

**‘Support to Indian Institutes for imparting training’ to the Faculty of Medical Colleges/
Research Institutes under Human Resource Development Scheme of
Department of Health Research**

1. Area of Training: Modern Biology

2. Name of the Institution and Contact Details :

National Institute for Research in Reproductive Health (Indian Council of Medical Research), Jehangir Merwanji Street, Parel, Mumbai – 400 012

3. (a) Name of the Principal Investigator and contact details :

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(b) Name of the Co- Investigators and contact details :

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4. Training Module

Programme	Duration of the training	Minimum 4 weeks/1 month
Training Course on “ Modern Biology Tools in Diagnostics (2016) ”	16 May to 10 June 2016	4 weeks

I. Introduction :

The Scheme entitled “Support to Indian Institutes for imparting training” by Department of Health Research, Government of India aims at upgrading skills of faculty of medical colleges, mid-career scientists, medical students etc by specialized training in priority areas of health research. The goal is to encourage and support the trainees to develop and take up research projects for addressing critical national and local health problems.

National Institute for Research in Reproductive Health (NIRRH) is a premier ICMR Institute which conducts basic, clinical, operational and socio-behavioral research on different aspects of reproductive health. The faculty of the Institute has considerable expertise in research and teaching in the area of Modern Biology and actively collaborates with neighbouring medical colleges. The Institute is affiliated to Mumbai University for Ph.D. programs in Applied Biology, Biotechnology, Biochemistry and Life Sciences. The Institute houses excellent facilities for conducting biomedical research.

Aim of the program :

The course aims at imparting conceptual and technical know-how on recent trends in molecular diagnostics. This 4-week course will cover lectures, demonstrations and interactive sessions on the principles of Molecular Diagnostics. Participants will get an opportunity to learn applications of modern and classical biology techniques such as DNA Sequencing, Real time PCR, FISH, ELISA, Flow Cytometry, Confocal microscope, Proteomics, etc. in diagnosis of various health disorders. The course will also cover a module on computational biology with emphasis on novel biomarker

drug discovery and pharmacogenomics. In addition, participants will be provided an overview of research methodologies including statistical analysis, grant and manuscript writing.

II. Existing faculty members, their details, positions, available with the institution for imparting training programme.

Sr. No.	Faculty - Name and designation	Research interest of faculty
1.	Dr. Smita Mahale Director & Scientist 'G'	Fertility Regulation, Hormone-receptor interaction
2.	Dr. Geetanjali Sachdeva Scientist 'E'	Steroid signalling, Intracellular trafficking
3.	Dr. Srabani Mukherjee Scientist 'E'	Genomics and proteomics of PCOS
4.	Dr. Deepak Modi Scientist 'E'	Endometriosis, Gonadal development
5.	Dr. Bhakti R Pathak Scientist 'E'	Biomarkers for ovarian and prostate cancers
6.	Dr. Vainav Patel Scientist 'D'	Viral & Immune signatures in HIV and CMV infections
7.	Dr. Vikrant. M. Bhor Scientist 'D'	Host-pathogen interactions, Immunology of RTIs/STIs/HIV
8.	Dr. Susan Thomas Scientist 'D'	<i>In silico</i> tools to design novel antimicrobial peptides and drugs

III. Available infrastructure facilities :

(a) Existing laboratory facilities to be described (List the major equipment & other facilities available with the institution that would be used for the training programmes):

General Equipment	Molecular Biology	Cell Biology	Protein Functions	Biomedical Informatics
<ul style="list-style-type: none"> • -20⁰C deep freezer • -70⁰C deep freezer • Hot air drying oven • Heated block • Microwave • Cold centrifuges • Benchtop 	<ul style="list-style-type: none"> • Nanodrop • Qbit • PCR machine • Real time PCR • Agarose gel electrophoresis • Gel documentation • DNA sequencing • Pyro sequencer 	<ul style="list-style-type: none"> • Fluorescence stereomicroscopes • Inverted fluorescent microscopes • Upright microscopes • Flow cytometers • Cell culture 	<ul style="list-style-type: none"> • SDS PAGE • ELISA reader • Western blotting units • X ray developer • Automated X-ray film processing unit • Chromatograp 	<ul style="list-style-type: none"> • Rack servers • Work stations

