**Central Research Laboratory for Central Research Laboratory**

**for Molecular Genetics, Bioinformatics and Machine Learning**

**Managed by Department of Biochemistry**

# Vision

To create a multidisciplinary, cutting-edge research facility that seamlessly integrates basic biomedical research with advanced computational methods, thereby enhancing research outcomes, driving breakthroughs that culminate in high-quality publications in esteemed national and international peer-reviewed journals, and elevating the institution's research profile globally.

# Laboratories within the CRL

- Karyolab (Cytogenetics Laboratory)
- Bioinformatics Laboratory
- Machine Learning Laboratory
- Molecular Biology Laboratory
- Sample Processing & Distillation Unit
- Immunoassay Laboratory
- Biological sample storage facility

# Infrastructure available

**Computational**

- High Capacity ML Units (×2, GPU-enabled)

**Molecular Biology**

- RT-PCR Unit

- PCR Workstation

- UV Transilluminator

- Cold Centrifuge

- Plate Centrifuge (RT)

- All necessary stirrers, vortex mixers, centrifuges, micropipettes, balances, etc.

- SDS-PAGE setup and accessories

**Clinical Chemistry**

- ELISA Unit

- Semi Analyzer (Small Capacity)

- High Capacity Semi Auto Analyzer

**Imaging**

- Stereo Microscope

- Compound Microscope with software for image capture and analysis

**Storage & Others**

- −20°C Storage Units (×2)

- BOD Incubator

- Bacterial Incubator

- Hot Air Ovens

- Water Baths

# Wet Lab Capabilities

- **Cell & Molecular Biology**

  Perform advanced investigations into DNA, RNA, and protein expression to understand cellular mechanisms and support translational research.

- **ELISA-Based Quantification**

  Utilize highly sensitive and reproducible ELISA techniques for accurate protein detection and quantification.

- **Clinical Chemistry Analysis**

  Perform biochemical assays using semi-automated and fully automated analyzers for reliable, high-throughput clinical and research applications.

- **Exosome Proteomics**

  Analyze exosomal cargo to uncover biomarkers and gain insights into intercellular communication.

- **Cell Signalling Analysis**

  Decode complex signaling pathways to understand cellular responses and functional interactions.

- **High-Throughput Metabolomics**

  Investigate metabolic alterations and pathway dynamics associated with physiological and pathological conditions.

# Dry Lab Capabilities

- **Whole Exome Sequencing Analysis**
  Identify and interpret genetic variants with precision to reveal mutation profiles and disease associations.

- **Bioinformatics & Machine Learning**
  Apply advanced computational models to predict candidate genes, biomarkers, and therapeutic targets.

- **Biomedical Statistical Analysis**
  Ensure robust, reproducible, and meaningful interpretation of experimental data using rigorous statistical frameworks.

- **Integrated Multi-Omics Analysis**
  Develop customized pipelines integrating genomics, transcriptomics, proteomics, and metabolomics for holistic insights.

- **Custom Pipeline Development**
  Build scalable, reproducible analytical workflows tailored to specific research needs.

- **AI-Assisted Programming & Automation**
  Develop efficient analytical pipelines using **R** and **Python**, enhanced by modern AI/LLM-assisted approaches.

- **Cloud-Based Computing (Google Colaboratory)**
  Enable scalable, collaborative, and resource-efficient data analysis using cloud platforms.

- **Android Application Development (Healthcare)**

  Design and develop customized Android applications tailored for healthcare and biomedical research, enabling efficient patient data management, clinical workflow integration, real-time monitoring, and intuitive data visualization while ensuring data security and compliance.

**End-to-End Research Support**

- Support research from concept to publication, including grant writing, review articles, manuscript preparation, infographics, and scientific illustrations.

