ICMR-NICPR

ANNUAL REPORT

2019 - 2020

CONTENTS

FROM THE DIRECTOR'S DESK

Dear All,

Greetings and Welcome...!

It is a matter of pride for me to present the annual report of ICMR-National Institute of Cancer Prevention & Research (ICMR-NICPR) for the period January 2019- September 2020. The report provides a candid overview of our team's work and the progress achieved by the Institute during this period. It highlights the achievements, the challenges faced, and lays down the future roadmap for the Institute's growth.

This year began with the country facing an unprecedented challenge due to novel Corona virus (COVID-19) pandemic. Unusual times call for extraordinary responses and the Institute was assigned pre-eminent role by ICMR Hqrs. The Institute rose to the occasion and established a state-of-the-art High Throughput Laboratory for COVID 19 testing by RT PCR in a record time of 3 weeks under stringent lockdown conditions. We are testing samples from Western UP and Delhi. We also tested Honorable Members of Parliament, their families and staff during the monsoon session.

NICPR has literally covered the length and breadth of the country for establishing COVID 19 RT PCR Labs and making testing kits available at Leh in the North, Chennai in the South, Ahemdabad in the West and Bhubaneshwar in the East besides host of other centers. We also carried out 2 phases of sero-surveillance for COVID 19 in Western UP and Delhi. We drafted the brief for the MoHFW for comprehensive ban on SLT products (manufacture and sale) along with ban on their use and spitting in public places for containing COVID 19 pandemic. This culminated in the Union Home Ministry including it in its consolidated revised guidelines issued on 15th April 2020 to contain COVID-19 pandemic. Several states including Jharkhand, Telangana, Uttar Pradesh, Uttarakhand, Maharashtra, Haryana, Nagaland, Bihar and Assam immediately issued orders on the ban of use of smokeless tobacco products and spitting in public places for containing COVID-19 pandemic.

The WHO FCTC Global Knowledge Hub on Smokeless Tobacco organized an international consultation in collaboration with WHO SEAR on Tobacco Advertisement, Promotion and Sponsorship (TAPS) Ban for Smokeless Tobacco (SLT) to strengthen the enforcement of TAPS ban in these countries. Representatives from Bangladesh, Bhutan, Myanmar and Sri Lanka attended the meeting along with State Nodal Officers from the Indian states. NICPR assisted Myanmar in developing Tobacco

Control Policy and Strategy at a Development workshop. A National Consultation was organized in Patna on effective implementation of measures for control of Smokeless Tobacco use in India. As a result, state governments of Himachal Pradesh, Tamil Nadu and Madhya Pradesh issued notifications for ban of SLT. We are continuing to work with other State governments to provide supportive documents to facilitate the ban of SLT use. Tobacco cessation clinic has been started at NICPR keeping in focus the high burden of tobacco use in the country. A 'White Paper on Smokeless Tobacco and Women's Health in India' published in the Indian Journal of Medical Research highlighting the research and policy priority to achieve tobacco-free society and health-for-all goals.

The National Tobacco Testing Laboratory (NTTL) has been notified in the Gazette of India by the MoHFW. Processes for accreditation to WHO Tobacco Laboratory Network (TobLabNet) are going on. The NTTL-NICPR tested and reported the presence of nicotine in Pan Masala samples from Bihar which provided evidence for banning the manufacture, storage, distribution, transportation or sale of Pan Masala brands found in violation of specified standards. The states of Rajasthan, Maharashtra and Uttarakhand also followed suit.

The Institute has laid emphasis on primordial, primary, secondary and tertiary prevention of various cancers. Realizing the intersection and commonality of various risk factors such as nutrition, inflammation and infections in the pathogenesis of cancers, cardiovascular diseases and other Non-communicable diseases (NCDs), a cardio-metabolic programme has been conceptualized at the Institute. This will help in increasing awareness and management of preventive measures applicable to cancers, cardiovascular diseases and other NCDs in a comprehensive manner.

NICPR has been designated as a super-hub by the MoHFW for training in-service healthcare providers for cancer screening. There are two hubs connected to us currently and we are in the process of widening our coverage. Training of healthcare providers in palliative care in cancer has also been initated this year.

NICPR is also supporting national level projects such as the Population Based Cancer Registry, National Survey for Pulmonary Tuberculosis and Evaluation of HPV Vaccination Programme in Sikkim. We have initiated processes for establishment of a Model Rural Health Research Unit at Panipat, Haryana.

In the past year, NICPR has made significant strides both on scientific and developmental fronts. I sincerely appreciate the unanimous support and cooperation from all the scientists and administrative staff of the Institute who have contributed to the developmental activities and scientific achievements. At the same time, I would like

to reiterate that the Institute shall continue to work hard to reach greater heights in cancer research for the benefit and welfare of the society.

Dr. Shalini Singh
Director

www.nicpr.res.in

www.cancerindia.org.in

http://untobaccocontrol.org/kh/smokeless-tobacco/

About the Institute

ICMR-National Institute of Cancer Prevention and Research (ICMR-NICPR) was initially established as Cytology Research Centre (CRC) by the Indian Council of Medical Research (ICMR) in 1979, and was elevated to the level of an Institute (Institute of Cytology and Preventive Oncology) in 1989. In recognition of its significant public health contributions towards cancer prevention in the country, the Institute received its national status and was rechristened as National Institute of Cancer Prevention and Research in 2016. The thrust areas of research have included pre-cancer and cancers of the uterine cervix, breast and oral cavity with special emphasis on primary and secondary prevention through screening and early detection. The concepts of clinical downstaging of cervical cancer, visual inspection of cervix with selective cytology screening and novel diagnostic approaches for HPV and other oncogenes were introduced by ICMR-NICPR for screening and early detection of cervical cancer. The scientists at the Institute innovated and designed a simple and economical visual device with a light source (AV Magnivisualizer) for better visualization of the uterine cervix as well as the oral cavity and for use in community cancer screening programs where colposcopy facilities might not be feasible. The technology has been transferred by ICMR to a private company for its commercialization.

The current major research areas at ICMR-NICPR include screening for common cancers, early detection and management of precancers, development and validation of point-of-care screening and diagnostic tests/devices, transcriptional control of viral gene expression, preparatory work on India-specific HPV vaccine, analysis of breast cancer susceptibility genes and genomic landscapes of gall bladder and esophageal cancers. At present many multidisciplinary extramural as well as intramural comprehensive research projects are underway on various aspects of these

cancers.

In addition to the various research activities, the Institute offers diagnostic & referral services for cancer screening to various government-run hospitals across Noida. The Institute has been organizing community outreach activities including cancer awareness and screening camps in Gautam Budh Nagar district, U.P. An indigeneously designed website "***India Against Cancer***" is hosted by the Institute to provide India-specific information on prevalent cancers for the general population as well as primary level health care workers in English as well as Hindi in an effort to promote cancer awareness. In addition, training on cancer prevention, screening and early detection is being carried out for different cadre of health providers through ECHO (Extension Community Health Outcomes) platform. A Health Promotion Clinic functions at the Institute for screening for non-communicable diseases including the prevalent cancers in the attendant population and a Breast Cancer Clinic is held on Friday where women with breast diseases are evaluated by a team of doctors from AIIMS and their further management at AIIMS, New Delhi is facilitated. These activities are supported by the provision of fine needle aspiration (FNA) and cytology-based cervical and oral cancer cancer screening.

Since the formulation and release of "Operational framework document" for screening and management of common cancers by MoHFW, ICMR-NICPR has been playing a nodal role in training of different health cadre workers to facilitate the effective roll out of population-based screening of common cancers in India.

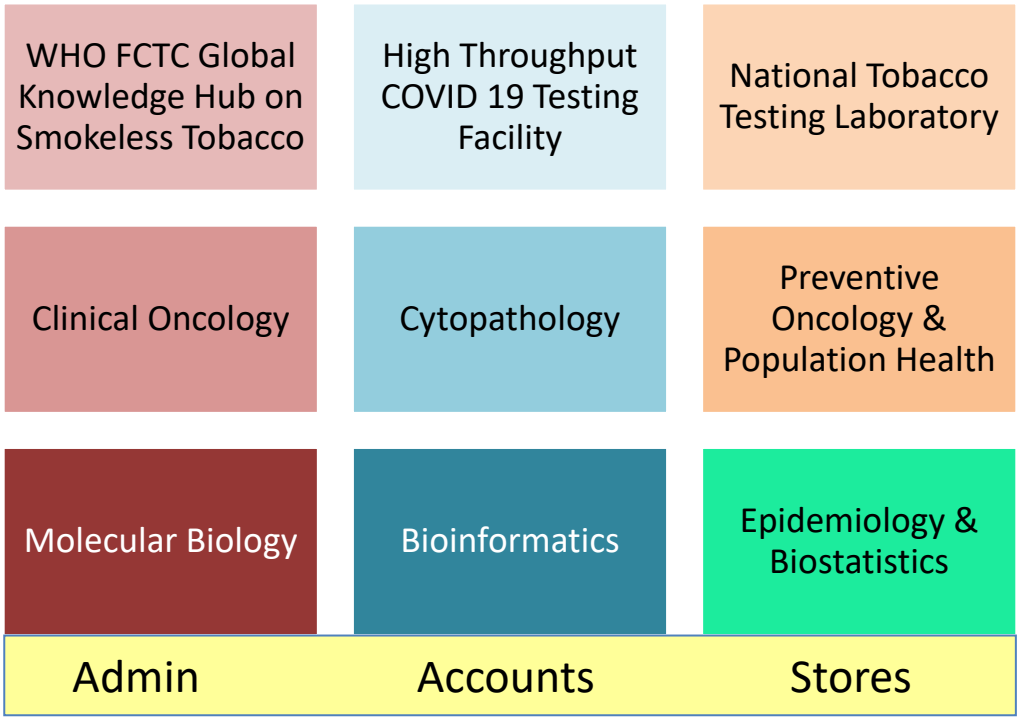
The Institute figures in many prestigious national and international scientific committees and has MOU with premiere Institutes like BR Ambedkar Institute of Rotary Cancer Hospital & NCI, All India Institute of Medical Sciences, New Delhi; Asian Institute of Public Health, Odisha; Rajiv Gandhi Cancer Institute and Research Centre, New Delhi; and All India Institute of Ayurveda (AIIA), Ministry of Ayush to collaborate for high-quality biomedical research to find innovative solutions to the existing lacunae in prevalent and emergent cancers in the country.

We have affiliation with different universities for Ph.D. program, including, Delhi University, Banaras Hindu University and Jamia Millia Islamia. NICPR promotes human resource development through in-service training workshops, summer training programs, MSc. project dissertation and Ph.D. programs.

ICMR-NICPR hosts the WHO FCTC Global Knowledge Hub on Smokeless Tobacco Products which generates and shares knowledge on smokeless tobacco and also guides the Parties to FCTC in control of SLT use. The Institute also houses the apex-level National Tobacco Testing Laboratory supported by the MoHFW.

The Institute is now poised to undertake a mission-mode project on cervical cancer elimination from India using a multi-pronged approach. Similarly, ICMR-NICPR is working towards realizing the dream of a Tobacco-free India through creation of mass awareness, promoting cessation for all types of tobacco products, and bringing about a step-change in implementation of effective prevention and control policies.

Since the beginning of 2020, the world as well as our country has been fighting with the pandemic of novel coronavirus (Covid-19). ICMR-NICPR rose to the occasion and its responsibility by establishment of a High-throughput viral diagnostic laboratory for RT-PCR based Covid-19 testing. NICPR has been conducting more than 6,000 tests daily in order to supplement the regional as well as national Covid-19 testing capacity. NICPR has also supported establishment of RT PCR testing facilities across the length and breadth of the country by providing logistics support and testing kits.



FACILITIES AT ICMR-NICPR

Health Promotion Clinic

The health promotion clinic has been functional at NICPR for the last five years. It functions in the OPD rooms situated in the clinical oncology wing, ground floor. Patient data is collected in electronic format.

Activities carried out at Health Promotion Clinic:

- Recording demographic parameters.
- Anthropometric measurements which includes height, weight and BMI
- General physical examination, Blood pressure and blood sugar estimation
- Oral examination with naked eye
- Breast examination of female patients
- Complete gynecological examination including Pap smear of women above 30 years.
- Symptomatic treatment
- Counseling regarding diet and risk factors of cancer
- Referral of patients to the tertiary care centre who require further evaluation and treatment.
- Creating awareness of cancer and its risk factors through kiosk displayed in the clinic area.

Summary of work done (Jan 2019 to Sept 2020):

- Total number of individuals screened: 10075
  (Females- 7940, Males-2131)
- Total number of Pap smears:7070

Breast Clinic (in collaboration with Dept. of Surgery, AIIMS)

Total registrations: 1317

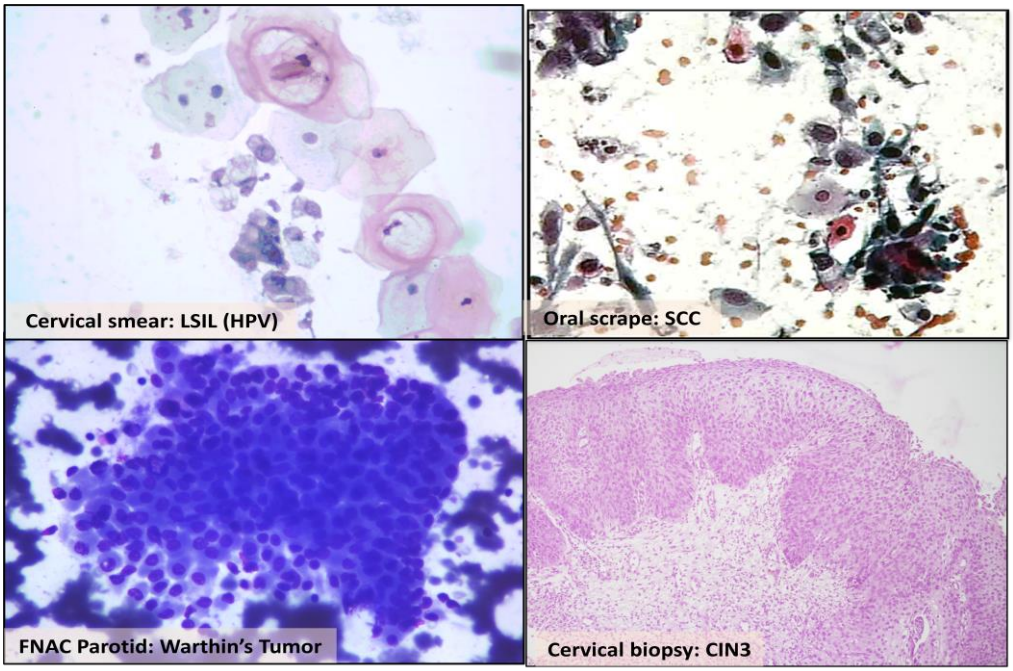
Oral Health Promotion Clinic

- A total of 7012 individuals were screened at the Oral Health Promotion Clinic, of which 796 individuals were diagnosed with abnormalities (oral potentially malignant disorders-OPMDs, oral malignancy, other tobacco-related and non-tobacco related orodental lesions).
- There were 1659 individuals who had a habit of using either smoked and/or smokeless tobacco, currently or formerly.
- Punch biopsy was performed for 13 suspected cases of OPMDs/oral malignancy, and exfoliative cytology for 29 such individuals.

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:

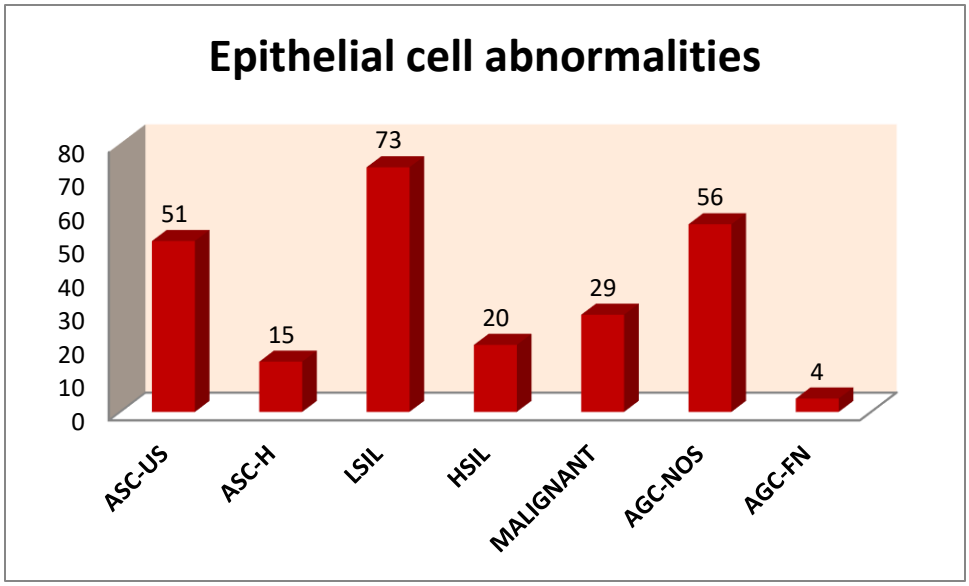
Investigation/ Procedure	No. conducted from Jan 2019 – Sept 2020
Pap smears	10012
Fine needle aspiration cytology (FNAC)	4968
Histopathology (biopsy examination)	503
Colposcopy	489
Thermocoagulation	37
LEEP procedure	11
HPV testing (HC2)	301

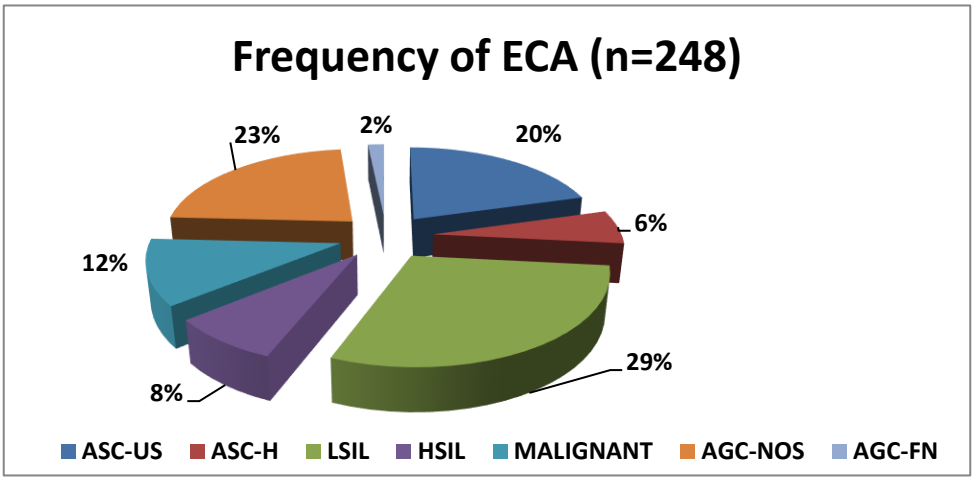


Audit of cervical smear reporting (Jan 2019-Sept 2020)

- Total no. of cervical smears: 10012
- Unsatisfactory rate: 14 (0.13%)
- Epithelial cell abnormalities (ECA): 248 (2.47%)

Epithelial cell abnormality	Number of cases	Percentage (N=9998)
ASC-US	51	0.51
ASC-H	15	0.15
LSIL	73	0.73
HSIL	20	0.20
MALIGNANT	29	0.29
AGC-NOS	56	0.56
AGC-FN	4	0.04
Total	248	2.47



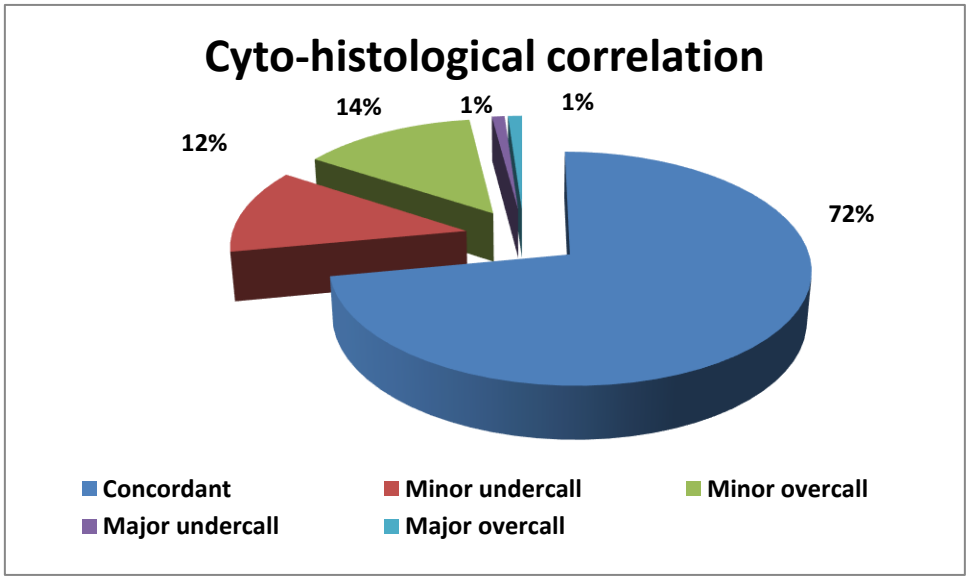


Cyto-histo correlation of cervical abnormalities *(as per American Society of Cytopathology guidelines 2017)*:

- **Cervical biopsies**: 225
  - Inadequate biopsies: 21
  - Adequate biopsies: 204

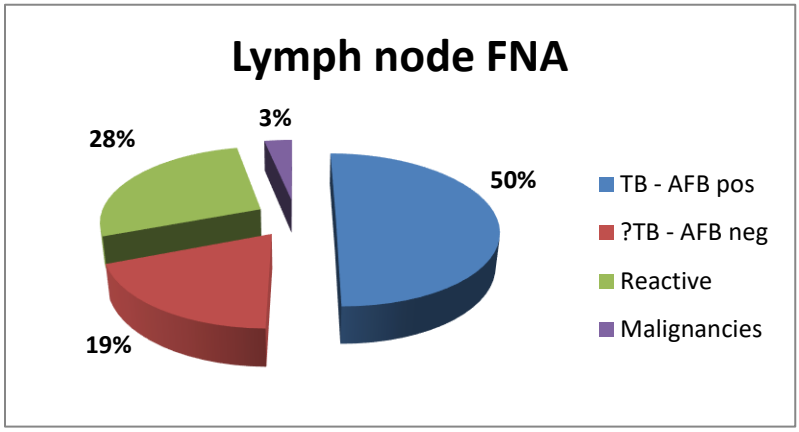
- **Cyto-histo concordance**: 139 (72% of 204)

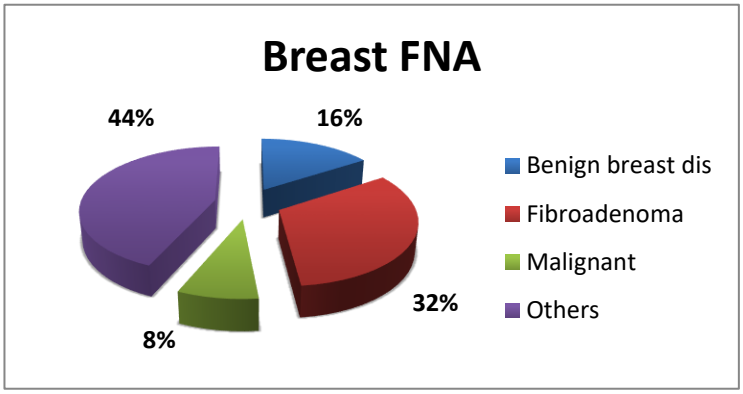
- **Discordance**:
  - Sampling error on biopsy: 6
  - Interpretative error on Pap: 53 (25 minor overcall, 28 minor undercall)
  - Sampling error on Pap: 6

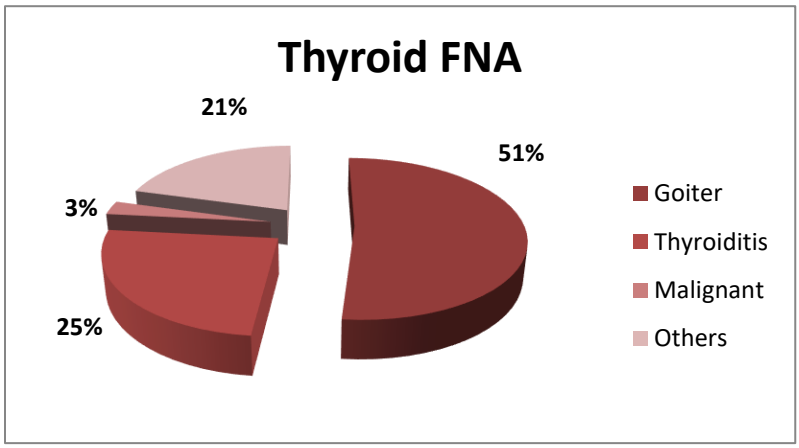


Fine needle aspiration cytology:

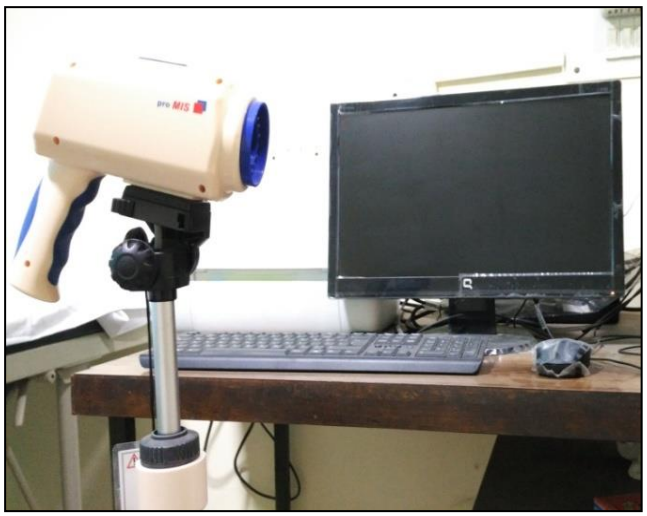
- **FNACs**: 4968
  - Lymph nodes: 2220
  - Breast: 879
  - Thyroid: 184
  - Other sites: 1685







Colposcopy



Colposcopy is a diagnostic procedure that involves examination of the cervix, vagina and vulva with the help of 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, 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 267 women were tested for HR-HPV during the year of 2019. 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.

Tobacco Cessation Services

Tobacco cessation clinic (TCC) at NICPR is equipped to provide tobacco cessation counseling to the all the patients visiting the Health Promotion Clinic. Tobacco history is recorded utilising the online clinical portal. This information includes the current status of tobacco use (current/former user), the type of tobacco/areca nut product used, its amount, duration, the frequency of use, duration of quitting the habit for former users, and the next date for follow up.

Behavioural intervention (periodic counselling, use of relevant IEC material) is the method employed for tobacco cessation. The tobacco user is recalled every 7-10 days until the habit is quit; thereafter follow-up visits are scheduled once a month for upto atleast 6 months. For those unable to be present for follow-up, periodic telephonic monitoring is done. The follow-up data is recorded for the concerned individuals, under the date of the follow-up visit, status of the tobacco/areca nut habit and next date of follow up, using the feature on the portal.

Tobacco cessation service in collaboration with National Drug Dependence and Treatment Centre (NDDTC), AIIMS

A special TCC was started every Tuesday since October 2019, for consultation by de-addiction specialists from NDDTC (AIIMS) Ghaziabad, who visited NICPR for highly dependent or relapse cases, or those having multi-substance use history, requiring extra assistance in the form of pharmacotherapy.

In the period Jan 2019-Sept 2020:

- A total of 1659 tobacco users (current users=1360, former users=299) reported to the oral health promotion clinic.
- The most common smoked tobacco products used were bidi (n=324) and cigarette (n=127), while the most common smokeless tobacco products used were gutkha (n=629), khaini (n=400), tobacco-based dentifrices (gulmanjan, nirala manjan) (n=236) and plain areca nut based products (supari, pan masala, plain betel quid) (n=200).
- The quit rate of these tobacco users was 4.3%.
- More than 50 tobacco users (including both new & on follow up) were prescribed Nicotine Replacement Therapy (nicotine gums or patches) and provided behavioural counselling, while 13 users (new & on follow up) were provided extensive behavioural counselling.

High Throughput Laboratory for COVID 19 Testing (HTL)

A High throughput laboratory (HTL) for COVID 19 testing was established at ICMR-NICPR at the behest of MoHFW. This facility was established in three weeks' time frame under most stringent conditions of the nationwide Lockdown due to Covid-19 pandemic. The HTL has been set up as the largest facility in India to cater to the needs of Uttar Pradesh and Delhi with testing capacity of up to 6000 samples per day.

The HTL has been designed for exclusive independent functions with partitioned cabin rooms for Sample receiving & sorting, Sample aliquoting, RNA extraction, Template addition, PCR reagent preparation and Real time PCR room. Separate areas were allocated for Stores, Records, Biowaste management and Control room in existing annexe building. A Data Management Team carries out online entry of results in the respective portals. SOPs for Covid-19 testing were standardized as per national and international bodies.

HTL at ICMR-NICPR has been rendering its testing services 24x7 to districts of Uttar Pradesh including Amroha, Baghpat, Rampur, Moradabad, Sambal, Shamli, Hathras, Bijnor as well as all the districts of Delhi.

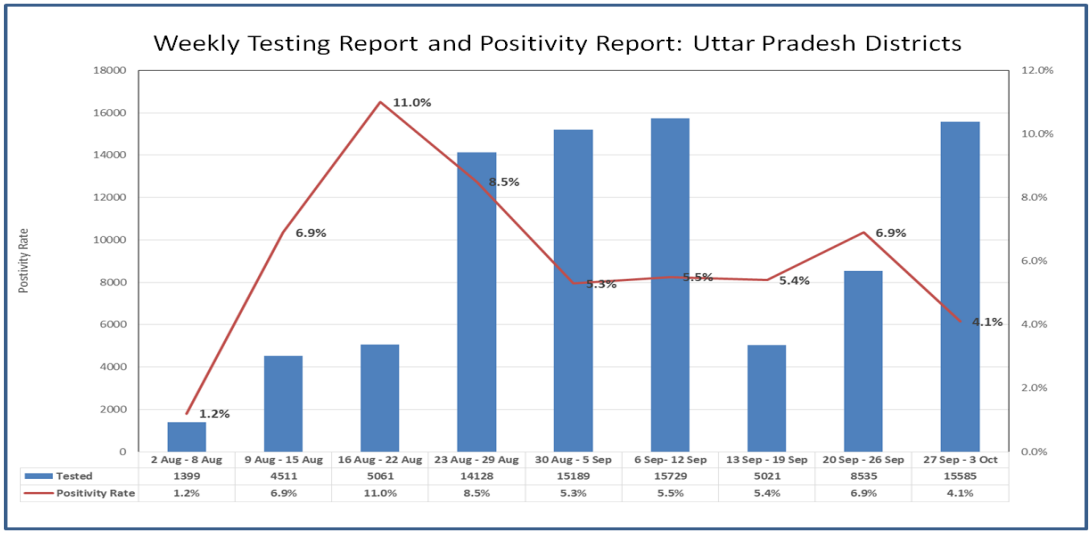


Fig: Graphical representation of NICPR-HDVTL sample testing and positive rates in UttarPradesh districts.

