DEPARTMENT OF STUDIES IN
BIOCHEMISTRY

UNIVERSITY OF MYSORE

Manasagangothri, Mysore-570 006 India

PROGRAMMES / COURSES OFFERED

1. M.Sc in Biochemistry (Four semesters) Students Intake: 16
2. Ph.D., in Biochemistry (By research)

The above courses are run in English medium.

Indian National Students : For M.Sc. course additional 50% seats are available under partially self-financing scheme as per University rule. M.Sc., students are admitted by entrance examination

International students : Limited seats are available for International students. Minimum eligibility for admission is 55% marks in life sciences where chemistry/biochemistry should be the major subject at the bachelor's degree. Entrance examination is exempted.

Course Fee for International students in Indian Rupees is 186,455.00

CURRICULUM

The duration of each semester is four months which includes four theory and two practical papers. Each theory paper is taught for 48 hours per semester. The duration of practical is 16 hours per week. The major subjects include Biochemical techniques, Biomolceules, Enzymology, Physiology and Nutrition, Bioorganic and Biophysical Chemistry, Metabolism, Clinical Biochemistry, Immunology, Genetics, Molecular Biology, Cell Biology, Biotechnology, Biostatistics and Bioinformatics. Practicals include range of relevant experiments designed from the theory subjects.

Each semester students have to deliver a seminar on assigned subjects. In the fourth semester students have to perform a project work under the guidance of the faculty in partial fulfillment of the course.

OTHER ACTIVITIES

Department has following organization.

- Biochemical Society
- Biochemistry Research Association®
- Biochemistry Alumni Association®

Under these organization series of invited lectures from eminent scientists are organized for the benefit of students. The other activities include conducting workshops and symposia. Department also encourages other extracurricular activities including semi annual excursion.

ABOUT THE DEPARTMENT AND FACULTY

The Department of Biochemistry came into existence in 1974. Establishing the department was the dream of founder professor T.R.Ramaiah. Since then training Ph.D. and masters degree students has been the major thrust of the department. The teaching programme is designed to give the students current awareness in a wide variety of subjects with in-depth study of core Biochemistry. Consequently many of the students successfully completed national level examinations like UGC/CSIR/ICMR & GATE. The department has so far produced over 750 M.Sc. biochemistry students and over 52 Ph.D's. the excellent training given to the students help them to be placed in national/international research labs & pharmaceutical industries, medical, dental, under-graduate & post graduate colleges in the country and abroad.

The Department at present has 21 Research scholars pursuing their PhD programmes. The department has received fundings from the DST, CSIR, ICMR, UGC, Lady Tata Memorial Trust and University Postgraduate Fellowships. The research work in the Department has resulted in more than 180 publications, in peer reviewed international journals.

GLIMPSES OF ONGOING RESEARCH ACTIVITY OF OUR FACULTIES

Prof. CLETUS J.M.D' SOUZA

Current research activity involves work on Lipids and lipoproteins

- Among lipoproteins, HDL and its modification in vitro and in vivo is studied with reference to cardiovascular diseases.
- HDL is modified among south Indians and it appears to have lost its functionality and one of the enzymes associated with HDL, namely Paraoxonase (PON) is isolated and characterized specifically for various natural and synthetic substrates.
- PON in snake Venom has been detected and its implication in envenomation strategy is being studied.
- Gene polymorphism of PON gene is under study in a single community in Mysore.
- Other research interests include effect of diesel exhaust on PON activity, life style on PON and HDL, and quantitative assay for modified PON are in progress.

Prof. M. KARUNA KUMAR

Dr. M. Karuna Kumar is involved in two research programmes.

Role of plant glycosidase in seed germination :

Although the metabolism of reserves from the storage tissue is well known to occur on seed germination, the regulatory mechanism has not been well elucidated. It was established that both cytosolic and cell bound forms of D-Galactosidases were involved in seed germination. A systematic and comprehensive study is undertaken to elucidate the overall metabolism including the molecular basis of seed germination.

Molecular mechanism of metastasis:

Another project is in collaboration with a foreign scientist on the technique and methodology for the early cancer diagnosis. This work presented a definitive relationship between hyaluronan receptor and metastasis. This work showed the presence of a common antigen in all human cancer tissues. Mechanism of invasion by looking at the differential expression of Matrix Metallo Proteaeses and the common antigen Hyaluronic acid binding protein (HABP) interrelationship using monoclonal antibody against HABP during invasive stages and on the early diagnosis in cancer is the ongoing research programme. Currently purification and characterization of the antigen and its relation with other known cancer antigens is under progress.

