virus mediated cancers", Save the Environment seminar, 8 March 2022.

- Workshop on High Throughput Viral Diagnostic Laboratory, ICMR-NICPR, 22-24 March 2022.

Dr. Smita Asthana

- 17th World Congress of International Federation of Cervical Pathology and Colposcopy (IFCPC 2021) Organized by the Indian Society of Colposcopy and Cervical Pathology, 1 – 5 July 2021.

  Oral Poster presented: "Cervical Cancer Incidence And Mortality In South East Asia: Evidence From Globocan 2020"

- Expert Consultation Webinar on "Mental Health Among Workers During COVID 19 Pandemic", 8 July 2021.

- Resource Person for One Week Online National Workshop on Time Series Analysis & Bio-statistics organized by Science Tech Institute, Lucknow from 12 – 18 July, 2021.

   Invited Talk: Systematic Review and Meta-Analysis

- Webinar "Training-cum-awareness" program of ERMED resources Access / Download articles from NML-ERMED consortium, organized by Cambridge University Press, 23 July 2021.

- Virtual launch of the key findings of fourth round of Global Youth Tobacco Survey (GYTS-4), 10 August 2021.

- Webinar on "Clinical Trial Registry-India", ICMR-NIMS, 24 August 2021.

- Webinar on "Lifestyle and Non communicable diseases" organized by ICMR-NCDIR, 26 August 2021.

- Webinar on "Preventive Vigilance in Good Governance" during observance of Vigilance Awareness Week, ICMR-NICPR, 29 October 2021.

- Regional meeting on eliminating cervical cancer as a public health problem in the South East Asia Region organized by WHO Regional Office for South East Asia, Delhi, 9 – 11 November 2021.

- Resource Person for Online International Workshop on "Systematic Review and Meta-analysis" at Science Tech Institute, Lucknow, 21 – 27 November 2021 .

   Invited Talk: Systematic Review and Meta-Analysis

- Webinar on "Ethics of Publication" organized by 'ICMR-Elsevier Publishing Workshop Series, 23 November 2021.

- Webinar on role of Dental Health Professionals in smokeless tobacco cessation organized by SLT- KH (ICMR-NICPR), 30 November - 2 December 2021.

- Annual conference of Indian Society for Medical Statistics (ISMS) workshop organized by Department of Preventive and Social Medicine, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, 8 December 2021.

- Speaker in workshop on "Research Methodology and Bio-statistical Methods" at Government Institute of Medical Sciences, Greater Noida on 18 – 19 February 2022.

   Talk: Research Methodology and Biostatistical Methods

- Resource Person for One Week Online National Workshop on Time Series Analysis & Bio-statistics organized by Science Tech Institute, Lucknow from 21 – 27 February 2022.

   Invited Talk: Systematic Review and Meta-Analysis

- Advance Course in Clinical Epidemiology (Online) organized by Institute of Liver and Biliary Sciences, 4 – 6 April 2022.

Dr Subhash M Agarwal

- Good Governance and Transparency through RTI Act 2005, organized by National Productivity Council, Under DPIIT, Ministry of Commerce & Industry, Govt. of India, 9- 10 September 2021.

Dr R Suresh Kumar

- Webinar on Oral Cancer and its prevention by Dr. Isha Preet Tuli organised by ICMR-NICPR Noida on 24 September 2021.
- 41st Annual International Conference of the Indian Association for Cancer Research (IACR), IACR-2022, from 02-05 March 2022.
- On International HPV Awareness Day &International Women's Day, webinars organised by ICMR-NICPR Noida on 8 March 2022.
- Webinar on 'What causes cervical cancer and how can it be prevented" by Dr Doris Benbrook, Univ of Oklohama USA
- Webinar on "Cancer is preventable and curable if detected early." By Dr GK Rath, Head, NCI India
- "Awareness on Common Cancers" organised by ICMR-NICPR Noida, 4 February 2022.

Dr Ekta Gupta

- Workshop on data management for WHO Unity study, organized by Hamdard Institute of Medical Sciences & Research (HIMSR), 6 July 2021.
- Webinar on Mental health among Workers during Covid-19 Pandemic, organized by ICMR-NIOH, 8 July 2021.
- Online course on: The COVID-19 Response in India: Impact on Women and Children's Health and Wellbeing", organized by John Hopkins Bloomberg School of Public Health and ICMR-NICED, July 2021.
- Operational Research Workshop on How to write a Manuscript, organized by PGI Chandigarh, 30 July 2021.
- International Conference on Tobacco Control and Smoking cessation, organized by Indian Society of Clinical Oncology (ISCO) and Lady Hardinge Medical College, Delhi, 20 to 21st August 2021.
- Webinar titled "Lifestyle and Noncommunicable diseases" organized by ICMR-NCDIR, 26 August 2021.
- National Consultation of Global Youth Tobacco Survey (GYTS-4): Emerging challenges and way

forward, organized by WHO FCTC Knowledge Hub on Smokeless Tobacco, ICMR-NICPR on 2nd September 2021

- Annual Nodal Communication Officer Meet, organized by ICMR-NIREH, 16-17 September 2021.

- Pre-Conference of Parties (COP) and Pre-MOP Meeting in WHO South-East Asia Region, organized by WHO-SEARO from 11 - 12 October 2021.

- ECHO India Healthcare Virtual Immersion Invite, organized by ECHO India from 26 - 27 October 2021.

- WHO Regional webinar on transition to HPV DNA test as a primary screening test for cervical cancer elimination to achieve the 2030 interim targets, organized by WHO SEARO, 29 October 2021.

- Webinar on "Preventive Vigilance in Good Governance", organized by ICMR-NICPR, 29 October 2021.

- Brainstorming Meeting on developing a Synergy Model between NACP and NCD Programmes" organized by MoHFW, 1 November 2021.

- Launching Webinar 2021 Global Progress Report on Implementation of the Protocol to Eliminate Illicit Trade in Tobacco Products, organized by WHO FCTC, 3 November 2021.