National Tobacco Testing Laboratory

The National Tobacco Testing Laboratories (NTTLs) are Tobacco Research and Testing Laboratories established by Ministry of Health and Family Welfare at three centers as ICMR-National Institute of Cancer Prevention and Research (NICPR), Noida; Centre Drugs Testing Laboratory (CDTL), Mumbai and Regional Drugs Testing Laboratory (RDTL), Guwahati. The NTTL at NICPR is the apex and coordination center for other two labs. It is first of its kind in South Asia 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 etcfor 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: The NTTL received smokeless tobacco (SLT) samples from State Nodal Officers (SNOs) from the states of Odisha, Chhattisgarh, Jammu & Kashmir; DGGI Pune Zonal unit; Drug Inspector, Odisha; Drug Inspector & Food Inspector, Jaipur; Food Safety officer Ranchi; Hukkah Bar- Noida and also Reference samples from CDC Atlanta for analyzing various parameters such as Nicotine, Moisture, Nitrate-nitrite, Chromium, Total sugars, Ammonia, Volatile Bases, Chloride, and pHs.

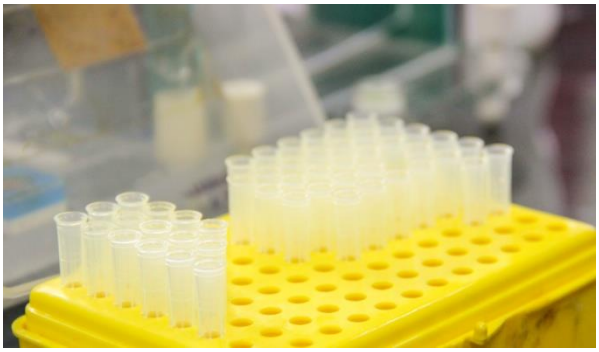
The NTTL at NICPR organized the first technical committee meeting for handholding the NTTLs with the three NTTLs and MoHFW members. NTTL at NICPR shared the experimental research experience on SLT samples to Director, TobLabNet through MoHFW for improvement/modification of SOPs for analysis of nicotine, moisture and pH in SLT samples.

NTTL at NICPR performed the analysis of 105 SLT samples for various parameters such as Nicotine, Moisture, Nitrate-nitrite, Chromium, Total sugars, Ammonia, Volatile Bases, Chloride, and pH for about 1000 tests in triplicate.

Future Plan:

- Participation in the WHO TobLabNet Smokeless Tobacco Method Validation Study for the determination of nicotine, moisture and pH in smokeless tobacco products.
- 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 equipments.
- Accreditation of NTTL by NABL.
- Development of new methods of tobacco product analysis according to the SLT products available in India.

RESEARCH PROJECTS



CERVICAL CANCER

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

Other Collaborating Institutes: District Hospital, Noida

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

Project Duration: Jul 2019- Dec 2021

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 high in HIV-infected women. 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 and 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 is 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 and willing for Genital examination and anal sampling.

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 is collected. All women undergo sampling for cervical Pap smear and for cervical HPV testing (by HC2). Concurrent sample collection from anal canal for cytology and HPV testing is also be done. Samples testing positive for high-risk HPV shall be further analyzed by PCR for HPV 16/18 genotyping. Additionally, women receive a symptom directed physical examination followed by testing and care as indicated. Women are 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 centres. Women found to have cervical or anal epithelial cell abnormalities are referred for appropriate management.

Work done during the period Jan 2019-Sept 2020:

The funding for the project was received in July 2019. Manpower (Medical Social Worker and Lab Technician) was recruited, chemicals and consumables procured and participant recruitment initiated from the ICTC, District Hospital, Noida.

	No. of participants	**Cervical cytology**	**Cervical HR-HPV (HC2)**	**Anal cytology**	**Anal HR-HPV (HC2)**
No. of HIV-negative (controls)	70	2 ASC-US 68 NILM	64 Negative 6 Positive	1 ASC-US 69 NILM	63 Negative 7 Positive
No. of HIV-positive (cases)	**15**	**2 HSIL 1 ASC-H 1 LSIL 11 NILM**	**8 Negative 7 Positive**	**Negative**	**9 Negative 6 Positive**

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

Translational Potential: The study shall:

a) Determine the prevalence of anal HR-HPV with or without cervical HPV shedding in HIV infected women in India;
b) Delineate the spectrum of anal and cervical epithelial abnormalities in HIV infected women;
c) Determine risk factors for anal HPV in HIV infected women; and
d) Establish feasibility of Anal HPV testing and cytologic examination for anal cancer screening.

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, Scientist G, 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 – Apr 2020

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 centres, 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 during Jan 2019 – Sept 2020:

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 expert cytotechnologists at

RCC-T.
From NICPR, a total of 3569 cervical samples collected in liquid medium have been transported to RCC-T for processing by megafunnel technique and utilization in refining of the algorithm for cervical cancer detection. Of these, 3562 were reported as satisfactory for evaluation at NICPR. A total of 112 samples, i.e. 3.14% of the satisfactory samples, were found to have epithelial cell abnormality by cytopathologists at NICPR.
From September 2019, only cytology-positive cases are being recalled for collection of cervical samples in vials to be transported to RCC-T.
Further extension of the project is awaited.

Translational Potential: The proposed system being developed in this project can be deployed as a complete system with limited dependencies on the external vendors or suppliers for the components like slide scanners, etc. The low-cost automated screening system could augment the cervical screening coverage in low resource settings like ours.

Development of DNA vaccine constructs against India specific HPV-16 variant: Enhancement of Immunogenicity of L1 constructs and characterization of T-cell epitope based E6/E7 construct

Principal Investigator: **Dr. Mausumi Bharadwaj, Scientist G, Division of Molecular Biology**

Funding agency & budget: ICMR, 65.0 Lakhs

Project Duration: Mar 2017 – Sept 2020

Brief background & rationale: Cervical cancer is one of the most common gynaecological cancer and leading cause of cancer related deaths in India. Persistent infection with high risk Human Papillomavirus (HR-HPV) is an established factor for the development of cervical cancer, especially HPV-16 followed by HPV 18 which causes more than 70% of cervical cancer cases in India. Two available vaccines Gardasil and Cervix are currently in use but they lack therapeutic potential and their high cost limits their use in low resource countries. On the other hand, there may be a possibility that intertypic HPV variant restrict the immune response by escaping consensus T-cell epitopes of the available vaccines. These variants may also provide some new epitopes for targeting a particular geographical population, which may not be presented by these available vaccines. To overcome the limitations of the available vaccines, researchers are trying to develop second generation vaccines. In the previous study (Indo-German Task force project - ICMR), we have identified sixteen (16) major variations (V1-V16) in L1 in HPV-16 genome derived from cervical cancer patient tissue biopsy samples. The present work is the continuation of the previous project.

Objectives:

- Enhancement of immunogenicity of prepared DNA based vaccine constructs (HPV 16 L1) by using genetic and non-genetic adjuvants
- Preparation and characterization of the therapeutic DNA vaccine constructs (HPV 16 E6/E7)

Brief Methodology:

- **Epitope Prediction:** Epitopes for MHC-I and MHC-II alleles were predicted in reference and variant sequences using Immune Epitope Database (IEDB): analysis resource (http://www.iedb.org/) and NetCTL 1.2 server (http://www.cbs.dtu.dk/services/NetCTL/).
- **Preparation of adjuvant-based DNA vaccine Constructs:** The potential immunogenic variants and reference segments were amplified by using specific primers and cloned into CMV expression vector pcDNA™3.3-TOPO® (Cat. No:K8300-01), according to the manufacturer's protocol.
- **Genetic immunization:** Plasmid DNA were dissolved in 0.9% saline without adjuvant at a concentration of 1mg/ml. C57BL/6mice (6±8-week-old; n=6) were immunized

intramuscularly three times at 4 weeks interval with 50 µg of plasmid into each quadriceps muscle (total 100 µg). Blood was taken before each immunization and two weeks after third injection, serum was separated and stored at -20°C.

- **Cellular Proliferation Assay:** Spleen of the immunized mice was collected and single cell suspension prepared according to the method described previously (Bharadwaj et al., 1999, 2002) and cell suspension was incubated with the antigen.
- **Cytokines Specific ELISPOT assay:** Single cell suspension or PBMC of the immunized mice was used. The anti-cytokine antibody followed by alkaline conjugated secondary antibodies or synthetic peptide was used for the stimulation and compared with the control and respective reference group.

Work Done:

The intra-type variations of HPV have different biological and pathological consequences with respect to disease progression. Six major variations of E6 gene identified from HPV 16 positive cervical cancer tissue biopsies by multi sequencing alignment. During In silico analysis on the prediction of B- and T-cell epitopes, 23 potent epitopes for MHC-II alleles, 10 potent epitopes for MHC-I and 15 B-cell epitopes in each reference and variant sequence were identified. Interestingly, the presence of variation H78Y and L83V result in creation of four new epitopes for the HLA-DQA1*0101/DQB1*0501. Out of 15 B-cell predicted epitopes, three most potent epitopes were identified in both reference and variant sequence. Notably the amino acid stretch from amino acid 16–60 and 76–94 are very important for the immunological properties of E6 protein because these regions contain majority of the predicted epitopes.

After multi sequence analysis we have identified 8 variations in E7 gene. Meantime, we worked on previously prepared constructs of HPV 16 L1 (pV16) with non-genetic adjuvant (GMCSF) in mice model and found that it was more immunogenic than the control group.

Translational Potential: DNA vaccines have great potential for the treatment of HPV infections and HPV-associated cancers due to their safety, stability, simplicity of manufacture, and ability to induce antigen-specific immunity. Therapeutic HPV DNA vaccines express tumour antigenic peptides and utilize APCs such as dendritic cells to provide effective cytotoxic T lymphocytes and antibody responses, allowing for the development of an adaptive immune response and immunologic memory. When combined with therapeutic HPV DNA vaccines, conventional treatments, such as chemotherapy and radiotherapy, result in enhanced CD8+ T-cell responses and antitumor effects. As a result, the prospect of combining therapeutic HPV DNA vaccines with chemotherapy and radiation therapy holds great potential in optimizing therapeutic efficacies.

Molecular Evaluation of Anticancer and Antiviral properties of Thuja Occidentalis

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

Other Collaborating Institutes: School of Life Sciences JNU, Central Council for Research in Homeopathy (CCRH)

Funding agency & budget: Ministry of AYUSH, 45 lakhs

Project Duration: Jan 2017 – Dec 2020

Brief background & rationale: Cervical cancer is second most common cancer in women and been associated with high risk Human papilloma virus (HPV) infection. Most of women get HPV infection in their life time but get cleared of immunologically. Persistent infection of HPV leads to cancer. It infects the epithelium of cervix and induces cellular changes resulting in tumour/cancerous lesions. Thuja is an ornamental/herbal plant that has been used in homeopathy practices for treatment for warts, caused by low risk HPV viruses. The present work aimed at evaluating homeopathy drugs against cervical cancer and transcriptional inhibitory potential of high risk HPV.

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: *Thuja Occidentalis* drug was prepared according to the homeopathy pharmacopeia and prepared with different potencies. Trypan blue dye exclusion, MTT were performed to investigate the growth of Hela, Siha and C33A cervical cancer cells in Thuja Occi-treated cells. FACS analysis was done to explore the cell cycle distribution; Real time PCR and western blotting were performed to check the expression of mRNA and protein respectively. Proteomics analysis (LCMS) to explore differential expressed proteins was performed in treated and control cells. Toxicity of different potencies of Thuja Occi. were explored on Balb/c mice model.

Work done during Jan 2019 – Sept 2020:

The cytotoxic and Molecular effect of T. Occidentalis was investigated in cervical cancer HeLa and Siha cell lines. Cell viability and cell cycle distribution, cell death were evaluated. Hela & Siha cells were treated with T. Occidentalis of different potencies (6C, 30C, 90C and 200C) for 48 and 72 h. There was a strong reduction in proliferation after 48 & 72 h treatment. The variations in copy number of HPV E6 were observed in Thuja treated cells by realtime PCR.

From proteomics study, it was found certain proteins were altered in treated cells and those altered proteins were identified and presently under investigations. These results suggest that T. Occidentalis has strong anti-proliferative property against cervical cancer cells and can induce cell cycle arrest in treated cells.

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.

Landscape of genomic alterations in Human Papilloma Virus Infection associated cancers- a genomics, bioinformatics and computational approach

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

Other Collaborating Institutes: School of Bioscience, University of Skovde, Sweden, Bioinformatics Research Group, University of Skovde, Sweden, Department of Urology, PGIMER, Chandigarh, Sahlgrenska University Hospital, Gothenberg, Sweden), Babasaheb Bhimrao Ambedkar University (BBAU) Lucknow, Department of Gynecology, AMU, Aligarh

Funding agency & budget: Joint Indo-Swedish (DST-VR), Rs 34,01,400

Project Duration: Jul 2017 – Mar 2020

Brief background & rationale: The increased number of cases in HPV association among different grades of cancers is an important factor to determine the tumor biology. Among many variants, E6 and E7 oncogenes present in HPV genome basically target tumor suppressor genes of the host for its integration. The present study involves identification of key genomic alterations and comparing the molecular landscape by Next-generation sequencing (Exome Sequencing) with respect to HPV infection. Bioinformatics and computational analysis of the data will be done to generate a database of altered genes for diagnostic purposes in future.

Objectives:

- Detection, typing and variant analysis of HPV Infection in different grades of cervical cancer.
- To study and compare the molecular landscape and key genomic alterations by next generation sequencing (exome sequencing) with respect to HPV infection.
- To identify key molecular pathways altered in cervical carcinogenesis and its correlation, if any, with HPV infection. To perform comparative analysis of cancer-related pathways between HPV-positive and HPV-negative cervical and prostate samples.
- To generate a database of altered genes that can act as potential therapeutic targets in the treatment of HPV related cancers.

Brief Methodology: The project associated methodology involves sample collection, followed by DNA extraction. Samples are then proceeded for Human Papillomavirus infection detection and typing using type-specific PCR primers. The samples are to be proceeded for Exome Sequencing using Illumina NextSeq 550 platform. Bioinformatics analysis includes finding the Somatic point mutations in tumor tissue compared to normal using MuTect. Annotation of mutations to be performed later by Broad Institute's Oncotator Programme to generate a database of mutated genes.

Work done during Jan 2019-Sept 2020:

The QC passed samples have been processed for exome sequencing to detect the genomic alterations associated with Indian population. To explore the genetic landscape, exome sequencing with 40X coverage was performed. The PCR enriched libraries were analyzed using High Sensitivity D1000 Screen-Tape assay, which shows the mean peak size of library for a sample at 357 bp ranging (228 - 534 bp) as shown in figure. Sequencing was carried out on Illumina NextSeq 500. The raw reads were filtered out and high-quality reads were selected from the dataset. We have got approximately 10 Gb of data from all the samples including approx. 60 to 70 million of high-quality reads per sample. We have completed somatic mutation calling and annotation in sequenced samples, where overall target alignment was ranging from 59 - 72%. We have found more than 26,000 total Exonic variants per sample with almost 13,000 synonymous and non-synonymous mutations. The sequencing data is under assessment for computational/statistical analysis where Hierarchical clustering using Kaplan-Meier analysis and mutated gene analysis with MuTect is ongoing.

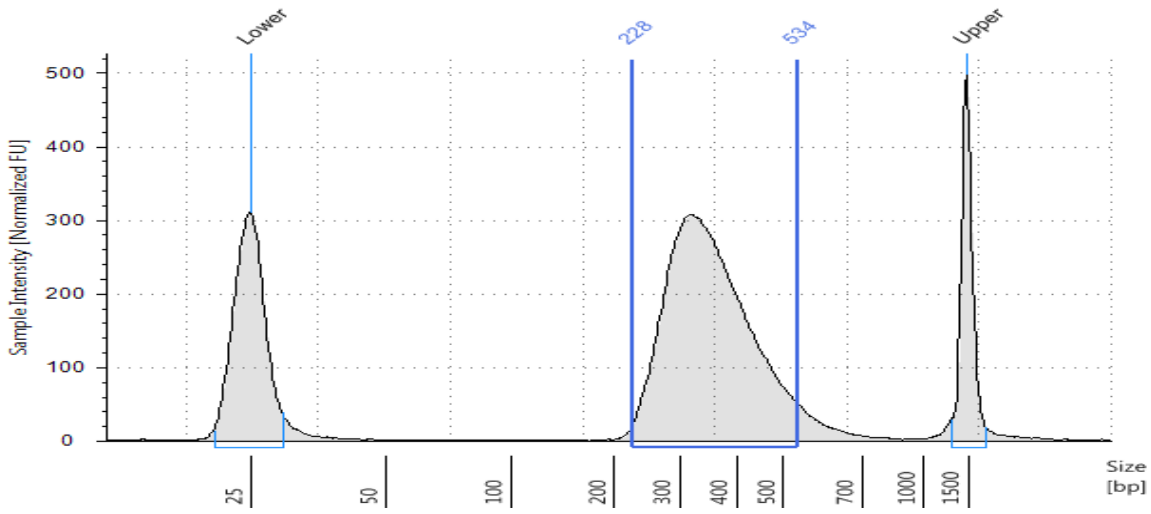


Fig: *The lowest peak depicts the lowest ladder base whereas highest peak size depicts the highest base pairs in ladder. The mean peak size of library is shown at 357 bp (average size of library) ranging (228-534 bp).*

Translational Potential: This study will be helpful in deriving a database of mutated genes among Indian population by using whole exome (Next-Gen. sequencing) technology through targeting the coding regions of DNA. We will also be able to find the correlation between HPV positive and negative cancer pathways, helpful in targeting specific markers for diagnostics purposes.

Reappraisal of cytology-histology correlation in cervical cytology based on the recent American Society of Cytopathology Guidelines (2017) at a cancer research centre

Intramural Research by Divisions of Cytopathology and Clinical Oncology, NICPR

Background: Cytologic-histologic correlation (CHC) is one of the routine quality assurance exercises for any laboratory practising cytology-based cervical cancer screening. A review of the literature highlighted a wide variation in the methodology employed for CHC. To bridge this gap, the College of American Pathologists' Gynecologic Cytopathology Quality Consensus Conference Working Group 4 and the Clinical Practice Committee of American Society of Cytopathology (ASC) recently formulated recommendations and guidelines for conduct of cervical cytology histology correlation (CHC).

Objectives: To assess the impact of recent ASC guidelines on the conduct of cervical CHC.

Brief Methodology: A retrospective review was conducted for cervical biopsies with their corresponding conventional cervical smears over a seven-and-half year period (January 2011-June 2018). As per the ASC guidelines, a discrepancy assessment grid was prepared. Major cytologic-histologic discordance was defined as a diagnosis of HSIL or CIN2+ in one of the tests with negative result in the other. Smears and biopsies of all discordant cases were reviewed for reasons of overcall and undercall.

Main Findings: Of the 341 cervical biopsies with corresponding Pap smear, cytologic-histologic agreement was noted in 249 (73%) cases. Major discordance was observed in 22 cases (6.4%) while minor discrepancies were noted in 70 cases. Atypical metaplasia and repair changes were the main reasons for overcall while small HSIL cells in atrophic smear and scant HSIL cells were important causes of undercall on cytology. Using the ASC guidelines, we could improvise upon the existing CHC methodology for categorization of cyto-histological pairs of cases with a cytological diagnosis of atypical glandular cells. Uniform application of these guidelines would standardize the conduct of cervical CHC internationally and provide scope for inter-laboratory comparison of data as well as enhance self and peer learning.

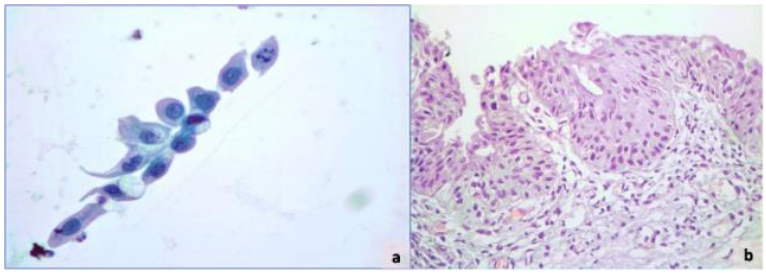


Fig: Cervical smear displaying cells with high nucleo-cytoplasmic ratio and hyperchromatic nuclei interpreted as HSIL (a, Papanicolaou stain x 400). Cervical biopsy of the same case displaying features of atypical metaplasia (b, H&E x 100)

Cervical high grade squamous intraepithelial lesion on conventional cytology: Cytological patterns, pitfalls and diagnostic clues

Intramural Research Study by Division of Cytopathology, NICPR

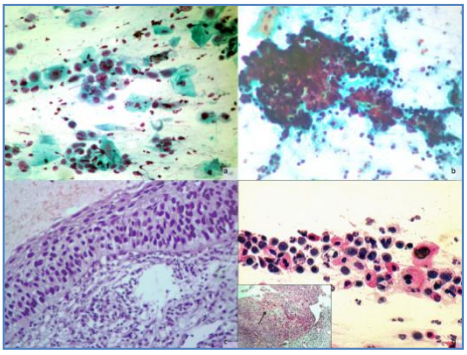
Background: Given the importance of detection of high-grade squamous intraepithelial lesion (HSIL), a precursor of invasive cervical cancer, efforts are imperative to avoid both underdiagnosis as well as overdiagnosis of this lesion on cervical smear. Overdiagnosis of HSIL on cervical smear leads to unwarranted investigations like colposcopy and biopsies and its associated anxiety among the screened women. Hence, awareness of the reasons of both under and overdiagnosis of HSIL is mandatory to avoid diagnostic errors.

Objectives: To elucidate the various cytomorphologic patterns, pitfalls and subtle clues to HSIL diagnosis on conventional cervical cytology through cytologic-histologic correlation.

Brief Methodology: Cervical biopsies reported as CIN2/3 were correlated with their corresponding Pap smears over a 10 year-period to determine the frequency of undercalls. For characterization of overcalls, cervical smears reported as HSIL and their corresponding biopsies during the same period were correlated. The discordant cases in both the groups were reviewed for problematic patterns and pitfalls in cytologic diagnosis of HSIL.

Main Findings: Of the 142 biopsies with CIN2/3, 20.4% cases had been undercalled on cytology. About half of these could be reclassified as ASC-H/ HSIL on smear review. Smears showing predominant cells of LSIL grade with a few HSIL cells and those with small abnormal cells in an atrophic background formed the main confounders for HSIL underdiagnosis.

Out of 130 Pap smears called as HSIL, the corresponding biopsy diagnosis was less than CIN2 in 10% and these were labelled as overcalls. Atypical metaplasia, hyperchromatic crowded groups and reparative changes constituted the major diagnostic pitfalls on cytology. A diligent smear review helped to reduce the undercall and overcall rates to 9.1% and 2.3%, respectively. Hence, awareness of morphologic challenges in interpretation of HSIL among cytopathologists practising cervical cytology would assist in reducing the diagnostic errors and ensure better patient management.



Classical patterns of HSIL: (a) single cell pattern (Pap x400); (b) Syncytial pattern (Pap x400); (c) Cervical biopsy with full thickness dysplasia or CIN3 (H&E x100); and (d) Keratinizing HSIL (Pap x400). Inset shows biopsy of the same case with keratinizing dysplastic squamous epithelium involving the full thickness (H&E x100)

Oral Contraceptives Use and Risk of Cervical Cancer – A Systematic Review & Meta-Analysis

Intramural Research Study by Division of Epidemiology and Biostatistics

Objectives: To evaluate risk of cervical cancer in OC users and non-users through a comprehensive systematic review and meta-analysis.

Brief Methodology: Literature search was conducted in databases such as PubMed, IndMed, Google Scholar and Cochrane databases from January 1990 till August 2019 using various search terms. Primary research studies that evaluated and assessed the association of OC use with cervical cancer with study design of case control or cohort types published in English language were included in the analysis. PRISMA guided review was done by two independent researchers. RevMan 5.3 package was used for meta-analysis. The random-effects model was used for pooling of data for each subgroup. The effect size of interest was the Odds Ratio (OR) for the effect of OC pill use and associated risk of cervical cancer. Risk estimates of effect size along with 95 % CI for overall and between subgroups were calculated. Forest plots were drawn to summarize information from individual studies and the pooled effect size for the subject under study. The variation across studies due to heterogeneity was described by a statistic called I^2.

Main Findings: The review included 19 studies. Overall risk of invasive cancer in OC users was found to be significant with known status of HPV OR (95 % CI) as 1.51 (1.35, 1.68) and for known HPV as 1.66 (1.24, 2.21). Adenocarcinoma, squamous cell carcinoma and carcinoma in situ had significant association with OR (95 % CI) of 1.77 (1.4, 2.24), 1.29 (1.18, 1.42) and 1.7 (1.18, 2.44) respectively.

A molecular understanding of the role of oral contraceptives in the pathogenesis of cervical cancer

Principal Investigator: Dr. Anamika Priyadarshini Sil, WOS
Mentor: Dr. Showket Hussain, Molecular Biology Group

Funding Agency: DHR – WOS
Duration of Project: 2017-2020

Background: Cervical cancer is caused by the persistent infection with high-risk Human papilloma viruses that leads to the development of carcinoma in situ from normal epithelial cells, but not to invasive cancer. Cofactors seem to be necessary for this last step. In this context, a detailed study is ongoing to find out an interplay between viral and cellular genes, and also the role of oral contraceptives (cofactors) in HPV positive and HPV negative cervical cell lines which ultimately lead to malignancy.

Objectives:

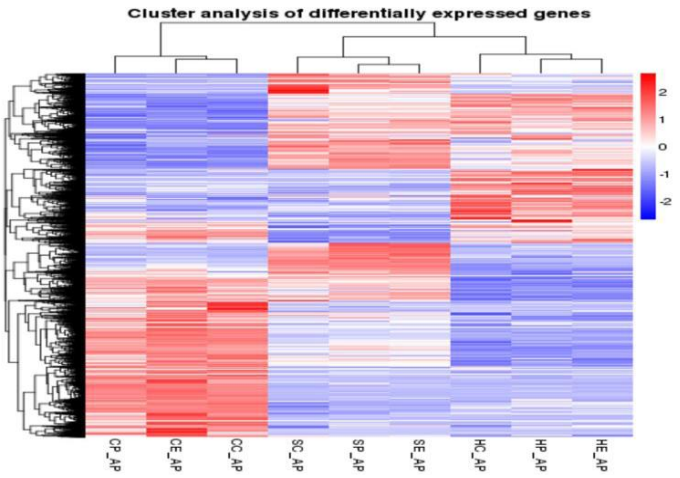
- To study differential expression of E6/E7 oncogene on human cervical cell lines on steroid treatment.
- To study the change in the global gene expression in human cervical cell lines with and without OCs treatment followed by their functional validation

Brief Methodology:

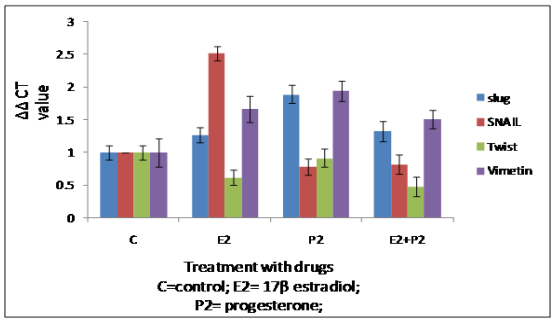
Human-derived cervical cell lines were treated with steroid hormones and following assays were done: Cell proliferation assay, Invasion assay, Expression of E6/E7 by RT-PCR and Western Blotting, EMT marker assay by RT-PCR, RNA sequencing and Analysis, Screening of differentially expressed genes, and Functional validation.

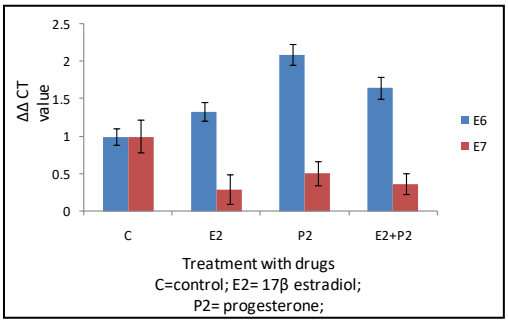
Work done during Jan 2019 – Sept 2020

The differential gene expression in control and treated cervical cell lines, RNA sequencing and analysis was done. The figure below shows hierarchical clustering Heatmap of differential expression genes in treated and untreated cervical cell lines. Red represents high expression genes, Blue represents low expression genes.



The Functional validation of differentially expressed genes is in progress. Immunoblotting of desired genes, invasion assay and real time PCR is being done. The oncogenes and EMT markers genes were being validated. The treated cervical cell lines showed significant changes in oncogenes and EMT markers as compared to untreated and HPV negative cell lines. The data is shown below.





Functional evaluation of Toll like receptors and Interleukin SNPs in association with Reproductive tract infections

Principal Investigator: Dr. Vineeta Sharma, RA
Mentor: Dr. Mausumi Bharadwaj, Molecular Biology Group

Funding Agency: ICMR, RA
Duration of Project: 2018-2021

Background: Reproductive Tract Infections (RTIs) symbolize a major public health problem in developing countries like India. According to the World Health Organization (WHO), each year around 500 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. They are associated with health outcomes such as pelvic inflammatory disease (PID), ectopic pregnancy, miscarriage, cervical cancer and an increased risk of HIV transmission RTIs include various infections such as Human Papillomavirus (HPV), *Chlamydia trachomatis* (*CT*), *Trichomonas vaginalis* (*TV*), *Neisseria gonorrhoeae* (*NG*), *Bacterial vaginosis* (*BV*) etc. Mutation or polymorphism in proinflammatory cytokines/TLRs can make the host susceptible to various infection or inflammatory diseases. Therefore, the study has designed for evaluation of the role of genetic variations in proinflammatory cytokines/TLRs in symptomatic and asymptomatic women with reproductive tract infections (RTIs)

Objectives:

- Detection of RTIs from cervical scrapes samples.
- Evaluation the role of TLRs and interleukin in RTIs by SNP analysis and expression.

Work done during Jan 2019 – Sept 2020

Total 200 cervical scrapes samples were collected from Gynecology clinic of NICPR. DNA was extracted from cervical scrapes and digested with Proteinase-K followed by the standard phenol-chloroform isolation and ethanol precipitation (Das et al., 1992). The DNA was quantified using Nanodrop spectrophotometer or by running in 1% agarose gel electrophoresis stained with Ethidium Bromide.

