



# Research in Faculty of Pharmacy Gazi University

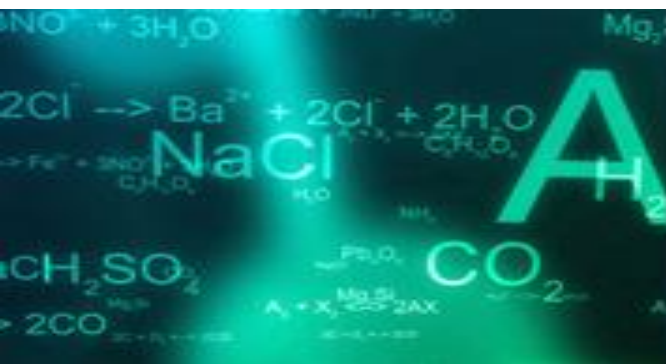
Prepared by Prof. Dr. İlkey ERDOĞAN ORHAN (Dean)



# DEPARTMENT OF ANALYTICAL CHEMISTRY

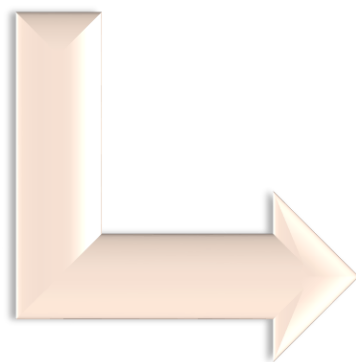
Analyses for the determination of active substances and excipients from biological media and pharmaceutical formulations are performed with high-performance liquid chromatography.

With the newly established Inductively coupled plasma (ICP)-mass spectrometry (MS) system, it has become possible to analyze (quantify) various metals from almost any environment.



# DEPARTMENT OF ANALYTICAL CHEMISTRY

## Research Areas



- Chromatographic analyses (HPLC, GC)
- Capillary Electrophoresis
- Molecular Impressed Solid-Phase Extraction (MISPE), Liquid-Liquid Microextraction
- Immunoassays, Magnetic Nanoparticules
- Raman, UV-Vis & Floresance Spectroscopy
- Trace Element Analysis (Atomic absorption, ICP-MS, AFS)
- Chemical and Biological Sensors (Molecular Impressed Polimers, Quantum Dots and Antibody-based)
- Microchip-Based Analyses



# DEPARTMENT OF BIOCHEMISTRY

- ❖ Investigation of the roles of some proteins that play a role in the repair of DNA damages in the formation of cancer and in the determination/direction of treatment.
- ❖ Examination of the expressions of enzymes that are important in the development of drug resistance in cancer
- ❖ Platelet aggregation and signal pathways
- ❖ Platelet aggregation inhibitory compound screening protocols
- ❖ Molecular action mechanisms for platelet-receptor-targeted compounds
- ❖ Obesity and ER stress mechanisms, UPR signal pathways
- ❖ NAFLD and ER stress, cell death pathways
- ❖ Cancer biochemistry from the view point of DNA damage and apoptosis
- ❖ Genetic polymorphism
- ❖ Free radical metabolism and oxidant and antioxidant measurements in cancer, cardiovascular diseases, diabetes mellitus, hypertension, hyperlipidemia, infertility and Alzheimer's disease



# DEPARTMENT OF BIOCHEMISTRY

In addition;

- ❖ Antioxidant activity methods
- ❖ Antioxidant vitamin supplements
- ❖ Oxidative protein damage
- ❖ Oxidative DNA damage
- ❖ Adipocytokins
- ❖ Uremic toxins
- ❖ Inflammation markers
- ❖ Inflammasoms



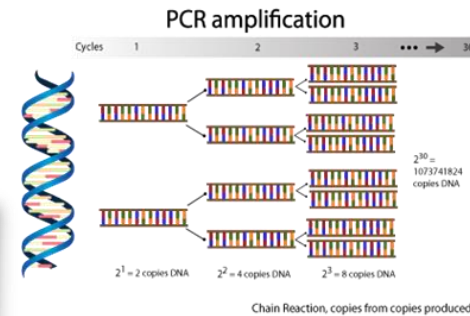
In these assays;

- RT-PCR & PCR-based techniques
- HPLC methods
- GC-MS methods
- ELISA Kit methods
- Agregometric screening methods
- Western-Blotting
- Spectrophotometric methods
- Cell culture methods

are applied.