- Virtual workshop on "How to develop, implement and evaluate tobacco endgame strategies? Case studies from Europe", organized by WHO FCTC Knowledge Hub on Surveillance, 4 November 2021.

- Workshop on National Guidelines for Data Quality in Surveys, organized by ICMR-NIMS, 23 - 24 November 2021.

- Online Cancer Screening Training Program for Medical Officers, organized by NICPR-ECHO, 29 November 2021 to 28 February 2022.

- Webinar on Role of Dental Health Professionals in Smokeless Tobacco Cessation, organized by ICMR-NICPR, 30 November - 2 December 2021.

- First meeting on Population-Based Cancer Registry organized by ICMR-NICPR, Noida, 15 December 2021.

- Webinar on Awareness on Common Cancers, organized by ICMR-NICPR, Noida, 4 February 2022.

- Organized and hosted the annual day program of the institute followed by a webinar on "Wellness - an antidote to cancer and other Non-communicable diseases", organized by ICMR-NICPR, Noida, 14 January 2022.

- International HPV Awareness Day and International Women's Day webinar with theme: Women's Health, organized by ICMR-NICPR, Noida, 8 March 2022.

- Annual NCO meet of ICMR: Prepared and presented a ppt containing cases studies of communication strategies being used by each institute, organized by ICMR, 21 April 2022.

- Two Day CME on Artificial Intelligence and Machine Learning in Medicine, organized by AIMS, Kochi & ICMR-NIMS, 29 April 2022.
- WHO-STOP World No Tobacco Day 2022". Talking Trash: Behind the industry's "green" public relations, organized by WHO, 12 May 2022.
- ICMR-DHR Biomedical & Research Ethics Update, organized by ICMR-NCDIR, 18 May 2022.

Dr Raj Narain

- Webinar on "Mental Health among Workers during COVID 19 Pandemic" organized by Min. of Environment, Forest and Climate Change, 8 July 2021.
- Webinar on "cancer epidemiology and surveillance training programme" conducted by ICMR-NCDIR Bengaluru, 22 October 2021.
- Webinar on "Preventive Vigilance in Good Governance' conducted by ICPR-NICPR, 29 October 2021.
- Webinar on "360 Degree View on Research Management and Academic Journal Publishing", ICMR-NICPR, 12 November 2021.
- Webinar on "Role of Dental Health Professionals in Smokeless Tobacco Cessation" organized by ICMR-NICPR, Noida, 30 November – 2 December 2021.
- "New Dimensions in Health Research with Focus on Emerging and Re-emerging Infections, and Pandemic Preparedness " organized ICMR-RMRC Gorakhpur, 8 December 2021.
- BMJ Webinar on Management of type 2 diabetes mellitus with focus on oral hypoglycemic agents by Prof. N Tandon, AIIMS New Delhi, 25 March 2022.
- Talk on "vermicomposting for a greener future" to celebrate swachhata pakhwada, ICMR-NICPR, 01 – 15 April 2022.
- Webinar on ERMED: Online Journals from Wolters Kluwer @ OVID organized by National Medical Library and Wolters Kluwer, 10 May 2022.
- Webinar on "Implementation Research- India summit" organised by NIIRNCD Jodhpur, 30-31 May 2022.

Dr Kavitha Dhanasekaran

- IFCPC 17th World Congress on the theme 'Eliminating Cervical Cancer-Call for Action', organized by IFCPC & ISCCP, 1 July 2021.

- Training the trainers workshop, Conference (Abstract titled "Cervical Cancer screening in Infertile women" accepted for oral presentation), organized by IFCPC &ISCCP, 2 July 2021 and post conference Workshop on 5 July 2021.

  Invited Speaker on the topic Screen & treat (case discussions and quiz) in The Post-Conference (IFCPC, 17th world congress), organized by International Federation for Cervical Pathology and Colposcopy on 5th July 2021

- WHO webinar on launch of cervical cancer screening recommendations, organized by WHO, 6 July 2021.

- ERMED Consortium: Training for BMJ Journals, organized by ERMED Consortium, 7 July 2021.

- Expert Consultation Webinar on Mental Health Among Workers During COVID 19 Pandemic, organized by ICMR-NIOH, 8 July 2021.

- NIMR_MERA-India Lecture Series in Infectious Diseases- "A typical cell wall of Mycobacteria: Its relevance to TB treatment and drug resistance", organized by ICMR-NIMR, 19 July 2021.

- Webinar on Advances in Sexual Health, organized by AICC RCOG North Zone, 14 August 2021.

- Webinar on Lifestyle and Noncommunicable diseases, organized by ICMR-NCDIR, 26 August 2021.

- Virtual Symposium "National Consultation on Global Youth Tobacco Survey-4: Emerging Challenges and Way Forward", organized by WHO FCTC ICMR-NICPR, 2 September 2021.

- A Regional webinar to accelerate progress toward eliminating cervical cancer as a public health problem, organized by WHO Regional Office for South-East Asia, 15 September 2021.

- Online International Workshop on Advance Statistical Data Analysis Using SPSS, organized by Science-Tech Institute, Lucknow, UP, 21 September 2021.

- Sensitization workshop on Pharmacovigilance (online), organized by ICMR-NICED, 21 September 2021.

- International E-symposium "Pregnancy leaves its Mark" organized by ICMR-NIRRH, 24 September 2021.

- Webinar on International Digital Governance and Governance on Digital Health, organized by Swiss embassy, New Delhi, 28 September 2021.

- Symposium on Implementation Research(virtual), organized by ICMR-NIIRNCD, 5 October 2021.

- Online Webinar on Breast Cancer Awareness Program, organized by Ghaziabad Obstetrics and Gynaecological Society & rotary club, 9 October 2021.

- Online Webinar on New Era in Cervical Cancer Screening, organized by Lalla Deb Hospital, Srinagar in association with Srinagar ob-Gyn society, 12 October 2021.