Quantification of extracted Genomic DNA from cervical scrapes samples

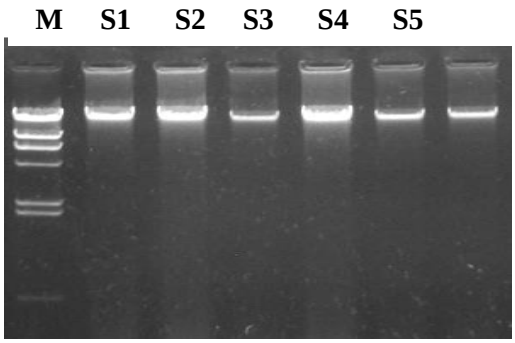


Fig: Gel picture showing the quantity of DNA in 1% agarose get stained with Ethidium Bromide. Lane 1(M) λ Hind III- digest Molecular marker. Lane 1 to 6: DNA from scrapes

Detection of HPV

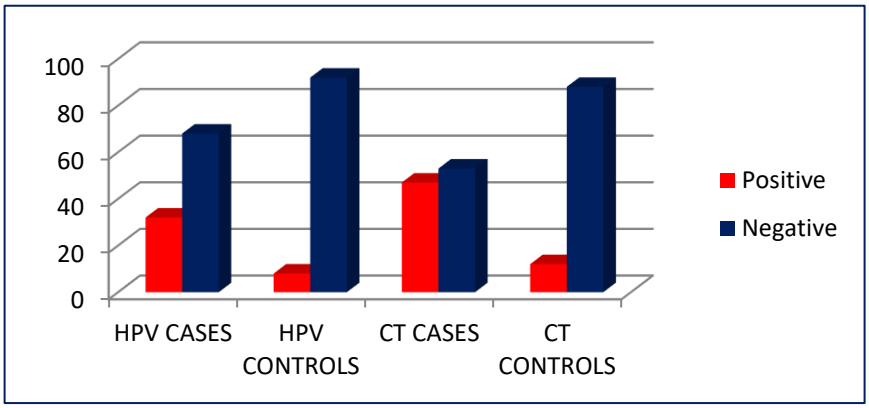
HPV infection was screened from scrapes samples by PCR using HPV consensus primers.

***Chlamydia* detection:**

Screening of Chlamydia was done by amplifying the gyrA gene by using standard PCR method mentioned by Patel AL et.al.

Prevalence of RTIs in cases and controls

	PV (Cases N=100)	**HPV (Controls N=100)**	***Chlamydia Trachomatis* (Cases N=100)**	***Chlamydia Trachomatis* (Controls N=100)**
sitive	32	8	47	12
gative	68	92	53	88



Bar diagram showing the frequency of RTIs in cases and controls

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: 2018-2020

Background: Cancer of uterine cervix is one of the most common gynaecological cancers worldwide. Human Papillomavirus (HPV) is considered as one of the major etiological factors in addition to other host genetic factors for development of this cancer. HPVs exhibit a great diversity in their genomic sequences because of which there are more than two hundred variants, HPV-16 and 18 being the most prominent HPVs contributing to over 70% of cervical cancer cases. HPV16 alone accounts for more than half the cases of cervical cancer worldwide. India shares approximately one-fifth of global cervical cancer burden and both the HR-HPVs (HPV-16 and HPV-18) was found in >95% of cervical cancer cases. Endometrial cancer (EC) is the most common gynaecologic malignancy in developed world, with incidence rising in developing countries like China, India also. In India, there are 0.88 million cancer cases with an incidence rate (ASR) of 105.5 per 100,000 in women; the highest being observed in Bangalore (ASR=4.2) and in Delhi (ASR=4.3), while in Mumbai it was 2.8 per 100,000. More than 380,000 new cases and 93,000 deaths from endometrial cancer are expected in 2020. Several genetic studies have indicated that common DNA polymorphisms in low penetrate genes may affect the susceptibility of an individual to malignancy. An array of polymorphic cytokines/chemokines produced by both tumors and free stromal cells (especially macrophages) is largely responsible for the complex phenomena occurring at the tumor / host interface and leading to tumor invasion. There is an attempt to relate cervical cancer and endometrial cancer. In medicine, biomarkers can be used for screening, diagnosis, prognosis or treatment monitoring.

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 during Jan 2019 – Sept 2020

Sample collection and Genomic DNA isolation was done from tissue and blood specimens by standard Proteinase K digestion and routine phenol chloroform extraction procedures. Detection of HPV and high-risk HPVs using standard PCR methods was done but till now none of the cases of endometrial cancer was found to be positive for HPV infection. Genotyping of SNPs for some of the samples was done using Allele specific PCR for the cases and control sample. Amplification of HPV DNA construct has been done.

To understand the mechanism of aberrant expression of miRNAs and their cross-talk 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 cancer 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. In order 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. The study shall also identify the epigenetic mechanism by which miRNAs probably regulate the expression of their target genes (oncogenes).

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:

Cervical cancer cell lines HeLa, SiHa would be cultured in MEM while C33A, Caski would be cultured in RPMI. For Protein Extraction and Western Blotting, the Nuclear or total cellular proteins from cervical cancer cell lines shall be extracted by standard method. Total RNA would be extracted using Trizol reagent for miR-21 analyses using Real-Time PCR. Methylthiazolyl blue tetrazolium (MTT) assay for Cell growth will be performed using MTT spectrophotometric dye assay. The cells shall be transfected with miR-21 inhibitor, 24 h post-transfection the cells will be allowed to reach confluency, before dragging a 1-ml sterile pipette tip through the mono-layer. The cells will then be washed and allowed to migrate for 12 or 24 h. At 0, 12 and 24 h post-wounding, images will be captured. ChIP (Chromatin Immuno-Precipitation) Assay will be performed to test the binding of H3K4me3, H3K27me3 on the promoter of target genes in the absence of miR-21 to understand the epigenetic landscape of these promoters. All data quantification and statistical analysis will be performed using SPSS 17.0 software. Values will be expressed as means ± SEM.

Work done during Jan 2019 – Sept 2020

Cervical cancer cell lines, HeLa and SiHa were maintained in MEM medium while C33a and Caski in RPMI medium containing antibiotics and 10% FBS. DNA was isolated from all of the cell lines using conventional Phenol-Chloroform Method and stored at -20℃. RNA extraction

was carried out using Trizol reagent and stored at -70℃ to perform expression-based studies using Real Time PCR. Nuclear protein extraction was carried out using RIPA buffer and stored at -80℃. Furthermore, protein expression-based studies using western blotting, promoter-based studies through ChIP and cell culture-based studies including MTT and invasion assay etc. would be performed.

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. The highest numbers of cervical cancer patients are found in the rural areas due to lack of awareness, lack of medical diagnostic facilities, unhygienic conditions, low income and lack of communication. However most prominently identified is HPV. 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:

Cervical cell line would be cultured. Nuclear and total cellular proteins from cervical cancer cell lines would be extracted by standard method described by Dignam with modifications by Hussain et al. DNA will be isolated by standard Phenol-Chloroform isolation method. RT-PCR would be used for preparing the cDNA. Si-RNA will be used for knockdown of gene expression. Cell function assays will be used to observe the proliferation/apoptosis and invasion/migration/adhesion of cells after Si-RNA treatment. Cell growth will be determined using MTT spectrophotometric dye assay. All data quantification and statistical analysis will be performed using suitable statistical software.

Work done during Jan 2019 – Sept 2020:

Cervical cell lines have been maintained in the laboratory. Consumables and chemicals have been procured. Further work such as DNA isolation, RT-PCR, Si-RNA transfection and cell function assays would be performed. All data quantification and statistical analysis will be performed using suitable statistical software.

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

Other Collaborating Institutes: AIIMS New Delhi, NIP New Delhi, Regional Cancer Centre Thiruvananthapuram

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

Project Duration: Mar 2017 – Mar 2021

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.

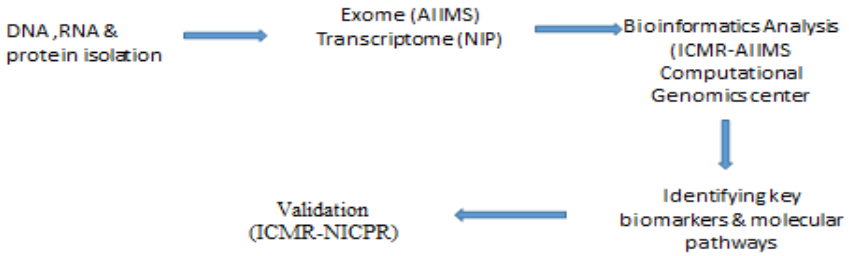
In India the incidence of breast cancer is increasing day by day and near future it will be major health issue among women. The proposed study will help in bringing awareness about breast cancer in India. In addition, it will help in framing the policies for breast cancer prevention and for the discovery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

Sample Collection:

- Patients & controls (n=120/120) (Tumor tissues, normal adjacent tissue & blood samples. New case un-treated & Histopathological confirmed provided informed consent
- To study risk factors (1:3 ratio of cases/controls) will be recruited from collaborating institutes.
- The brief of methodology is given below in schematic presentation:



Work done during Jan 2019-Sept 2020:

So far, we have received 95 breast tissue biopsies including normal; n=44 samples from AIIMS, New Delhi; and n= 51 samples from NIP, New Delhi. In addition to this whole exome sequencing and whole transcriptome analysis is being done in association with collaborative centres, AIIMS, New Delhi and ICMR-NIP, New Delhi.

Whole exome sequencing:

A total of n=142 samples (71 tumor samples + 71 matched blood samples) have been processed for whole exome sequencing with 100 samples of complete bioinformatics analysis and rest samples are being processed for analysis. To identify the somatic mutations, firstly Panel of Normal (PONs) were created from all the available normal samples followed by the implementation of Mutect2 tool of GATK package, that is used to identify the somatic variants and annotation is done by the implementation of ANNOVAR and SnpEff tools. Data analysis shows that the number of variants per sample in 50 paired tissue and blood samples varied from 558 to 1144 and total 38,143 variants are localized in 9564 genes. We have observed some of the novel genetic alterations among breast cancer patients in Indian population.

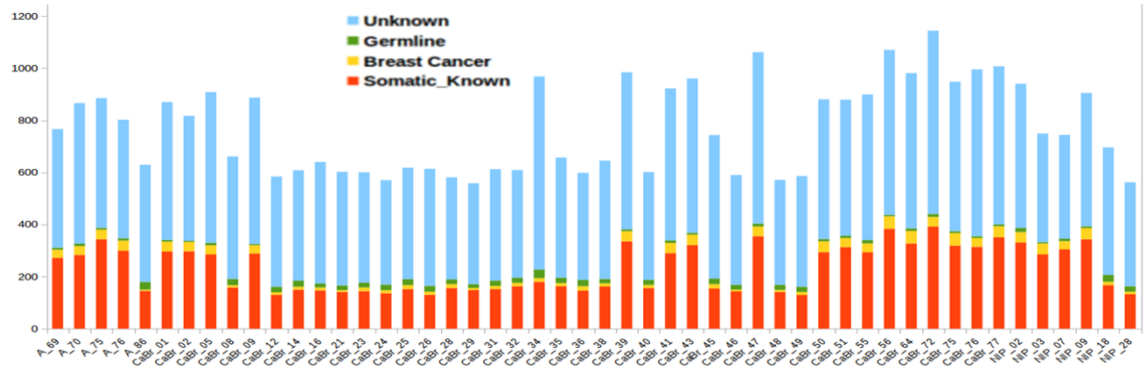


Fig: Whole exome analysis of breast cancer patients

Whole Transcriptome Analysis:

For whole transcriptome analysis, a total of n=84 samples (42 tumor& normal paired cases) were processed. RNA extraction was performed for both tumor and adjacent normal tissue of breast cancer. QC of all samples was performed. Among them 84 cases have more than 1000ng concentration in both tumour and normal and 76 pairs have passed RNA integrity having ≥7 RIN no. Library was constructed for 65 pairs. All library was barcoded and stored at -20^{0}C.bioinformatic analysis have been done for n=30 samples and rest of samples being analysed. Data of transcriptome is being validated in ICMR-NICPR, Noida.

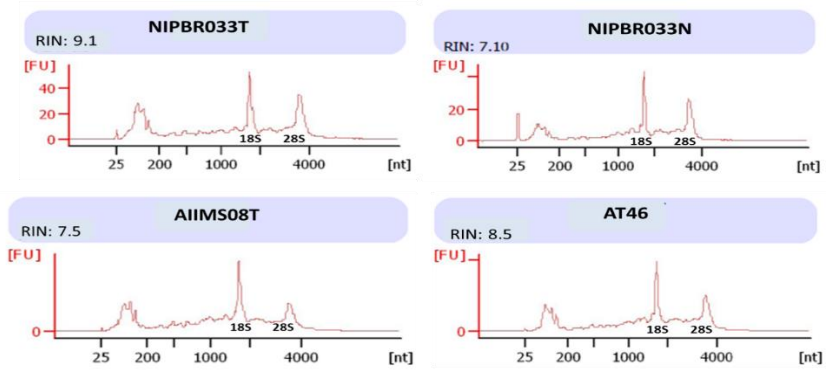


Fig: Representative Bioanalyzer snapshot of Total RNA sample of breast cancer patients showed more than 6 RIN number and peaks of 18S and 28S.

To summarise, the whole exome sequencing and whole transcriptome data is being validated in order identify the potential biomarkers for breast carcinogenesis.

Translational Potential: This study will help in finding out the novel key genes modulated in breast cancer in Indian population. The epidemiological data will also provide the key factors responsible for the occurrence of breast cancer in Indian population.

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 sonomammography correlation. All the results including FNAC and/ or biopsy were recorded for final comparison.

Main Findings: Till date total recruitment done: 204

Total Niramai done: 204
Total mammogram done: 197
Total ultrasound breast done: 192.

Evaluation of Breast light as a tool for early detection of breast cancer in women positive on clinical breast examination or at high risk of having breast cancer

Intramural Research Project by Division of Clinical Oncology

Other Collaborating Institutes: IARC, AIIMS New Delhi

Background: Clinical breast examination (CBE) has been proposed as an alternative to mammography screening in low-resource settings. However, it is seen that the efficacy of CBE may be substantially lower (28-36%) in practice than is reported in clinical trials. BreastLight™ (PWB Health, of Dumbarton, Scotland-model BL801) is a handheld device that trans-illuminates the breast with a visible harmless red-light (617 nm) that is absorbed by hemoglobin so that areas of high vascularity (such as malignant tumors) should appear black. As it highlights dark areas where blood is present, it is therefore quite normal to see a pattern of veins, but if there is a dark cluster, it is likely to be a potential abnormality. A cross-sectional study found BreastLight™ to have a sensitivity of 93% and a specificity of 73.7% in detection of breast cancer. Benign lesions (e.g. fibrous cysts), on the other hand, generally do not show up as positive with Breastlight™.

Objectives:

Primary Objective: To estimate the sensitivity, specificity and predictive values of Breastlight™ in detecting breast cancers in the women referred for positive CBE and mastalgia or for evaluation of contra-lateral breast in breast cancer patients against the ‘gold-standard’ test of mammography and/or tissue diagnosis

Secondary objectives:

- To develop a diagnostic algorithm that incorporates Breastlight™ in the triage of breast lumps detected on CBE to avoid unnecessary imaging and biopsy procedures for benign lumps

- To assess the agreement between Breastlight™ and ultrasonography in localizing the breast lesions correctly

Brief Methodology: This is a cross-sectional study to evaluate BreastLight™ as a triaging tool for the CBE-positive women. The study also intends to evaluate the accuracy of Breastlight™ to detect an early cancer in the contralateral breast of the women operated for breast cancer. After obtaining written informed consent, the participants will are interviewed to collect the socio-demographic and reproductive variables. The Breastlight™ examination is performed by a trained provider and the results are recorded. Both the breasts including the axillary tail are systematically examined in sitting position in a dark room.

If a dark cluster/dark mass is visible in the background of red colour the test is considered

positive. The location of the lesion by the breast quadrant is documented. All the recruited women undergo CBE by a trained clinician or surgeon and breast ultrasound (USG) by a trained sonologist irrespective of CBE and Breast light™ results. The sonologist is blinded to the Breastlight findings. All the women, except those with obvious lesion on CBE or USG will have diagnostic mammography for disease confirmation. Those with suspected lesions either on USG or mammography undergo FNAC or core biopsy. Women positive for malignancy on FNAC or core biopsy undergo further investigations, staging and treatment.

Main Findings: Till date total recruitment done: 251

Identify the Mechanisms Involved in Developing Resistance against Abemaciclib and Palbociclib in ER+ve, PR+ve and HER-2-ve Breast Cancer

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

Funding Agency: ICMR – PDF
Duration of Project: 2018-2020

Background: Abemaciclib and Palbociclib are kinase inhibitors, targeting cyclin-dependent kinase 4 and 6 (CDK4 and CDK6) that inhibit cell cycle progression from G1 to S phase. Abemaciclib and Palbociclib are approved by FDA for the treatment of advanced stages of ER +ve, PR +ve and HER-2 –ve breast cancer (BC) patients. Several clinical studies have reported that during the long run of an anticancer drug in breast cancer, tumor cells acquire resistance. Mechanism of drug resistance against Abemaciclib and Palbociclib are poorly understood and requires extensive study to sort out the therapy resistance problem.

Objectives:

- To understand the molecular mechanisms involved in developing resistance to these drugs in breast cancer cell line.

Work done during Jan 2019 – Sept 2020

We have selected two kinase inhibitors which target CDK4/6 in the G1 to S phase transition of cell cycle. MCF-7 and MDA-MB-231 cells were kept in continuous treatment with Abemaciclib and Palbociclib to develop resistance cell models. We observed elevated level of IC-50 values in resistant cells as compared to sensitive one. Confirmation of our resistance cell models has been done by cell viability assay and PI-staining-microscopy.

On molecular study of resistance models, we found elevated expression of anti-apoptotic genes such as BCL2, MCL1 in resistant cells as compared to sensitive ones. We also observed elevated expression of MDR1 and ABCG2 genes expression in resistant cells further confirming our resistant models. Our proteome data showed that resistant cells have multiple genes which are differentially expressed. Refinement of oncogenic role of these differentially expressed proteins from available literature on PubMed site is in the process. Deep analysis of mRNA, miRNA and proteome data at a single platform is required to obtain the key molecules which may be obtained as prognostic marker candidate or new drug target candidate for further validation in the mouse model.

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

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

Background: Chemotherapydelivers anti-cancer 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 body cells. Conventional chemotherapy fails to target the cancerous cells selectively without interacting with the normal body cells. Thus, they cause serious side effects including organ damage resulting in impaired treatment with lower dose and ultimately low survival rates. Whereas, nanotechnology-based drug-delivery system should possess some basic requirements such as large loading capacity, biocompatibility, less toxicity, easily degraded by the body's metabolism, and be nanoscale in order to facilitate the release of drugs by intravenous administration with controlled manner. Besides this, for better therapeutic effectiveness, combination anti-cancer treatment has also long been adopted in clinics. For example, anthracyclines (a class of drugs) -based combination chemotherapy has shown improved anticancer activity than anthracyclines alone. This combinatorial therapy shows three types of mechanism; (1) inhibit DNA and RNA synthesis by intercalating between base pairs of the DNA/RNA strand, thus preventing the replication of rapidly-growing cancer cells, (2) inhibit topoisomerase II, preventing the relaxing of supercoiled DNA, and thus blocking DNA transcription and replication, and (3) 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 during Jan 2019 – Sept 2020

A comparative study has been carried out for refinement of nano-carriers and obtained results are given below. Based on results, it is concluded that DOX loaded MOF@GO-FA is better nano-carrier in comparison to GO-FA.

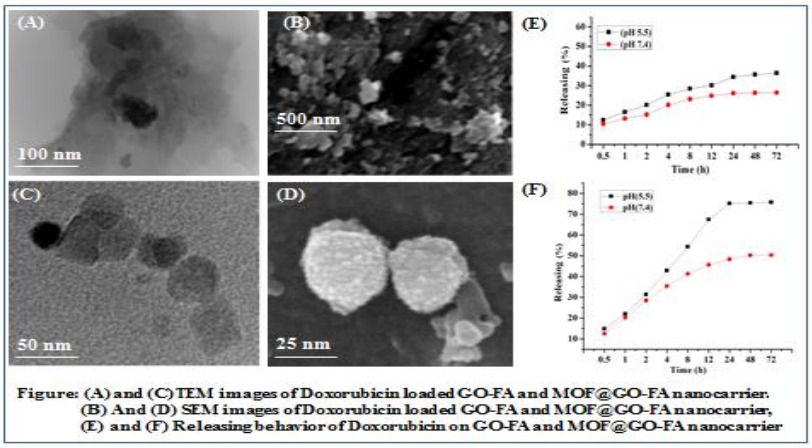


Figure: (A) and (C) TEM images of Doxorubicin loaded GO-FA and MOF@GO-FA nanocarrier.
(B) And (D) SEM images of Doxorubicin loaded GO-FA and MOF@GO-FA nanocarrier,
(E) and (F) Releasing behavior of Doxorubicin on GO-FA and MOF@GO-FA nanocarrier

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 CO2 incubator. Cells were treated with resveratrol and incubated in a CO2 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 during Jan 2019 – Sept 2020

Our results suggest that MBD's proteins have binding affinity on promoter sequence of BRCA1 gene but not on p16 gene and regulate its transcription after binding. Resveratrol is a phytochemical has been reported to possess anticancer properties; however, there is no report available for its role on MBD genes expression. We have found that resveratrol has anti-

metastatic role in MCF-7 and MDA-MB-231 breast cancer cell lines in higher concentration but there is no effect on MCF10A breast control cell line. Higher concentration of resveratrol was also found to reduce the colony formation in MCF-7 and MDA-MB-231 cell lines which suggests that resveratrol may help in control of tumor progression. Further real time PCR and western blotting results will suppose to explore the correlation of MBD protein and HDAC1 role in BRCA1 and p16 genes expression and its role in breast cancer progression.

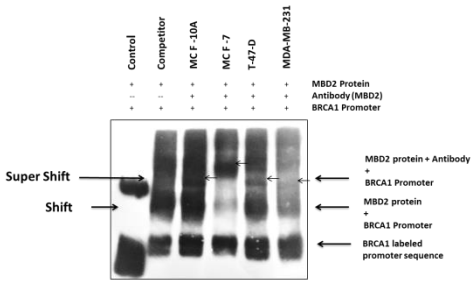


Figure: presence of active MBD2 protein and BRCA1 promoter complexes in MCF-10A,MCF-7, T-47D and MDA-MB-231 breast cancer cells.

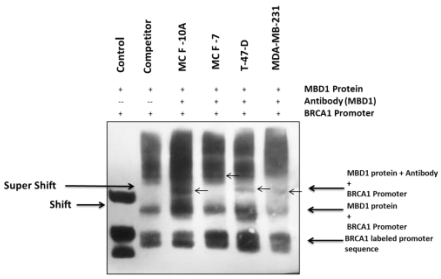


Figure: presence of active MBD1 protein and BRCA1 promoter complexes in MCF-10A,MCF-7, T-47D and MDA-MB-231 breast cancer cells.

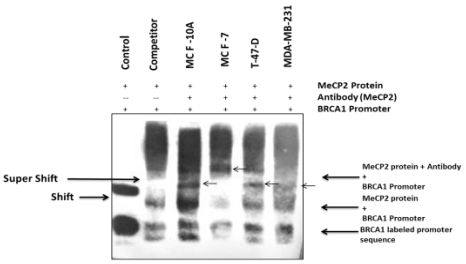


Figure: presence of active MeCP2 protein and BRCA1 promoter complexes in MCF-10A,MCF-7, T-47D and MDA-MB-231 breast cancer cells.

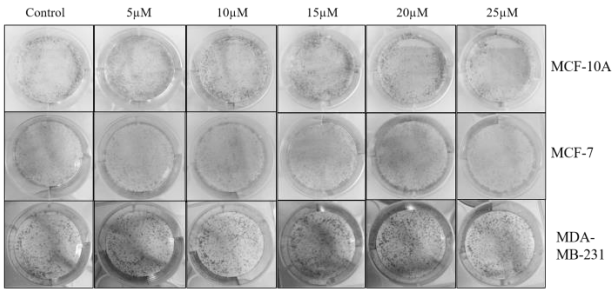


Figure: Clonogenic assay was performed in MCF-10A, MCF-7 & MDA-MB-231 cell line with different conc. of Resveratrol and colony were counted using Image-J software. frequency was calculated using formula

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.

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.

Role of Ets-1 Transcription Factor in Breast Carcinogenesis

Principal Investigator: Dr. Showket Hussain, Molecular Biology Group
Research Scholar: Mr. Sheeraz Un Nazir, SRF

Funding Agency: ICMR – SRF
Duration of Project: 2017-2020

Background: It is well established that breast cancer is the most common cancer both in developed and developing countries. Its risk factors are broadly categorized into exogenous and endogenous factors which cause changes in structure and function of various genes such as tumor suppressor genes, oncogenes, DNA repair genes and cell cycle control genes. The regulation and expression of those high risk genes are controlled by host transcription factors which play a key role by activation and repression of genes and by inducing several aberrant deregulation of signaling pathways in the cell. One such transcription factor is Ets-1 whose higher expression of Ets-1 is found in number cancers with poor prognosis. However, its role in breast cancer is not fully explored. Our aim is to study in detail the regulation of Ets-1 in Breast cancer.

Objectives:

- Expression profile of Ets1 transcription factor in breast cancer cell lines.
- Validation of Ets1 expression profile in a subset of breast cancer tissue biopsies and its comparison in normal adjacent breast tissue biopsies.
- Role of downstream target gene MMP-9 regulated by Ets1 in breast carcinogenesis

Brief Methodology:

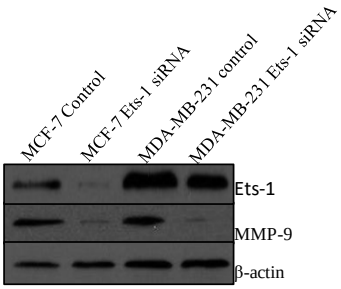
Human breast cancer cell lines MCF-7 (ER, PR +ve, Her2 -ve) and MDA-MB-231(ER, PR and Her2 -ve) were maintained. Basal expression of Ets-1 was checked by western blotting, real time PCR and immunofluorescence. Knockdown of Ets-1 was performed by Ets-1 siRNA and its effect on various oncogenic processes was evaluated by performing invasion assay and the effect on EMT markers.

In order to validate the above results, histopathologically confirmed 150 breast biopsies consisting of 75 tumor tissues and 75 corresponding normal adjacent tissues were taken and the expression of Ets-1 was checked by western blotting and immunohistochemistry.

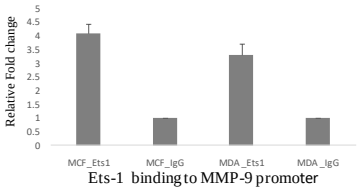
For Objective 3, knockdown of Ets-1 was performed and its effect on MMP-9 was checked by immunofluorescence, real time PCR and western blotting. Regulation of MMP-9 by Ets-1 was also checked bioinformatically and was validated by performing ChIP assay and Pull-Down Assay.

Work done during Jan 2019 – Sept 2020:

Our results showed that transfection of Ets-1 siRNA in breast cancer cell lines resulted in downregulation of Ets-1 and MMP-9. Ets-1 knock down also showed reduced cell invasion and altered expression of EMT markers. Moreover, we could also predict that MMP-9 gene promoter harbors a binding site for Ets-1 transcription factor may be responsible in direct transactivation of Ets-1 along with EMT markers. Therefore, these findings may suggest a plausible role of Ets-1 dependent regulation of MMP-9 gene and may have a significant impact on breast carcinogenesis. Further validation of the results revealed an overexpression of Ets-1 gene in 75 breast cancer tumors as compared with their normal adjacent tissues. The findings significantly established a correlation betweenEts-1 expression in breast cancer tissue with hormonal receptor profiles and ductal-lobular histological subtypes in Indian population. In addition, a differential expression pattern of Ets-1 was observed between high, moderate and low grades of breast cancer patients.

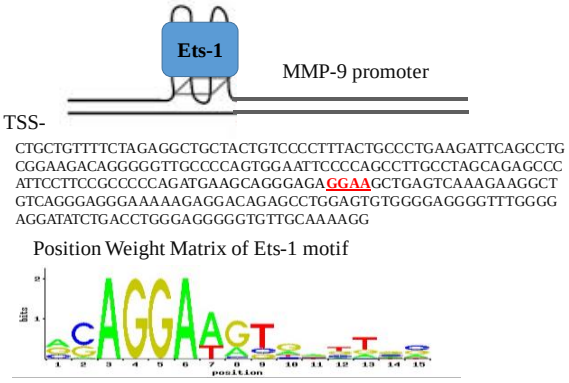


Ets-1 siRNA transfection and effect on MMP-9 expression in breast cancer cells

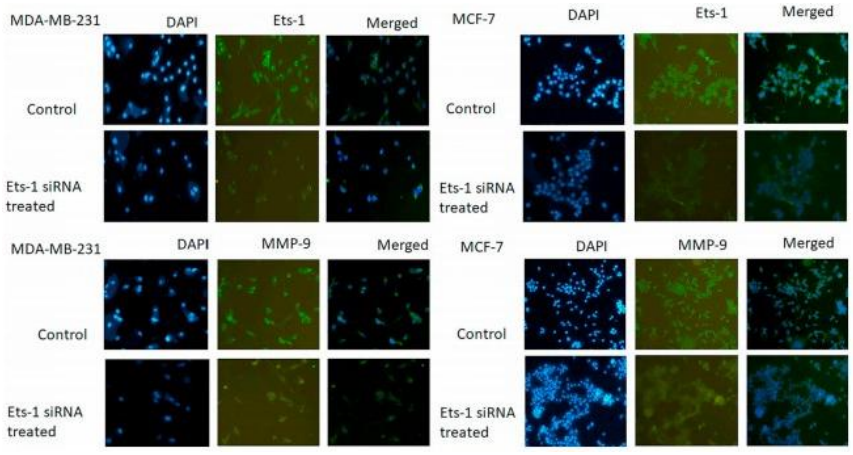


Ets-1 binding to MMP-9 promoter

ChIP assay performed to show MMP-9 promoter regulation by Ets-1 transcription factor.



Transactivation of MMP-9 promoter by Ets-1



Immunofluorescence of Ets-1 and MMP9 in Ets-1 siRNA treated MCF-7 and MDA-MB-231 cells were probed using antibodies specific to Ets-1 and MMP-9 Nuclear stationing was done using DAPI.

ORAL CANCER

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 during Jan 2019 – Sept 2020

Ethical approval for the conduct of study was formally granted by the Institutional Ethical Committee (IEC) on 12th November 2019. Subsequently, collection of biological specimen material i.e. un-stimulated fresh saliva/oral rinse samples was initiated following informed consent. The basic molecular biology techniques required for the project were standardized.

A. Clinical Sample Collection: Un-stimulated fresh saliva/oral rinse samples (n= 100) from normal (n= 36), OPMDs (n= 43) and oral cancer (n= 21) were collected in a 15ml sterile vial placed on ice as per protocol and stored at -70º C until further use.

B. Literature Review: Literature in the area of oral cancer early detection by different approaches as cytology, imaging and bio-molecular marker based was extensively reviewed and manuscript is under preparation.