# DEPARTMENT OF PHARMACEUTICAL MICROBIOLOGY

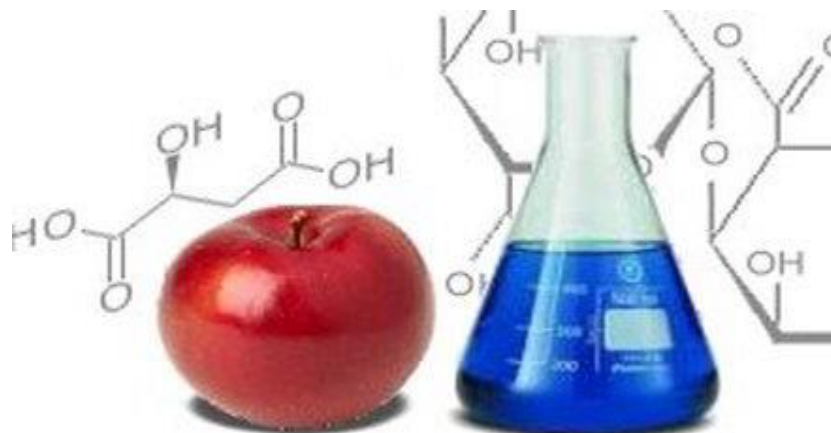
- Test techniques related to the scope and applications of microbiology
- Identification, culture, preparation and use of suitable solvents
- staining techniques of strains (gram staining, differential staining-ARB, endospore staining, capsule staining)
- Minimum inhibition concentration (MIC) assay
- Antimicrobial sensitivity
- Determination of activity in new synthesis and herbal extracts
- Microbiological analysis
- Disc diffusion tests
- Disinfection-sterilization
- Hospital infection control
- ABO-blood groups
- DNA isolation
- PCR



# DEPARTMENT OF BASIC PHARMACEUTICAL SCIENCES

- Food analysis and nutrition
- Antibiotics in food
- Food additives and food contaminants

- Heavy metals
- Aflatoxins
- Melamine



# DEPARTMENT OF PHARMACOLOGY

Experimental animal models and molecular investigation of insulin resistance and obesity in humans; Drug development studies for prevention and treatment are carried out.



By examining the morphological and functional properties of cancer cells, the effects of drugs and drug candidate molecules on these cells and related mechanisms are investigated. Records are made with real-time cell tracking systems.

In vitro and in vivo pharmacological activity determinations of new drug candidate molecules (anti-inflammatory, analgesic activity, toxicity tests, etc.) and chronopharmacology studies are carried out.



Pharmacology





# DEPARTMENT OF PHARMACOLOGY

By creating disease models (metabolic syndrome, diabetes, hypertension, obesity, inflammation, pain, etc.) in experimental animals; Studies are carried out to elucidate physiological and pathological mechanisms at the level of cells, tissues and organ systems.

Cancer research and cytotoxicity studies are carried out at the cellular level.

Clinical studies are carried out on the efficacy and safety of new drug candidate molecules to be used in the diagnosis and treatment of diseases in humans.



# DEPARTMENT OF PHARMACEUTICAL CHEMISTRY



**Drug design & development**

**Inflammatory diseases**

**Cancer (target-specific anticancer drug discovery/development)**

**Alzheimer's disease**

**Discovery and development of new compounds that are candidates for preliminary clinical trials**

**New drug molecule design studies with computer Technologies**

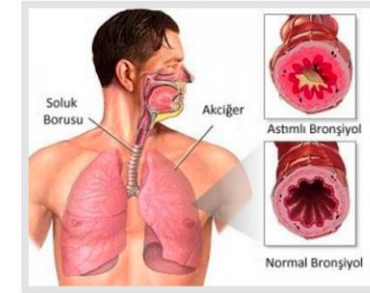
**Generic (equivalent) drug development and analysis studies**