# Research Portfolio Overview

- **300+** Total Active Projects
- **150+** Faculty Research
- **100+** PG Dissertations
- **39** UG Student Projects

# Three Strategic Research Focus Areas

- Non-Communicable Diseases
- Maternal & Child Health
- Infectious Diseases

80+ bioinformatics & AI/ML papers published in last 9 months

## Research Themes

**Clinical Research** Medication adherence, ADR prediction, drug-drug interactions, hospital antibiograms, clinical laboratory QC using ML, surgical outcomes

**AI & Machine Learning** 15+ ML projects across all three areas: diabetic retinopathy screening, SAM prediction, pre-eclampsia, treatment response, antimicrobial resistance, chest X-ray classification

**Genetics & Genomics, Bioinformatics** Multi-omics studies, GWAS, pediatric epilepsy gene polymorphisms, gestational diabetes prediction, diabetic nephropathy, cancer pathogenesis, COVID-19 severity

## Research Impact Areas

- **Clinical Excellence** Focusing on innovation, ethics, data integrity, and patient safety
- **Public Health** Epidemiology, disease prevention, community interventions
- **Medical Education** Novel teaching methods, competency-based education, assessment
- **AI & Technology** Machine learning, multiomics, diagnostic/prognostic algorithms
- **Maternal & Child Health** Pregnancy outcomes, pediatric care, nutrition
- **Cancer Genetics** Genetic basis of cancers, personalized medicine, molecular diagnostics

## Comprehensive AI/ML Portfolio- 25+ Projects

- **7** Maternal & Child Health
- **9** Non-Communicable Diseases
- **6** Cancer & Vascular
- **7** Virology
- **15** In Progress & Pipeline
- 15+ Deployed Web Applications | Multiple Publications | 95% Accuracy Achieved*

# Maternal & Child Health- 5 Projects

- GDM Prediction
- High-Risk Pregnancy
- Menstrual Cycle
- PCOS
- Postpartum Depression
- Malnutrition
- Down Syndrome

# Non-Communicable Diseases

- Kidney Stone
- Diabetic Foot (Bio)
- Diabetic Foot (Thermal)
- Diabetic Foot Ulcers
- Hearing Loss
- Diabetic Nephropathy
- Stroke Prediction
- COPD
- Non Alcoholic Fatty Liver Disease
- Meningioma Prediction

# Cancer & Vascular AI

- Breast Cancer (Clinical)
- Lung Cancer (CT Images)
- Lung Cancer (NLP Survey)
- Colorectal Histopathology
- Liver Tumor (3D U-Net)
- Abdominal Aortic Aneurysm

# COVID-19 Virology- AI-Genomics-Public Health Integration

- **Mutation Prediction**
- **Epi Forecasting**
- **Mortality Risk**
- **Vaccination Effect**
- **Policy Impact**
- **Genomic-Clinical**

- **Hospital Preparedness** Admissions /beds availability

# Machine Learning Algorithm Based Applications

- **01** Gestational diabetes & High Risk pregnancy prediction apps https://my-gdm.streamlit.app/ https://high-risk-pregnancy-prediction.streamlit.app/
- **02** Image based Malnutrition detection in under 5 children https://malnutrition-detector.streamlit.app/ https://malnutrition-detector-app-version-2.streamlit.app/
- **03** Kidney stone prediction https://kidney-stone-prediction.streamlit.app/
- **04** Breast cancer prognosis prediction https://breast-cancer-prediction-application.streamlit.app/
- **05** Diabetic foot risk prediction https://df-prediction.streamlit.app/

# Research Output 2025

- **124** Total Publications *In 2025*
- **40%** Q1 & Q2 Journals *High Impact*
- **11** Lancet Publications *Premium Research*

# UG & PG Grants Statistics

- **2025 - PG Thesis support - ICMR** Applied: 36 | Accepted: 8
- **2023 - ICMR STS** Applied: 17 | Accepted: 2
- **2023 - UGSRS** Applied: 24 | Accepted: 6
- **2024 - ICMR STS** Applied: 45 | Accepted: 11
- **2024 - UGSRS** Applied: 27 | Accepted: 8
- **2025 - ICMR STS** Applied: 55 | Accepted: 4
- **2025 - UGSRS** Applied: 25 | Accepted: 6

# Capacity Building Activities

- Workshops for Faculty & PG students on research methodology
- Manuscript writing workshops (using AI-assisted tools)
- Grant writing training sessions using AI
- UG training programs in bioinformatics and ML
- Inter-departmental research collaboration facilitation
- Ethics in clinical research training

**Grants & Infrastructure Funding | Academic Year 2025 | CRL AIMSR Chittoor**

1. **₹10 Lakh – ARA (Dr. Usha Adiga)**
   **Apollo Research Academy**
   Prof. Ravi Mahajan / Apollo Research Academy — Infrastructure funding for ML Workstation and research equipment.