- NIMR_MERA-India Lecture Series in Infectious Diseases- "Antimalarial drug resistance in Africa and other regions: Are ACTs in danger?", organized by ICMR-NIMR, 12 October 2021.

- A Person-Centered And Compassionate Health Care, organized by Columbia Global Centers| Mumbai in collaboration with the Mailman School of Public Health, 15 October 2021.

- Annual COGSICON 2021 (Virtual conference), organized by Covai obstetrics and Gynaecology society on 22 October 2021.

- Inauguration of "Cochrane India Network, organized by Cochrane India Network on 26 October 2021.

- WHO Regional webinar on transition to HPV DNA test as a primary screening test for cervical cancer elimination to achieve the 2030 interim targets, organized by WHO SEARO on 29 October 2021.

- Webinar on Preventive Vigilance in Good Governance, organized by ICMR-NICPR on 29 October 2021.

- Brainstorming Meeting on developing a Synergy Model between NACP and NCD Programmes (Subject Expert), organized by NACO on 1 November 2021.

- Live webinar on Can we move towards HPV Screening based on WHO new guidelines, organized by ISCCP on 3 November 2021.

- Regional virtual meeting on eliminating cervical cancer as a public health problem in South-East Asia Region (Invited delegate), organized by WHO SEARO on 9 November 2021.

- Launching of the policy brief for India 2021, organized by ICMR-HQ on 15 November 2021.

- AOGD Pre Conference Workshop on "PROTOCOLS & PROCEDURES FOR CERVICAL CANCER PREVENTION"(Chairperson), organized by AOGD on 18 November 2021.

- Trends in Global Virology, organized by ICMR-Elsevier Publishing Workshop Series 2021 on 19 November 2021.

- NIMR_MERA-India Lecture Series in Infectious Diseases- Visceral Leishmaniasis-An Update, organized by ICMR-NIMR, 22 November 2021.

- Resource-based Good Clinical Practice Recommendations for Quality Assurance in Colposcopy, (Nominated expert), organized by WHO & AIIMS on 23 November 2021.

- Webinar on Role of Dental Health Professionals in Smokeless Tobacco Cessation, organized by ICMR-NICPR on 30 November 2021.

- Quality Assurance Standards for Colposcopy Review Meeting, organized by WHO & AIIMS on 2 December 2021.

- Research methodology workshop10th National Conference of AOGIN (Secured second prize), organized by AIIMS on 3 December 2021.

- 10th National Conference of Asia Oceania Research Organisation on Genital Infections and Neoplasia, India, organized by AIIMS on 4 December 2021.

- Effective writing skills for promoting research-what do we need to know? organized by ICMR-Elsevier Publishing Workshop Series 2021 on 13 December 2021.

- NIMR_MERA-India Lecture Series in Infectious Diseases- Challenges and progress on endectocides for malaria control, organized by ICMR-NIMR, 17 January 2022.

- Webinar on Updates in Cervical Cancer Screening & Case Based Discussions, organized by BD on 27 January 2022 - Attended as expert.

Talks delivered:

- HPV Vaccination – WHO Position Paper and the current scenario (for 1st Virtual National Workshop on Cervical Cancer Screening for Pathologists), organized by Division of Cytopathology, ICMR-NICPR on 30 July 2021

- Infection Control & Documenting Cancer Screening Results (Online for Certificate Course on Basics of4Cancer screening and prevention for nursing staff-batch 4), organized by HBCH&RC, Vishakhapatnam on 30 July 2021

- "Training of Trainers" training for medical officers in Cervical cancer screening, organized by MCH Wing, NPCDCS, Chhattisgarh on 3 September 2021

- "Training of Trainers" training for medical officers in Cervical cancer screening, organized by MCH Wing, NPCDCS, Chhattisgarh on 8 September 2021

- Introduction to Cancer Screening and the role of staff nurses in the nations' cancer screening program (Certificate Course on Basics of Cancer screening and prevention for nursing staff-batch 5), organized by HBCH&RC, Vishakhapatnam on 8 October 2021

- Methods of cervical Cancer Screening and their advantages and disadvantages (Certificate Course on Basics of Cancer screening and prevention for nursing staff-batch 5), organized by HBCH&RC, Vishakhapatnam on 14 October 2021

- Visual Inspection with Acetic Acid (VIA) & its Evaluation" (Certificate Course on Basics of Cancer screening and prevention for nursing staff-batch 5), organized by HBCH&RC, Vishakhapatnam on 22 October 2021

- Infection Control & Documenting Cancer Screening Results" (Certificate Course on Basics of Cancer screening and prevention for nursing staff-batch 5), organized by HBCH&RC, Vishakhapatnam on 10 December 2021

- Methods of cervical Cancer Screening and their advantages and disadvantages " (Certificate Course on Basics of Cancer screening and prevention for nursing staff-batch 6), organized by HBCH&RC, Vishakhapatnam on 25 March 2022

- Online Cervical cancer screening training program for nurses (DH Chhattisgarh), organized by MCH Wing, NPCDCS, Chhattisgarh in association with CHAI on 7 to 8 April 2022

- Online Cervical cancer screening training program for nurses (DH Chhattisgarh), organized by MCH Wing, NPCDCS, Chhattisgarh in association with CHAI on 28 to 29 April 2022

- Online cancer screening training program for healthcare providers in the state of Sikkim, organized by NPCDCS, Sikkim in association with CHAI on 13 to 14 May 2022

Dr Prashant Kumar Singh

- Attended virtual training programme on 'Tracking and tracing of tobacco products: the importance of knowing product movements', organized by WHO FCTC Secretariat, Geneva, 08 July 2021.

- Attended virtual workshop on 'Economics of Tobacco Control', organized by WHO FCTC Knowledge Hub on Tobacco Taxation and Illicit Trade, 16-26 August 2021.