**Determination of drug active ingredient and impurity**



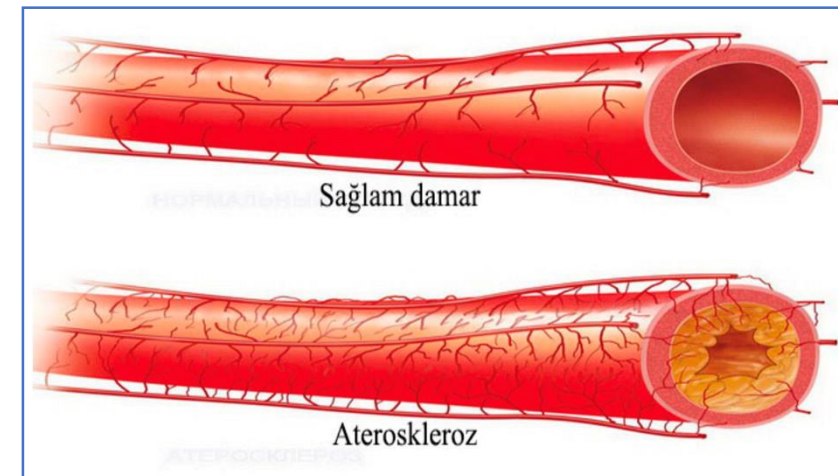
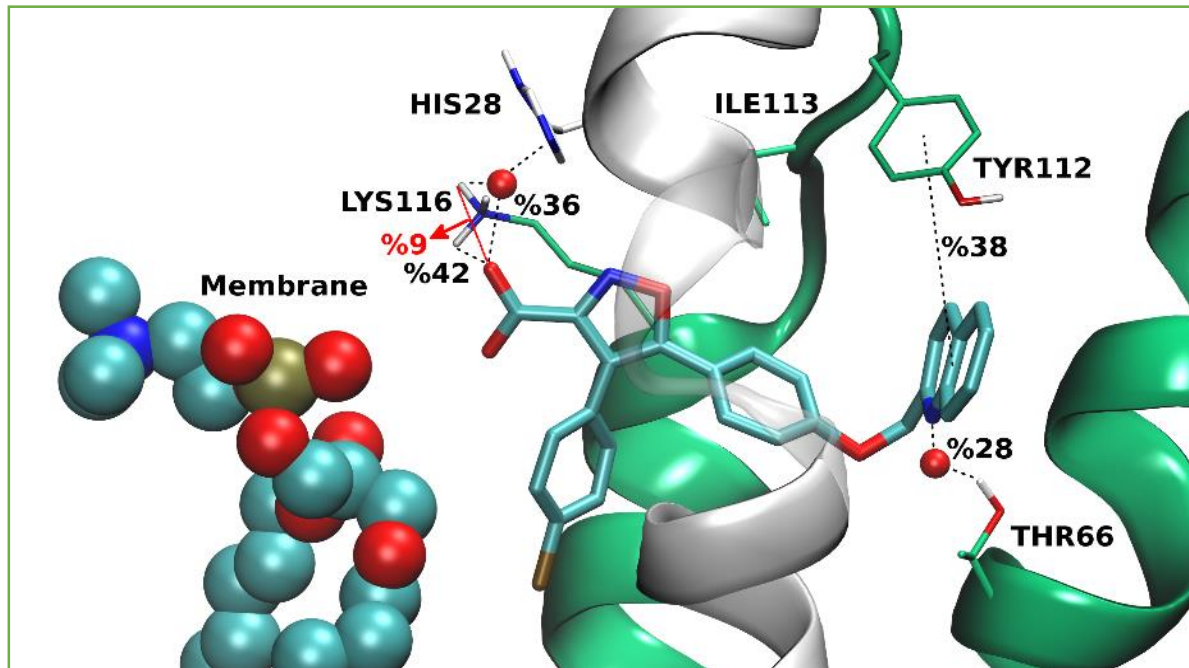
# DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

Drug candidate molecule  
BRP-187 (**FLAP inhibitor**)  
*European Patent Application*  
*EP2949653*