2. **₹ 3.1 Lakhs - Matching Grant (Dr. Usha Adiga)**
   **Dr. H. Vinod Bhat, Vice Chancellor**
   For Stereo Microscope and BOD Incubator — supporting molecular biology and environmental research.

3. **₹ 2 Lakhs – MRHRU, ICMR, (Dr. Usha Adiga)**
   Machine Learning Based Prediction Model for Pre-eclampsia: An Implementation Research Proposal

4. **₹93 Lakh – ICMR, (Dr. Usha Adiga)**
   NAFLD project – Developing liquid biopsy panel

   **Infrastructure**

5. **Karyotyping Laboratory – Dr. Usha ICMR Funds**
   Cytogenetics facility — Karyotyping Lab established under Dr. Jeevan to support chromosomal and prenatal diagnostics

6. **₹ 1.75 Lakhs – ANRF, Govt. of India (Dr. Usha Adiga)**
   CONNECTOMICS 2025: A National Conference organized by AIMSR Chittoor with the theme Bridging Medicine and Bytes (July 2025)

7. **Collaborative Funding**
   **TANUH / IISc**
   Collaborative project funding through partnerships with (TANUH), IISc Bangalore for AI-driven diagnostics.

## Current collaborations

- Apollo Total Health
- TANUH an AI Centre of Excellence / IISc, Bengaluru
- IIT Tirupathi
- IISER Tirupathi
- Manipal College of Health Professions, Manipal

## Core Members

- **Dr. Alfred J Augustine**
  Dean, AIMSR Chittoor | Advisor

- **Dr. Usha Adiga**
  Associate Dean Research & Prof/HOD, Dept. of Biochemistry
  Director — Research, The Apollo University

- **Dr. Sampara Vasishta**
  Senior Resident, Dept. of Biochemistry
  Scientific Officer

- **Ms. Sireesha**
  Research Assistant – ICMR Project
  ML Engineer

- **Ms. Sharitha**
  Technician

## Contributors & Support

- **Karyotype Lab**
  Supported by Dr. Jeevan
  Dept. of BMS, TAU

- **Workshops**
  Supported by Dr. Ravikanth

- **Capacity Building Workshops**
  Supported by FRF

- **Connectomics**
  Dr. Sachidananda Adiga
  Prof. & HoD, Dept. of Pharmacology
  AIMSR Chittoor

- **Department of Biochemistry**
  Dr. Anil Kishore B (Prof)
  Dr. Amulya (SR)
  Dr. Farzia (SR)
  Mrs. Supriya (Tutor)
  Mrs. Reddemma (Tutor)
  Dr. Venkata Ramesh B (Asst. Prof)

  **Technical Staff, Department of Biochemistry**
- Mrs. Supriya
- Mr. Chaitanya

  **Research Operations**
  Finance Dept. | Transport | F&B | Maintenance Dept. | IT Dept. | Purchase Dept. –
  AIMSR Chittoor

# Distinguished Visitors

Academic Year 2025–2026 | CRL AIMSR Chittoor



**Dr. Manvendhu Jha**
Dec 8, 2025



**Prof. Geeta Shetty & Prof. Sadashiv**
Dec 20, 2025



**Gates Foundation**
Feb 7, 2026



**Prof. N.K. Ganguly**
Feb 10, 2026



**NTRUHS Vice Chancellor,
Dr. CHANDRA SEKHAR PULALA** Feb 20, 2026



**CEO, AKC — Mr. V. Sivaramakrishnan**
Feb 21, 2026

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# Distinguished Visitors

Academic Year 2025–2026 | CRL AIMSR Chittoor

**Dr. Ravi Raju Tatapudi
Pro Chancellor, Apollo University**



**Dr. Muralidharan
Apollo Hospitals, Chennai**