Prof. B.S. VISHWANATH

Presently working on the following research areas.

Phospholipase A2 (PLA2) inhibitors as anti-inflammatory molecules.

The key enzyme involved in acute and chronic inflammatory reaction is PLA_2. The powerful anti-inflammatory drug glucocortisosteroid has many side effects. The interest is in finding alternative specific PLA_2 inhibitor(s) from various medicinal plants. In addition synthesis and derivatization of potent PLA_2 molecules with anti-inflammatory activity is in progress.

Biochemical and pharmacological actions of plant latex proteases:

Blood coagulation and wound healing processes are strictly regulated by proteolytic events. Plant latex is known to control bleeding and is extensively used in folk medicine. Proteases from these plant latex were isolated and characterized for their involvement in blood coagulation and wound healing processes

Clinical significance of hyaluronan degrading enzymes in hypothyroid and hyperthyroid conditions.

Myxedema is the main characteristic feature of hypothyroid condition where the content of hyaluronic acid is elevated. This condition is effectively treated by thyroid hormones. The effect of thyroid hormones on the regulation of hyaluronic acid content by enzymes is currently being investigated.

- New Angiotensin Converting Enzyme (ACE) inhibitors and their importance in therapeutics:

Angiotensin Converting Enzyme is involved in the elevation of Blood Pressure (Hypertension). In the treatment of High Blood Pressure, the existing ACE inhibitors have side effects and hence, we are attempting to synthesize safe and effective ACE-inhibitory peptides as well as to isolate and characterize ACE inhibitory bioactive molecules from medicinal plant extracts.

- Also working on the venom components of Trimeresurus malabaricus an endemic snake which occur in Western Ghats of India.

Dr. K. KEMPARAJU

Working on the pharmacology of venoms from snakes and spiders.

Anti-venom therapy fails to control the local toxicity of envenomation. Therefore, new therapeutic strategies are in demand for the efficient management of the condition. Further, as venoms are known as the depot of molecules that exhibit high target specificity, there is a greater scope for isolation, characterization and understanding the molecular mechanisms of toxins that may serve as prototypes for designing therapeutic molecules. Therefore, the focus is on:

- Isolation and characterization of toxins responsible for local toxicity of venoms.
- Isolation, characterization and understanding the molecular mechanisms of venom Components that interfere in homeostasis.
- Inhibition of hydrolytic enzymes especially, the hyaluronidases and matrix degrading metalloproteases by plant components and their role in the management of local toxicity.

Dr. GOPAL MARATHE

Dr. Marathe has extensively worked on biologically active phospholipids for the past several years and recently joined the faculty in 2007. Platelet activating factor (PAF) and related lipid molecules are implicated in variety of inflammatory disorders. Although the mechanism of their synthesis is currently not clear, an alternative pathway by which PAF analogues are made by oxidative fragmentation of phospholipids has been identified. Such a pathway is employed extensively during LDL oxidation. The current project involves the identification of such mediators in a variety of inflammatory disorders such as asthma and sepsis.

In another project in collaboration with scientists from Cleveland Clinic Foundation, mechanisms underlying aspirin resistance are currently being investigated.

Dr. K.S. GIRISH

Rheumatoid arthritis (RA) and osteoarthritis (OA) are the two most common joint disorders, causing pain and disability to a significant proportion of the human population due to the destruction of articular cartilage. This destruction is largely due to the elevated activities of proteolytic enzymes and hyaluronidases that degrade extracellular matrix (ECM) macromolecules in the cartilage. The regulation of these enzymes by plant components is therapeutically important.

The drugs commonly in use for the treatment of arthritis include glucocorticoids, non-steroidal anti-inflammatory drugs, disease-modifying anti-arthritic drugs and biological response modifiers. The prolonged use of many of these drugs is associated with severe adverse reactions and toxicity. In this context, we are making an effort to identify and characterize the therapeutic values of common inhibitor(s) for ECM degrading enzymes especially from medicinal plants.

The department is also equipped with good library for reference work.

Major facilities available:

- High pressure liquid chromatography.
- Spectrophotometer.
- Spectrophotofluorimeter
- High speed centrifuge
- Liquid scintillation counter
- Platelet aggregometer
- Cell culture facility
- ELISA reader
- Lyophilizer
- Rotary Flash evaporator

National Symposium on Bioactive Molecules : From Discovery to Industry
April 6-7, 2009

Chairman,
DOS in Biochemistry,
Manasagangotri, Mysore.