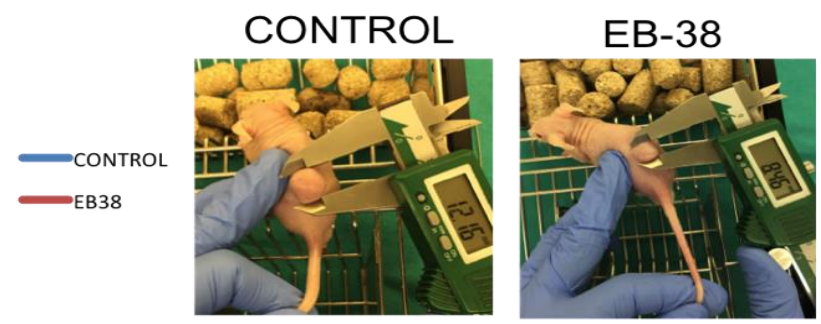
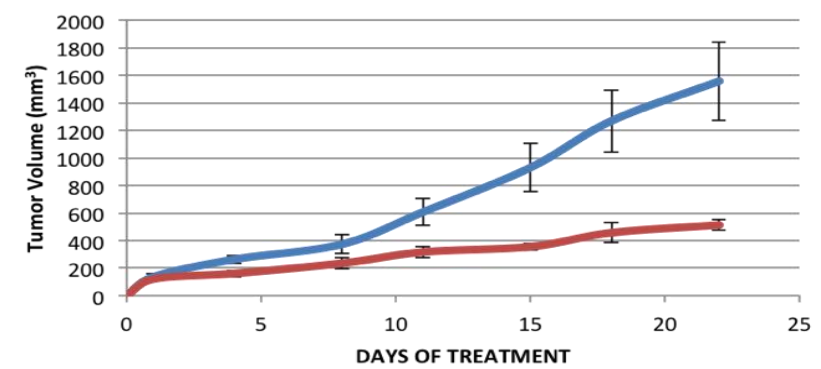
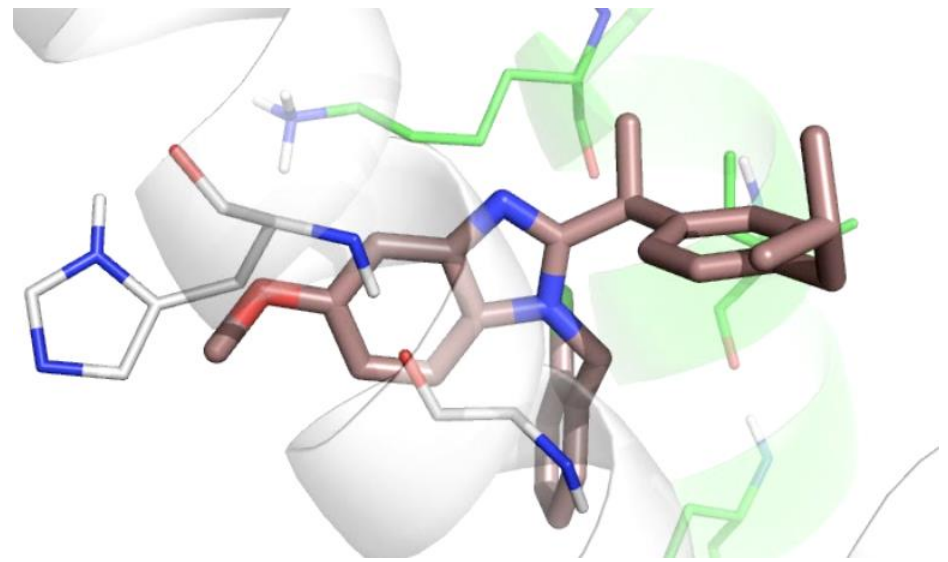


Indication for the treatment of asthma

Atherosclerotic vascular formation  
and development of cardiovascular  
diseases prevention indication



**EB<sub>38</sub>** – TUBITAK 1003 (215S015)  
At the stage of pre-clinical studies



# DEPARTMENT OF PHARMACOLOGY

## BIOACTIVITY-GUIDED ISOLATION AND STRUCTURE DETERMINATION OF PLANT EXTRACTS

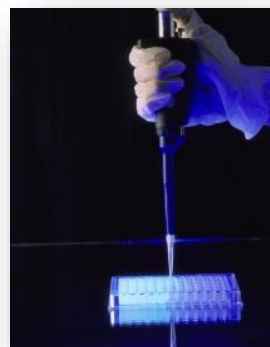
**IN VITRO ACTIVITY ASSAYS**

**ENZYME INHIBITION ASSAYS**

**ANTIOXIDANT ACTIVITY METHODS**

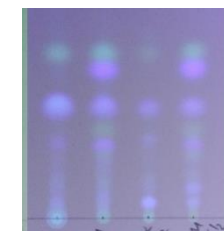
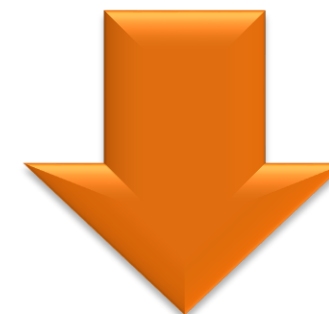
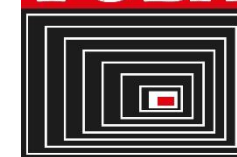