and micro centrifuges <ul style="list-style-type: none"> • Water purification system • Water bath • Spectrophometer • RIA counter 		rooms <ul style="list-style-type: none"> • Histology work station • Confocal microscope • Cell counters • CO₂ incubators • Laminar air flow hoods • Electron microscope 	hy tools <ul style="list-style-type: none"> • CD spectroscopy • Peptide synthesiser • Amino acid analyser • 2D electrophoresis units • Spot picker • Spot digester • DIGE scanner • MALDI ToF ToF 	
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(b) Back-up existing internet facilities to provide online course: Not Applicable

(c) Hostel

- (i) International hostel-cum staff quarters, Worli, Mumbai
- (ii) NIRRH ladies hostel, BVC, Parel, Mumbai

(d) Others: Clinical diagnostics laboratory, Experimental animal facility, Seminar Hall, Conference Room, computer lab facility with internet, library

IV. Training schedule with elaborate details day wise or week wise along with the topic.

Sr. No.	Topic/Module Name	Duration	Details
1.	Nucleic Acid Based Diagnostics	Week 1 Day 1: 16.05.2016	9:30- 11 am
			<ul style="list-style-type: none"> • Gene, Genome, Genetics and Genomics
			11- 4:30pm
		<ul style="list-style-type: none"> • Lab exercises: Chromosome preparation, setting up a karyotype 	
			4:30- 5:30pm
			<ul style="list-style-type: none"> • Experimental Techniques in Genomics
		Week 1 Day 2: 17.05.2016	9:30- 11 am
			<ul style="list-style-type: none"> • Molecular cytogenetics
			11- 4:30pm
			<ul style="list-style-type: none"> • Lab exercises: Cytogenetic preparations, Fluorescent In situ Hybridization (FISH)

Sr. No.	Topic/Module Name	Duration	Details
			4:30- 5:30pm <ul style="list-style-type: none"> • Single gene disorders
		Week 1 Day 3: 18.05.2016	9:30- 11 am <ul style="list-style-type: none"> • Tools in detection of single gene disorders
			11- 4:30pm <ul style="list-style-type: none"> • Lab exercises: DNA extraction, PCR, agarose gel electrophoresis
			4:30- 5:30pm <ul style="list-style-type: none"> • DNA sequencing
		Week 1 Day 4: 19.05.2016	9:30- 11 am <ul style="list-style-type: none"> • Tools in detection of single gene disorders
			11- 4:30pm <ul style="list-style-type: none"> • Lab exercises: DNA extraction, PCR
			4:30-5:30pm <ul style="list-style-type: none"> • Prenatal diagnosis
		Week 1 Day 5: 20.05.2016	9:30- 11 am <ul style="list-style-type: none"> • Preimplantation genetic Diagnosis
			11- 4:30pm <ul style="list-style-type: none"> • Lab exercises: Data analysis, trouble shooting
			4:30-5:30pm <ul style="list-style-type: none"> • Applications of nucleic acid based diagnosis in infectious diseases
2.	Cell Based Diagnostics	Week 2 Day 1 : 23.05.2016	9:30- 11:00 am <ul style="list-style-type: none"> • Cell structure and function, immunohistochemical localization, immunofluorescence, Tissue arrays, Cells in various pathological conditions
			11-12:00 noon <ul style="list-style-type: none"> • Visit to EM laboratory
			2:00-5:30 pm <ul style="list-style-type: none"> • Tissue embedding, sectioning, microtomy
		Week 2 Day 2 : 24.05.2016	9:30- 11:00 am <ul style="list-style-type: none"> • Advances in cell based diagnostics
			11-12:00 noon <ul style="list-style-type: none"> • Visit to confocal laboratory
			2:00-5:30 pm

