

# **Multidisciplinary Research Unit (MRU)**

## **Pt. J.N.M. Medical College Raipur Chhattisgarh**

### **Formation of Multidisciplinary Research Unit (MRU)**

MRU was established by central sector scheme of Department of Health Research, to create a dedicated infrastructure for research in Government Medical colleges with special focus on Non-Communicable Diseases (NCDs).

### **Mission of MRU**

- Encourage and strengthen an environment of research in Medical Colleges
- Bridge the gap in the infrastructure which inhibits health research in the Medical Colleges by, assisting them to establish multidisciplinary research facilities with a view to improve the health research and health services
- To ensure the geographical spread of health research infrastructure, in order to cover unserved and under-served Medical Colleges and other institutions
- To improve the overall health status of the population, by creating evidence-based application of, diagnostic procedures/processes/methods etc.

## **Message from Dean**

We established Multidisciplinary Research Unit (MRU) with a vision for exploring its various potentiality for translational research as well as establishing newer molecular diagnostics in our medical college. In long run we wish to sustain MRU as research centre which will address different non communicable diseases or any other emerging medical challenges as well as local health related problems. We are building MRU as State of the Art facility with highly skilled and experienced scientific staff. Uniqueness of our MRU is its focus on developing product oriented research which may give some definitive solution of existing medical challenges.

As MRU Raipur is the first Multidisciplinary Research Platform in a state Medical College of Chhattisgarh, it could also take leadership and provide guidance in establishing similar research platform in other less facilitated medical colleges of our state and establish a unified research network among the state medical colleges of Chhattisgarh.

We are also thankful to Government of Chhattisgarh, which set a first example as a state government taking over the MRU's future responsibilities along with the expansion and sustainability plan. As one of the mandates of the MRU is to generate researchers from medical field so that they could take newer medical challenges like Covid19 in future, we also considered to create attractive research opportunity in MRU for medical scientists. Hope this initiation will encourage motivated medical graduates to take research as alternative carrier option in future.

## Goal of Multidisciplinary Research Unit (MRU), Pt. J.N.M. Medical College Raipur Chhattisgarh

- MRU will continue research on prevalent **local health problems** as well as **global health challenges** which includes but not limited to:
- MRU will assist diagnostic departments to implement modern **molecular/genetic biomarker** based diagnostic tests and necessary guidance to the technical staff.
- As per the new curriculum of medical education high quality research work is mandatory for faculties as well as PG students. **MRU will provide the platform for required advanced facilities training guidance as well as technical assistance to the post graduates medical students as well as faculties.**
- To bring all the departments to be involved in research activities and contribute in the biomedical innovation and in this mission MRU will take the central leading role
- Implementing PhD as well as **MD-PhD integrated** programme in MRU
- We have a vision to establish an **advance Bioinformatics section** which will be connected with online data entry portal with all the departments. MRU will analyze the data in a integrative and comprehensive manner and **give a alert regarding disease burden**, changes in disease trend and time to time notify to the health system to take the appropriate needful.
- **As MRU Raipur is the first Multidisciplinary Research Platform in a state Medical College of C.G., it could also take leadership and provide guidance in establishing similar research platform in other less facilitated medical colleges of CG and establish a unified research network among the state medical colleges of C.G.**
- To expand the MRU as a **Advanced Referral research Centre** which will provide advanced facility support as well as advanced training on various biomedical technology (molecular biology/cell biology/genetic study etc) to the surrounding institutes particularly in context of any initiative on health research
- **MRU has undertaken several research initiatives and pro-active motivational approaches**, resulting in participation of other clinical departments in MRU research programs.

## Activities of MRU

- Need based globally and locally relevant research on major health issue
- Establishing research environment in the medical college.
- Providing advance research training and thesis guidance to MD, MDS student as well as MSc students.
- Provide guidance to the medical faculties for pursuing research.
- Provide research training to surrounding medical or other institutes.
- MRU has played a role of expertise for establishing new molecular diagnostic laboratory in our medical college as well as other medical college of the state

### Focus Areas of Research

<b>Drug Development:</b>	anti cancer drug development anti Covid -19 drug development
<b>Biomarker development:</b>	early/preclinical diagnosis of oral cancer  prognostic early biomarker for Covid19  pre diabetic metabolic biomarker for Polycystic ovarian disease (PCOD)
<b>Personalized chemotherapy</b>	:Formulating personalized chemotherapy strategy by in vitro chemo sensitivity testing on patient's resected tumor tissue
<b>Diagnostic kit development:</b>	Covid19 <b>Neutralizing antibody detection kit development</b>  Developing low cost, paper based point of care diagnostic tool for screening sickle cell anemia

**Administration control:** Dean, Nodal officer (Acting Head)

**Nodal Officer:** Dr. Nidhi Pandey  
Designation: Professor & HOD  
Qualification: MS (Ophthalmology)  
Contact No: 0771-2890142