Quality Control Analysis in European Pharmacopoeia Herbal Monographs



L'ORÉAL

TÜBA



Cholinesterase inhibition

Tyrosinase inhibition

Elastase inhibition

Urease inhibition

Collagenase inhibition

Alpha-glucosidase inhibition

Marine Pharmacognosy

Anti-aging Cosmeceutical Formulation Studies



# DEPARTMENT OF PHARMACOGNOSY



## WOUND HEALING ACTIVITY



## ANTI-INFLAMMATORY ACTIVITY



## ANALGESIC ACTIVITY



## UROLITHIASIS RAT MODEL

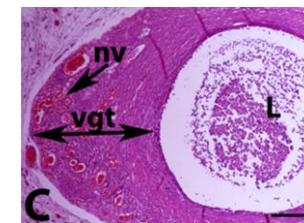
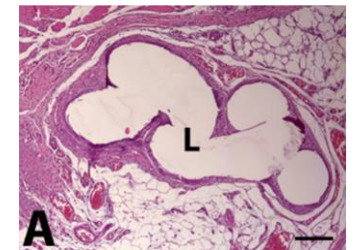
## ENDOMETRIOSIS RAT MODEL

## IN VIVO ACTIVITY ASSAYS

## HEPATOPROTECTIVE ACTIVITY

## ANTIDIABETIC ACTIVITY

## ANTI-ULCER ACTIVITY



# DEPARTMENT OF PHARMACEUTICAL TOXICOLOGY

5 of Academic staff - *European Registered Toxicologists*



RESEARCH AREAS



- Drug safety and pharmacogenetics
- Environmental Toxicology
- Industry Toxicology Analytical Toxicology
- Forensic Toxicology
- Nanotoxicology
- Cosmetic product safety
- Toxicological Risk assessment

Nanomaterial toxicity-international project

○Modelling Nanomaterial Toxicity- COST Action TD 1204-

# DEPARTMENT OF PHARMACEUTICAL TOXICOLOGY

- Gene polimorfism
- Genotoxicity
- Drug toxicity-Individual susceptibility
- Drug impurities
- Mutagenic activity - *in silico* analyses

- Association of gastrointestinal adenocarcinoma and NEIL 1 gene polymorphism
- Evaluation of Genotoxicity and Cytotoxicity in Children with Thalassemia by Cytome Method CYP19 in adolescent girls with polycystic ovary syndrome (PCOS)
- Investigation of DENND1A genetic polymorphisms and exposure to some endocrine disruptors in terms of gene-environment interaction
- Toxicity of antipsychotics and the effect of individual susceptibility on toxicity
- The role of MTHFR 677CT gene polymorphism and homocysteine and vitamin B levels in Parkinson's disease





# DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY

1-DEVELOPMENT OF CONVENTIONAL DRUG FORMULATIONS (SOLID DRUG FORMS; TABLET, ODT, GEL, SUSPENSION, EMULSION, OINTMENT, CREAM)

2-DEVELOPMENT OF CONTROLLED RELEASE SYSTEMS

Oral Drug Forms

Transdermal Drug Systems

Veterinary Parenteral Drug Forms

Vaginal Drug Forms

Column-Specific Drug Forms

3- NANOTECHNOLOGY-BASED DRUG CARRIER SYSTEMS

Nanoparticules

Nanocrystals (Nanosuspensions)