Sr. No.	Topic/Module Name	Duration	Details
			<ul style="list-style-type: none"> • IHC/immunofluorescence
		Week 2 Day 3 : 25.05.2016	9:30- 11:00 am <ul style="list-style-type: none"> • Cell and tissue based diagnosis of cancer/infections/ other disorders
			11-12:00 noon <ul style="list-style-type: none"> • Introduction to animal cell culture
			2:00-5:30 pm <ul style="list-style-type: none"> • IHC/Immunofluorescence (contd)
		Week 2 Day 4 : 26.05.2016	9:30- 11:00 am <ul style="list-style-type: none"> • Applications of flow cytometry in diagnosis
			11-12:00 noon <ul style="list-style-type: none"> • Handling infectious organisms
			2:00-5:30 pm <ul style="list-style-type: none"> • Flow cytometry (CD4 and CD8 cell count in blood)
		Week 2 Day 5 : 27.05.2016	9:30- 11:00 am <ul style="list-style-type: none"> • Circulating tumor cells and cancer stem cells and their diagnostic potential
			11-12:30 noon <ul style="list-style-type: none"> • Biostatistics - I (Research methodology)
			2:00-5:30 pm <ul style="list-style-type: none"> • Flow cytometry (Contd)
3.	Protein Based Diagnostics	Week 3 Day 1 : 30.05.2016	9:30- 11:30 am <ul style="list-style-type: none"> • Protein structure and post-translational modifications
		Week 3 Day 2 : 31.05.2016	1:00 pm-5:30 pm <ul style="list-style-type: none"> • Protein extraction, estimation, separation and detection by Western Blotting Day 1
		Week 3 Day 3 : 01.06.2016	9:30- 11:30 am <ul style="list-style-type: none"> • Immunodiagnosics
			1:00 pm-5:30 pm <ul style="list-style-type: none"> • Protein extraction, estimation, separation and detection by Western Blotting Day 2
			9:30- 11:30 am <ul style="list-style-type: none"> • Diagnostic Assay Development

Sr. No.	Topic/Module Name	Duration	Details		
			1:00 pm-5:30 pm • ELISA		
		Week 3 Day 4 : 02.06.2016	9:30- 11:30 am • Proteomics in biomarker discovery		
			1:00 pm-5:30 pm • Metabolomics in diagnostics		
		Week 3 Day 5 : 03.06.2016	9:30- 10:30 am • Good Laboratory Practices (Research methodology)		
			10:30 am- 11:30 am • Biostatistics –II		
			1:00 pm-5:30 pm • Industry visit		
		4.	Data Mining and Precision Medicine	Week 4 Day 1 : 06.06.2016	9:30- 10:30 am • Overview of biological and clinical databases
					10:45 am -1:00 pm • Hands-on session on use of databases such as UniProtKB, OMIM, dbSNP, dbGaP, ClinVar, DrugBank, PubChem etc.
					02:00 pm -3:00 pm • Exploring the online genome browsers
					03:00 pm -5:00 pm • Hands-on session on primer design; use of UCSC genome browser and Ensemble
Week 4 Day 2 : 07.06.2016	9:30- 10:30 am • Microarrays for biomarker discovery				
	10:45 am -1:00 pm • Hands-on session on microarray analysis				
	02:00 pm -3:00 pm • Functional annotation of proteins using sequence signatures				
	03:00 pm -5:00 pm • Hands-on session on sequence analysis using online databases and tools				
Week 4	9:30- 10:30 am				

Sr. No.	Topic/Module Name	Duration	Details
		Day 3 : 08.06.2016	<ul style="list-style-type: none"> • How to effectively do a literature review using online search engines (Research Methodology) <p>10:45 am -1:00 pm</p> <ul style="list-style-type: none"> • Hands-on session on use of PubMed <p>02:00 pm -3:00 pm</p> <ul style="list-style-type: none"> • Next Generation Sequencing: Technology & Data Analysis <p>03:00 pm -5:00 pm</p> <ul style="list-style-type: none"> • Tutorial: Analysis pipeline construction and demo
		Week 4 Day 4 : 09.06.2016	<p>9:30- 10:30 am</p> <ul style="list-style-type: none"> • Pharmacogenomics: Integrative biomarkers for optimized interventions <p>10:45 am -1:00 pm</p> <ul style="list-style-type: none"> • The microbiome: Exploring it 's role in diagnosis and prognosis <p>02:00 pm -3:00 pm</p> <ul style="list-style-type: none"> • Precision Medicine: Where do we stand? <p>03:00 pm -5:00 pm</p> <ul style="list-style-type: none"> • Case study and discussion