C. Molecular Biology Techniques performed:

Salivary Exosome Isolation and Colorimetric analysis: Salivary exosomes were isolated from the saliva/oral rinse samples by using ExoEnrich (Saliva) Exosome Isolation Kit ExoCan (Pune, India) followed by colorimetric assay for qualitative assessment using ExoColor Exosome Colorimetric Quantification Kit ExoCan (Pune, India) as per the manufacturer's protocol.

miRNA Isolation from Exosomes: miRNA was extracted from enriched exosomes using QIAGEN's miRNeasy Mini Kit, (USA). Initially, exosome samples was lysed in QIAzol Lysis Reagent.

Small RNA Next Generation Sequencing: The extracted miRNA from isolated salivary exosomes analyzed by Small RNA Next Generation Sequencing (Outsourced) in 6 samples (3 OPMDs and 3 Oral Cancer). The data is being analyzed for studying the differential expression of salivary exosomal miRNAs in OPMDs and cancer subjects.

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

Funding Agency: ICMR
Duration of Project: 2018-2020

Background: Oral cancer is a common malignancy in India especially among tobacco users. Large number of patients suffers from the disease due to detection at late stage. Leukoplakia / sub mucosal fibrosis is very common precancerous lesions among tobacco users and known to progress cancer. However, it is very difficult to predict, which person with leukoplakia would progress to cancer with the existing detection tool. Therefore, the current study has designed for profiling of SNPs of immunomodulatory genes of both Th1/Th2 types as well as microRNAs together with evaluation of role of NF-kB for identification of high-risk group among tobacco users.

Objectives:

- Detection of human Papilloma virus (HPV) and EBV (Epstein-Barr virus) infection in oral cancer patients in Indian Population by polymerase chain reaction.
- Investigation of Single Nucleotide Polymorphisms (SNPs) in immunomodulatory genes (Th1/Th2) with reference to interaction with NF-kB signalling pathway in leukoplakia and oral cancer cases.
- Expression profile of toll like receptors and different cytokines in OSCC tissue biopsies.

Work done during Jan 2019 – Sept 2020

- Important genes IL-10, IL-6 and TLRs of the inflammatory pathways were studied. Previously we found three Novel SNPs in IL-10 gene promoter region and gotten the accession number for these three variations **(accession numbers - KT291743.1, KT153594.1 & KT291742.1).** After this we have checked the prevalence of HPV and EBV infectionin oral pre-cancerous, cancerous cases and controls. Further we also did the TLRs genotyping and their genotypic correlation with HPV/EBV, co-infection & lifestyle habits in Indian population. After the SNP analysis further, we have checked the expression of TLRs genes by Immunohistochemistry.

- **Expression of TLR-4 & 9 in oral premalignant and malignant lesions:** Immunohistochemistry results showed the expression level of TLR4 in pre-cancer, cancer tissues as compare to control (Fig. 1&2). In pre-cancerous cases, TLR4 showed higher nuclear and cytoplasmic positivity as compare to normal cases. The nuclear and cytoplasmic positivity (N+C) was 75% (15/20) in pre-cancerous cases and 20% (4/20) in controls which is statistically significant (p=0.0015). A significant up-regulation of TLR-4 expression was observed in pre-cancerous cases with higher nuclear and cytoplasmic score (4.65 ± 0.39, p=0.0001) as compared to controls (2.25±0.33).

- In contrast, the positivity percentage of TLR-9 expression was slightly higher than TLR-4 as shown in Fig. 2. The nuclear and cytoplasmic staining for TLR-9 was observed in 85% (17/20) of the precancerous cases and same 85% (51/60) as in cancer (p<0.0001 for both compared to controls). A significant up-regulation of TLR-9 expression was observed in both nuclear & cytoplasm (4.95±0.28, p<0.0001) of pre-cancer and cancer (6.15±0.21, p<0.0001) as compared to normal controls (2.75±0.29). We found a gradual increase in expression of TLR4 and TLR9 in all grades (WDDSCC, MDSCC & PDSCC) of oral carcinoma**.** The overall (N+C) expression of both TLR4 & TLR9 has been showing increasing trend towards aggressiveness of disease.

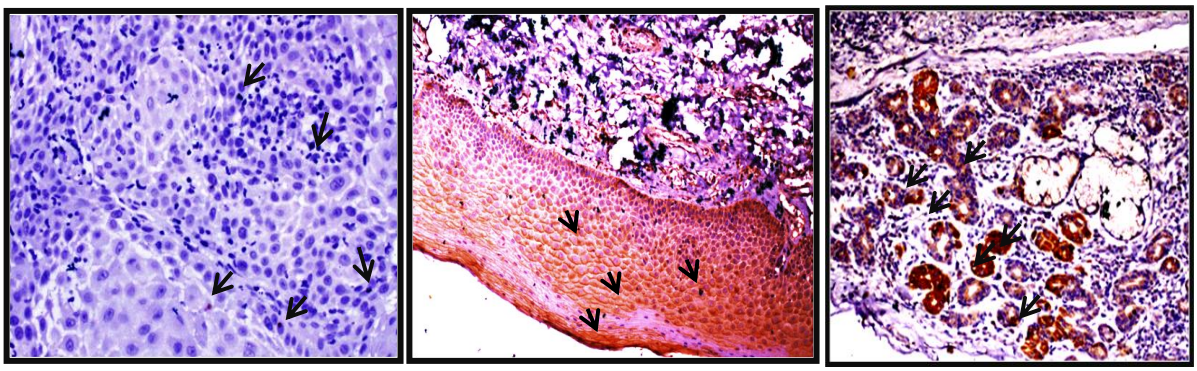


Fig: Representation of immuno-histochemical staining patterns of TLR-4 in oral normal mucosa, pre-cancer & squamous cell carcinoma (OSCC)

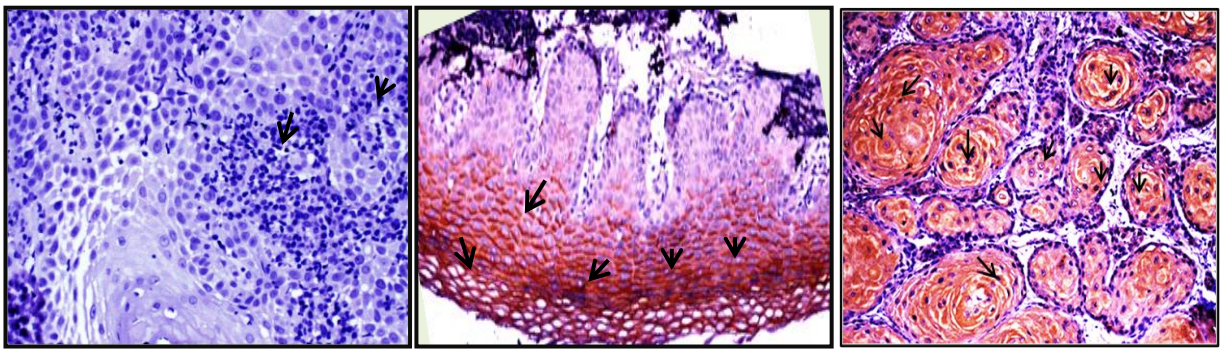


Fig: Representation of immuno-histochemical staining patterns of TLR-9 in oral normal mucosa, pre-cancer & squamous cell carcinoma (OSCC)

Mechanistic insights into NF-κB interactome in HPV and/or tobacco induced tongue squamous cell carcinoma: role of mutations in shaping protein-protein interactions for identification of therapeutic targets

Principal Investigator: Dr. Shilpi Gupta, PDF
Mentor: Dr. Mausumi Bharadwaj, Molecular Biology Group

Funding Agency: ICMR-PDF
Duration of Project: 2018-2020

Background: Tongue cancer (TSCC) is the most prevalent head and neck cancer, often associated with tobacco or HR-HPV infection. HPV-positive TSCCs possess a unique mechanism of tumorigenesis which contrasts with that of tobacco-induced TSCCs which in turn show a better prognosis following treatment. These intra-tumor heterogeneities and associated genetic alterations in TSCC appear to be the major obstacle to the identification of effective therapeutic targeting agents. Our earlier research established that NF-κB subunits play a significant role in tumor aggressiveness and metastasis. NF-κB along-with HPV and tobacco play a critical role in the development of tongue tumorigenesis.

Objectives:

- To identify non-canonical and/or de-novo interactions and associated mutations in HPV and/or tobacco-induced TSCCs, to identify new potential therapeutic target(s).

Brief Methodology

Protein extraction	Total and nuclear protein from all samples and cell lines will be prepared as described earlier**(Dignam, 1990)**
Immunoprecipitation	For immunoprecipitation, 3-6 mg of nuclear extract will be incubated with antibody against desired protein for overnight followed by incubation with protein A/G beads, overnight. The protein will be eluted and measured. Once quantified, proteins will be analysed using mass spectrometry.
Western Blotting	Western Blotting will be performed as described previously by **Gupta et al; 2015.**
Mass Spectrometry	***Sample Preparation for Mass Spectrometry:*** The proteins will be denatured using 50ul of 8M urea, disulfide bonds will be reduced by 1mM DTT and alkylated by 1mM iodoacetamidefollowed by Tryptic digestion. The peptides will be analyzed by mass spectrometry.
	Protocol for Mass Spectrometry: These peptides will be loaded on a 15cm long column, packed with preheated, 1.8um C_{18} beads. The peptides will be separated using a linear gradient from 5 to 35% of buffer B followed by a wash reaching 95% of buffer B. The gradient length will be adjusted to 240 mins.
Co-IP & Sequential ChIP assay	The ChIP assay will be carried out in accordance with **Kuo and Allis (1999)**.
siRNA knockdown	Knocking down will be performed using commercially available siRNAs raised against NF-kB specific genes and *de-novo* interactors will be performed according to the manufacturer's protocol (Invitrogen).
Mutation Analysis by Sequencing	Isolated DNA will be used to amplify genes coding for NF-kB family proteins & *de-novo* interactors, using primers flanking the gene body. Amplicons will be sent for sequencing and aligned against the reference human genome to identify mutations associated with the gene.

Work done during Jan 2019 – Sept 2020

A total of 40 fresh specimens comprising cancer (n=20) along-with 20 adjacent normal mucosa as controls (n=20) were collected. HPV diagnosis revealed that significantly higher prevalence of HPV was found in tumor tissues (20%; 4/20). HR-HPV 16 was the most prevalent type found in tumor tissue of TSCC cases. Interestingly, HPV infection was higher in non-smoker female patients as compared to smoker patients.

TSCC cell lines and majority of TSCC cases showed higher level of expression of NF-kB family proteins (p50, p52, RELA, RELB and c-REL) as compared to normal controls and the level of expression increased gradually as the lesions progressed to malignant phenotype. In-Silico mapping data revealed that NF-κB/RELA/REL associated protein-protein interactome formed several non-canonical interactions in TSCC cells. Several RELA/REL associated protein-protein interactions were identified using GeneMania database.

NF-kB/RELA and REL binding promoters were highly enriched in these target genes. The overlapping of RELA and REL binding sites with key target genes suggested a possible functional interaction between RELA/REL and their target genes in the regulation of gene expression during TSCC

OTHER CANCERS

Role of cellular Transcription Factor NF-κB and HPV in the development of esophageal carcinogenesis

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

Other Collaborating Institutes: Amity University, Noida, AIIMS New Delhi, Shere-e-Kashmir Institute of Medical Sciences J&K

Funding agency & budget: ICMR, Rs 33,70,400

Project Duration: Mar 2017 – Mar 2020

Brief background & rationale: Esophageal cancer (EC) is a leading cause of cancer-related deaths in India and is often associated with distinct food and drinking habits which contains carcinogenic compounds, most common being tobacco smoking. Plethora of reports have documented alterations in some of the oncogenes and tumor suppressor genes however the exact molecular and genetic basis of esophageal carcinogenesis remains unclear. In addition, the high-risk Human Papilloma viruses (HR-HPVs) particularly HPV16 which is a well-established cause of cervical cancer has also been found to be associated with esophageal cancer. Our recent investigations have clearly demonstrated potential carcinogenic role of transcription factor NF-κB in the HPV-associated malignancies, which may influence expression of viral oncogenes and subsequent carcinogenic events. Therefore, the present study has been designed to provide a rationale for drug targeting host cellular transcription factor NF-kB and to understand its synergism with HPV either alone or in cooperation with other known risk factors in esophageal carcinogenesis.

Objectives:

To elucidate the role and molecular mechanism of transcription factor NF-kB and HPV in the development of oesophageal carcinogenesis.

Brief Methodology: HPV infection was studied using L1 consensus sequence PCRs and type specific PCRs for high -risk &typeslow –risk types of HPV. Further confirmation by direct DNA sequencing, DNA binding activity was performed by Electro Mobility Shift Assays (EMSA) followed by gel supershiftassays, expression by immunoblotting & IHC using specific antibodies. Also, the impact of HPV infection was checked in esophageal cancer cell lines by transfection using specific inhibitor directed against NF-kB members and cloning in desired expression vector.

Work done during Jan 2019-Sept 2020: Altogether 100 cases of esophageal squamous cell carcinoma and equal number of adjacent normal tissue samples were collected and analysed for HPV infection, NF-kB expression and its DNA binding activity using Western blotting, EMSA and Super-shift assays. Experiments from tumour samples indicate strong correlation between

HPV infection and increased NF-kB expression and DNA binding activity. As demonstrated in the figure below HPV infection induced differential expression and altered dimerization of NF-kB subunits in the active complex.

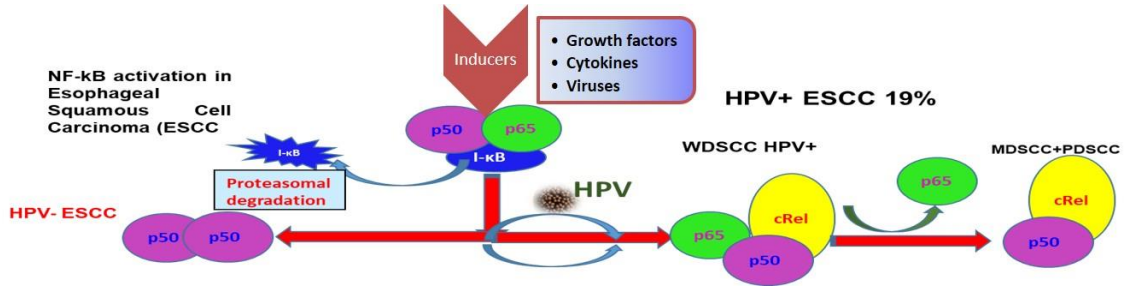


Fig: Pictorial representation of NF-κB subunit composition as observed in the presence and absence of HPV infection in ESCC

Further, KYSE 410 esophageal cancer cell line was used to investigate the role of HPV in NF-kB signalling pathway and esophageal carcinogenesis. KYSE cells were transfected with HPV E6/E7 expressing vector, to study the role of HPV E6/E7 protein in carcinogenic transformation of the esophagus. Electromobility shift assays were also conducted to study the effect of HPV infection on NF-kB DNA binding activity. Additionally, the dose of optimal inhibition of NF-kB activity using Bay11 inhibitor and anti-NF-kB siRNA was also standardized.

Translational Potential: This study will pave way for establishing transcription factor NF-kB as a potential diagnostic or prognostic marker for esophageal cancer, and also to validate NF-kB as a drug target in esophageal cancer, which can further be used to model drugs against it. The outcome of this project will provide more insights into the cross-talk mechanism of HPV and NF-kB, and hence evaluating the detailed mechanism of esophageal tumorigenesis in presence and absence of HPV infection.

Genomics of Gall Bladder Carcinoma in Indian Population

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

Other Collaborating Institutes: AIIMS New Delhi, CSIR- Institute of Genomics and Integrative Biology 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:

- After informed consent, the relevant clinical information obtained based on questionnaire
- Intra-operative collection of gall bladder tumor tissue, inflammatory lesion and adjacent normal tissue & blood sample was done from the Gastro-Intestinal Surgery and Surgical Oncology.
- Gall bladder tumor tissue, inflammatory lesion and adjacent normal tissue are preserved in PBS and Trizol solution for DNA and RNA extraction respectively at -80ºc.
- Ongoing data mining from through Bioinformatics analysis of microarray data (available public data) of Gallbladder cancer available at NCBI-GEO (Gene Expression Ominbus) is being done.
- Effect of point mutations on the structure and function of protein biomarker responsible for Gall bladder cancer is being done through software-based modelling and simulation studies

Work done during Jan 2019-Sept 2020: A total of 32 cases of gallbladder cancer have been collected till date. The median age of gallbladder cancer cases was 53 years, out of which 22 cases were female and 10 cases were male. Out of 32 cases, 15% and 7% patients had the habits of smoking and alcohol, respectively. 34% and 26% patients had gallstone and liver disease (jaundice), respectively. In addition to this whole exome sequencing is being processed and data will be validated at ICMR-NICPR.

Translational Potential: This above study will help in finding out the mutated novel genes in gall bladder cancer in Indian population. The epidemiological data will also provide the key factors responsible for the occurrence of Gall bladder cancer in Indian population

Role of hepatitis B virus genotype specific X protein (HBx) in TGF-β mediated regulation of liver inflammation in hepatocellular carcinoma: an in vitro study

Principal Investigator: Dr. Manikankana Bandopadhyay, RA
Mentor: Dr. Mausumi Bharadwaj, Molecular Biology Group

Funding Agency: ICMR, RA
Duration of Project: 2018-2021

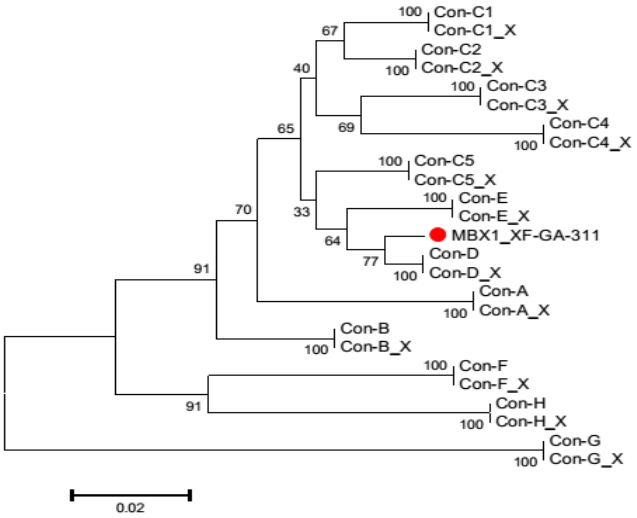
Background: Hepatocellular carcinoma (HCC) is a typical chronic inflammation-related cancer and inflammation is one of the major risk factor for HCC progression. Hepatitis B virus (HBV) X protein (HBx) encoded by HBV reported to be associated with pathogenesis of HCC. The transactivator HBx protein plays a vital role in the initiation and maintenance of hepatic inflammatory processes through interactions with components of the tumor microenvironment. Hepatic stellate cells, which are a cellular member of liver tumor microenvironment, reportedly participate in the progression from chronic liver inflammation to cirrhosis and liver cancer.
TGF-β, an inflammation-related cytokine belonging to the TGF-β superfamily, possesses significant role in cancer development. Numerous studies have confirmed a close relationship between HBx and TGF-β. Initiation and progression of HCC are highly reliant on viral genomic heterogeneity In India. Hence, developing information in the Indian context becomes imperative for rational design of newer diagnostic/therapeutic interventions for overall management of HBV related HCC. So studying effect of HBx protein of different HBV genotype found in Indian population on TGF-β mediated regulation in the context of hepatic cancer is of utmost importance
.

Objectives:

- Study of activation of hepatic stellate cells by HBx of viral genotypes prevalent in the Indian population.
- Analysis of TGF- β expression in hepatocyte cell lines.

Work done during Jan 2019 – Sept 2020

Preparation of HBx plasmid: HBV X gene region was amplified from HBV plasmid. DNA was sequenced bi-directionally by purifying PCR amplicons and the genotype was identified. The sequence was aligned and corrected along with reference gene bank sequence in Bioedit sequence alignment editor. HBx genotypes were identified from neighbor-joining tree constructed using Mega 6 software. Next X gene from plasmid were ligated in TA cloning kit. The ligated X gene were transformed and cloned. The plasmids were isolated. Next, this ligated sample was inserted into mammalian expression vector pCXN2. For this, the plasmids (pTZ57R/T and pCXN2) were digested with KpnI and HindIII (double digestion). The products were ligated by T4 ligase. The X gene construct (pCXN2 –HBx) were selected, transformed and cloned. The plasmids were isolated and the insertion and transformation was confirmed by amplifying X gene using X gene specific primer from isolated plasmid (pCXN2 –HBx).



The HBx gene of interest (represented in red) were compared to reference consensus sequences of complete HBV genome and consensus sequence of full length HBx gene (represented in black).

Huh-7 cells have been procured and are being maintained in the cell culture facility. Procurement of HepG2 cells are in the pipeline. Arrangement of reagents for transfection are in process. Next, transfection will be standardized and the standardized protocols will be used in these two hepatoma cell lines.

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

Funding Agency: ICMR, RA
Duration of Project: 2019-2022

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.

Work done during Jan 2019 – Sept 2020

We found that AS events in HNC is a complex regulatory mechanism of gene expression. It can be studied in detail via RNA-Seq using different bioinformatics tools. Two genes i.e. *MLL3* and *RPS9*, were repeatedly found to be associated with HNC. Further, the details of RNA-seq data

from these records are being worked upon to understand the multifaceted biology of HNC, and developing a database.

Translational Potential: Based on the information obtained from the analysis of the RNA seq data from the HNC, hopefully a database on AS events in HNC will be developed.

Lysine Specific Demethylase 1 mediated regulation of metabolic stress-induced molecular signaling in Gastric cancer cells

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

Funding Agency: ICMR – PDF
Duration of Project: 2018-2020

Background: Exploring the differential status in response to metabolic stress will help to understand the stressed tumor microenvironment. The findings of this work may bring the improvement of drug therapy like the use of 2-deoxyglucose (2 DG) more close to the treatment of cancer. Broad level analysis of transcriptome and small RNA profiling will suggest some new unidentified therapeutic targets. Since the metabolic stress of glucose deprivation is a factor of all tumor cells, the finding of this project can be relevant to all kind of malignancies and suggests the possible targets for the cancer therapeutics.

Objectives:

- To explore the differential expression of metabolically stressed gene with LSD1 and transient silenced LSD1 with glucose starvation and without starvation in gastric cancer cells.

Brief Methodology: Transfection was performed by mixing siRNA with Lipofectamine reagent in OptiMEM medium and cells were incubated with the complex for 12 hrs. After the transfection, medium was replaced with normal growth medium and experiments were carried out as required. Total RNA was isolated from the samples by Trizol method. The libraries were prepared with input total RNA ~1µg using Illumina TruSeq Stranded mRNA Library Preparation Kit as per the manufacturer's protocol. Further experiment followed by whole trancriptome sequencing.

Work done during Jan 2019 – Sept 2020

In metabolic stress condition, we found upregulated and down-regulated genes are 39209 and 41524 respectively and significant upregulated and down-regulated genes are 1171 and 999 respectively. Without stress condition, we found up-regulated and down-regulated genes are 985 and 1025 respectively and significantly up-regulated and down-regulated are 450 and 270 respectively. The criteria used to identify up-regulated and down-regulated are log2FC > 0 and log2FC < 0 respectively and Significantly up regulated and down regulated are log2FC > 0 and p-value <0.05 and log2FC < 0 and P-value <0.05 respectively.

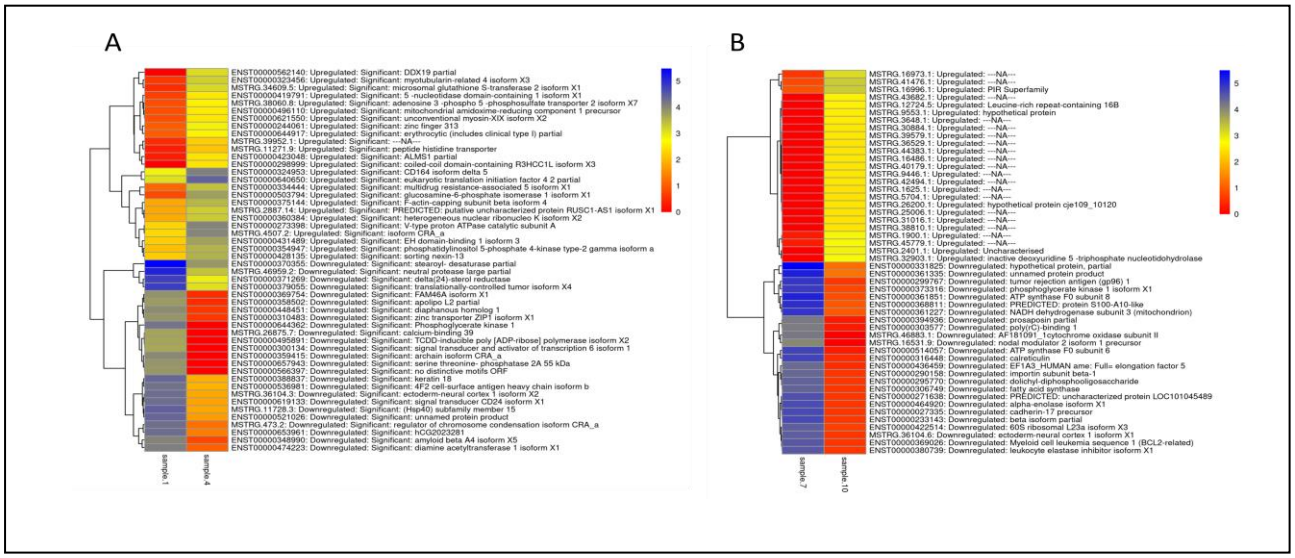


Fig: Heatmap for differentially expressed gene 1 vs 4 and 7 vs 10 combinations

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 cychlohexamide (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 immunoprecipetation, ELISA, Cell colony formation assay, Chip-sequencing.

Expected outcomes: The frequent over expression of HERV proteins in cancer cell has been proposed as a target for immunotherapy. This study is focused on immunotherapy of gastric cancer specific to 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

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: 5 years

Background: Prostate cancer is one of the most prevalent malignancies worldwide affecting male population and is predicted to be the third leading cause of cancer deaths in men. Adoption of the western lifestyle appears to promote prostate cancer development in India. Cancer of prostate is a multifactorial, multistep genetic disease requiring several changes in the genetic and molecular machinery of cell. 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. Hence PSA is not a reliable diagnostic biomarker for carcinogenesis of prostate. Depending upon their relative expression and its biological importance, miRNAs are presumed to be valuable, diagnostic, predictive and prognostic biomarkers because miRNAs are stable in serum, plasma, urine, paraffin fix tissue etc. and more specifically deregulated in cancer compared to other biomarker. 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 Jan 2019 – Sept 2020

Specimens collected from patients were categorised under different demographic status (Age, sex, income, incidence of disease etc) for the expression study of miRNAs in the development of prostate cancer. Collected samples were further used for total RNA extraction by kit based protocol. Total RNA quality and quantity was assessed and it was found good for gene expression analysis. cDNA of miRNA specific was prepared from corresponding total RNA sample, its quality was measured by GAPDH gene amplification through RT-PCR. Amplification of 6 miRNAs gene in duplicate manner with GAPDH as endogenous control gene was performed. miRNAs expression analysis was done.

miRNAs gene amplification using Real Time- PCR

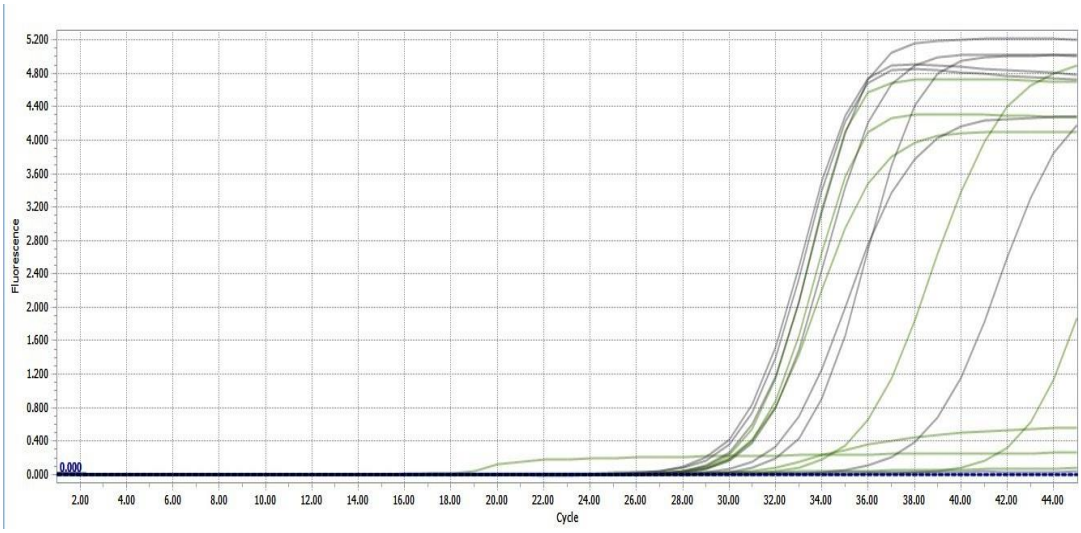


Fig: Amplification of 6miRNA gene (like hsa-miR-548e, hsa-miR-548c-5p, hsa-miR-548c-3p, hsa-miR-548b-5p, hsa-miR-548d-5p etc.) from one sample

Next generation Epidermal Growth Factor Receptor inhibitor identification using ligand based QSAR technique

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

Funding agency & budget: DHR, Rs. 29,87,000/-

Project Duration: Sept 2016 – Sept 2019

Brief background & rationale: The Epidermal Growth Factor Receptor (EGFR) is a clinically important therapeutic drug target in Lung cancer. The first generation tyrosine kinase inhibitors used in clinics are effective against L858R mutated EGFR. However, relapse of the disease due to presence of resistant mutation (T790M) makes these inhibitors ineffective. This has necessitated the need to identify new potent inhibitors against the drug resistant double mutants (T790M/L858R) of EGFR.

Objectives:

- Development of QSAR model for discriminating EGFR mutant inhibitors from non-inhibitors.

Brief Methodology: A data set of diverse molecules which are reversible inhibitors and act against T790M/L858R (TMLR) double mutants was collected from literature. These inhibitors have been used to develop various machine learning based classification models for predicting inhibitory potential of a molecule. Also, we have analyzed the inhibitors to identify important scaffolds, fingerprints and functional groups that play a significant role in distinguishing actives and inactive inhibitors.