**Detail of the MRU core staffs are as follows:**

S.No	Designation	Name	Qualification	Tenure	Contact
1.	Scientist II	Dr.Jagannath Pal	MBBS, PhD(JNU), (Postdoc: Harvard Cancer Institute)	14/10/2015-present	<a href="mailto:jagannathpall@gmail.com">jagannathpall@gmail.com</a> , 9903602668
2.	Scientist I	Dr.Yogita Rajput	M.Sc. PhD	05/05/2016-present	<a href="mailto:yogitaryp@gmail.com">yogitaryp@gmail.com</a> , 9826137942
3.	Lab Technician	Mr. Fulsay Paikra	DMLT	28/02/2019-present	-----

## **Academic training programs in MRU**

MD thesis dissertation

M.Sc. thesis dissertation

MDS rotational training program

### **Departmental Participation:**

Following departments have participated in MRU's research activities:

- Department of Radiotherapy/Regional Cancer Center
- Department of TB & Chest
- Department of Community Medicine
- Department of Paediatrics
- Department of Microbiology
- Department of Biochemistry
- Department of Pathology
- Department of ENT
- Department of Skin and STD
- Department of Gynecology & Obstetrics

### **External collaboration:**

- Dana-Farber/Harvard Cancer Center (DF/HCC) Boston, United States
- Translational Health Science and Technology Institute, Department of Biotechnology, Ministry of Science and Technology, Government of India, Faridabad
- Sickle Cell Institute, Raipur, Chhattisgarh
- Government Medical College, Rajnandgaon
- Government Dental College, Raipur
- National Institute of Technology(NIT), Raipur

## **Significant achievements**

### **Research**

- Point of care development: Developed paper based low cost Sickle cell anemia diagnostic
- Identified a new herb from Western Orissa having potent anticancer activity
- Established novel “standalone” protocol for using telomere length measurement for identifying high risk oral leukoplakia
- Developed low cost Covid-19 neutralizing antibody assay
- Identified gene signature for prognostic biomarker of Covid-19
- Publication

## Publication and presentation

### publications:

- Pal J, Rajput Y, Shrivastava S, Gahine R, Mungutwar V, Barardiya T, Chandrakar A, Ramakrishna PP, Mishra SS, Banjara H, Choudhary V, Patra PK, Shammash MA. A standalone approach to utilize telomere length measurement as a surveillance tool in oral leukoplakia. Mol Oncol. 2021 Nov 1. doi: 10.1002/1878-0261.13133. Epub ahead of print. PMID: 34725903.  
**Impact Factor: 6.603**
- Golchha T, Rajput Y, Shrivastava S, Sahu M, Chandrakar A, Mungutwar V, Mishra SS, PinakaPani R, Khodiar PK, Banjara H, Gahine R, Choudhary V, Shammash MA, Patra PK and Pal J. Interplay of lifestyle factors in oral leukoplakia: A translational study in Chhattisgarh, India. Journal of Translational. 2019, 5; 1-7. Impact Factor: 2.3

### Paper presentation in National/International conferences

**International:** 1. Anticancer drug development: An unmet challenge needs revisiting basic drug efficacy protocol. International conference on herbal medicines: research and commerce – global perspective, L.M.College of Pharmacy, Ahmedabad, December 27-29, 2018

### Diagnostic laboratory establishment

- Covid diagnostic laboratory in Pt.J.N.M.Medical College Raipur has been initiated by MRU scientists

**Local Research Advisory Committee (LRAC):** As per the DHR guideline revised Local Research Advisory Committee (LRAC) of MRU

S.No.	Name and address	Remark by DHR	RAC Members
1.	Dr. A.K.Sharma, Rt. Dean, Pt.J.N.M.Medical college Raipur	Senior Medical Person (External)	Chairman
2.	Dr. Vishwa Mohan Katoch, NASI-ICMR Chair on Public Health Research at Rajasthan University of Health Sciences (RUHS), Jaipur, President, JIPMER, Puducherry, Former Secretary, Department of Health Research, Govt of India and Director-General, Indian Council of Medical Research	Senior Level Professor (External)	Co-Chairpersons
3.	Dr. Ashoo Grover, Scientist 'F', Indian Council of Medical Research, Ansari Nagar, New Delhi-110029 (India)	One Nominee from nearby ICMR institute/ICMR Headquarter	Member
5.	Dr. Smit Shrivastava, Professor, Department of Cardiology, Pt.J.N.M. Medical College Raipur	Internal	Member
6.	Dr. Vinit Jain, Professor, Department of Orthopedics, Pt.J.N.M. Medical College Raipur	Internal	Member
7.	Dr.Jagannath Pal, Scientist II, Multi Disciplinary	Internal	Member

