



# International Biotechnology Faculty Development Program

## International Molecular Biology Individual Hands on Training

**Duration: 30 days**

### **Theory (lectures, discussion, power point presentation)**

1. Basic concept of Polymerase Chain Reaction, PCR primers types of PCR, how it work?
2. Instrumentation: a. Thermal cyclers types and applications
- c. Powerpack and submarine electrophoresis systems with Gel Documentation system
3. Recombinant DNA technology basis concept with Hepatitis E virus DNA vaccine approach
4. Electrophoresis: Agarose and SDS PAGE and Western blot development
5. PCR applications in molecular diagnostics: Parental detection, SNP primer designing
6. RNA handling and isolation precautions, cDNA preparation, pre RT and RT steps in RT PCR
7. Pre and post purifications
8. DNA sequencing
9. Data handling of actual DNA sequences carried out at ATG LAB
10. Basic bioinformatics applications for biotechnologists

### ***1. Wet Lab Orientation Program Before Training***

#### **Handling of Equipments and Instruments:**

- a. How to work clean for molecular biology: Laminar air flow, decontamination and sterilization
- b. Extra care during RNA work, other cell and mol bio and immunology protocol precautions
- c. Clean and dirty area in PCR protocol handling
- d. Micropipettes and how to use and take care
- e. Storage of samples, reagents, how to mix
- f. Instrumentation basic handling and care during usage: Thermalcycler Gradient, Gel documentation system with quantity one software, Universal powerpack, Subcell I GT submarine electrophoresis for DNA, Tetracell Vertical electrophoresis for Protein electrophoresis, Semi dry Trans blot for southern and northern blot development, Western blot system (all BIORAD make) Orbital shaker incubator etc



## **2. Exploring DNA & RNA: Nucleic acid extraction techniques**

- a. DNA extraction from bacteria by proteinase K treatment DNazol method
- b. DNA extraction from human plasma / serum by DNazol method
- c. DNA extraction from plant ATG LAB modified **CTAB - DNazol** DNA recovery method
- d. Total RNA extraction plant by filtration column method
- e. Total RNA extraction from human plasma / serum by TRIzol method
- f. Total RNA extraction from bacteria by TRIzol method

## **3. Polymerase Chain Reaction and DNA electrophoresis**

- a. Level 1 learner's PCR
- b. Level 2 Nested PCR for viral diagnosis by diagnostic primers set
- c. Level 3 Gradient PCR: Standardization of new PCR
- d. Applied PCR for bacterial detection from conserved region primers

## **4. Reverse Transcriptase Polymerase Chain Reactions**

- a. Pre RT,
- b. cDNA preparation by Reverse Transcriptase action
- c. second strand synthesis and PCR
- d. DNA electrophoresis for RNA isolated from specific Human cell line

## **5. Protocols in recombinant DNA technology & Genetic Engineering**

- a. Restriction digestion by EcoRi / Hind III
- b. Ligation by T4 DNA ligase
- c. Revival / subculture of Ecoli (host cells)
- d. Plasmid (pUC 18) preparation, competent cell preparation (CaCl<sub>2</sub> method) & transformation,
- e. Identification of transformants
- f. blue white screening, transformation efficiency studies



## 6. Post rDNA technology protocols

- a. SDS PAGE
- b. Western Blotting

## 7. Human Genetics studies:

- a. Protein isolation
- b. purification
- c. hemolysate preparation
- d. Hemoglobin separation and identification of homozygous sicklers, heterozygous and normal
- e. Clinical examination studies from patients retrospective data base
- f. Pedigree analysis and studies on gene flow in sickle cell families
- g. Human Parvovirus B19 susceptibility studies from retrospective clinical profile

## 8. Applied Bioinformatics

- a. Reading DNA sequence from Applied Biosystems 3100 Genetic analyzer
- b. DNA Sequence selection for BLAST, Forward and Reverse primer data interpretation
- c. Bioinformatics softwares: BLAST, BALST2, Reverse complement, Bioedit, MEGA, Primer 3
- d. Primer designing, BLAST & phylogeny

## 9. Discussion with scientists from National R&Ds / Assessment

Lectures by trainee, calculation demonstration to new fresh trainees, Group discussion & Powerpoint presentation for their own project and how they will apply to their research project

**Devendra Lingojwar, Director ATG LAB**  
**16, Apurva Complex, Pune University Road, Aundh, Pune 411007**  
**PhNo. +91 9921446321 email [atglabpune@gmail.com](mailto:atglabpune@gmail.com) Website [www.atgbiotech.com](http://www.atgbiotech.com)**

**Note:**1. Once we receive your completely filled registration form, we will let you know confirmed dates and your planned schedule as per your request. 2. Clearance from FRO Pune office is mandatory for International scientists / students / Faculties \*\*\*International candidates should contact us in this regard before confirmation of any program