VI. Relevance in Public Health

This 4 week course will equip a pool of young medical and clinical researchers with technical and conceptual knowledge on recent trends in nucleic acid, protein, cell and tissue based diagnostics. Sensitive and cost-effective diagnostic tests for early detection are required to effectively manage the burden of communicable (TB, Malaria etc), and non-communicable diseases (Cancer, diabetes, cardiovascular diseases). This is extremely relevant in developing and resource-poor countries, like India where early detection may curtail the spread of various communicable diseases and also help in reducing the cost of treatment of non-communicable diseases. The medical faculty participating in this course may further disseminate the knowledge gained through this course, to their students. It will also encourage young researchers to initiate new research proposals related to public health.

5. Eligibility Conditions:

Candidates with MBBS/MD or Ph.D (in any area of Life Sciences) can apply. Faculty from Medical Colleges/Research Institutes/NIRRH Field Units and applicants from North-East and Semi-Urban/Rural Regions of India are encouraged to apply.

Annexure A

Details of Institute Faculty

S. No	Post at the time of Recruitment	Names	Current Post
1.	Scientist G	Dr. Smita Mahale	Scientist G
2.	Scientist D	Dr. Deepa Bharatiya	Scientist D
3.	Scientist D	Dr. Taruna Gupta	Scientist D
4.	Scientist D	Dr. Vainav Patel	Scientist D
5.	Scientist C	Dr. Donta Balaiah	Scientist G
6.	Scientist C	Dr. K.V.R. Reddy	Scientist F
7.	Scientist C	Dr. Manjramkar	Scientist D
8.	Scientist C	Dr. Srabani Mukherjee	Scientist D
9.	Scientist C	Dr. Deepak Modi	Scientist D
10.	Scientist C	Dr. Bhakti Pathak	Scientist D
11.	Scientist C	Dr. kaushiki Kadam	Scientist C
12.	Scientist C	Dr. Shahina Begum	Scientist C
13.	Scientist C	Dr. Vikrant Bhor	Scientist C
14.	Scientist B	Dr. S.L. Chauhan	Scientist F
15.	Scientist B	Dr. Geeta Vanage	Scientist F
16.	Scientist B	Dr. Bandivedekar	Scientist E
17.	Scientist B	Dr. Ikram Khatkhatey	Scientist E
18.	Scientist B	Dr. Jayanti Mania	Scientist E
19.	Scientist B	Dr. Nafisa Balasinor	Scientist E
20.	Scientist B	Dr. Geetanjali Sachdeva	Scientist E
21.	Scientist B	Dr. Lalita Savardekar	Scientist E
22.	Scientist B	Dr. Beena Joshi	Scientist D
23.	Scientist B	Dr. Priyanka Parte	Scientist C
24.	Scientist B	Dr. Vikas Dighe	Scientist C
25.	Scientist B	Dr. Udhav Chaudhury	Scientist C
26.	Scientist B	Dr. Susan Thomas	Scientist C
27.	Scientist B	Dr. Ragini Kulkarni	Scientist C
28.	Scientist B	Dr. Rahul Gajbhiye	Scientist B
29.	Scientist B	Dr. Anushree Patil	Scientist B
30.	Scientist B	Dr. Clara Aranha	Scientist B
31.	Scientist B	Dr. Meena Desai	Scientist B
32.	Scientist B	Dr. Dipty Singh	Scientist B
33.	Scientist B	Dr. Suchitra Surve	Scientist B