- Attended Joint Regional Workshop for the 'Ninth Session of Conference of the Parties to the WHO FCTC (COP) and Second session of the Meeting of the Parties to the Protocol (MOP)', organized by WHO SEAR Region, New Delhi, 11-12 October 2021.

- Workshop on 'Role of Dental Health Professionals in Tobacco Cessation', organized by WHO FCTC Knowledge Hub on Smokeless Tobacco, ICMR-NICPR, Noida, 30 November - 02 December 2021.

- Workshop on Tobacco Taxation (virtual) organized by WHO FCTC Knowledge Hub on Tobacco Taxation & Illicit Trade, South Africa, 14 March 2022.

Dr. Showket Hussain

- Training-cum-awareness program of ERMED resources Access / Download articles from NML-ERMED consortium 2021, 22 June to 16 August 2021.

- Pharmacovigilance workshop, organized by ICMR, New Delhi on 21 September 2021.

- Workshop on "Six Waste Management Rule 2016" on 28 to 30 September 2021.

- Invited as speaker and guest of honour in PRARAMBH 2021, organized by IMS Ghaziabad.

- Lecture delivered in Workshop on "Basic Molecular Biology Techniques relevant to Cancer Research", organized by DHR from 30 November to 3 December 2021 at ICMR-NICPR, Noida.

- Invited speaker at 41st Annual Conference of Indian Association for Cancer Research (IACR), Organized by Amity university, Noida on 02 to 05 March 2022.

Dr Ruchika Gupta

- 17th World Congress of International Federation of Cervical Pathology and Colposcopy (IFCPC 2021) organized by the Indian Society of Colposcopy and Cervical Pathology, 1 – 5 July 2021.

  Poster presented: Cervical Cancer Awareness Among the Rural Population in GautamBuddh Nagar District, India and its Association with Demographic Factors & Internet Usage

  Secured 1st place in the International Cytology Quiz

- Expert Consultation Webinar on "Mental Health Among Workers During COVID 19 Pandemic", 8 July 2021.

- Webinar "Training-cum-awareness" program of ERMED resources Access / Download articles from NML-ERMED consortium, Cambridge University Press, 23 July 2021.

- IAC Jewel 50 Series Lecture, by Dr Domanski on "Soft tissue Cytopathology" The Lund Sarcoma group Experience, organized by IAC, 24 July, 2021.

- We Hope Seminar on Diagnostic Non- Gyne Cytology using BD Surepath LBC- Case Based discussions, Organized by BD India, 27 July 2021.

- 1st Virtual National Workshop on Cervical Cancer Screening for Pathologists, 26 – 30 July 2021.

  Talks delivered:
  o Biomarkers for cervical cancer prevention
  o Cervical cyto-histological correlation: the ASC guidelines

- IAC Jewel 50 Series Lecture "Thyroid Cytopathology- opinions, discussions and controversies" organized by IAC, 07 August, 2021.

- Virtual launch of the key findings of fourth round of Global Youth Tobacco Survey (GYTS-4), 10 August 2021.

- International Conference on Tobacco Control and Smoking Cessation, organized by LHMC and Indian Society of Clinical Oncology, 20 – 21 August 2021.

- Webinar on "Clinical Trial Registry-India", organized by ICMR-NIMS, Delhi, 24 August 2021.

- Webinar on "Lifestyle and Noncommunicable diseases", organized by ICMR-NCDIR, 26 August 2021.

- National Consultation on Global Youth Tobacco Survey (GYTS-4): emerging challenges and way forward, 2 September 2021.

- Webinar on 'HPV and Liquid based Cytology" organized by 360 Diagnostics, Noida, 10 Sept 2021.

- Pearls, Perils and Pitfalls in Bone and Soft Tissue Pathology, organized by RMLIMS, Lucknow 18 - 19 September 2021.

- Webinar on Oral Cancer and its prevention by Dr. Isha Preet Tuli, organized by ICMR-NICPR on the occasion of World Cancer Research Day, 24 September 2021.

- Online release of 'clinicopathological profile of cancers in India: a report of the hospital based cancer registries, 2021' by ICMR-NCDIR, 24 September 2021.

- 8th Annual Histopathology Meet – The Grey Zone – with The Masters, SRL Diagnostics Reference Lab, Gurugram, 25 September 2021.

- Webinar on Digital Pathology organized by Digilab Bio Analytical Instruments, 25 September 2021.

- Webinar on "International Digital Governance and Governance on Digital Health", Swiss Embassy, New Delhi, 28 September 2021.

- Invited as a Panelist in the Panel Discussion on "Importance of Research and Clinical Trials in Breast Cancer Care" organized by the Integrated Health and Wellbeing Council, 16 October 2021.

- 5th Annual International Precision Oncology and IBC Conference, organized by SMS Medical College, Jaipur, 22 – 24 October 2021.

- Webinar on "Preventive Vigilance in Good Governance" by Mr RK Juneja, organized by ICMR-NICPR, 29 October 2021 during observance of Vigilance Awareness Week.

- Regional meeting on eliminating cervical cancer as a public health problem in the South East Asia Region (virtual) 9- 11 November 2021, organized by WHO Regional Office for South East Asia, Delhi

- Webinar on "Ethics of Publication" organized by 'ICMR-Elsevier Publishing Workshop Series, 23 November 2021.

- 50th online Annual Conference of Indian Academy of Cytologists, hosted by AIIMS New Delhi, 19 - 21 November 2021.

  Poster presented: High grade squamous intraepithelial lesions (HSIL) in cervical smears: an audit of 12 years for reasons of undercalls on cytology

  Invited as judge for a session on Poster Presentations.

- Webinar on role of Dental Health Professionals in smokeless tobacco cessation, organized by SLT- KH (ICMR-NICPR) 30 November to 2nd December 2021.

- ICMR-NICPR Annual Day lecture – Primary prevention of Cancer By Dr Sonu Subba Prof, Dept of PSM , AIIMS Bhubaneshwar
  Panel Discussion – Wellness: an antidote to cancer and other NCDs organized by ICMR-NICPR, 14 January 2022.