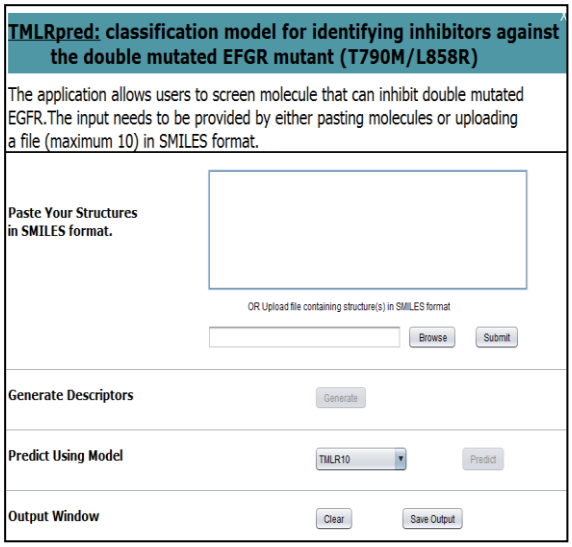
Work done during Jan 2019 – Sept 2020:

A total of 12 classification models using three different datasets (TMLR10, TMLR25 and TMLR50) were developed for predicting the TMLR inhibitory potential of the chemical compounds and validated using five-fold cross-validation technique. To develop models for differentiating molecules that are active below 10nM, TMLR10 dataset was used as active molecules and rest all of the molecules as inactive molecules. The best performance on the training and test set was obtained with Random forest. On the training set it showed 84.21% specificity, 71.88% sensitivity, 82.23% accuracy with 0.47 MCC and 0.85 AUC. While, independent evaluation using the validation data exhibited 83.72% specificity, 75.0% sensitivity, 82.35% accuracy with 0.49 MCC and 0.87 AUC.

Similarly for model generation having threshold of 25nM, TMLR25 dataset was used. In this case, both naïve bayesian and random forest were selected as the best models. The accuracy of the training/valid set for NB and RF models was 74.26%/76.92% and 73.26%/75% respectively. While the MCC and AUC for the validation dataset of the two models (NB and RF) was 0.56/0.83 and 0.47/0.87 respectively.

Again for the classification model having threshold value of 50nM, TMLR50 and IA datasets were used as active and inactive molecules respectively. The random forest classifier showed best performance based on the MCC and AUC values of the training and validation dataset. The MCC and AUC values were found to be 0.54/0.83 and 0.55/0.85 for train and valid set respectively. Additionally, the valid dataset exhibited 82.61% sensitivity, 72.41% specificity and 76.92% accuracy. Overall, it was found that models built using random forest had better performance.

Translational Potential: To facilitate identification of new potent inhibitors against the drug resistant double mutants EGFR, a user friendly desktop application termed TMLRpred has been developed. The graphical user interface (GUI) is designed in Java and it allows user to paste or upload list of compounds for screening. The output then shows the classification of the query compound as inhibitor or non-inhibitor. It is expected that the tool will prove useful to medicinal chemists for pre-screening and identifying compounds that could be active against the double mutated EGFR.



Identification of novel phytochemicals for drug resistance reversal property against lung cancer stem cells

Principal Investigator: Dr. Narendra Singh, PDF
Mentor: Dr. R. Suresh Kumar, Molecular Biology Group

Funding Agency: ICMR- PDF
Duration of Project: 2018-2020

Background: Lung cancer cells acquire drug resistance during repeated chemotherapy cycles of treatment, and such resistance phenotype arises in group of cells generally dominated by the presence of cancer stem cells (CSCs). Overexpression of ATP binding cassette (ABC) in CSC has been found responsible for multidrug resistance. Overcoming the drug resistance is the challenge in cancer therapy. Phytochemicals are considered as one of the safest approach in chemoprevention/therapeutic intervention. Targeting the CSCs with phytochemicals would be good approach to inhibit growth of cancer and prevent from relapse of cancer.

Objectives:

- To determine growth inhibitory potential of selected novel phytochemicals, for example usnic acid and plumbgin, in drug resistant and stem cells and molecular alterations in treated cells.
- To evaluate stem cell population through CD44, CD133, CD90 and CD117 markers and expression dynamics of markers in treated cells.
- To investigate gene networks bridging drug resistance ABC efflux drug transporters and twist, sox2 in cancer stem cells.
- Assessment of drug resistant reversal potential and treatment of cells with selected phytochemicals.

Brief Methodology:
FACS: The A549 cells were seeded and treated with UA, after the incubation time cells were harvested with brief trypsinization, cells were washed and re-suspended in ice cold PBS, cells were stained with 0.1 µg/ml rhodamine 123, cells were incubated for 30 minutes at 37^0C, washed with PBS followed by analysis through fluorescent microscopy. Same way the treated cells were trypsinized, incubated for 30 minutes at 37^0C with propidium iodide along with RNAse. Washed cells were taken for FACS.
Immunoflourescence: Cells were Cultured in cover slips and cells were washed in PBS. Samples were fixed by 4% paraformaldehyde for 15 min and washed the cells. Samples were permelaise with triton X for 10 mins and washed with PBS. The samples were incubated with goat serum for 30 mins, Incubate the fluorochrome conjugated primary antibody in PBS over night at 4C. The cells were washed and 1ug/ul of DAPI was added and samples were mounted o n mounting medium for visualization.
***Western blot*:** Samples were loaded into SDS PAGE gels and proteins were run in gel at constant voltage of 60-90 volt. Transfer of proteins from gel to PVDF membrane was performed by using transfer assembly. Blocking of membrane was done for 1 hour at RT. Specific primary antibody

was added and the incubated overnight at 4^0C on shaker. Next day after 3 times of washing, blots were incubated with HRP-linked secondary antibody for 2 h at high speed shaking and followed by three time washing in 1X wash buffer and processed for ECL detection. Different exposures were taken to get best one on x-ray film.

Work done during Jan 2019 – Sept 2020

The cells were cultured in 100mm plates, treated with UA (25-100 µM) for 24 & 48 h at 70% confluency**)**. The expression of Stem cell marker (CD markers), and drug transporter ABCC1 and ABCG2 were found to be strongly down regulated in UA treated cells **(Figure 1)**. After the treatment, expressions of the above-mentioned proteins were checked by western blotting. From the results, it was observed, there is well defined differences in expression of UA treated cells, i.e down regulation in the expression of CD markers, ABC proteins were noticed in UA treated cells **(Figure 2)**

We next performed proteomics of treated cells and found the there is differential expression of proteins and still those are under investigation. From the experiments we could find the ligand UA treated cells could reverse the drug resistance and it also affect the stem cell population.

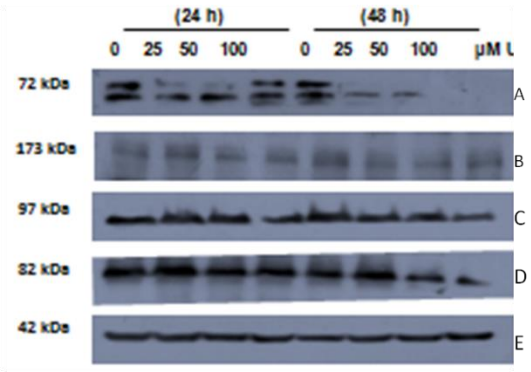


Fig UA down regulates drug transporters and decrease stem cell markers A,B – drug transporters, C, D stem cell marker and E -Control.

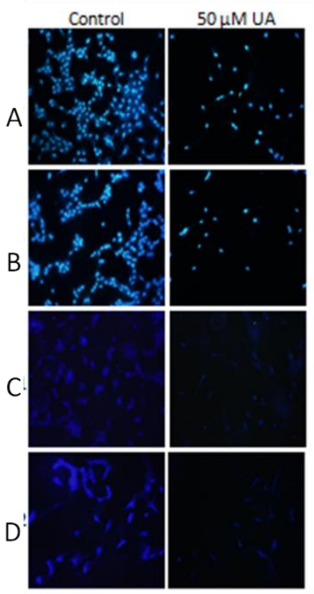


Fig: Immuno flourescence of expression of stem cell markers and drug transporters in Lung cancer cell lines A, B Stem cell markers, C,D - drug transporters

CANCER SCREENING & AWARENESS

Screening and early detection of cervical, breast and oral cancer in the Dibrugarh, Assam: a demonstration project in TATA Tea gardens: ICMR Task Force study

Site Investigator: Dr Roopa Hariprasad, Scientist E, Division of Clinical Oncology

Other Collaborating Institutes: ICMR Hqrs, RMRC, Dibrugarh, TATA R&R Hospital, Dibrugarh, Assam Medical College, Dibrugarh

Funding agency & budget: ICMR, Rs. 1,36,30,421 (NICPR – Rs 37,91,905)

Project Duration: Aug 2017 – Jul 2020

Brief background & rationale: In North East India, there is a wide disparity in both the diagnosis and treatment of cancers, mostly due to lack of awareness, poor socioeconomic conditions, and difficulty in accessing the facilities for cancer diagnosis and treatment. The proportion of tobacco-related cancers relative to all sites is highest in Assam and Meghalaya. Therefore, it is necessary that the health parameters may be documented on an ongoing basis alongside health improvement programmes. The three most commonly occurring cancers in India are those of the breast, uterine cervix and oral cavity, together accounting for approximately 34% of all cancers. These are usually detectable at early stage; malignancies of the oral cavity, breast and cervix have precancerous stages that are amenable to secondary prevention. Since there is no organized screening program in India, most of the screening programs take place in the opportunistic setting. As the level of cancer awareness rises, the health seeking behaviour towards early detection may increase and consequently the cancer load in the country will hopefully begin to decline. Understanding workable strategies for a country wide implementation of screening for prevention and control of widespread cancers is essential.

Objectives

- To assess the training needs of medical officers working in the tea garden health facilities for screening of cervical, breast and oral cancer
- To assess the effectiveness of training package in improving knowledge and building skills of medical officers of tea garden health facilities in detection, work up of screen positive cases for treatment and referral.

Brief Methodology:

Phase I: General duty medical officers posted at TATA Referral Hospital and Research Centre and at PHCs of tea gardens, Dibrugarh and medical officer of MRHRU were enrolled after obtaining written informed consent.

Intervention: 2-3-day hands-on workshop was organized at AMC, Dibrugarh for training the participants in screening of cervical, breast and oral cancer.

Phase II: Master trainers provided hands-on training to the front-line workers (Nurses, ANMs) posted in their respective PHC areas before initiating systematic population-based cancer screening in the population of Dibrugarh tea gardens. The demographic data was collected by Community Health Volunteer (CHV) for the study. Existing data is updated periodically. The positives/ suspicious cases identified during the screening at PHCs are referred to Tata referral centre for further management

Work done during Jan 2019-Jul 2020:

A total of four monitoring visits have been undertaken by the NICPR team in 2019-2020.

Summary of data collected

Total households covered for demographic data	**2534**
Total household members covered for demographic data	8772
Total number of beneficiaries screened	631
No. of beneficiaries with breast signs	10
No. of beneficiaries with oral signs	177
No. of beneficiaries with cervical signs	06
Total number of cases referred for further management	71
No. of beneficiaries with NCD score >4	1016

Translational Potential: The current project is an implementation research of operational guidelines for population cancer screening of common cancers. If the project is implemented successfully at Dibrugarh, the model can be replicated throughout the country. Through this project, 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 screening.

Screening and early detection of cervical, breast and oral cancer in Cachar, Assam: A pilot project

Principal Investigator: Dr. Roopa Hariprasad, Scientist E, Division of Clinical Oncology

Other Collaborating Institutes: Cachar Cancer Hospital and Research Center (CCHRC) Silchar, NHSRC

Funding agency & budget: ICMR, Rs. 2,17,45,590 (NICPR - 85,92,275)

Duration of Project: Mar 2017- Sept 2020

Brief background & rationale: The North east district has been selected considering the high burden of cancer in the region. According to the latest ICMR's NCRP data, age adjusted rates (AAR) for all sites of cancer in males at Cachar is 125.4/1,00,000 and 95.2/1,00,000 among females. The three most commonly occurring cancers in India are those of the breast, uterine cervix and oral cavity, together accounting for approximately 34% of all cancers. These are usually detectable at early stage; malignancies of the oral cavity, breast and cervix have precancerous stages that are amenable to secondary prevention. Since there is no organized screening program in India, most of the screening programs take place in the opportunistic setting. As the level of cancer awareness rises, the health seeking behaviour towards early detection may increase consequently the cancer load in the country will hopefully begin to decline. Understanding workable strategies for a country wide implementation of screening for prevention and control of widespread cancers is essential.

Objectives

- Capacity building: To train the master trainers in screening of cervical, breast and oral cancer, work up of screen positive cases for referral and treatment.
- Initiate a systematic population-based cancer screening at Cachar district and link the screening services to appropriate evaluation and treatment facilities.

Brief Methodology:

Phase 1: Specialists in respective subjects with adequate knowledge and skills underwent 'training of the trainers' to be conversant with objectives, methodologies and training materials of the training program. Medical officers of PHC, selected doctors at Cachar cancer centre and Silchar Medical College were trained. The frontline workers including ANMs, Male health workers, Anganwadi workers, Staff Nurses, Program Management Unit staff and ASHA workers were trained subsequently by master trainers in local language.

The master trainers completed online web based didactic teaching through a specially designed web platform. The trainees spent 3 days to get hands-on experience followed by post-training assessment. Master trainer manuals comprising of modules of all three cancers were provided to all the participants. The program managers, i.e. district hospital superintendents, PHC medical

officers, district NCD officer and other health officials were trained for 2 days.

Phase 2: The Cachar district of Assam state has a total population of 1,736,319 (as per 2011 census). Approximately one fourth of the total population was likely to be in the age targeted for cancer screening. As per the guidelines of the NCD Control program of the Ministry of Health, screening for oral cancer was to be performed on all men and women of 30-65 years of age who were habitual users of tobacco/alcohol. Cervical and breast cancer screening was to be provided to the women between 30-65 years of age.

ASHAs performed door-to-door-survey to motivate eligible participants for screening using the IEC material in local language. Eligible individuals underwent oral and breast screening by ASHAs at home. For cervical screening, women were invited to screening venue (select PHCs or district hospital). The screen positive individuals were referred to district hospital for further evaluation. The cervical and oral premalignant lesions were treated at the district hospital. The cancers detected were referred to Cachar cancer center. Eligible participants received a unique identification number after signing consent form. Health workers entered demographic details and screening information in the proforma designed by NICPR. A registration and referral card was issued to the participants. A health message was provided to all individuals regarding warning signs and asked to approach the health facility if any sign or symptom was experienced.

Work done during Jan 2019-Sept 2020:

A total of three monitoring visits have been undertaken by the NICPR team in 2019. Data collected are as follows:

▪ Number of Subject screened	46158
▪ Total number of males screened	19535
▪ Total number of females screened	26623
▪ Total number of areca nut users (n=29994) ▪ Male ▪ Female	 13017 16976
▪ Total number of tobacco chewers (n=12092) ▪ Male ▪ Female	 6309 5781
▪ Total number of tobacco Smoker (n=2892) ▪ Male ▪ Female	 2374 517
▪ Total number of individuals taking alcohol (n=2815) ▪ Male ▪ Female	 2324 490
▪ Total number of screen positives with oral lesions (n= 3560) ▪ Male	 1651

▪ Female	1809
▪ Total number of screen positives with Breast lesions	803
▪ Total number of screen positives with Cervical lesions	1226

Translational Potential: The current project was an implementation research of operational guidelines for population-based screening of common cancers. Through this project, the various challenges faced in the implementation would become clearer and help GOI and the states to make necessary changes during implementation of the population-based cancer screening.

Evaluation of a comprehensive cancer prevention and early detection program run by ICPO Health Promotion Clinic

Principal Investigator: Dr Shalini Singh, Director

Funding Agency & Budget: ICMR, Rs 35,10,661

Project Duration: Mar 2017- Mar 2020

Brief background & rationale: Over 80% of cancer cases in India are detected late and patients report for treatment in very advanced stages. As the level of cancer awareness rises, the health seeking behaviour towards early detection may increase and consequently cancer related mortality will begin to decline. In the Indian context, screening and early detection is applicable for common cancers e.g. cervical, breast and oral.

Awareness, education and counselling with respect to common cancers will help in spreading information, decreasing morbidity and mortality, adopting a better lifestyle and avoiding risk alleviators.

Brief Methodology:

Motivation: Eligible population residing in GautamBudh Nagar district, Uttar Pradesh is motivated by ASHA workers of the respective areas for oral, breast and cervical cancer screening at HPC, NICPR. The motivated individuals are screened for common cancers by Oral Visual Exam, visual inspection with acetic acid & cervical smear and clinical breast exam.

Participants are provided with IEC material and information on common cancers; their risk factors, warning signs, breast self examination, pap smear test, diet and lifestyle modification. Participants are provided with one questionnaire before the cancer education session and one after the session, each containing 20 questions. The impact is then assessed.

Objectives:

- To evaluate before and after scores of knowledge, attitude and values for cancer prevention and early detection in the community.
- To evaluate before and after scores of knowledge, attitude and values for cancer prevention and early detection in the community health workers.
- To assess the prevalence and incident cases of cancers specially three common cancers viz. cervix, breast and oral cavity and its premalignant conditions if any.

Work done during Jan 2019-March 2020:

Oral Examination (3409)			Breast Examination (3196)		
Option	**n**	**%**	**Option**	**n**	**%**
Chemical burn	45	0.7	Axillary nodes: Yes	2	0.1
Leukoplakia	141	2.2	Clinical diagnosis: Benign	7	0.2
Lichenoid Lesion	10	0.2	Clinical diagnosis: Normal	2652	83.1
Malignancy	14	0.2	Clinical diagnosis: Others	97	3.0
Oral lichen planus	35	0.6	FNAC done: No	1	0.0
Oral Submucous Fibrosis	200	3.1	Lump: No	147	4.6
Others	2770	44.0	Lump: Yes	278	8.7
Preleukoplakia	126	2.0	Nipple discharge: Bilateral	5	0.2
Smokers palate	39	0.6	Nipple discharge: Unilateral	5	0.2
Tobacco pouch keratosis	181	2.9	Retraction of nipple: Unilateral	2	0.1
Ulcer	48	0.8			

PAP Report (3393)			VIA Result (3209)		
Option	**n**	**%**	**Option**	**n**	**%**
NILM	3291	96.8	Indeterminate	2	0.1
Squamous-ASC-H	3	0.1	Negative	3119	97.2
Squamous-ASC-US	22	0.6	Positive	88	2.7
Squamous-HSIL	4	0.1			
Squamous-LSIL	16	0.5			
Squamous-Susp of Malig	2	0.1			
Glandular-AGC-NOS	11	0.3			
Other	44	1.3			

- **Translational Potential:**
  - Increased awareness regarding risk factors of cancers.
  - Systematic screening of population for hypertension, diabetes, obesity and three common cancers (oral, breast and cervical).
  - Decline in use of tobacco.
  - Increased health seeking behaviour.
  - Increased survival of cancer patients because of early detection.
  - Adoption of better lifestyle.
  - Understanding the need of addressing the common link between cancers and other NCDs such as cardiovascular diseases leading to the initiation of cardio-metabolic clinic at NICPR.

Evaluation of existing web-portal for cancer awareness for general population and level 1 care providers

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

Other Collaborating Institutes: AIIMS Bhopal, ICMR Hqrs

Funding Agency & Budget: ICMR, Rs 65 lacs
Project Duration: Apr 2017- Mar 2020

Brief background & rationale: ICMR-NICPR has designed an India-centric cancer-related website with information base at two-tiers: general population in villages, smaller towns and large cities of India and primary health providers, viz. ASHA, ANMs, paramedics, AYUSH practitioners etc. This project was envisaged to help evolve a nascent cancer education website into a mature web-based education tool superadded with mobile apps for its popularity. The website will be strongly peer-reviewed for face validity, construct validity by testing the tool on a cross section of population from stratified groups of people at various levels of education and test-retest reliability, inter-observer reliability.

Objectives:

- ***To Assess the Face Validity***: To perform a detailed gap analysis of an already structured 2 tier web portal for cancer awareness of general population and level 1 care providers:

a) Compare it with the existing similar knowledgebase websites, apps, printed material etc
b) Strong peer review through intra-disciplinary, inter-disciplinary & trans-disciplinary experts

- ***To Assess the Construct Validity***: To pilot test this website for its content comprehension – construct validity on a cross section of potential users of village/town/city population and primary level health care providers

- ***Tool Evaluation*** – Before & After Study: To perform a qualitative & quantitative research analysis of improved knowledge and values. Translation of the web portal to Hindi and other regional languages.

- ***To Test the Efficacy*** of the web portal & its mobile based application by web analytics.

Brief Methodology:

- ***Objective 1***: A systematic literature search of PubMed/Medline and Web of Science core collection databases did not yield any studies regarding existing websites on cancer awareness in general population in Indian setting. Hence, relevant websites containing information on cancer were searched and first 65 websites which met the criteria were included. An advisory panel of experts reviewed the available websites and graded them for content validity from level 1 to 6. A brief environmental scan of various available web sites on cancer prevention was conducted to identify features and promising practices that could be used to enhance the "India Against Cancer" Web site developed by NICPR. Expert group meetings were held to improve the website in terms of content, visibility and features.
- ***Objective 2***: The website was pilot tested for its content by installing a kiosk at the health promotion clinic at National Institute of Cancer Prevention and Research, and showing the website to the HPC visitors. Their feedbacks and suggestions were taken and incorporated into the website design and contents.
- ***Objective 3***: A qualitative study using in-depth interviews and focus group discussions as well as quantitative questionnaire-based study to assess the general cancer awareness, myths about cancer, specific cancer-related questions and feedback for our website were conducted among general population, primary level health care workers and health professionals/ researchers.
- ***Objective 4***: Google analytics were used to assess three attributes: Audience, Acquisition and Behaviour (metrics) to test the efficacy of our website.

Work done during Jan 2019 – Sept 2020:

Objective 1: *To Assess the Face Validity*
This objective was achieved in 2018
Objective 2: *To Assess the Construct Validity*
○ A kiosk was installed in the month of March 2019 and the website content uploaded on the kiosk for visibility among the individuals attending the clinic. Apart from the individuals attending the clinic to undergo cancer screening or fine needle aspiration cytology services provided by the Institute, a significant number of people accompanying them also expressed interest in the information provided by the kiosk. ○ Almost all of them found the web portal to be of good use, easy to understand and extremely helpful in improving their knowledge about cancer. The people who attended the kiosk were divided into two categories viz. HPC visitors (who attended the HPC clinic) and Non-HPC visitors (Relatives of the HPC clinic visitors). The number of Non-HPC visitors was much higher as compared to HPC visitors.
Objective 3: *Tool Evaluation*
○ Following expert group meetings, the Hindi translation of the website was simplified for easier comprehension by the general public ○ A quantitative study was conducted on 204 participants and significant knowledge

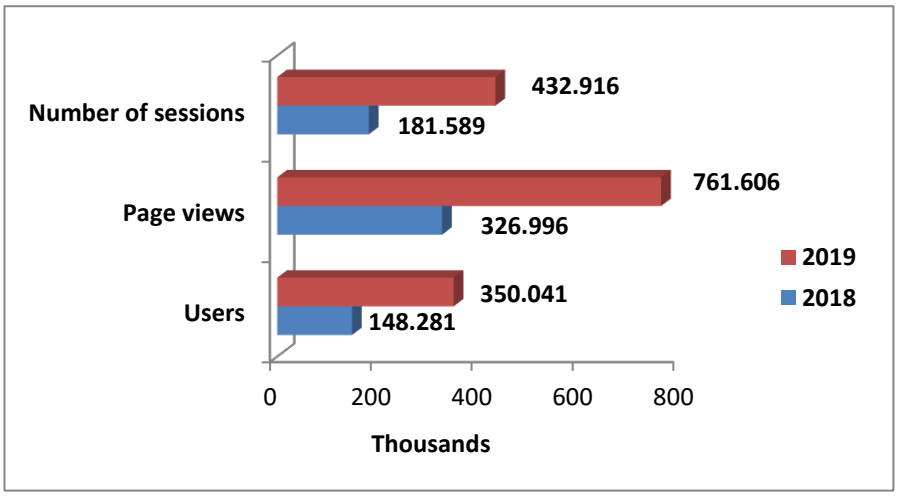
improvement on various aspects of cancer was observed. Majority of the participants (96.56%) had heard about cancer at some point in their life. The most common sources of cancer-related information were health facility, relative/family member and television. Upon enquiring about the most common cancer site, only 42 (20.58%) knew that breast cancer was the most common cancer among Indian population. Among the risk factors for cancer, 54 people (26.4%) listed tobacco as a risk-enhancing factor. Nearly 75% (146) of the participants were aware of tobacco being a risk factor for oral cancer.

- Through in-depth interviews, it was found that a lot of myths regarding cancer are still prevalent among the people and hence, the section on 'Myths and Facts' of the web portal was useful in dispelling these myths.
- A significant improvement in the knowledge level was observed after apprising the participants of the information available on the website and many participants of them were motivated to quit using tobacco, alcohol and areca nut.

Objective 4: *To Test the Efficacy* of the web portal & its mobile based application by web analytics

Web analytics of the portal post-modifications:

- Through Google analytics, it was discovered that the global ranking of the website has improved from 1,575,894 at the beginning of the project to 4,87,798 and the website has managed to reach out to more than 1 million people. Social media activities were also updated regularly
- Facebook likes 491 and 505 followers; Twitter follower 703; YouTube subscribers 237



Translational Potential: The success of the website in reaching out to people and improving the cancer awareness proves that the portal was the need of the hour in assisting and augmenting the cancer control efforts of the government. With the current generation having better access to internet and mobile, the web portal would come in handy for cancer prevention. It not only helps the general population but level 1 care providers (ASHAs and ANMs) to spread cancer awareness and aid in cancer prevention).

Evaluation of Acceptance and Satisfaction of Cancer Screening Services among attendees, motivated by ASHAs, in a semi-urban population of Uttar Pradesh

Intramural Research Study by Division of Clinical Oncology

Background: ICMR-National Institute of Cancer Prevention and Research runs a health promotion clinic, where female participants are screened for common cancers like cervical, breast and oral cancer and male participants are being screened for oral cancer, as per the guidelines of the Operational Framework. Since population based cancer screening has been proposed for the country fairly recently, the community is not sensitized enough to take up these services. Thus, ASHAs who play a major role in motivating the individuals from the neighboring village for screening can be trained for cancer screening and awareness in the community.

Objectives:

- To evaluate the implementation, satisfaction and acceptance of the screening program for common cancers among women attending cancer screening facility at research institute in UP from ASHA's perspective
- To evaluate the feasibility of ASHAs to motivate participation of the community in cancer screening services
- To evaluate the level of acceptance and satisfaction of cancer screening services among participants

Brief Methodology: This is a descriptive cross sectional study being conducted at NICPR, among the eligible population in a semi-urban community in Uttar Pradesh. The study has two components: Qualitative, and Quantitative. All eligible participants who visit the Health Promotion Clinic undergo screening for common cancers and consent to participate in the study are administered a semi-structured questionnaire. The ASHAs are also administered a separate questionnaire. Focus group discussions (FGDs) and in-depth interviews (IDIs) would be conducted for ASHAs as well as the participants to capture their collective thoughts and opinions in rolling out cancer screening in their communities. The sample size for Quantitative part of the study has been calculated to be Males 384 and females 384. For Qualitative analysis, 10 % of the quantitative sample size shall be taken.

Work Done: Till date total recruitment done

Qualitative: Male Participants: 10, Female Participants: 15

Quantitative: Male Participants: 250, Female Participants:400

EPIDEMIOLOGY

Setting up of Population Based Cancer registry at Institute of Cytology and Preventive Oncology (ICMR-NICPR) covering GautamBudh (GB) Nagar

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

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

Project Duration: 2017 - 2022

Brief background & rationale: Cancer registries are essential part of any national programme 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 Buddh 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 Institute of Cytology and Preventive Oncology (ICPO) covering the rural and urban population of GautamBudh 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 during Jan 2019 – Sept 2020:

Incidence Cases registered for the year 2017 & 2018 from different hospitals in Population Based Cancer Registry, G.B. Nagar between 01/01/2019 to 30/09/2020.

Total registered incidence cases registered during reporting period (Jan 2019-Sep 2020):

Sr. no.	Hospitals Name	Total Cases	Male	Female	No of cases 2017	No of cases 2018
1.	AIIMS, New Delhi	406	206	200	175	231
2.	Apollo Hospital, Noida	68	30	38	49	19
3.	Batra hospital, New Delhi	41	23	18	11	30
4.	CMO, Noida (Death certificate only)	17	10	7	17	0
5.	Delhi State Cancer Institute, New Delhi	131	70	61	115	16
6.	Dharamshila Cancer Hospital & Research Center	429	212	217	226	203
7.	Fortis Hospital, Noida	185	87	98	101	84
8.	Indraprastha Apollo Hospital, New Delhi	165	85	80	75	90
9.	Jaypee Hospitals, Noida	218	94	124	114	104
10.	Kailash Hospital, Noida	88	50	38	28	60
11.	Lok Nayak Hospital, New Delhi	38	19	19	16	22
12.	Max Superspeciality Hospital, Vaishali	116	54	62	0	116
13.	Rajiv Gandhi cancer Hospital, New Delhi	312	170	142	126	186
14.	Safdarjung Hospital & Medical College, New Delhi	186	95	91	52	134
15.	Shanti Mukund Hospital, New Delhi	78	46	32	59	19
16.	Sharda Hospital	138	65	73	56	82
17.	Others	225	115	110	94	131
	Total	**2841**	**1431**	**1410**	**1314**	**1527**

Mortality data

Total cancer mortality cases registered for the year 2017 & 2018 at **PBCR, G.B. Nagar:**

Year	**2017**	**2018**
No. of registered cases	138	124

Oral Cancer Screening: development of research partnership and feasibility study

Principal Investigator: Dr Roopa Hariprasad, Scientist E, Division of Clinical Oncology

Other Collaborating Institutes: University of Warwick, UK

Funding agency & budget: University of Warwick (UK), Rs. 21,75,588/-

Project Duration: Jan – Dec 2020

Brief background & rationale: Oral cancer screening may be useful with one large RCT in Kerala, India showing significant reduction in mortality. However, in this trial non-medical university graduates were trained to undertake visual inspection of the oral cavity and there is a need for further research on the role of community health workers in undertaking this role using mobile technology. We propose a new international, leading interdisciplinary group to: (a) develop and evaluate a novel screening strategy in resource–limited settings; (b) build national/regional capacity to conduct high quality research; (c) use this capacity to support wider prevention efforts within the region; and (d) provide robust evidence to up-scale for long-term sustainability

Objectives:

- To develop UK-India partnership on Oral cancer
- To develop novel screening strategy encompassing community health workers screening for oral cancer using mobile technology
- Train community health workers in conducting screening
- Produce preliminary data for future grants applications
- Establish dataset of photographs for further analyses
- Use Machine Learning to develop algorithms for use within the community
- To build research capacity by offering bespoke training in oral cancer prevention; sharing examples of good practice, offering mentorship
- To develop a sustainable research partnership through a strong interdisciplinary research team, establishing links with academic, governmental and advocacy organisations.

Brief Methodology:

- Study participants: Males & females aged above 30 years + Adult tobacco users <30 years registered in the house-hold survey
- Exclusion criteria: Adult non tobacco users aged below 30 years
- Sample size: 1000 participants
- Study tool: After training, the ASHAs visited each household to seek consent to screen eligible adults in random selected areas. They screened them by completing a

questionnaire using mobile application noting demographic/life-style factors; and visual oral examination. High resolution photographs were taken and downloaded at the end of the day to a secure server. Any abnormality noted was referred to local hospitals for further management which also included tobacco/alcohol cessation.