	Research Unit (MRU), Pt.J.N.M. Medical College Raipur		
8.	Dr. Kamlesh Jain, Deputy Director (DD) Non Communicable Diseases (NCD), Directorate of Health Service, Indravati Bhawan, New Raipur C.G.	One Nominee from State health Department/Medical Education Department	Member
9.	Dr. Nidhi Pandey, MS (Ophthalmology), Professor & HOD, Department of Ophthalmology, Pt. J. N. M. Medical College Raipur, Chhattisgarh	Nodal officer	Member

**List of Equipments available in Multidisciplinary Research Unit (MRU) and its application:**

S.No.	Instrument name	Location	Application
1.	RT- PCR	MRU	Simple and inexpensive technique to determine the expression level of target genes and is widely used in biomedical science research including for semiquantitative analysis.
2.	PCR Thermal Cycle (Research grade; gradient PCR)	MRU	Its s conventional machine which is used to amplify genes associated with genetic disorders from the DNA of patients
3.	In-situ PCR	MRU	The low copy number of DNA can be detected with high sensitivity by this method. It is widely used in the study of organogenesis
4.	Automated Fluorescence Inverted Microscope	MRU	advanced imaging techniques for understanding the cellular basis of human health and diseases through the use of fluorescence
5.	Multimode Microplate Reader	MRU	Measure absorbance, Fluorescence, Luminescence, cell counting
6.	Chemi Doc	MRU	Use with Fluorescent Western Blot, Chemiluminescence, and General & Stain-free Gel Imaging. Sensitive Detection of Secondary Antibodies with Low Fluorescence Background.
7.	HPTLC/TLC Photo Documentation System	MRU	Metabolism studies, drug screening, purity testing,
8.	Microtome	Clinical pathology department	Histopathological study
9.	Cryostat	Clinical pathology department	cutting tissue at low temperatures (typically around $-15$ to $-30^{\circ}\text{C}$ ) useful in histopathology

## Other supportive instruments at MRU

- Electronic weighing balance
- pH meter with pH micro electrode (low sample volume <100ul)
- Electronic Water bath
- Vortex mixers
- Microwave oven
- Micro pipettes
- Multi-channel (8 channel) micropipettes
- High-speed and bench top centrifuge
- -80°C refrigerator (2), 4°C refrigerator (1)
- Horizontal gel apparatus (mini, midi, maxi) with power pack
- Florescent microscope
- Cryostat
- Microtome
- Vertical Digital Autoclave
- Portable Autoclave
- CO<sub>2</sub> incubator
- Incubator
- Shaking incubator
- Hot Air Oven
- Inverted microscope
- Binocular compound microscope
- Water Purification system
- Ice flake maker
- -20°C Laboratory Deep Freezer (vertical Refrigerator)
- Class II, Type A2 Biological Safety Cabinet
- Biological Safety Cabinet Type II B2
- Cell / tissue homogenizer
- Electroporator
- Cytospin
- Shaker (horizontal rocker)
- Magnetic stirrer with hot plate
- Transilluminator UV/white light
- Micropipettes
- Steripipette
- Electronic Repeater pipettman
- Mini spin

### Past and present students trained in MRU

S.No	Name	Department	course	tenure
1.	Dr. Tripi Golchha	Department of Biochemistry	MD thesis	2016-2019
2.	Dr.Kritika Chandrakar	Department of Gynecology & Obstetrics	MS thesis	2019-2021
3.	Dr. Alok Dewangan	Department of Radiotherapy/Regional Cancer Center	MD thesis	2020
4.	Dr. M. Manish	Department of Biochemistry	MD thesis	2021-Present
5.	Dr. Sadhana Tirkey	Department of Oral Pathology	MDS (rotational hands-on training )	2020
6.	Dr. Ashutosh K	Department of Oral Pathology	MDS (rotational hands-on training )	2020
7.	Dr. G. Sangeeta	Department of Oral Pathology	MDS (rotational hands-on training )	2020
8.	Dr. Harikrishna	Department of Oral Pathology	MDS (rotational hands-on training )	2021
9.	Dr. Yogendradeep	Department of Oral Pathology	MDS (rotational hands-on training )	2021
10.	Dr. Indu Sonwani	Department of Oral Pathology	MDS (rotational hands-on training )	2021
11.	Ms. Diksha Mahilang	Medical Biotechnology, Department of Biochemistry	M.Sc. dissertation	2019
12.	Ms. Akankcha Yadav	Medical Biotechnology, Department of Biochemistry	M.Sc. dissertation	2020
13.	Ms. Kiran Dhurve	Medical Biotechnology, Department of Biochemistry	M.Sc. dissertation	2020
14.	Ms Neetu Sahu	Medical Biotechnology, Department of Biochemistry	M.Sc. dissertation	2021 to present
15.	M.Sc. (Medical Biotechnology)	Medical Biotechnology, Department of Biochemistry	hands-on training on animal cell culturing	2018