- WE HOPE Webinar "Updates in Cervical Cancer Screening & Case Based Discussions" organized by BD India, 27 January 2022.

- Webinar on "CAHO CDE Series - Theme 7: Cervical Cytology and HPV" organized by CAHO, 28 January 2022.

- Web seminar: ASSOCHAM Conference on "Awareness and Prevention of Cervical Cancer" organized by ASSOCHAM India, 28 January 2022.

- Webinar titled "Awareness on Common Cancers" organized by ICMR-NICPR on 4th February 2022.

- राष्ट्रीय हिंदी संगोष्ठी-''कोविड 19 और मानव स्वास्थ्य'' organized by ICMR-NIOH, 15 फरवरी 2022.

- Online Certificate Course on Cervical Cancer Screening for Pathologists through ECHO platform 23 February – 29 April 2022 (Twice-a-week sessions, 1.5 hrs each session).

Talks delivered:
- o 'HPV and other biomarkers in cervical cancer prevention'
- o 'Cervical cyto-histological correlation: the ASC guidelines'
- o Virtual interactive slide sessions on cytology of normal, infections and SIL lesions of uterine cervix

- 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" organized by Amity Institute of Molecular Medicine & Stem Cell Research (AIMMSCR), Amity University, Uttar Pradesh, Noida in the Hybrid Mode from 02 – 05 March 2022.

  Poster presented: Knowledge, practice and skills in Cytology-based cancer screening: Impact assessment of training workshops for the Pathologists

- International HPV awareness day and International Women's Day, 08 March 2022, organized by ICMR-NICPR
  Webinar on 'What causes cervical cancer and how can it be prevented" by Dr Doris Benbrook, Univ of Oklohama USA
  Webinar on "Cancer is preventable and curable if detected early." By Dr GK Rath, Head, NCI India.

- WE HOPE webinar "Towards Elimination of Cervical Cancer- Translating Guidelines to Practice, 19 March 2022, organized by BD India in association with AOGD), FOGSI, ISCCP & Royal College of Obstetricians and Gynecologists India North

- WE HOPE webinar Towards Elimination of Cervical Cancer-Translating Guidelines to Practice, Session 2: TRIAGE | 23 April 2022, organized by BD India in association with AOGD, FOGSI, ISCCP & Royal College of Obstetricians and Gynecologists India North.

Dr Shamsuz Zaman

- 50th online Annual Conference of Indian Academy of Cytologists, hosted by AIIMS New Delhi, 19 - 21 November 2021.

- Digital Cytology Workshop & Cervical Cytology Workshop during 50th online Annual Conference of Indian Academy of Cytologists, hosted by AIIMS New Delhi, 19 November 2021.

Dr Malasha Kumari

- Certificate Course on "Health Research Fundamentals", 8Weeks Duration conducted by ICMR- NIE, Chennai, 26 July – 17 September 2021.

- Webinar on National Consultation of Global Youth Tobacco Survey (GYTS): Emerging Challenges and Way Forward, organized by WHO FCTC Global Knowledge Hub, ICMR-NICPR, 2 September 2021.

- Webinar on "Role of Dental Health Professionals in Smokeless Tobacco Cessation organized by WHO FCTC Global Knowledge Hub, ICMR-NICPR, 30 November - 2 December 2021.

- Cancer Screening Training Program for Medical Officers, 14 weeks duration, ICMR-NICPR ECHO, 29 November 2021-28 February 2022.

- Workshop on Oral Potential Malignant Tumors (OPMD) organized by Oral Potential Malignant Tumors (OPMD) Hub , Lady Harding Medical College , Delhi, 3 February 2022.

- National Hindi Webinar "Covid 19 and Human Health" organized by ICMR- NIOH, Ahmedabad, 15 Feb 2022.

Dr Pramod Kumar

- National Cancer Awareness Day 2021: "Cancer Awareness Campaign" at Institute of Pharmaceutical sciences, Guru Govind Singh Indraprastha University, Dwarka, organised by ICMR-NICPR, Noida on 8 November 2021.

- World cancer day 2022: Awareness of common cancers, organised by ICMR-NICPR, Noida on 4 February 2022.

- QIAcuty one 5-plex Digital PCR hands on, organised by ICMR-NICPR, Noida on 23 February 2022.

- Celebration of HPV awareness day & International Women's Day, organised by ICMR-NICPR, Noida on 23 February & 8 March 2022.

Dr Dinesh Kumar

- QIAcuty one 5-plex Digital PCR hands on, organised by ICMR-NICPR, Noida on 23 February 2022.

Dr Rakesh Meena

- Online "Cancer Screening Traning Program for Medical Officers" conducted by NICPR ECHO, 29 November 2021 – 28 February 2022

- Online course on "Health Research Fundamentals", ICMR-NIE, Chennai, 24 January – 18 March 2022

Dr Sandeep Kumar

- Role of NGS in Genomic Surveillance and Clinical Microbiology organized by Life Science Group, Thermo Fisher Scientific, 21 April 2022.

- Reveal the Secrets of Tissue Microenvironment organized by TissueGnostics and IISER-Pune, 02 May 2022.

- ERMED: Online Journals from Wolters Kluwer @ OVID organized by National Medical Library, ERMED Consortia, 10 May 2022.

- ICMR-DHR Biomedical & Research Ethics Update" ICMR Bioethics Unit, NCDIR, Bengaluru, 18 May 2022.

- Talk on "Prevention of NCDs- Indian Perspective" by Dr. Sanjiv Kumar at ICMR-NICPR, 19 May 2022.

Dr Sudhir Tanwar

- cPIE Evaluators Orientation Workshop organised by MoHFW & WHO, New Delhi, 13 April 2022.