Work done during Jan 2019 – Sept 2020:

- The screening commenced on 1st January 2020 which got stopped due to Covid -19 lockdown on 20th March 2020. A total of N=532 were screened by the ASHA's in the community (49% males and 51% were females). Out of the population screened, 39% belonged to 30-39 years of age. Smokeless tobacco usage reported was 24.2 % (25.9% in males & 22.5% in females) and 6.3% were smokers (9% males & 3.7% females). 15.7% (26.6% males and 5.1% females) white patch lesions were found suspicious by the ASHA's on Oral visual examination (OVE). Out of the community-based screening done by the ASHA's (N=532), 349 participants got registered in the NICPR-Health Promotion Clinic (HPC) in which 47% were males and 53% were females. On OVE by the dentists at NICPR-HPC, 11% patients were diagnosed with leukoplakia (24% males & 3 % females), 6% oral sub mucous fibrosis (OSMF) cases (11% males & 3% females), 5% Tobacco pouch keratosis (TPK) cases (13.3% in males & 1% in females) and ulcers 5% (7.9% in males & 2.7% in females). There was almost perfect agreement (kappa = 0.94) between the findings of the CHWs and the dentists at ICMR-NICPR in identifying the positive or negative cases with overall sensitivity of 94.5% (95% CI: 89.06-97.7) and specificity of identification was 99.2% (95% CI: 97.4% to 99.9%).
- Eight subjects with OPMDs- 4 leukoplakia, 4 oral sub mucous fibrosis and 2 recurrent apthous ulcers were misdiagnosed as normal by the CHWs (false negative) as these lesions missed were present in the lower vestibular mucosa and the lower lip

Translational Potential:

- Develop training material for ASHA workers on Oral Cancer Screening
- Management of suspected oral lesions and regular follow up for tobacco users
- Expedite the process of Oral screening by Community health workers
- Establish dataset of photographs for analyses by screening more population and use machine learning to develop algorithms for use within the community

Exploration of National Cancer Registry Project (NCRP) Data and Other Secondary Data and its Statistical Modelling

Intramural Research Study by Division of Epidemiology and Biostatistics

Objectives: The project was proposed in the year 2005 with an aim to explore the NCRP data, to recognize any pattern or structure that require explanation and to attempt statistical modelling of data to understand the significant hidden trends.

Methodology: During the period of reporting, secondary data was analysed on obesity prevalence and underweight, over weight and obesity prevalence compared among Indian women, National cancer registry project data was analysed for skin cancers (melanoma and non-melanoma), and incidence and risk of breast and cervical cancers analysed to see the trends using joinpoint regression analysis. Cancer of unknown primary origin also analysed to see the incidence and trends of cancers of unknown primary origin using joinpoint regression analysis.
Main Findings: The study led to the following publications:

- Asthana S, Rawat D, Labani S. Comparison of underweight, overweight and obesity prevalence among Indian women in different national health surveys. Current Medicine Research and Practice. 2019; 9:138-144.
- Labani S, Asthana S, Rathore K, Sardana K. Incidence of melanoma and non-melanoma skin cancers in Indian and the Global Regions. Journal of Cancer Research and Therapeutics. 2020;XX:XX-XX. [Accepted for publication] DOI: 10.4103/jcrt.JCRT_785_19.
- Labani S, Asthana S, Srivastava A, Vohra P, Bhatia D. Incidence and trends of breast and cervical cancers: A joinpoint regression analysis. Indian J Med Paediatr Oncol. 2020;41:654-662. DOI: 10.4103/ijmpo.ijmpo_83_20.
- Labani S, Asthana S, Vohra P, Kailash U, Srivastava A. Incidence of cancers of unknown primary origin in India and their trends during 1986–2014: A joinpoint regression analysis. Indian Journal of Cancer. 2020 [Accepted for publication].

Incidence of Melanoma and Non-Melanoma Skin Cancers in Indian and the Global Regions

Intramural Research Study by Division of Epidemiology and Biostatistics

Objectives: To summarize and report recent skin cancer incidence in India and compare it with the incidence across the globe.

Brief Methodology: Age-specific rates (ASpRs) and age-adjusted rates (AARs) of incidence of skin cancer for all ages (0–75 years) were collected from India and world respectively from National Cancer Registry Programme (NCRP) and GLOBOCAN 2018.

Main Findings: The AAR per 100,000 of melanoma of skin was highest in North region of India for both males and females with 1.62 and with 1.21 respectively. Incidence of non-melanoma of skin or other skin cancers for males was highest in East region with 6.2 and for females in Northeast with 3.49. Among non-melanoma, northeast region showed the maximum incidence for both male (75.6) and female (43.6) sexes. Globally, AAR of melanoma of skin for males was highest in western pacific region with 36.9 and for the females AAR was highest in European region with 31.7. Incidence of non-melanoma of skin or other skin cancers for males was highest in western pacific region with 225.4 and 68.6 for females.

Comparison of underweight, overweight and obesity prevalence among Indian women in different national health surveys

Team: Dr. Smita Asthana, Dr. Satyanarayana Labani

Division of Epidemiology and Biostatistics

Background: The project was initiated with an aim to explore the NCRP data, and other secondary data to recognize any pattern or structure that require explanation and to attempt statistical modelling of data to understand the significant hidden trends.

Objectives: To study and compare the prevalence of underweight, overweight and obesity among Indian women using the updated data from different NFHSs.

Brief Methodology: Data collected under three surveys e NFHS-2, NFHS-3 and NFHS-4 e from different states of India were arranged according to geographical regions. Data on age, marital status, area of urban or rural, education, religion and wealth index were also collected. Body mass index (BMI) less than 18.5 kg/m2 was labelled as ‘underweight’, 25e30 kg/m2 ‘overweight’ and greater than or equal to 30 kg/m2 ‘obese’.

Main Findings: Overall prevalence of underweight in Indian women reduced to 22.9%, while overweight (15.5%) and obese (5.1%) increased over different survey years. There was a decline in prevalence of underweight (17.1%) and increase in prevalence of overweight (7.3%) and obese (2.3%) among illiterate. The urban areas showed a comparatively higher burden of obesity (9.1%) than the rural areas (3.1%), but there was not much change (4.8e6%) over years. Prevalence of underweight remained higher in rural areas (26.7%) although there was apparent decline (13.8%). The states/union territories (UTs) belonging to Central (25.3%e28.3%) and Eastern regions (21.3%e31.5%) of India showed higher prevalence of underweight.

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

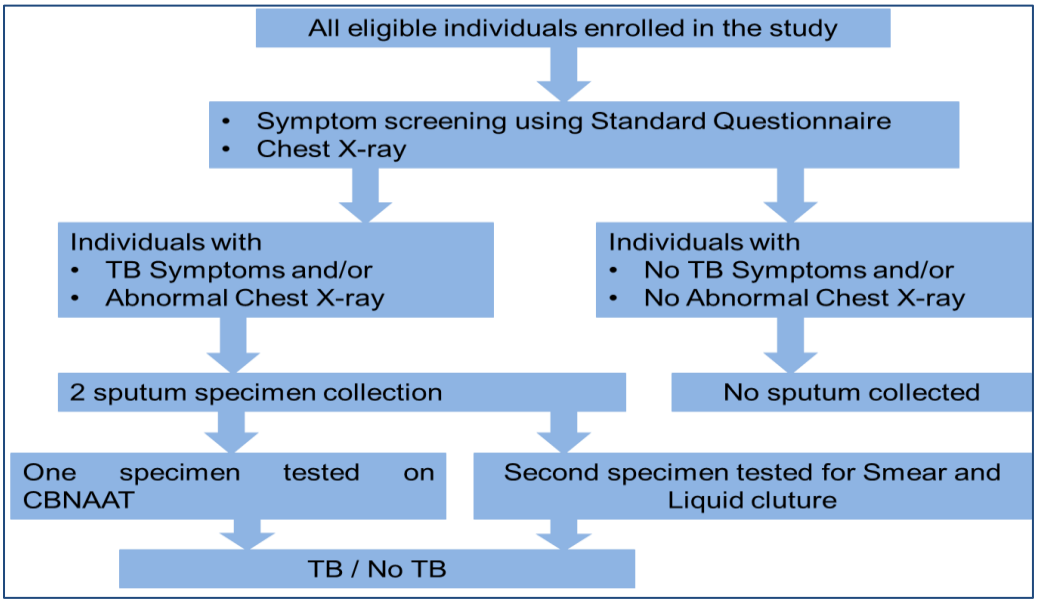
Project Duration: 2018 – 2020

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 institute 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:



Screening Strategy of the Survey

No. of clusters covered/ Total No. of clusters envisaged: The survey is to be conducted at Delhi and in 34 districts of UP. Total clusters proposed at Delhi were 9, and all of the clusters from Delhi was completed. At UP, total clusters were 34. Work has not started at UP area due to COVID 19 Pandemic.

Work done so far:

Data of 8 clusters entered on software out of 9 as follows:

- Total population enrolled 6520
- Interview completed 5762
- Ist sputum tested 900
- CBNAAT positive 21
- Microscope positive 10
- Culture positive 18

CAPACITY BUILDING PROJECTS

Capacity building in cancer prevention and early detection through the ECHO model

Principal Investigator: **Dr. Roopa Hariprasad, Scientist E, Division of Clinical Oncology**

Funding agency & Budget: Tata Trusts – Rs 26 lakhs (1st year); ECHO India – Rs 26 lakhs (2nd year)

Project Duration: Jun 2018- Sept 2020

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 train the medical personnel in the Indian Public Health System to empower them with knowledge and skills required for population-based cancer screening. This includes training medical officers, gynaecologists and dentists in knowledge in cancer screening through weekly online sessions, followed by 3-day hands-on workshop in Screening for Common Cancers at NICPR, Noida.

Brief Methodology: Medical Officers nominated by the state program officers (SPO) of NCD cells 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 Jan 2019 – Sept 2020

- 774 (medical Officers – 566, Gynecology – 149, Dentists – 59)
- NICPR has been designated by MoHFW as a superhub and is now eligible to train hubs across India, in order to assist in the capacity building efforts across India
- We have recruited 2 hubs to assist in the training in south and East zones of the country.

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

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

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

Team members: Dr R Suresh Kumar, Dr Suresh 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 bridgeing 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 Colleages/ 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: Through adversiment in ICMR-NICPR website, 20 participants from different disciplines of clinical and biomedical research background are selected per workshop for two workshops in a year. For short term training, 15-20 students while 10-12 students are accepted for long term training in a year.

Work done so far: One workshop was conducted on research methodologies for four days (January 28-31st, 2020). Twenty candidates were selected from various disciplines and imparted training on various molecular techniques.

Eight long time students conducted six-months training during this time

TOBACCO-RELATED RESEARCH

WHO FCTC Global Knowledge Hub on Smokeless Tobacco

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

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: An international meeting was organized on Tobacco Advertisement, Promotion and Sponsorship (TAPS) Ban for Smokeless Tobacco (SLT) in collaboration with WHO SEAR on 6-7 Nov 2019 at ICMR, New Delhi. The objective was to engage with the Parties most affected by SLT use particularly through violation of TAPS ban and to strengthen the enforcement of TAPS ban in these countries. Representatives from Bangladesh, Bhutan, Myanmar and Sri Lanka attended the meeting along with State Nodal Officers from the Indian states. The meeting conluded with seeting policy priorities and key recommondations on the challenges related to surrogate, internet, satellite, and other forms of cross-border advertising of SLT products. Partcipating countries unanimously shown their commitment and proposed action plan for SLT-TAPS ban.

Online courses on SLT and webinars are being held periodically on different topics for capacity building and knowledge dissemination. An online course on SLT cessation was conducted in collaboration with University of York, UK with focus on SLT epidemiology and harms,

addictiveness, withdrawal symptoms, and different cessation methods including behavioural intervenations. The course was attended my many young scholars, dentists, public health professionals and public policy experts from various countries.

A dedicated website for WHO FCTC GKHSLT has been hosted to provide information on the activities on SLT https://untobaccocontrol.org/kh/smokeless-tobacco/. This website also provides valuable information related to SLT products, epidemiology, policies, cessation etc.

Effective Implementation of Tax & Tobacco Advertisement, Promotion and Sponsorship (TAPS) measures for Prevention & Control of Smokeless Tobacco in South East Asia Region (SEAR)

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

Nodal Officer: Dr Prashant Kumar Singh, Scientist D, Division of Preventive Oncology & Population Health

Funding agency & budget: The UNION

Project Duration: Mar 2017 – Aug 2020

Brief background & rationale: The aim of the project is to convene, map and equip the states and national government and non-government organization who work on tobacco control and support them to execute for effective implementation of SLT. Build capacity and organise training workshop to build capacity of key national and state government stakeholders and non-government stakeholders on Tax and TAPS polices and violations prevalent in India. Generate novel solutions based on policy framework for high burden SLT states in India and support tobacco control cells and state governments to draft policies.

Objectives:

- To monitor the SLT industry and map the regulatory processes, policies and legislations that governs the SLT industry.
- To monitor SLT taxation, compliance to health warnings regulations for SLT products.
- To provide institutionalize mechanisms to regulate SLT by building capacities of government officials at national and state level, and support implementation to achieve stronger compliance to FCTC guidelines and domestic legislation.

Activities: A National Consultation was organized in Patna on **"Effective implementation of measures for control of Smokeless Tobacco use in India" on 18-19 Feb 2020**. The Honorable Health Minister of Bihar inaugurated the meeting and Health officials from different states across the country attended the meeting.

Factsheets on SLT Control in India and Bihar were released. Recommendations for effective implementation of measures for control of SLT use were prepared. As a result of the consultation, state governments of Himachal Pradesh, Tamil Nadu and Madhya Pradesh also issued similar notifications for ban of SLT.

Our team provided supportive documents to State governments of Madhya Pradesh and Kerala to

facilitate the ban on SLT use.

We collated and provided data to the Government of Bihar on 15 banned Pan Masala brands along with information on its trademark registration under different classes such as Class 30 (Spices & preserved herbs etc.), 31 (Raw & unprocessed agricultural grains & seeds etc.) and 34 (Tobacco and tobacco substitutes etc.).

We mapped regulatory processes, policies and legislations, which govern the SLT industry along with the details of SLT trades and their registration. Coordination between state nodal officers from department of health and tobacco control was established to understand challenges towards stronger implementation and compliance with respect to SLT.

Translational Potential: The study facilitated building building capacity of health officials at National and State level to regulate SLT use and supported implementation of policies to achieve greater compliance with WHO-FCTC guidelines and domestic legislations. The regulatory processes, policies and legislations governing the SLT industry have been mapped out to help monitor the SLT industry in India.

Assisting Parties in addressing SLT use and development of relevant policies on all WHO FCTC requirements

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

Funding agency & budget: Govt. of Norway through WHO FCTC Secretariat, Rs. 6.95 lakhs

Project Duration: Jul - Dec 2019

Brief background & rationale: Smokeless tobacco (SLT) is an increasingly significant issue in tobacco control. This is explicitly recognized in decision FCTC/COP6 (8), which describes smokeless tobacco as a global concern. The WHO FCTC Global Knowledge Hub on SLT is responsible for the development of a comprehensive knowledge base on SLT, as well as using their specialist expertise to assist Parties' efforts to improve SLT control. This project activity was aimed at addressing SLT use in high burden countries, with specific support to their legislation and research efforts. The GKH-SLT was invited by the Ministry of Health and Sports, Myanmar for assisting them in the inclusion of SLT ban as an integral part of national law.

Objectives:

- To provide in-country direct assistance in addressing SLT use to three LDC/LMIC Parties, primarily in South-East Asia
- To develop relevant policies and/or draft legislation as well as research on SLT.

Activities: NICPR assisted Myanmar in developing Tobacco Control Policy and Strategy at a Development workshop held at NayPyiTaw, Myanmar during 19-22nd Nov 2019. The workshop was attended by representatives of different Ministries from Myanmar working together with Health Ministry to regulate tobacco use. A document on the policy priorities and key recommendations was prepared and submitted to Government of Myanmar and the WHO FCTC Secretariat.

Translational Potential: WHO FCTC GKH-SLT assisted them in analysing Article wise gaps and making recommendations from the existing policies for better and quick implementation for:

- Adopt plain packaging
- Enforce the current tobacco Control Law and increase its effectiveness
- Raise taxes to reduce affordability of tobacco products and protect youth

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

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

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

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

Project Duration: Apr 2019 – Mar 2021

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 during Jan 2019-Sept 2020: Till now, adaptation phase of the trial has been completed with the aim of understanding the current SLT usage, including type of SLT use and its determinants. Based on findings of adaptation phase of the study, we have developed Information, Education and Communication (IEC) materials that will be provided to the SLT users during the next (main trial) phase of the study.

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

Other Collaborating Institutes: ICMR Hqrs, RMRC Bhubaneshwar

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 SLTand 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, 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 will be conducted.

o For the second objective, an attempt to understand the socio-cultural context and determinants of SLT and areca nut use among target population will be undertaken. It will 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 will be developed using Information, Education and Communication (IEC) strategy which will be tested for cultural acceptability at a local cessation centre.

Work done during Jan 2019-Sept 2020: Data analysis from India indicates significant proportion of both pregnant and lactating mothers consume SLT with considerable regional disparity across states.

A 'White Paper on Smokeless Tobacco and Women's Health in India' has been published in Indian Journal of Medical Research highlighted the present knowledge, gaps, research and policy priorities related to tobacco control with special focus during pregnancy, nutrition, cessation gender roles along with other socioeconomic dimentions.

Extensive global literature review on development of Behaviour Change Intervention (BCI) tools is underway and a preliminary result indicates a lower number of studies conducted among women.

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.

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

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 first phase of the study, characterization of common microbiome present in SLT products will be performed by Next Generation Sequencing (NGS)

Work done during Jan 2019-Sept 2020:

In last six months (June-December), project staffs got recruited and chemicals got procured. Listing and logistics of procurements of available SLT products in India are under process for microbiological analysis.

Nineteen (19) SLT products of various brands of seven different categories were procured from local setup. A total of 42 individual SLT products were procured. These SLT products are most common and widely used in this region and are in the process of characterisation.

Translational Potential: To create a robust SLT control regime in India by undertaking research, cessation, capacity building, policy action that is based on scientific evidence

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:

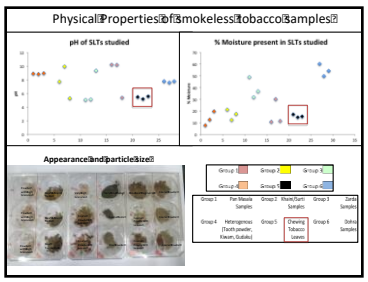
- To identify and characterize the microflora present in different Indian ready-to-use smokeless tobacco products using conventional microbiological and molecular methods.

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.).

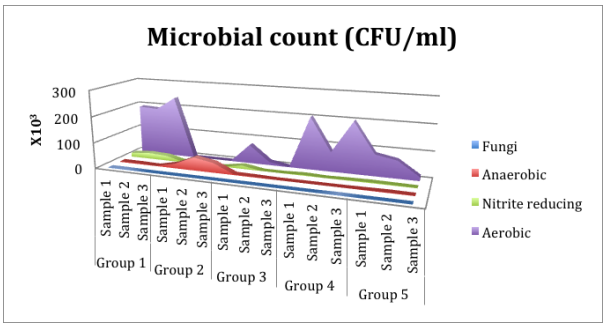
Chemical contents of different smokeless tobacco products such as nitrite, various TSNA compounds and other chemicals would be estimated on LC-MS/MS. Statistical analysis will be performed using ANOVA followed by suitable post-hoc analysis to compare chemical profiles of various tobacco products. The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

Work done during Jan 2019 – Sept 2020

We completed the study of certain physical parameters (Appearance check, Partical size, % moisture available and pH) of 18 smokeless tobacco products available in Indian market. The results confirmed the heterogeneous nature of tobacco products available in Indian market.



Total 32 Nitrate/Nitrite reducing bacteria were isolated as pure culture from 15 different SLT samples tested till now. These cultivable microbes were studied to understand the microbial community structure of SLTs.

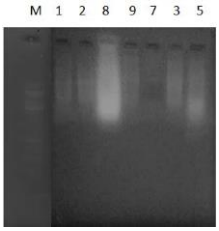


These results again showed **no homogenous presence of microbes among SLT samples.** Some loosly common trends may be seen as all Khaini/Surti samples of group 2 showed only representation of anaerobic microbes and all Pan masala samples of group 1 showed good representation of all groups of cultivable microbes. Chewing tobacco leaves samples of group 5 were next best in harbouring three groups of cultivable microbes including nitrate/nitrite reducing microbes, aerobic and anaerobic microbes except anaerobic group.

DNA extraction was done from 10 SLT samples of which 7 SLT samples provided good amount of DNA for further genetic analysis. Genetic analysis and community structure study is under progress.

Microbial DNA Isolation Studies

Sample	Sample in well	Concentration of DNA (ng/ul)
Gp 5 Sample 1	1	66
Gp 5 Sample 2	2	61
Gp 5 Sample 3	3	93.4
GP 1 Sample 1	4 (Not loaded)	0.434
GP 1 Sample 2	5	12.1
GP 1 Sample 3	6 (Not loaded)	0
Gp 2 Sample 1	7	62
Gp 2 Sample 2	8	8.56
Gp 2 Sample 3	9	67
Gp 6 Sample 1	10 (Not loaded)	0.966



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: Naturally occurring scaffolds are recognised superior due to their druggable nature, optimal interaction with biological molecules and reduced toxicity. Therefore, natural products remain an indispensable source for anticancer drug discovery. Although experimental methods are available that can determine the bioactivity however they are time consuming and costly. This has necessitated the development of computational methods for predicting anti-cancerous activity.

Objectives:

- Collection and compilation of phyto-molecules 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 during Jan 2019 – Sept 2020:

We have collected and compiled information related to experimentally validated plant-derived natural compounds exhibiting anti-cancerous activity (*in vitro* and *in vivo*). It currently contains nearly 1900 compound entries, and each record provides information on their structure, manually curated published data on *in vitro* and *in vivo* experiments along with reference for users referral, inhibitory values (IC_{50}/ED_{50}/EC_{50}/GI_{50}), properties (physical, elemental and topological), cancer types, cell lines, protein targets, and drug likeness of compounds.

Translational Potential: To facilitate identification of new inhibitors against the different cancer drug targets from phyto-compounds, we have been able to create a useful data resource which will provide starting points for in silico screening of natural compounds as well as scaffolds to be selected for the design of novel molecules with anti-cancer potential.

ADMET profiling of diverse phytocompounds using chemoinformatics tools

Intramural Research Study by Division of Bioinformatics

Background: Natural products from plants have been used from centuries as they have proved important in identification of therapeutic compounds. They provide the starting structures from which synthetic analogs can be formed that are more potent and effective. Although, phytocompounds are important due to their uniqueness however, only few reach the development phase due to their poor pharmacokinetics. Therefore, pre-assessing the absorption, distribution, metabolism, excretion and toxicity (ADMET) profiling of phytochemicals is a prerequisite for promoting drug discovery from medicinal plants.

Objectives: To predict the pharmacokinetic properties of phytochemicals identified from the regions of India, Brazil and South Africa.

Brief Methodology: We have studied the physiochemical and pharmacokinetic behaviour of approximately 3100 phytochemicals from biologically diverse regions covering India, Brazil and South Africa. We have assessed nearly 30 different properties to evaluate the ADMET profile of molecules using three different chemoinformatic tools (Qikprop, pkCSM and DataWarrior). We then short-listed a few compounds that meet all the pharmacokinetic criteria and subsequently validated the predictions using literature survey and gathered information on their anticancer activity against cancer cell lines as well as protein target

Main Findings:

- On individual application of parameters in each of ADMET group, we identified 1658, 393, 1127, 2933 and 880 compounds that were absorbable, distributable, metabolized, excreted and non-toxic respectively.
- Simultaneously, sequential processing of molecules through each of ADMET criteria's resulted in identification of 24 compounds that adhered to all the properties.
- These phytocompounds belong to five chemical classes (alkaloids, flavonoids, terpenes, lignoids and phenols) and fifteen different plant sources.
- Literature survey further revealed that five of these molecules (Eriodictyol, Stachysterone, Catechin, Heliovinine-N-oxide and Hydroxytyrosol) have potent in-vitro anticancer biological activity against cancer cell lines and can thus serve as the base for further drug development studies.

Study on Reversal of Multidrug Resistance (MDR) and role of P-gp in different cancer cell lines Using Natural Chemo preventive agents

Principal Investigator: Ms. Indu Kumari, WOS
Mentor: Dr. R. Suresh Kumar, Molecular Biology Group

Funding Agency: DHR – WOS
Duration of Project: 2018-2021

Background: Drug resistance has been a major problem in cancer therapy. Almost all therapies (except surgery) being used in the treatment of cancer can result in resistance. Unfortunately there is a large group of patients that either do not respond to the therapy (intrinsic resistance) or become resistant during therapy (acquired resistance). Various mechanisms involved in multidrug resistance (MDR) like alterations in the cell cycle, reduced apoptosis, decreased uptake of drug have been identified. One of the proteins in the family of ABC transporters, P-glycoprotein (P-gp) acts as an ATP-dependent efflux pump to remove cytotoxic drugs from cytoplasm.
Phytochemicals may serve as an alternative option in management of many diseases including cancer. Identification of phyto inhibitors and reversal of MDR using natural compounds may help in reducing the cancer burden and easy to use for successful cancer chemotherapy.

Objectives:

- To Study on drug tolerant and drug resistant phenotypes in cancer cells (breast carcinoma cell line, lung carcinoma cell line, and oral carcinoma cell line) through progressive in vitro drug exposures.
- To study on the expression profile of ABC drug transporters (p Glycoprotein) and its role in drug resistance pathway.

Brief Methodology: In-silico methods were used to screen phytochemicals against target protein. Colony formation assay, MTT assay and Trypan blue dye exclusions were performed with compound No 4 to investigate the growth in non - treated and treated normal breast cancer and resistant MCF-7 cells. Drug uptake capability of resistant breast cancer cells was explored by Rhodamine assay in phytochemical treated cells. Expression of proteins was evaluated by Western blot against targeted genes related to multidrug resistance. Pulse Resistance cells are being developed with known chemotherapeutic drug.

Work done during Jan 2019 – Sept 2020

From MTT result we evaluated the cytotoxic effect and IC50 value of phytocompound as 60µM and 40 µM Ver., for both MCF-7 and MDA MB-231 cell lines. Morphological analysis of MCF-7 from trypan blue exclusion dye showed significant effect of HAR, a inhibitor ligand drug as increasing concentration of drug. Trypan blue exclusion showed increasing proliferation inhibition with increasing dose of phytocompound (drug) in treated and untreated cell for normal MCF-7 and resistant MCF-7/ 5-FU cells. Wound healing assay result showed inhibition

of cell migration as increasing dose of drug for both MCF-7 and MCF-7/5FU. From FACS result we concluded that drug arrest G-M phase of cell cycle. From result of Rhoda mine assay we determined that HAR significantly reverse /sensitize the 5-FU resistant breast cancer cell (MCF-7/5-FU) Western blot analysis of MCF-7 positively support the Rhoda mine results as increasing the dose of drug decreasing the expression of target transporter protein, drug resistance maeker , MAPK/ERK pathway related protein

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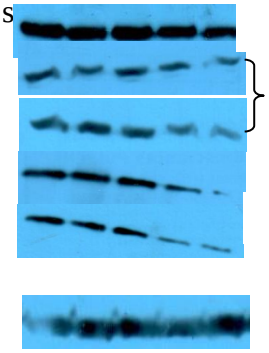

Fig: Expression of various proteins following treatment of normal breast cancer cells MCF-7 with HAR compound for 48hr

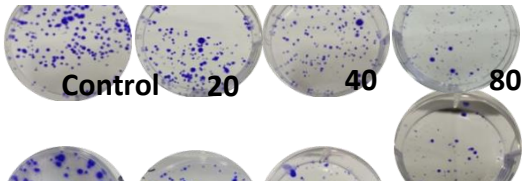

Fig: Clonogenic assay to determine colonies survival efficiency after treatment with HAR on breast cancer cell.

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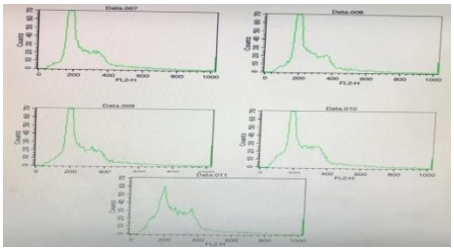


Fig: Cell cycle distribution analysis in HAR treated MCF-7 breast cancer cells

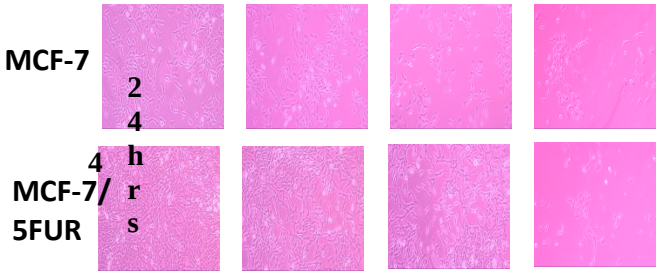


Fig: Morphology and cell proliferation analysis using trypan blue dye

COVID-19 RELATED RESEARCH

National sero-surveillance to monitor the trend of SARS-CoV-2 infection transmission in India: Community-based surveillance

Institutional Coordinator: Dr. Shalini Singh, Director

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

Funding agency & budget: ICMR

Project Duration: June 2020

Brief background & rationale: Population-based seroepidemiological studies measure the extent of SARS-CoV-2 infection in a country. First round of a national serosurvey, conducted to estimate the seroprevalence of SARS-CoV-2 infection among adult population of India.

Brief Methodology: From May 11 to June 4, 2020, a randomly sampled, community-based survey was conducted in 700 villages/wards, selected from the 70 districts of the 21 States of India, categorized into four strata based on the incidence of reported COVID-19 cases. Four hundred adults per district were enrolled from 10 clusters with one adult per household. Serum samples were tested for IgG antibodies using COVID Kavach ELISA kit. All positive serum samples were re-tested using Euroimmun SARS-CoV-2 ELISA. Adjusting for survey design and serial test performance, weighted seroprevalence, number of infections, infection to case ratio (ICR) and infection fatality ratio (IFR) were calculated. Logistic regression was used to determine the factors associated with IgG positivity.

Work Done: ICMR-NICPR was one of the nodal centre covered three districts and 30 clusters covering 1200 population in first round of survey. Survey was conducted and blood sample was collected for 1200 population.

S.No.	District Name	Tested	Positive	Negative
1.	Gautam Budhha Nagar	398	3	395
2.	Jyotiba phule Nagar	399	2	397
3.	Saharanpur	390	2	388
	Total	**1187**	**7**	**1180**

The survey was also conducted in five containment zone of Delhi by ICMR-NICPR.