Nanofibers, Nanoemulsions

Nanogels, Nanotubes

Quantum Dots

Liposomes Kohleat

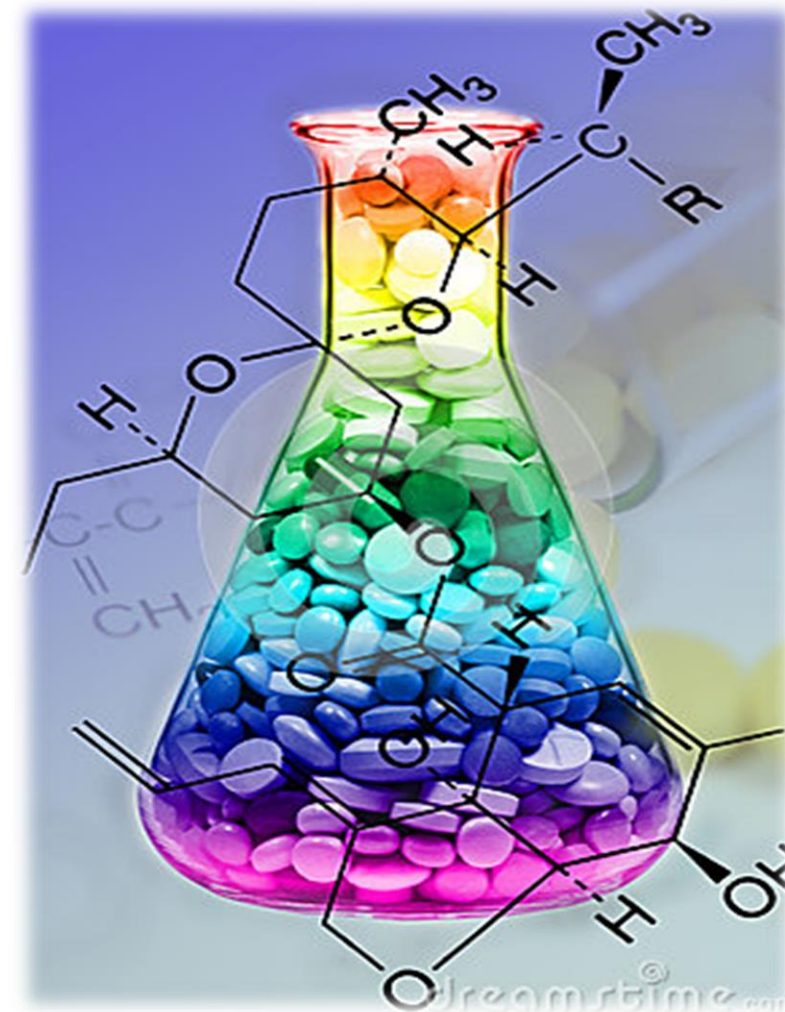
4- PHARMACEUTICAL BIOTECHNOLOGY-BASED FORMULATIONS

Peptit-Protein Formulations (Oral, Parenteral, Pulmonar, Dermal)

Vaccine Formulations by Nasal Application

5- SOLID DOSAGE FORMS PREPARED BY 3D PRINTING TECHNIQUE

6- QbD-DESIGN QUALITY APPLICATIONS



# DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY

## TESTS & ANALYSES

- **STABILITY (STABILITY TESTS ACCORDING TO ICH RULES)**
- **DISSOLVING RATE TESTS**
- **PARTICLE SIZE AND DISTRIBUTION**
- **ELECTRICAL LOAD (ZETA POTENTIAL) MEASUREMENTS**
- **DETERMINATION OF MUCOADHESION AND MECHANICAL PROPERTIES**
- **SURFACE TENSION MEASUREMENT**
- **DSC (DIFFERENTIAL SCANNING CALORIMETER) AND DTA (DIFFERENTIAL THERMAL ANALYSIS) MEASUREMENTS**
- **MORPHOLOGICAL EXAMINATION WITH ATOMIC FORCE MICROSCOPE**
- **PERMEABILITY - PERMEATION ASSESSMENTS**

## R&D STUDIES



- Development of cosmetic product formulations
- Skin and hair care products, cleaning products, sun products, oral care products
- Cream, solution, gel, emulsion, suspension, powders, foams, patches, nano-sized carrier systems
- Determination of the properties of cosmetic products
- Carrying out quality controls, release and skin transfer studies
- Performing stability studies
- Examining the effectiveness of the developed cosmetic products (such as instrumental analyses, biochemical analyzes and cell culture studies)

# SUBDEPARTMENT OF BIOPHARMACEUTICS AND PHARMACOKINETICS



- **Biopharmaceutics / Pharmacokinetic evaluations**
- **Bioavailability / Bioequivalency**
- **Biopharmaceutic Classification System (BCS) assessments**
- **Strategies to increase drug absorption**
- **Development of New Dosage Forms for Increasing Absorption and Bioavailability of Potency-Soluble Active Substances (Oral, Nasal, Nanoemulsified and Self-Emulsified Systems)**
- **Dermatopharmacokinetic**
- **Microdialysis**
- ***In vitro* dissolution rate studies**
- **Estimates with biocompatible dissolution media**
- **Simulation of Hunger and Fullness States – Lipolysis Studies**
- ***In vitro* / *In vivo* Correlation (IVIVC)**
- **Membrane permeability & cell culture assays**
- ***In situ* perfusion studies**



**WE ARE OPEN TO SCIENTIFIC COLLABORATIONS  
PLEASE CONTACT US AT [ecza@gazi.edu.tr](mailto:ecza@gazi.edu.tr)**