EVENTS ORGANIZED

Scientific Colloquium on "Prevention of NCDs- Indian Perspective", 19th May 2022

Oral Cancer Awareness month: Awareness Program 29th April 2022

Visit of the National Task Force on Cancer Management of The High Commission of the Republic of Kenya to NICPR, Noida, 28th April 2022

"Swachhta Pakhwada" celebrated by ICMR-NICPR, 1st - 15th April 2022

Invited lecture by Dr (Lt Col R R Nara) on Vermicomposting

Vermicomposting facility at ICMR-NICPR

Morning walk/Trek at Sanjay Van and Nehru place, New Delhi with staff of High throughput Viral Diagnostic lab, 27th February 2022

Meeting with Sources of Registration (SoR) in collaboration with ICMR-NCDIR, Bangalore, of Population Based Cancer Registry (PBCR), Gautam Buddha Nagar, 15th December 2021
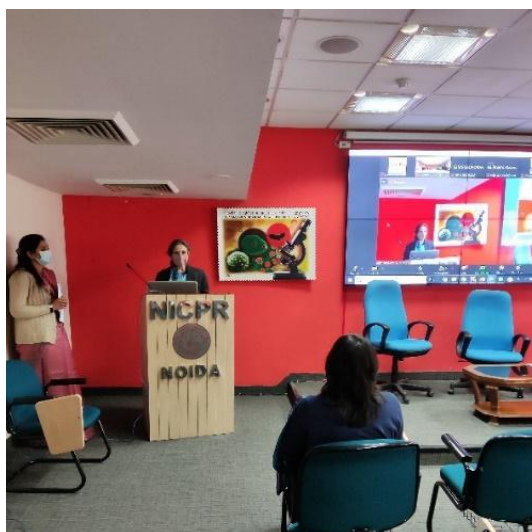
Communal Harmony Campaign Week, 19th – 25th November 2021
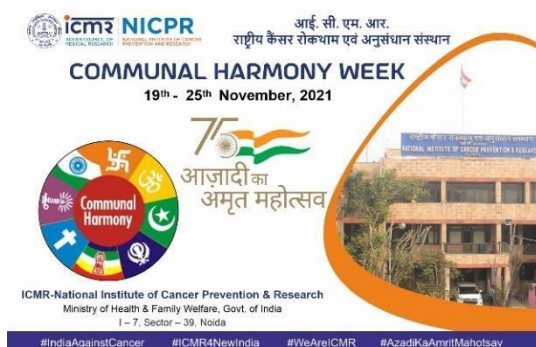
Oral Cancer Screening Activities 24th November 2021

National Cancer Awareness Day, 7th November 2021

Breast Cancer Awareness & Role of Modifiable Life Style Factors in Reducing Risk, 29th October 2021

Observance of Vigilance Awareness Week, 26th Oct- 1st November 2021
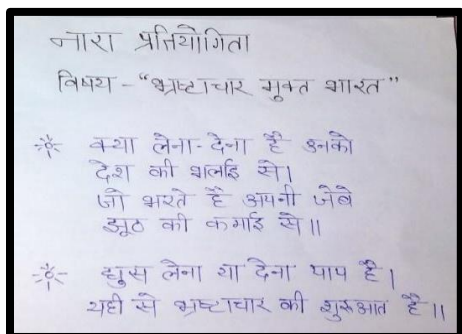
World Cancer Research Day - Webinar on "Oral Cancer and its Prevention", 24th September 2021

Celebration of Independence Day, 15th August 2021

हिंदी सप्ताह समारोह (13-20 सितंबर, 2021)

आयोजित गतिविधियाँ :

o   राज -भाषा प्रतिज्ञा

o   निबंध प्रतियोगिता   विषय: "भारत मेरा लक्ष्य २०३०"

o   काव्य पाठ

India Freedom Run 2.0 - Fit India Mission, 17th September 2021
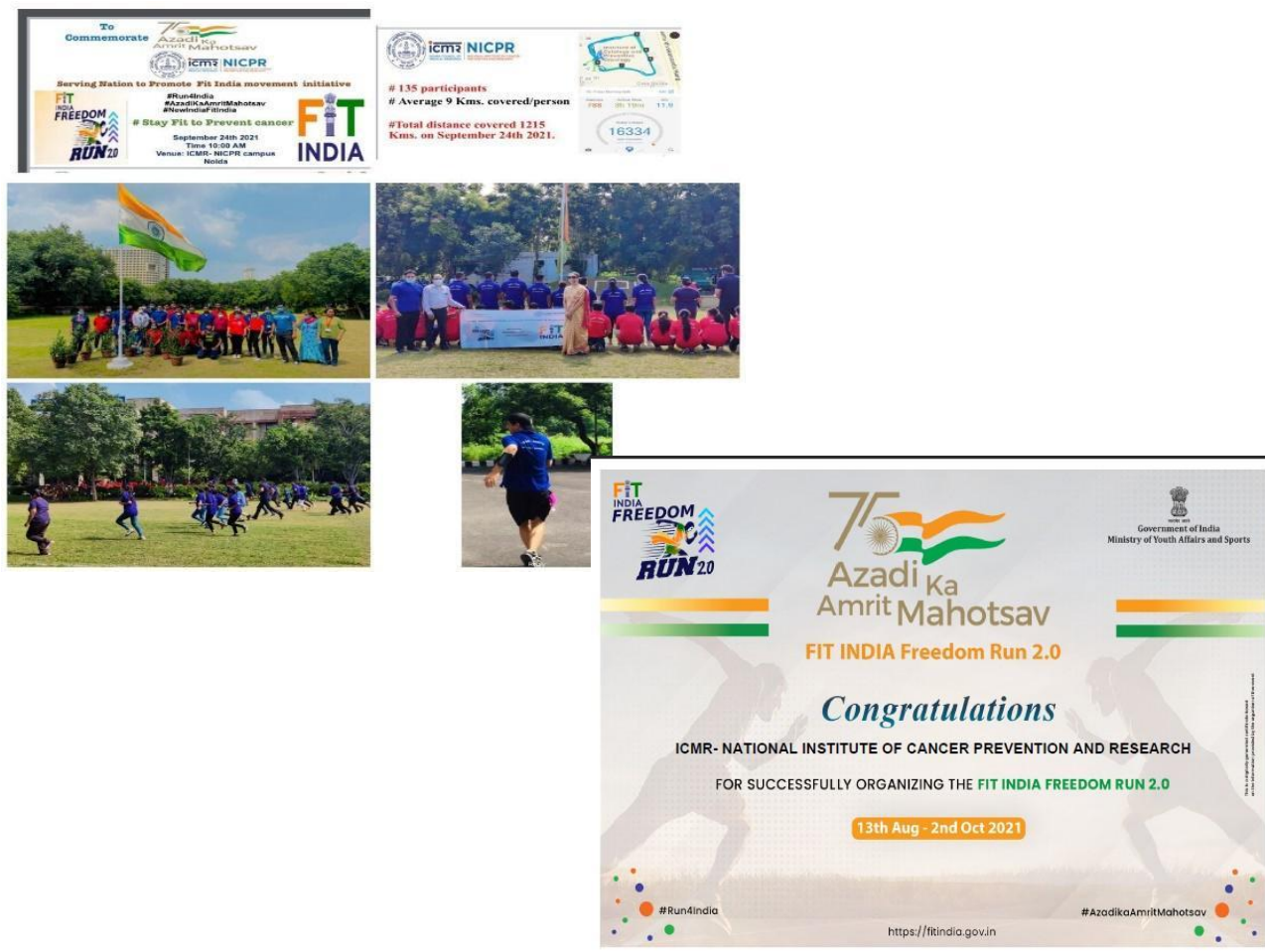
DIVISIONS AT A GLANCE