S.No.	Containment Zone
1.	Markaz Masjid and Nizamuddin Basti
2.	H. No. 811 to 829 and 842 to 835 - Khadda Colony, Jaitpur, Extension , Part-II, Delhi
3.	Gali No. 16, Kachhi Colony, Madanpur Khadar, Extension, Delhi
4.	H. No. 53 to 55 & 25, Shera Mohalla, Garhi, East of Kailash, Delhi
5.	D-Block, (H.No. 152 to 162) Shaheen Bagh , Delhi

National sero-surveillance to monitor the trend of SARS-CoV-2 infection transmission in India: Second round of survey, August 2020

Institutional Coordinator: Dr. Shalini Singh, Director

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

Funding agency & budget: ICMR

Project Duration: August 2020

Primary Objective: To estimate the seroprevalence for SARS-CoV-2 infection in the general population at the national level and determine the trend over time.

Secondary objectives

- To estimate the age and sex-specific sero-prevalence
- To estimate the proportion of asymptomatic SARS-Cov-2 infections at community level

Brief Methodology:
Study design: Serial cross-sectional survey of individuals
Study population

- Inclusion criteria: Usual resident, age ≥10 years, available at the time of household visit
- Exclusion criteria: Age < 10 years, locked household, guest/visitor

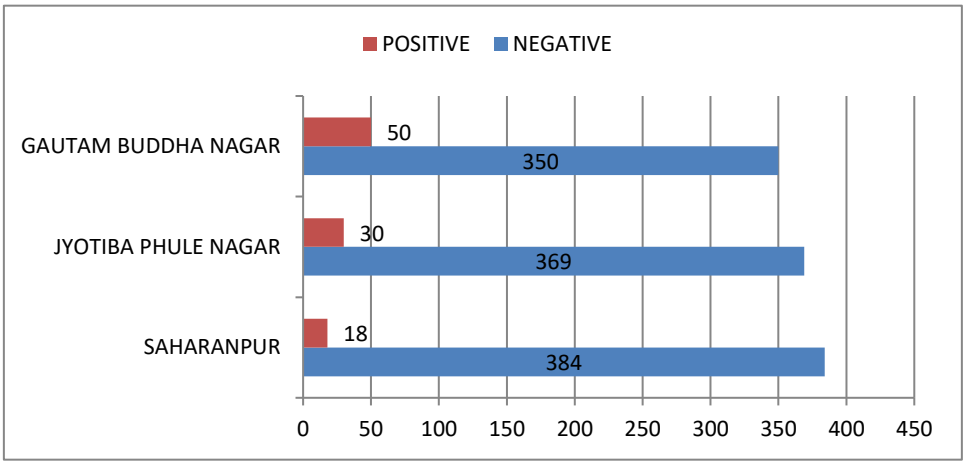
The household serosurvey was conducted among individuals aged ten years and above in the same 700 villages and wards from 70 districts selected during the first serosurvey.

Participant sera were tested for the presence of SARS-CoV-2 specific IgG antibodies on the Abbott Architect i2000SR automated analyser using the Abbott SARS-CoV-2 IgG assay as per

manufacturer's instructions. This assay detects IgG antibodies against the SARS-CoV-2 nucleocapsid protein, and has a sensitivity and specificity of 100% and 99·6%, respectively. The assay was calibrated with positive and negative quality controls prior to analyses. Assay results above the cut off index value of ≥1·4 were interpreted as positive for SARS-CoV-2 antibodies. As a part of quality control, ten percent of positive, and equal number of negative sera were re-tested using the same assay.

Work Done: The collected data shows that:

- In Saharanpur district, out of 402 individuals 384 (95.5%) are Negative and 18 (4.5%) are Positive for Cov-19.
- In Jyotiba Phule Nagar district, out of 399 individuals 369 (92.5%) are Negative and 30 (7.5%) are Positive for Cov-19.
- In Gautam Buddha Nagar district, out of 400 individuals 350 (87.5%) are Negative and 50 (12.5%) are Positive for Cov-19.



Comparison of Positive and Negative for Cov-19 in three districts

Mental health and social stigma among healthcare personnel involved in the management of COVID-19 patients in India

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

Other Collaborating Institutes: ICMR Hqrs

Funding agency & budget: ICMR, Rs 3.52 lakhs

Project Duration: Sept – Nov 2020

Brief background & rationale: Healthcare personnel working in COVID-19 wards face tremendous pressure owing to concerns about their personal safety, safety of loved ones, and shortage of equipment such as ventilators and protective gear. Prior studies have documented similar adverse psychological reactions during the 2003 SARS outbreak. However, evidence-based interventions for healthcare personnel during epidemics are scarce. Identification of factors associated with mental health issues among healthcare personnel would inform such interventions. The present study seeks to address this knowledge gap.

Objectives:

- To assess the occurrence of psychological distress, including depression, burnout, anxiety and other associated mental health outcomes among healthcare personnel (doctors, nurses, laboratory technicians, etc.). engaged in COVID-19 management
- To understand the extent of social stigma faced by the healthcare personnel engaged in the management of COVID-19 and its effect on their mental health status.
- To identify the coping mechanisms adopted by the healthcare personnel to mitigate the psychological effects of handing the COVID-19 infected.
- To explore the perception and expectations of healthcare personnel on interventions that could mitigate the stigma associated with the COVID-19.

Brief Methodology:

This is a mixed-method study with both quantitative data collection as well as qualitative indebt-interview among the selected participants. The quantitative component will provide the proportion of subjects suffering from psychological distress, including depression, burnout, anxiety and other associated mental health and the qualitative component will provide answers to the extent of social stigma, perceptions and coping mechanism of health care providers. For the quantitative study, different cadres of 90 healthcare workers including doctors, nurses, ambulance emergency response teams, lab personnel, and others who are directly involved in patient care from COVID 19 designated hospitals. Study also includes frontline health workers who are involved in case identification, contact tracing, prevention and control measures for COVID 19.

Work done: Data collection is on-going.

Translational Potential: This study finding would provide insight and understanding of the mental health and social stigma faced by the healthcare professionals due to COVID management at different

levels. This understanding could help in evolving feasible acceptable and timely need-based interventions for health care providers that address these concerns. The interventions based on these findings we hope will protect the interests of health care workers and provide the support they need medically, health system related and most importantly the psychosocial and emotional support to cope with the management of this difficult illness. This has public health implications as all these need-based interventions will in turn reflect in the provision of holistic quality COVID care that would make a difference to prevent morbidity and mortality due to COVID 19, promote screening, timely testing and treatment of this dreaded disease.

ACADEMIC ACTIVITES

PhD/ MD/ MS Thesis Enrolled/ Completed

Dr Mausumi Bharadwaj, Molecular Biology Group

- **PhD Thesis**

S.No.	Name of student	Title of Thesis	
1	Upma Sharma	Role Of Immuno Modulatory Genes In Oral Squamous Cell Carcinoma (OSCC) In Indian Population	2014-2019
2	Mohd Mabood Khan	Study on expression profile of miRNA in Prostate Cancer	2017-2022
3	Heena Gautam	Comparative Study on Endometrial and Cervical Cancer with special reference to Human Papillomavirus type 16	2018-2023

Dr. Suresh T Hedau, Molecular Biology Group

- **PhD Thesis**

S.No.	Name of student	Title of Thesis	
1	Indu Kumari	Study on Reversal of Multidrug Resistance in different cancer cell lines Using Natural Chemo preventive agents	2020-2024

- **MD/ DNB Thesis**

S.No.	Name of student	Title of Thesis	
1	Dr Saloni Chadha, LNJP (MD)	Comparison of HPV16/18 genotyping and P16/Ki67 dual staining for detection of high-grade cervical lesions in patients with low-grade cervical smears	Ongoing
2	Dr. Milind Babanrao Zade (DNB)	Correlation of p53 and Ki-6 immunoexpression with stage, grade and prognosis of urinary bladder lesions	Ongoing

Dr. Subhash Agarwal

- **PhD Thesis**

S.No.	Name of student	Title of Thesis	
1	Mr Agneesh Pratim Das	To be finalized	2020-2024

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	2019-2021
2	G Prakash Singh	To study the chronic obstructive pulmonary disease as risk factor for CKD	2017 - 2020

Dr. Showket Hussain, Molecular Biology

- **PhD Thesis**

S.No.	Name of student	Title of Thesis	
1	Sheeraz Un Nazir	Role of Ets-1 Transcription Factor in Breast Carcinogenesis	2014-2020
2	Dev Jyoti Dalal	Optical characterization of breast cancer	2015-ongoing
3	Atul Chikara	To understand the mechanism of aberrant expression of miRNAs and their cross-talk with drug resistance in cervical cancer cells	2019-2022
4	Sandeep Sisodiya	Symbiosis International, Pune.	2020-ongoing
5	Jyoti Rani	Under process of registration	2019-ongoing

MD Thesis

S.No.	Name of student	Title of Thesis	
1	Dr. Manisha Yadav	Evaluation of expression of extracellular signal regulated kinase-1 in oral cancer	Ongoing
2	Dr. Aadarsh Kumar Meena	Expression of FOXP3 marker in oral and oropharengeal carcinoma	Ongoing
3	Dr. Nitin Singh	Expression of E26 Transformation Specific Sequence 1(ETS-1) and Human Papilloma Virus (HPV) in oral cancer	Ongoing
4	Dr. Gopal Puri	Association of different modalities of treatment with the expression of various subsets of T Lymphocytes in patients with breast cancer and their clinical outcomes	Ongoing
5	Dr. Shaifali	Role of C-Myc mediated P53 dependent pathway in the staging of OPMDS and OSCC	Ongoing

Dr. Ruchika Gupta, Division of Cytopathology

- **MD (Obstetrics & Gynecology) Thesis**

S.No.	Name of student	Title of Thesis	
1	Dr Saloni Chadha, LNJP	Comparison of HPV16/18 genotyping and P16/Ki67 dual staining for detection of high-grade cervical lesions in patients with low-grade cervical smears	Ongoing

POST-DOCTORAL FELLOWS/ RESEARCH ASSOCIATES/ TRAINEES/ DISSERTATIONS

Dr Sanjay Gupta

Observership (one month)

Sr. No.	Name	Name of University
1.	Dr. Purva Sharma	Mulayam Singh Yadav Medical College, Meerut
2	Dr Anchit Goel	Institute of Human Behaviour and Allied Sciences (IHBAS)

Dr Mausumi Bharadwaj

S. No.	Name of student	Fellowship	Project
1.	Dr. Vineeta Sharma	ICMR-RA	Functional evaluation of Toll like receptors and Interleukin SNPs in association with Reproductive tract infections
2.	Dr. Manikankana Bandopadhyay	ICMR-RA	Role of hepatitis B virus genotype specific X protein (HBx) in TGF-β mediated regulation of liver inflammation in hepatocellular carcinoma: an in vitro study
3.	Dr. Shilpi Gupta	ICMR-PDF	Mechanistic insights into NF-κB interactome in HPV and/or tobacco induced tongue squamous cell carcinoma: role of mutations in shaping protein-protein interactions for identification of therapeutic targets

Dissertation Trainees under Dr. Mausumi Bharadwaj:

S. No.	Name of student	University enrolled	Duration
1.	Y. Ghanapriya	Amity University	6 months
2.	Rahul Gautam	Invertis University	6 months
3.	Mimansa Sharma	Jiwaji University	6 months
4.	Harsh Chaprana	Amity University	6 months

Summer Training: 2 Months (under Dr. M. Bharadwaj)

Sr. No.	Name	Name of University
1.	Niyati Oli	Amity University
2.	Anjali Pathak	Amity University

3.	Yogesh Kumar Sahu	Amity University
4.	Vaibhav Tiwary	Vellore Institute of Technology
5.	Ishita	ISSER
6.	Saurabh Mukherjee	NIT, Durgapur
7.	Sameer Kumar	DPSR University
8.	Iffat Akhtar	Shoolini University
9.	Shagufta Akhtar	Shoolini University
10.	Srinidhi	SRM, Chennai
11.	Aditi Mangla	Amity University
12.	Garusha Jain	Punjab Agriculture University
13.	Amandeep Kaur	Punjab Agriculture University
14.	Priyanka Roy	IILM
15.	Rishika Sharma	IILM
16.	Shaiesta Haider	Jamia Millia Islamia
17.	Shivani	IILM

Dr R Suresh Kumar

S. No.	Name of student	Fellowship	Project
1.	Dr. Narendra Singh	ICMR-PDF	Identification of novel phytochemicals for drug resistance reversal property against lung cancer stem cells
2.	Ms. Indu Kumari	DHR-WOS	Study on Reversal of Multidrug Resistance (MDR) and role of P-gp.in different cancer cell lines Using Natural Chemo preventive agent
3.	Dr. Nivedita Mishra	DHR-WOS	Studies on the Impact of Microbial Treatment on Tobacco Specific Nitrosamines in Indian Smokeless Tobacco Products

Dissertation Trainees under Dr. R Suresh Kumar:

S. No.	Name of student	University enrolled	Duration
1.	Pushpanjali	Amity University	6 months
2.	Lakshit	IMS ghaziabad	6 months
3.	Priyansha	Amity University	6 months

Summer trainees (under Dr. R Suresh)

S. No.	Name of student	Degree pursuing	University enrolled	Duration of training
1.	Ms. Yathika	MSc Integrated	Amity Unviersity	2 months
2.	Mr. Siva	MSc Biochemistry	Bharathiar Univ, Coimbatore, TN	4 Months
3.	Ms. Adhira Jose	MSc Biochemistry	Bharathiar Univ, Coimbatore, TN	4 Months
4.	Ms. Oviya bhaskar	MSc Biochemistry	Bharathiar Univ, Coimbatore, TN	4 Months
5.	Ms. Karunya Umayal	MSc Biochemistry	Bharathiar Univ, Coimbatore, TN	4 Months
6.	Mr. Mukul Tyagi	Msc Biotechnology	CCS Univ Meerut	4 months

Dr Suresh T Hedau

	Name of student	Fellowship	Project/ Study title
1	Dr. Binayak Kumar	ICMR-PDF	Identify the Mechanisms Involved in Developing Resistance against Abemaciclib and Palbociclib in ER +ve, PR +ve and HER-2 –ve Breast Cancer
2	Dr. Soni Kumari	ICMR-PDF	Lysine Specific Demethylase 1 mediated regulation of metabolic stress-induced molecular signaling in Gastric cancer cells
3	Dr. Ragini	ICMR-PDF	Development of Folate Targeted Biocompatible Nanocarrier: Controlled Drug Delivery System in Combination for Breast Cancer Treatment
3	Ram Krishna Sahu	ICMR-SRF	Role of HDAC1 in the regulation of BRCA1 & p16 gene expression by methyl-CpG binding protein MBD2 in breast cancer cell lines

Dissertation Trainees under Dr. Suresh T Hedau:

S. No.	Name of student	University enrolled	Duration
1.	Aditi Sharma	Amity University	6 months
2.	Bhawana Adhikari	Amity University	6 months

3.	Shubham Kumar Shrivatava	Sharda University, Greater Noida	2 months
4.	Shweta Sharma	Raja Balwant Singh College, Dr. Bhim Rao Ambedkar University, Agra	6 months
5.	Sandhya Kumari	Govt. Kamla Raja Girls Post Graduate (Autonomous) College, Gwalior	6 months

Dr. Subhash Agarwal

S.No.	Name of student	University enrolled	Duration
1	Ms. Hritika Upadhyay	Jaipur National University	6 months
2	Ms Nidhi Chaubey	Jaipur National University	6 months
3	Ms Himani Saxena	Jaipur National University	6 months
4	Mr Neeraj Kumar Rai	Jaipur National University	6 months
5	Ms Mallika Jha	Sardar Patel University	6 months

Summer trainees (under Dr. Subhash Agarwal)

S. No.	Name of student	University enrolled	Duration
1.	Ms Vibha Taneja	Amity Unviersity	2 months
2.	Ms Smriti Mistra		2 months
3.	Mr Abhishek Tiwari		2 months
4.	Ms Anjali Shula	Noida Institute of Engineering and Technology	2 months
5.	Ms Pulkita Bansal		2 months
6.	Ms Riya Sharma		2 months

Dr Smita Asthana

Dissertation Trainees:

S. No.	Name of student	University enrolled	Degree pursuing
1.	Dr Kushal Rathore	Amity University	MPH
2.	Dr Parul Vohra	Amity University	MPH
3.	Dr Vishakha Francis	Amity University	MPH
4.	Dr Swati Kandpal	Amity University	MPH
5.	Dr Pooja Dhingra	Amity University	MPH
6.	Dr Muvin Khan	GD Goenka University Gurugram	MPH

7.	Siddhant Jain	DIPSRU	M.Pharm
8.	Pooja Vaishnavi	DIPSRU	M.Pharm
9.	Dr Nupur Garg	IIHMR, Delhi	PGDHM

Dr Roopa Hariprasad & Dr Kavita Dhanasekaran

Trainees for cancer screening:

S.No.	Name of trainee	Profession	Duration of training
1.	Dr. Wassim	Dentist	11 days
2.	Dr.Divjot	Dentist	11 days
3.	Dr.Jinkimoni	Dentist	11 days
4.	Dr. Nilofer	Dentist	11 days
5.	Dr.Eleena	Dentist	11 days
6.	Dr.Debashis	Dentist	11 days
7.	Dr. Zeena Chaudhury	Dentist	11 days
8.	Dr. Mevica Baruah	Dentist	11 days
9.	Dr.Ankita Gosh	Dentist	11 days
10.	Dr. Sahidul Islam	Dentist	11 days
11.	Ms. Pooja Kakoti	Staff Nurse	11 days
12.	Ms. Jyotismita	Staff Nurse	11 days
13.	Ms. Helmina	Staff Nurse	11 days
14.	Ms. Mriduchanda	Staff Nurse	11 days
15.	Ms. Ankita	Staff Nurse	11 days
16.	Ms. Sabnam	Staff Nurse	11 days
17.	Jamala Khatun	Staff Nurse	11 days
18.	Jenny Champia	Staff Nurse	11 days
19.	Rosna Begam	Staff Nurse	11 days
20.	Niveditya Yumnam	Staff Nurse	11 days
21.	Dorin Ingtipi	Staff Nurse	11 days
22.	Priya Kullu	Staff Nurse	11 days
23.	Jayasmita Nath	Staff Nurse	11 days
24.	Dr.Shree Shyla	Gynecologist	One month

25.	Dr.Tarini Sonwani	Gynecologist	One month
26.	Dr. Abha Mathur	Gynecologist	One month

Dr Showket Hussain

S. No.	Name of student	Degree pursuing	Project/ Study title
1	Dr. Anamika Priyadarshini Sil	DHR Women Scientist	A molecular understanding of the role of oral contraceptives in the pathogenesis of cervical cancer
2	Dr. Saba Noor	CSIR-RA	A Study on Synergistic Anti-Tumorigenic Effect of NGR-siRNA and Photo-thermal Ablation Mediated by Functionalized Carbon Nano-Tubes on Cervical Cancer Cells
3	Dr Banashree Bondhopadhyay	RA	Comparative study of Genetic, Clinical and Epidemiological factors of Breast Cancer in Indian population

Dissertation/ Summer Trainees under Dr. Showket Hussain:

S. No.	Name of student	University enrolled	Duration
1.	Guneet Kaur	Amity University	6 months
2.	Mahima Chauhan	Amity University	6 months
3.	Taru Jain	Jaypee Institute Of Information technology	6 months
4.	Garima Yadav	Amity University	6 months
5.	Mariyam Chaudhary	Chandigarh University, Chandigarh	6 months
6.	Ms. Muzdalfa Rizwan	Multanimal Modi College, Modinagar	6 months
7.	Ms. Akshita Chhabra	Amity University	6 months
8.	Anshika Garg	G.B Pant University of Agriculture and Technology.	2 months

Dr Prashant Kumar Singh

Dissertation Trainees:

S. No.	Name of student	University enrolled	Duration
1.	Ms. Pallavi Sinha	TERI University	5 months
2.	Ms. Pakhuri Jain	TERI University	5 months

Dr Ruchika Gupta

Observership (one month)

Sr. No.	Name	Name of University
1.	Dr. Purva Sharma	Mulayam Singh Yadav Medical College, Meerut
2	Dr Anchit Goel	Institute of Human Behaviour and Allied Sciences (IHBAS)

PUBLICATIONS

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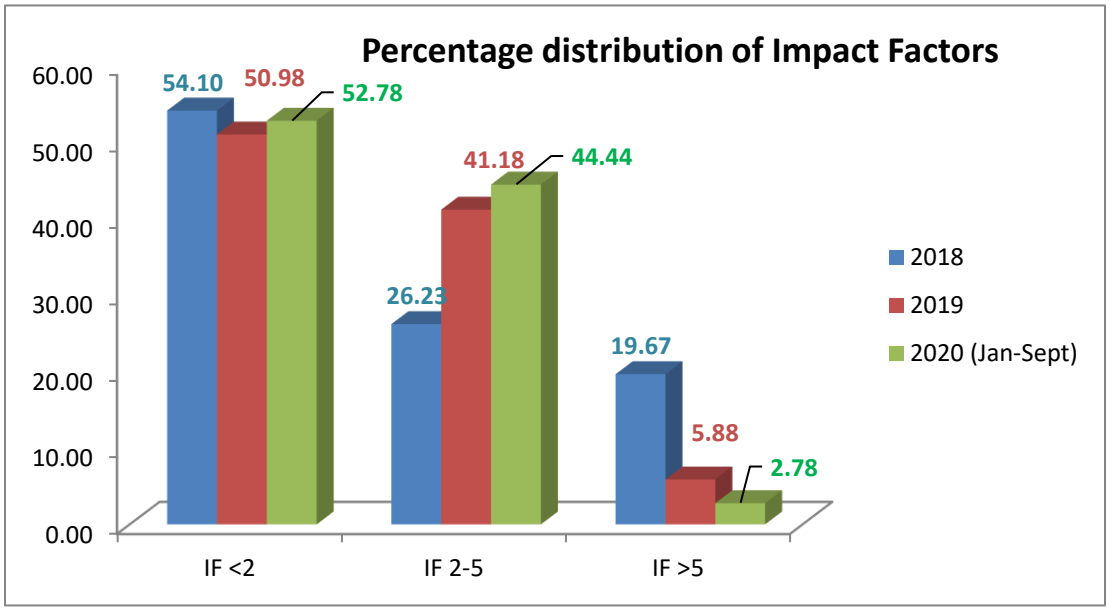

Books/ Chapters/Monographs

1. Hariprasad R, Dhanasekaran K. Training manual on cervical cancer screening using visual inspection of acetic acid (VIA)
2. Hariprasad R, Dhanasekaran K. Training Manual on Screening and early detection of common cancers (Cervical/breast and oral cancers).
3. Yadav SK, Singh S, Gupta R. Biomedical Statistics: A Beginner's Guide. Springer Nature, Singapore, 2019.
4. Kumar RS, Mishra N, Kumar A. Characterization of Tobacco Microbiome by Metagenomics Approach. Springer publication, Methods in Molecular Biology.
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WORKSHOPS ORGANIZED

MOLECULAR BIOLOGY GROUP

• Organized **ICMR-AU-SRTC Workshop on "Basic Molecular Biology Techniques Relevant to Cancer Research"** from 2nd -6th Sept 2019 at ICMR-NICPR, Noida**.**

Participants-11

- Organized DHR funded workshop on research methodologies **"Hands on training- Basic Molecular Biology Techniques Relevant to Cancer Research-Tissue Culture techniques"** January 28-31st, 2020

Participants-20

DIVISION OF CYTOPATHOLOGY

- **9th Hands on Workshop on Cervical Cancer Screening for pathologists**, February 26-28, 2019 Particpants: 36

- **ICMR-AU-STRC Hands-on workshop on cervical cancer screening for pathologists,** September 11-13, 2019 Particpants: 10

- **7th Annual Conference of the UP Chapter of Indian Academy of Cytologists (UP Cytocon 2019),** September 28-29, 2019 Participants: 200

- **10th Hands on Workshop on Cervical Cancer Screening for pathologists, March 4-6, 2020** Participants: 36

DIVISION OF CLINICAL ONCOLOGY

1. Hands-on Workshop on Screening for Common Cancers for Medical Officers, 18-20 Feb, 2019
   Participants: 48
2. Hands on Workshop on Oral Cancer Screening for Dentists, 10 April, 2019
   Participants: 45
3. Enabling continuum of care for cancer-Training of trainers,17 -19 July 2019
   Participants: 40
4. Hands-on training and workshop for staff nurses, ANMs, MHWs, ASHAs and AYUSH doctors at the Karatagi CHC, 28- 30 Aug, 2019
   Participants: 42
5. Hands-on workshop on Screening for Common Cancers for Medical Officers, 5-7 Nov,2019
   Participants: 38
6. Hands-on workshop on Screening for Common Cancers for Medical Officers, 25-27,Feb ,2020
   Participants: 37

ISCCP accredited Advanced Colposcopy training for Gynecologists	June 03-July 07, 2019	01
ISCCP accredited Advanced Colposcopy training for Gynecologists	Aug 01-Sept 03	01
Hands-on training on Screening for Common Cancers for staff nurses from Assam	Oct 14-25, 2019	06
Hands-on training on Oral Cancer screening for dentists from Assam	Oct 14-25, 2019	06
ISCCP accredited Advanced Colposcopy training for Gynecologists	Nov 8-Dec 9, 2019	01

DIVISION OF EPIDEMIOLOGY AND BIOSTATISTICS

- **Bio-Statistical Analysis on SPSS & Research Paper Writing -**
  - Jan 21st – 25th, 2019: 13 participants
  - May 13th-17th, 2019: 10 participants
  - July 22nd – 26th, 2019: 9 participants
  - December 1-31, 2019: 12 participants

- **One-month hands-on Training Course on Research Methodology & Bio-Statistical Analysis -**
  - January 1-31, 2019: 4 participants
  - May 1-31, 2019: 3 participants
  - July 1-31, 2019: 2 participants
  - December 1-31, 2019: 2 participants

- Organized **ICMR/AU-STRC Health Practitioners/Researchers Capacity Building Scheme workshop on Research Methodology & Bio-Statistical Analysis**, 22nd – 25th October, 2019.

- **COVID related trainings**
  - Workshop for COVID 19 protection for community health workers, March 24, 2020 Participants: 22
  - Workshop for live training of protection from COVID 19 (Regarding Sero survey Project), April 1, 2020 Participants: 18
  - Workshop for lab technician, April 30, 2020 Participants: 18
  - Workshop on microplanning & protocol, May 8, 2020 Participants: 18
  - Training on community-based survey, May 9, 2020 Participants: 20
  - Workshop on Covid sero-survey-II for community-based activities, May 12, 2020 Participants: 18
  - Workshop on Covid sero-survey-II for lab technicians, May 12, 2020 Participants: 8

DIVISION OF PREVENTIVE ONCOLOGY

- One-day **hands-on training workshop of NVIVO 12 Plus (qualitative research software), August 28, 2019** **Participants: 20**

NATIONAL TOBACCO TESTING LABORATORY

- Meeting of Technical Committee, 27 Jan 2020
- Second Technical Committee meeting for Handholding the National Tobacco Testing Laboratories (NTTLs), 13 July 2020 at CDTL, Mumbai.

WHO FCTC GLOBAL KNOWLEDGE HUB ON SMOKELESS TOBACCO

- **International Meeting on Tobacco advertisement, Promotion, and Sponsorship (TAPS): Ban for Smokeless Tobacco (SLT), November 6-7, 2019, ICMR Hq., New Delhi**


धुआं रहित तंबाकू के खिलाफ कई देश एकजुट

बैठक

- म्यांमार, भूटान, डोमिनिका जैसे देशों के प्रतिनिधि शामिल रहे।
- तंबाकू विज्ञापन के खिलाफ की रणनीति की अपील

हर वर्ष विश्व में 50 लाख की मौत

- **Expert meet on 'Protecting youth from industry manipulation & preventing them from tobacco & nicotine use' on the occasion of 'World No Tobacco Day' – May 31, 2020**

- **Online course on Smokeless Tobacco Cessation, July 10 to August 28, 2020**

कैंसर संस्थान शुरू करेगा तंबाकू के खिलाफ ऑनलाइन कोर्स

जासं, नोएडा : धुआं रहित तंबाकू पदार्थों के सेवन से होने वाले कैंसर से चिकित्सकों को अवगत कराने के लिए राष्ट्रीय कैंसर रोकथाम एवं अनुसंधान संस्थान (एनआइसीपीआर) दो माह का ऑनलाइन कोर्स शुरू करने जा रहा है। कैंसर विशेषज्ञ प्रशिक्षण प्राप्त करने वाले चिकित्सकों को कोरोना महामारी के इस दौर में धुआं रहित तंबाकू के सेवन से होने वाले कैंसर के इलाज व रोकथाम की जानकारी देंगे।

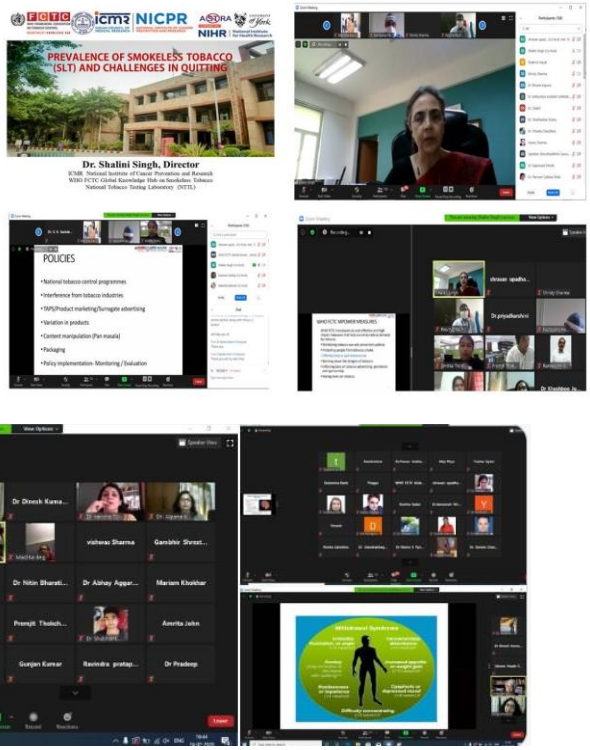
निदेशक शालिनी सिंह ने बताया कि फ्रेमवर्क कन्वेंशन ऑन टोबैको कंट्रोल (एफसीटीसी), इंडियन मेडिकल काउंसिल ऑफ मेडिकल रिसर्च (आइसीएमआर), नेशनल इंस्टीट्यूट फॉर हेल्थ रिसर्च (एनआइएचआर), एडवरटाइजिंग स्मोकलेस टोबैको यूज एंड बिल्डिंग रिसर्च कैपेसिटी इन साउथ एशिया (एएसटीआरए), यूनिवर्सिटी ऑफ यार्क के साथ मिलकर धुआं रहित तंबाकू पर रोकथाम के लिए दो माह का ऑनलाइन सर्टिफिकेशन कोर्स शुरू किया जा रहा है। एमबीबीएस, एमडीएस, बीडीएस, एमपीएच, एमएससी डिग्री प्राप्त व पैरा मेडिकल स्टाफ को धुआं रहित तंबाकू के सेवन हो रहे नुकसान से अवगत कराया जाएगा। इच्छुक स्वास्थ्य कर्मी एनआइसीपीआर की वेबसाइट पर रजिस्ट्रेशन करा सकते हैं। इसकी अंतिम तारीख 20 जून है। उन्होंने बताया कि भारत में पान मसाला, गुटखा और खैनी जन स्वास्थ्य के लिए एक गंभीर मुद्दा है। एक रिपोर्ट के मुताबिक दुनिया में करीब 36 करोड़ लोग इसका इस्तेमाल करते हैं।

दक्षिण पूर्व एशियाई देशों में गुटखा खाने वालों में करीब 66 फीसद भारतीय है। ग्लोबल टोबैको सर्वे इंडिया रिपोर्ट के मुताबिक, गुटखे का सेवन करने वाले करीब 80 फीसद लोग दक्षिण पूर्व एशिया में रहते हैं। भारत में इसे गंभीर मुद्दा बताते हुए धुआं रहित तंबाकू उत्पादों के निर्माण, बिक्री और आयात पर रोक लगाने की सिफारिश की जा चुकी है।

डॉक्टर शालिनी सिंह ● सौ. स्वयं

जागरूकता

● **कैंसर विशेषज्ञ तंबाकू से होने वाले कैंसर व इसके नुकसान से कराएंगे अवगत**



- **Virtual Consultation on "Effective implementation of measures to eliminate smokeless tobacco (SLT) and pan masala use in India", August 2020.**

- **Online course on Smokeless Tobacco- Basic Course**

AWARDS, FELLOWSHIPS & RECOGNITIONS

AWARDS, FELLOWSHIPS & RECOGNITIONS

- **Poster presented by Dr Sanjay Gupta, Scientist G** entitled **'**Cervical cyto-histologic correlation as per the ASC guidelines (2017): implementation experience at a cancer research centre' was selected among best 5 posters, at **International Cytology Congress, Sydney Australia** 5th-9th May, 2019

- Dr. Smita Asthana was awarded the **Dr. Nandagudi Suryanarayana Rao Award** for best paper titled "Association of Smokeless Tobacco Use and Oral Cancer: A Systematic Global Review and Meta-Analysis" by the National Academy of Medical Sciences (NAMS) for the year 2019.