DIVISION OF CLINICAL ONCOLOGY

Front row (L to R): Mr. Bhupal Ram Arya, Dr. Jigisha Choudhary, Dr. Ekta Gupta, Dr. Shalini Singh, Ms. Manu Choudhary, Ms. Amita, Mr. Sunil
Back row (L to R): Mr. Anit Malik, Dr. Rakesh Meena, Dr. Kavitha Dhanasekaran, Ms. Reena Dwivedi, Ms. Latha Sriram, Ms. Sarita

DIVISION OF PREVENTIVE ONCOLOGY & POPULATION HEALTH

Left to Right: Mahesh Kumar, Sachin, Dr. Rishita Chandra, Chandresh Pragya Verma, Dr. Malasha Kumari, Dr. Shalini Singh (Head of the Division), Dr. Prashant Kumar Singh, Dr. Sudhir Tanwar, Santosh Srivastava, Rupal Jain

DIVISION OF CYTOPATHOLOGY

Left to Right Sitting: Dr. Ruchika Gupta, Dr. Sanjay Gupta (Head of the Division), Dr. Shamsuz Zaman
Left to Right Standing: Jitender Singh, Anil Verma, Shivani Bansal, Kalpana Verma, Bhopal Singh, Gaurav Sharma, Daniel Das

DIVISION OF EPIDEMIOLOGY & BIOSTATISTICS

Left to Right: Sanjay Yadav, Rajesh, Dr. Raj Narain, Rajshri, Dr Shalini Singh, Dr. Smita Asthana (Head of the Division), Rajani Yadav, Satendra Singh Yadav

DIVISION OF BIOINFORMATICS

Left to Right: Gaurab Kumar Jha, Dr. Subhash Mohan Agrawal (Head of the Division), Agneesh Pritam Das, Yasmin Fatima

MOLECULAR BIOLOGY GROUP

Left to Right: Dr. Showket Hussain, Dr. Dinesh Kumar, Dr. Suresh Hedau, Dr. Pragya Sharma, Dr. Mausumi Bhardawaj (Head of the Division), Dr. Nazneen Arif, Dr. R. Suresh Kumar, Dr. Anuj Kumar, Dr. Pramod Kumar, Dr. Sandeep Kumar

MOLECULAR GENETICS & BIOCHEMISTRY LAB

Left to Right Standing: Ravi Yadav, Lata Joshi, Heena Gautam, Manu Yadav, Dr. Pragya Sharma, Dr. Mausumi Bharadwaj (Lab Head), Dr. Upma Sharma, Dr. Sonal Srivastav, Dr. Ved Vrat Verma, Dr. Mohd Sajid, Abhishek Singh
Left to Right Sitting: Ishita Raheja, Ananya, YAshita Dwivedi, Anjali Pathak, Ishita Vaishkiar, Gunjan Baghel

MOLECULAR GENETICS LAB

Left to Right Standing: Dr. Anita, Mayank Maheshwari, Dr. R Suresh Kumar (Lab Head), Dr. Nivedita Mishra

MOLECULAR ONCOLOGY LAB

Left to Right Standing: Chandan Govind, Pratibha Agnihotri, Dr. Soni Kumari, Dr. Suresh T. Hedau (Lab Head), Ram Krishan Sahu, Dr. Binayak Kumar, Arjun

CELLULAR & MOLECULAR DIAGNOSTICS LAB

Left to Right Standing: Vishaka Kasherwal, Shagufta, Mehreen Aftab, Sandeep Sisodiya, Dr. Showket Hussain (Lab Head), Atul Chikara, Neha Singh, Jyoti Rani, Sonam Tulsyan
Left to Right Sitting: Fabeha Fatima, Saima Shaikh, Nida Mehmood, Tenzin Khando, Aradhita Dutta