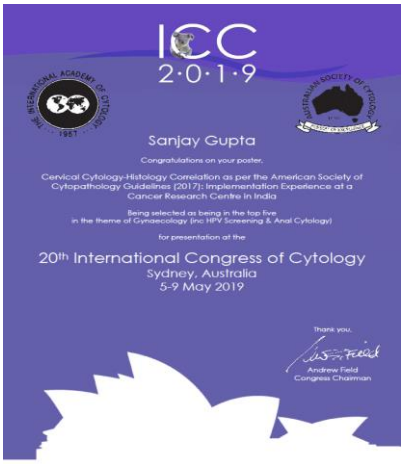
- Dr. R Suresh Kumar gave a talk on "**Polymerase Chain Reactions and its Applications In Environmental Health Research**" on a web-based TV channel IGNOU-Gyandarshan, 19th December 2019

- Dr. Showket Hussain was selected for DHR Young Scientist International Fellowship Program for the year 2019-20.

- Division of Clinical Oncology has been recognized as an ISCCP-certified training centre for colposcopy

- Division of Molecular Diagnostics is recognized for Evaluation of In-vitro diagnostic Medical devices for Cancer (Cervical cancer/HPV diagnostics) under the Medical Devices rules 2017, Central Drugs Standard Control Organisation (CDSCO), DGHS, Ministry of Health and Family Welfare

- Dr Subhash Agarwal was selected as Member, The National Academy of Sciences (NASI, Allahabad)



CONFERENCES/ WORKSHOP ATTENDED

Dr Shalini Singh

- Guest speaker in Workshop on Respectful Maternity Care under LaQshya. 13th May 2019, NIHFW, New Delhi
- Drafted Chapter for MOHFW on Measuring Respectful Maternity Care in Health Facilities, May-June 2019
- Guest Speaker on Menstrual Hygiene: Need to Break the Silence and Build Awareness, 28th May 2019 organized by ASSOCHAM, New Delhi
- Guest of Honour and Guest Speaker at Foundation Day of NIREH Bhopal, 11th Oct 2019
- International meeting on TAPS ban for smokeless tobacco, 6-7 Nov, 2019 at ICMR, New Delhi
- Tobacco Control Policy and Strategy at a Development workshop held at NayPyiTaw, Myanmar during 19-22nd Nov 2019
- Effective implementation of measures for control of Smokeless Tobacco use in India" on 18-19 Feb 2020
- Guest speaker and Chief Guest at Seminar organized by the Public Relations Society of India (PRSI), Delhi Chapter on Cancer Prevention and early detection 1st March,2020, New Delhi
- Protecting youth from industry manipulation & preventing them from tobacco & nicotine use' on the occasion of 'World No Tobacco Day' – May 31, 2020

Dr. Sanjay Gupta

- 24th ICP AIPNA International CME, AIIMS Bhopal, Feb 1-3 2019
- CME on Pediatric Pathology: current trends and perspectives, March 16, 2019 at SSPH&PGTI, Noida

  Invited Talk: Perspectives in Pediatric Effusion Cytology
- International Cytology Congress, 5-9May, 2019 at Sydney Australia

  Poster: Cervical cyto-histologic correlation as per the ASC guidelines (2017): implementation experience at a cancer research centre
- Online capacity building for Smokeless Tobacco Control, 19July 2019 at GKH-SLT, NICPR **Webinar** on "Integrating Smokeless Tobacco Control in other health streams"

- CME on Liquid Biopsy, 7 Aug 2019 organized by NAPM, Noida in association with Datar Genetics Ltd.

Chairperson for the sessions

- Faculty for ISCCP Certified Colposcopy Training Program at ICMR-NICPR

Talks: Specimen processing and Pap smear interpretation 12 June 2019

Bethesda System of reporting cervico-vaginal cytology

Cytology and histopathology slide demonstration 13 Aug 2019

- Attended expert group meeting on "Clinical performance evaluation of new IVD MammoAlertCDx and Pandora CDx intended for In-Vitro Screening", 23 Aug 2019 at FDA Bhawan, Kotla Road, Delhi

- 49th Annual conference of Indian Academy of Cytologists, 21Sept 2019 at Vardhman Mahavir Medical College and SJH, New Delhi
  Acted as Judge for poster session
  Co-author in poster on 'Eziprepvs conventional cytology'

- Workshop on "An update on Research Ethics and Good Clinical Practice" 23 Sept 2019at ICMR-NICPR, Noida

- Symposium on "Holistic approach to cancer research" on the occasion on World Cancer Research Day 24 Sept 2019 at NICPR, Noida

- Organizing chairperson for UP Cytocon 2019- 7th Annual Conference of UP Chapter of Indian Association of Cytopathologists, 28-29 Sept 2019 (Conference on Cytopathology and workshop on cervical cytology) at ICMR-NICPR & SSPH PGTI
- ICMR-AU-STRC Workshop on Research Methodology & Biostatistical Analysis, 22-25 Oct 2019, ICMR-NICPR, Noida
  Talk on "Writing Methods Section of a Research Paper"

- International meeting on TAPS ban for smokeless tobacco, 6-7 Nov, 2019 at ICMR, New Delhi

- 49th Annual conference of Indian Academy of Cytologists, 8-10 Nov, 2019, at PGI Chandigarh
  Talk on "HPV and beyond" in Workshop on Liquid based Cytology

- SAG meeting, 20 Nov 2019, ICMR, New Delhi

- Advanced cancer screening training program for Gynecologists (ACSTP-G3), ICMR-NICPR ECHO course, 25 Nov 2019.

- CME on "Salivary Gland Cytology" at ABVPGI, RML Hospital Delhi, 15th Feb 2020- **Chaired a session on clear cell tumors of salivary gland**

- Meeting with delegates of Global Development Centre (GDC) Fellowship Programme on Public Health Management (SAARC delegation) at NICPR, 5th March 2020

- Presented work and achievements of Cytopathology Division

- Webinar on "Cervical cancer screening: Current practices and Trends" Organized by BD DS India. May 8, 2020

- Webinar on "Routine Pathology/ Cytopathology sample handling in COVID times" Organized by BD DS India May 16, 2020

- Webinar on "Liquid based cytology" Organized by BD DS India July 4, 2020

- Webinar XIII: COVID-19: Guidelines for Cytopathology Laboratories, 29th May 2020, Organized by PGI Chandigarh

- Wiley Webinar for ERMED consortium members, 2nd Sept 2020

- Webinar on "The trend of HPV DNA based cervical cancer screening" Organized by Roche Diagnostics India Pvt Ltd., September 11, 2020,

- Webinar on "Food, nutrition and Health" organized by National Institute of Plant Genome Research. Sept 21, 2020

- Diagnostic week- National Conference 2020- Organized by MELAP 21st- 27th September 2020, - Virtual conference
  Talk: **Benign cellular changes and specific infections in cervical cytology**

Dr. Mausumi Bharadwaj

- International Seminar on Cancer Biology, 12 March 2019, at IAMR, Ghaziabad
  Lecture on Cancer Genomics

- Cellular and Molecular Basis of Cancer: Molecules to Mechanisms (CMBC-2019),7-9 Feb. 2019, at Savitribai Phule Pune University (SPPU), Pune, Maharashtra
  Lecture on Human Papilloma virus (HPV) mediated Cervical Cancer and HPV Vaccine

Dr. Smita Asthana

- Guest lecturer for workshop on "Research Grant Writing," 27– 28 February, 2019 at TMMC, Moradabad

- Participated in the Dissemination Workshop on "NCD program implementation learnings from the State of Jharkhand, National Health Mission" on 25 February 2019, held at Chancery Hall, The Pride Plaza Hotel, Delhi

- Invited as the Guest Speaker for the workshop on "Research Grant Writing" on 1- 2 August, 2019 at CMC, Ludhiana

- Invited as Guest Speaker for workshop on "Research Paper Writing" at Government Autonomous Medical College during 27– 28 September, 2019 at Ratlam, Madhya Pradesh

- Invited as a Guest Faculty for Research Methodology Workshop on "Research Grant Writing" on 14– 15 November, 2019 held at Maharaja Hall, Santosh Deemed to be University, Ghaziabad, NCR Delhi

- Invited as Guest Speaker for the workshop on "Research Grant Writing" from 11 – 12 December, 2019 held at M M Institute of Medical Sciences & Research, Maharishi Markandeshwar University, Mullana, Ambala

Dr Subhash Agarwal

- Advancing drug discovery from plant based natural products using computational approach. Interdisciplinary Science Conference on Big Data and Computational Biology, Jamia Millia Islamia, New Delhi. 21-22nd October, 2019

Dr R Suresh Kumar

- Lecture on "Essentials of Research Protocol Development & requirement of Funding Agency (ICMR, DST, DBT etc)" in Bio-Statistical analysis on SPSS and Research paper writing, NICPR, 21st-25th Jan 2019.

- Lecture on "Writing Results and Discussions for Bio-Medical students" in Bio-Statistical analysis on SPSS and Research paper writing, NICPR, 21st-25th Jan 2019.

- Lecture on "Essentials of Research Protocol Development & requirement of Funding Agency (ICMR, DST, DBT etc)" in Bio-Statistical analysis on SPSS and Research paper writing, NICPR, 13th -17th May 2019.

- Lecture on "Writing Results and Discussions for Bio-Medical students" in Bio-Statistical analysis on SPSS and Research paper writing, NICPR, 13th -17th May 2019.

- Lecture on "Essentials of Research Protocol Development & requirement of Funding Agency (ICMR, DST, DBT etc)" in Bio-Statistical analysis on SPSS and Research paper writing, NICPR, 22nd -26th July 2019.

- Lecture on "Writing Results and Discussions for Bio-Medical students" in Bio-Statistical analysis on SPSS and Research paper writing, NICPR, 22nd -26th July 2019.

- Lecture on "Role of Epigenetics in Cancer" in Indo-African (ICMR-AU-STRC) Workshop on "Basic Molecular Biology Techniques Relevant to Cancer Research, 2nd-6th September 2019.

- Lecture on "Writing Results and Discussions for Bio-Medical students" in ICMR/AU-STRC Health Practitioners/Researchers Capacity Building Scheme workshop on Research Methodology & Bio-Statistical Analysis, 2nd -6th December 2019

- Lecture on "Essentials of Research Protocol Development & requirement of Funding Agency (ICMR, DST, DBT etc)" in Bio-Statistical analysis on SPSS and Research paper writing, NICPR, 2nd -6th December 2019.

Dr. Suresh Hedau

- 3rd World Cancer Congress, 20-21 Nov, 2019 at Mumbai

  Paper: p16 promoter methylation, expression, and its association with ER+ve, PR+ve and HER2+ve subtype of breast carcinoma.

- 39th Annual Conference of Indian Association for Cancer Research 5th - 7th February, 2020 at Thiruvananthapuram, Kerala.
  Lecture on 'Role of methylated CpG binding proteins and its involvement in the regulation of BRCA1, BRCA2 and p16 genes promoter in breast cancer cell lines'

Dr. Roopa Hariprasad

- Panelist at the Workshop on Vulval Disorders from Adolescence to Menopause, 21 Feb 2019 at Safdarjung Hospital, New Delhi.

- National Consultation of CP/ CPHC Nodal Officers, 13 March 2019 at NIHFW, Delhi
  Oral Presentation

- Annual conference of Indian Society of Colposcopy & Cervical Pathology (ISCCP), 19-21 April 2019 at Visakhapatnam
  Oral Presentation

- Post Introduction Evaluation of HPV vaccination program in Sikkim, 10-18 May 2019 at Gangtok, Sikkim (Representative from ICMR)

- Cancer conclave to strengthen community level screening/treatment of oral, breast and cervical cancers in the states of Madhya Pradesh and Telangana, 2 July 2019 at Bhopal
  Oral Presentation

- ECHO-SuperHub training of University of New Mexico, July 2019 at ECHO India office, New Delhi

- National Cancer Grid academic meeting 26-27 Sept 2019 at Tata Memorial Centre, Parel, Mumbai

- Panelist at the Integrated Startup Mission Complex, KINFRA Biotechnology Park, Kalamassery, Ernakulam, 8-10 Nov 2019.

- Webinar: Online Module on Cervical cancer Prevention, organized by Indian Society of Colposcopy and Cervical Pathology 20th April -3rd May 2020
  Lecture on VIA as a primary screening tool for cervical cancer

- Webinar on "Preventing harm in research – safeguarding in international development Research" 1st July 2020

- Webinar: Panel Discussion: Pap and LBC laid Bare, 4th July 2020

- Webinar on Prevention and early detection of Cancer in Women, 24 July 2020

- NCG CReDO virtual research board, Principles of Health Technology Assessment in Oncology, 26th Sep 2020

Dr. Deepika Saraf

- Online webinar on National Consultation organized by Tata Memorial Hospital Webinar on COVID-19 on 18th July 2020

Dr Raj Narain

- Online continuous medical education launched by CDAC Noida E- Learning course in "IPV6 & SECURITY" from August 24 - 28, 2020.

- Online digital Workshop on Diabetes and Technology on 20th August, 2020

- Attended Continuous medical education (CME) organized by Indian Society of Nephrology (ISN) and International Society of Nephrology (ISN) on 19th August, 2020

- Attended Continuous medical education (CME) on COVID AND ONCOLOGY- An Exclusive session by TMC

- Online session on Tobacco Product regulation: building laboratory Testing capacity on 27th Sep, 2020

- WHO Covid-19 Mass gathering risk assessment Training on 27th Sep, 2020

- Online webinar on Open WHO Course Drug-resistant tuberculosis: how to interpret rapid molecular test results on 8th May, 2020

- Online webinar on Record of Achievement Occupational health and safety for health workers in the context of COVID-19 on 16th Sep, 2020

Dr. Kavitha Dhanasekaran

- Annual conference of Indian Society of Colposcopy & Cervical Pathology (ISCCP), 19-21 April 2019, at Visakhapatnam

- Post Introduction Evaluation of HPV vaccination program in Sikkim, 10-18 May 2019 at Gangtok, Sikkim (Representative from ICMR)

- ECHO - SuperHub training of University of New Mexico, July 2019 at ECHO India office, New Delhi

- Research Ethics and Good Clinical Practice, 23 Sept 2019 at NICPR, Noida

- 41st AOGD conference, 28-29 Sept
  Oral presentation: Thermal ablation in the treatment of CIN

- Workshop on Research Ethics, 17th-19th December 2019, organized by PHFI Gurugram

- Webinar: Online Module on Cervical cancer Prevention, 20th April -3rd May 2020

- Webinar on “Preventing harm in research – safeguarding in international development Research” 1st July 2020

- Webinar: Panel Discussion: Pap and LBC laid Bare, 4th July 2020

- Webinar on Prevention and early detection of Cancer in Women, 24 July 2020

Dr. Showket Hussain

- International workshop on "Recent Advances in Nano Indentation Techniques" 11th Dec 2019, JMI, New Delhi

- International conference on "Oral cancer and Reconstruction" on 13th Dec 2019 at U-Chicago Centre, New Delhi organized by department of ENT head and neck surgery UCMS & GTB Hospital, Delhi

- "Single Cell Genomics Seminar" organized by Premas Life Sciences. on 9th April 2019 at IIIT Delhi

- Delivered a Lecture on "Advanced Molecular Diagnostics Techniques" on 14th Feb. 2019, I.T.S Centre for Dental studies and research, Muradnagar, Ghaziabad, Advanced Molecular Diagnostics Techniques

- Symposium on "Advances in Immunomics& Immune oncology" on 30th Jan. 2019 in New Delhi organized by Sun Pharma Science Foundation

- International Conference on Biomedical Engineering, Bioscience, Bioinformatics, Biochemistry Cancer Biology, Molecular Biology and Applied Biotechnology (BCM-2019) on 12th Jan 2019, at Convention centre, JNU, New Delhi.
  Paper: Transcription factor Ets-1 regulates matrix metallo-proteinase-9 expression in human breast cancer

- Lecture delivered as a guest speaker in an international conference "Jivaneeyam: Rejuvenating target cells" at Scope complex auditorium, CGO complex, Pragati Vihar, New Delhi, from All India Institute of Ayurveda (AIIA) on behalf of Ministry of AYUSH, 12th Feb, 2020

Dr Prashant Kumar Singh

- National Cancer Grid Research and Guideline meeting - Preventive Oncology and Primary care guideline group, 26- 27 Sept, 2019

- National Level Consultation Workshop on Hysterectomy, 1 Aug, 2019, New Delhi
  Presentation: Hysterectomy: Data and Research Priorities in India

- Indian Association for Social Science and Health (IASSH), 8-10 Dec, 2019

  Presentation: Quality of Care and Survival of Neonates in India

Dr Ruchika Gupta

- 24th ICP AIPNA International CME, AIIMS Bhopal, Feb 1-3 2019

- CME on Pediatric Pathology: current trends and perspectives. SSPH&PGTI, Noida March 16, 2019

- CME on Liquid Biopsy organized by NAPM, Noida in association with Datar Genetics Ltd., 7th August 2019

- 49th Annual conference of Indian Academy of Cytologists, 21st Sept 2019 at Vardhman Mahavir Medical College and SJH, New Delhi.
  Poster presented: 'Eziprep vs conventional cytology'

- Workshop on "An update on Research Ethics and Good Clinical Practice" at ICMR-NICPR, 23rd September 2019

- Symposium on "Holistic approach to cancer research" on the occasion on World Cancer Research Day 24th Sept 2019 at NICPR

- Organizing secretary for UP Cytocon 2019- 7th Annual Conference of UP Chapter of Indian Association of Cytopathologists, 28-29 Sept 2019 (Conference on Cytopathology and workshop on cervical cytology) at ICMR-NICPR & SSPH PGTI

- International meeting on TAPS ban for smokeless tobacco, ICMR, Nov 6-7, 2019

- 49th Annual conference of Indian Academy of Cytologists at PGI Chandigarh, Nov 8-10, 2019
  Talk on "Challenging cases in cervico-vaginal cytology" in Workshop on Liquid based Cytology

- CME on "Salivary Gland Cytology" at ABVPGI, RML Hospital Delhi, 15th Feb 2020-

- Meeting with delegates of Global Development Centre (GDC) Fellowship Programme on Public Health Management (SAARC delegation) at NICPR, 5th March 2020

- Webinar on "Cervical cancer screening: Current practices and Trends" Organized by BD DS India. May 8, 2020

- Webinar on "Routine Pathology/ Cytopathology sample handling in COVID times" Organized by BD DS India May 16, 2020

- Webinar XIII: COVID-19: Guidelines for Cytopathology Laboratories
  29th May 2020, Organized by PGI Chandigarh

- 4th online Advanced Cancer Screening Training Program for Gynaecologists (ACSTP-G4) organized by Division of Clinical Oncology, NICPR, June 04, 2020

  Lecture: "Molecular testing platforms for HPV"

- 11th Webinar on COVID-19 preparedness: a National Cancer Grid Initiative, June 20 2020

- Webinar on "Food, nutrition and Health" organized by National Institute of Plant Genome Research. Sept 21, 2020

Dr Malasha Kumari

- Social Media Capacity BuildingWorkshop at Agra, 26th - 27th August 2020

- Online Basic course on Smokeless Tobacco Control, 1st May 2019 to 30th Sep 2020
- Online Cessation of Smokeless Tobacco use course, 10th July to 28th August 2020

Dr Anuj Kumar

- "Biobank International Symposia 2020" at ILBS
- International meeting on TAPS ban for smokeless tobacco, ICMR, 6-7 Nov, 2019
- Three-day advisor Training for "Addressing Smokeless tobacco use & building research capacity in South Asia", ICMR, 15th – 17 th Oct 2019

EVENTS ORGANIZED

Hindi Divas, September 2020

World Cancer Research Day, 24th September 2020

Independence Day Celebration, 15th August 2020

World No Tobacco Day 31st May 2020

World Cancer Day – February 8, 2020

Fit India Movement Initiative – January 10, 2020

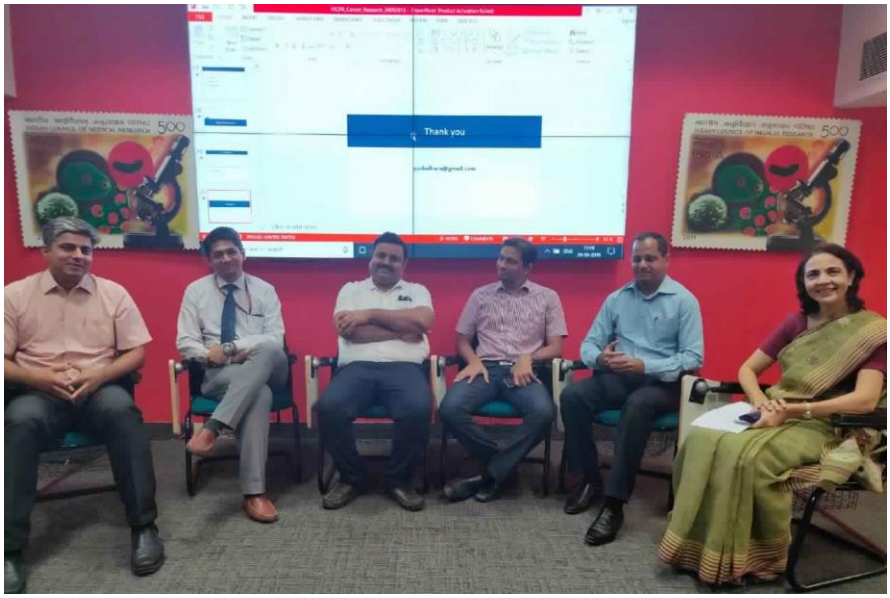
International Meeting on Tobacco advertisement, Promotion and Sponsorship: Ban for Smokeless Tobacco, 6th – 7th November 2019

Vigilance Awareness Week observed by staff of ICMR-NICPR, Oct 2019

ASTRA Cessation Training Program, 15th – 17th October, 2019

"Breast cancer Awareness Month" observed by NICPR, 15th October 2019

World Cancer Research Day: Experts talk & panel discussion on "Different perspective, One Goal", 24th September, 2019



Workshop on "An update on Research Ethics and Good Clinical Practice", 23rd September, 2019

Training on Bio-Waste Management for housekeeping and administrative staff, 17th September 2019

Independence Day Celebration with tree plantation drive, 15th August 2019

Observance of International Yoga Day, 21st June, 2019

World No Tobacco Day celebration, 31st May, 2019

World Cancer Day celebration, 4th February, 2019

ICMR-NICPR STAFF

(AS ON SEPTEMBER 30, 2020)

SCIENTIFIC STAFF

	NAME	DESIGNATION
1.	Dr. Shalini Singh	Director
2.	Dr. Sanjay Gupta	Scientist –G
3.	Dr. Mausumi Bharadwaj	Scientist –G
4.	Dr. Smita Asthana	Scientist –E
5.	Dr. Subhash M. Agarwal	Scientist –E
6.	Dr. R. Suresh Kumar	Scientist –E
7.	Dr. Suresh T. Hedau	Scientist –E
8.	Dr. Roopa Hariprasad	Scientist –E
9.	Dr. Deepika Singh Saraf	Scientist – E
10.	Dr. Raj Narain	Scientist –D
11.	Dr. Kavitha Dhanasekaran	Scientist –D
12.	Dr. Prashant Kumar Singh	Scientist – D
13.	Dr. Showket Hussain	Scientist –D
14.	Dr. Ruchika Gupta	Scientist - D
15.	Dr. Malasha Kumari	Scientist –C
16.	Dr. Parmod Kumar	Scientist – C
17.	Dr. Anuj Kumar	Scientist – B
18.	Dr. Dinesh Kumar	Scientist - B

Superannuated Scientific staff

- Dr. Aditya Parashari – May 2019
- Ms. Sarita Sardana – October 2019
- Dr. L. Satyanarayana – February 2020
- Dr. Shashi Sharma – June 2020

	TECHNICAL STAFF	
1.	Mrs.Latha Sriram	Principal Technical Officer
2.	Dr. Pragya Sharma	Sr. Technical Officer-1
3.	Smt.Rajshri	Technical Officer-C
4.	Mr. Chidambarmurthy Joshi	Technical Officer-C
5.	Dr. (Mrs.) Uma Kailash	Technical Officer-B (upto 13.02.2019)
6.	Dr. Nisha Thakur	Technical Officer-B
7.	Mrs. Amita	Technical Officer-B
8.	Mrs.Reena Diwedi	Technical Officer-B
9.	Mrs.Chandresh P. Verma	Technical Officer-B
10.	Ms. Pushpa Bhadola	Technical Officer-A (upto 30.04.2020)
11.	Mr. Akhileshwar Sharda	Technical Officer-A
12.	Mr. Deep Kumar	Technical Officer-A
13.	Mr. Dinesh Kumar	Technical Officer-A
14.	Mr. Himanshu Rohilla	Technical Officer-A
15.	Mr. Bhopal Singh	Technician-C
16.	Mr. Bishan Singh	Technician-C (upto 30.06.2019)
17.	Mr. Ram Prakash	Sr.Technician-3
18.	Mr. Danial Das	Lab.Assistant-1
19.	Mrs. Asha Rani	Lab.Assistant-1 (upto 29.02.2020)
20.	Mr.D.K.Roy	MTS(LT)
21.	Mr. Brij Pal Sharma	MTS(LT) (upto 30.06.2019)
22.	Mr. Sandeep Kumar	MTS (Tech)

	DIRECTOR'S OFFICE	
1.	Mr. Sanjeev Kumar	Private Secretary
	ADMINISTRATIVE STAFF	
2.	Mr.Rajesh Sharma Mr.Ishwar Likhar	Admn.Officer (upto 31.05.2020) From 15.04.2020 till date (4 days a week)
3.	Mr.Kumar Gautam Mr.V.S.Rawat Mr..M.L.Meena	Accounts Officer (upto 02.03.2020) From 18.02.2020 to 11.06.2020 From 22.09.2020 till date (2 days a week)
4.	Mr. Mohanan T.	Section Officer (Establishment)
5.	Ms Sonia Khattar	Section Officer & Store-in-charge (from Sept 2020)
6.	Mr. Monu Sharma	Assistant
7.	Mr. Vijay	Assistant
8.	Mr. Harsh Agnihotri	Assistant & Store in-charge (upto Sept 2020)
9.	Mrs. Krishna Magoo	Personal Assistant
10.	Mr. Ramesh Kumar	UDC
11.	Mr. Sant Ram	UDC
12.	Mr. Avinash Malhotra	UDC
13.	Mr. Siddarth Yadav	UDC
14.	Mr. Naveen Kumar	UDC
15.	Mr. Neha Kaushik	LDC
16.	Mr.Kailash Kumawat	Staff Car Driver
17.	Mr.Tara Chand Gurjar	Staff Car Driver
18.	Mr.Dheeraj Rajaura	Staff Car Driver
19.	Mr. Roopchand	MTS (Gen)
20.	Mr. Rajesh Solanki	MTS (Gen)
21.	Mr. Jai Prakash	MTS (Gen)
22.	Mr. Mohinder Singh	MTS (Gen.)
23.	Mrs. Anoop Devi	MTS (Gen.)

SUPERANNUATED/ TRANSFERRED TECHNICAL & ADMN STAFF

Dr. Uma Kailash – February 2019 (transferred)

Mr. R. Manjhi – February 2019

Mr. Bishan Singh – June 2019

Mr. Brij Pal Sharma – June 2019

Mrs. Asha Rani – February 2020

Mr. Dalipa Ram – April 2020

Ms. Pushpa Bhadola – April 2020

Mr. Ashok Kumar – April 2020 (transferred with promotion)

Mrs. Chander Kanta Sharma – May 2020

LIST OF SAC MEMBERS

Prof. Maqsood Siddiqi, Chairperson **Chairman MC and Managing Director** **Cancer Foundation of India** **1120, Tagore Park** **Tiljala, Kolkata-700 039** **West Bengal.**
Dr R Sankarnarayanan Advisor, Reserch Trinagle International 43, Padma Nabha Nagar, Airport Road, Coimbatore - 641014
Dr. Shubada V Chiplunkar Director, Advanced Centre for Treatment, Research and Education in Cancer (ACTREC) Tata Memorial Centre, Mumbai
Prof. Abraham Peedicayil Department of Gynaecologic Oncology Christian Medical College & Hospital Vellore, Tamil Nadu
Dr. P.C. Gupta Healis Sekhsaria Institute for Public Health 601/B Great Eastern Chambers Plot No.28, Sector 11 CBD Belapur Navi Mumbai-400 014
Dr. Suneela Garg Director Professor & Head, Department of Community Medicine Maulana Azad Medical College and associated hospitals New Delhi - 110002
Dr. Shyama Jain Director Professor, Department of Pathology Maulana Azad Medical College New Delhi - 110002
Dr. RS Dhaliwal **Scientist- G and Head** **NCD** **Indian Council of Medical Research** **Ansari Nagar** **New Delhi-110 029.**
Special Invitee **Prof. Sanghamitra S. Acharya** Centre of Social Medicine and Community Health, School of Social Sciences Jawaharlal Nehru Univesity, New Delhi
Member Secretary **Dr. Shalini Singh** Director ICMR-NICPR, I-7, Sector 39, NOIDA.