ICMR-NICPR STAFF

SCIENTIFIC STAFF

	NAME	DESIGNATION
1.	Dr. Shalini Singh	Director
2.	Dr. Sanjay Gupta	Scientist –G
3.	Dr. Mausumi Bharadwaj	Scientist –G
4.	Ms. Rekha Saxena	Scientist – G
5.	Dr. Smita Asthana	Scientist –E
6.	Dr. Subhash M. Agarwal	Scientist –E
7.	Dr. R. Suresh Kumar	Scientist –E
8.	Dr. Suresh T. Hedau	Scientist –E
9.	Dr. Roopa Hariprasad	Scientist –E (on study leave)
10.	Dr. Ekta Gupta	Scientist – E
11.	Dr. Raj Narain	Scientist –D
12.	Dr. Kavitha Dhanasekaran	Scientist –D
13.	Dr. Prashant Kumar Singh	Scientist – D
14.	Dr. Showket Hussain	Scientist –D
15.	Dr. Ruchika Gupta	Scientist – D
16.	Dr. Shamsuz Zaman	Scientist – D
17.	Dr. Nazneen Arif	Scientist – D
18.	Dr. Malasha Kumari	Scientist –C
19.	Dr. Pramod Kumar	Scientist – C
20.	Dr. Anuj Kumar	Scientist – C
21.	Dr. Dinesh Kumar	Scientist - C
22.	Dr. Rakesh Meena	Scientist – B
23.	Dr. Sandeep Kumar	Scientist – B
24.	Dr. Sudhir Tanwar	Scientist – B

TECHNICAL STAFF

1.	Mrs. Latha Sriram	Principal Technical Officer & Administrative Officer-in-Charge
2.	Smt. Rajshri	Technical Officer-C
3.	Mr.Shailendra Kumar	Sr. Technical Officer (2)
4.	Dr. Pragya Sharma	Sr. Technical Officer C
5.	Mrs. Amita	Technical Officer-B
6.	Mrs. Reena Diwedi	Technical Officer-B
7.	Mrs. Chandresh P. Verma	Technical Officer-B
8.	Mr. Himanshu Rohilla	Technical Officer-B
9.	Mr. Deep Kumar	Technical Officer-A
10.	Mrs. Kalpana Verma	Technical Officer-A
11.	Mr. Neeraj Dubey	Technical Assistant
12.	Mr. Bhopal Singh	Technician-C
13.	Mr. Dharmender Kumar Sharma	Technician-1
14.	Mr. Mritunjay Kumar	Technician-1
15.	Mr. Danial Das	Lab.Assistant-1
16.	Mr. D.K.Roy	MTS(LT)
17.	Mr. Anil Kumar Verma	Lab. Assistant
18.	Mr. Jitender Singh	Lab.Attendant-1
19.	Mr. Gaurav Sharma	Lab Attendant -1
20.	Mr. Sandeep Sharma	MTS (Tech)
21.	Mr. Bhupal Ram Arya	Field Worker

ADMINISTRATIVE STAFF

Sl. No.	Name	Designation
1.	Mr. Yogesh Kumar	Administrative Officer
2.	Smt. Latha Sriram	Admn.Officer In-Charge
3.	Mr. Kishore Kumar	Accounts Officer
4.	Mr. Sanjeev Kumar	Private Secretary & Accounts Officer-in-Charge
5.	Mr. Rajveer Singh	Section Officer
6.	Mr. Sanjay Kumar Gupta	Section Officer
7.	Mr. Vijay	Assistant
8.	Mr. Monu Sharma	Assistant
9.	Mr. Sant Ram	Assistant
10.	Mrs. Krishna Magoo	Personal Assistant
11.	Mr. Ramesh Kumar	UDC
12.	Mr. Avinash Malhotra	UDC
13.	Mr. Naveen Kumar	UDC
14.	Mr. Paras	UDC
15.	Ms. Neha Kaushik	UDC
16.	Ms. Vikas Kumar	UDC
17.	Mr. Kailash Kumawat	Staff Car Driver Grade-I
18.	Mr. Tarachand Gurjar	Staff Car Driver Grade-I
19.	Mr. Dheeraj Rajaura	Staff Car Driver Grade-I
20.	Mrs. Anoop Devi	MTS (Gen.)
21.	Mr. Jai Prakash	MTS (Gen)

SUPERANNUATED TECHNICAL & ADMN STAFF

1. Mr. Chidambarmurthy Joshi, TO-C – August 2021
2. Mrs. Sangeeta Batra, Jr. Librarian – September 2021 (VRS)
3. Mr. Ramprakash, Sr. Driver – October 2021
4. Mr. Roop Chand, MTS – November 2021

STAFF TRANSFERRED/ RESIGNED FROM NICPR

Mrs. Karuna, Sr. Technician-3 (DOJ at NICPR-10.02.2021) – August 2021

Mr. Vinod Kumar Dhyani, Lab.Attendant-1(DOJ at NICPR-12.03.2021)-August 2021

Mr. Yogesh Kushwah, Lab. Attendant (DOJ at NICPR-13.04.2021) – September 2021

Mr. Jiwan Singh Bisht, Section Officer (DOJ at NICPR-23.02.2021) – September 2021

Mr. Dinesh Soni, Admn Officer (DOJ at NICPR-14.06.2021) – September 2021

Mr. Rajesh Kumar, Section Officer (DOJ at NICPR-01.03.2021) – October 2021

Mr. Rakesh Kumar, Section Officer (DOJ at NICPR-24.02.2021) – October 2021

Mr. Rahul Tiwari, Lab. Attendant (DOJ at NICPR-08.03.2021) – November 2021

Mr. Ram Phool Meena, Lab. Assistant (DOJ at NICPR-12.02.2021) – December 2021

Mr. Sidharth Yadav, UDC (DOJ at NICPR-20.02.2019) – Resigned in December 2021

Mr. Ajay Singh, Lab Attendant (DOJ at NICPR-01.07.2021) – January 2022

Mrs. Sonia Khattar, Section Officer (DOJ at NICPR-018.09.2020) – March 2022

Mr. Ram Chander Das, Lab. Assistant (DOJ at NICPR-09.02.2021) – March 2022

Mr. Satya Pal Singh, Lab. Assistant (DOJ at NICPR-03.03.2021) – March 2022

LIST OF SAC MEMBERS