



TEHRAN UNIVERSITY  
OF  
MEDICAL SCIENCES

**School of Pharmacy**

**Fellowship Program in Critical Care Pharmacotherapy**

The Critical Care Pharmacotherapy Fellowship Program at Tehran University of Medical Sciences and Sina Hospital is a postdoctoral fellowship program whose primary goal is to provide ICU pharmacists with the skills necessary to monitor pharmacotherapy-related interventions posed in every day clinical practice through the design, implementation and evaluation of methodologically-sound studies. This fellowship program will integrate didactic training, clinical experience and active participation in the development and completion of original research in critically-ill patient populations. Development of laboratory-based analytical skills and proficiency in pharmacokinetic data analysis are additional major goals of the program. Research participation will account for more than 50% of the fellow's activities.



**Program Chairman:**

Mohammad Sharifzadeh (Pharm.D., Ph.D.)  
Professor of Pharmacology  
Dean, School of Pharmacy

**Program Directors:**

Mojtaba Mojtahedzadeh (Pharm.D.)  
Professor of Clinical Pharmacy  
Head, Pharmaceutical Care Division (Sina Hospital)

**Application Deadline:**

- 1<sup>st</sup> September 2018

**Fellowship beginning:**

- 1<sup>st</sup> February, 2019

**Eligibility:**

All students with the following degrees are eligible to apply:

- M.Pharm.
- Pharm.D.
- Ph.D. in Pharmaceutical sciences (All related subjects)
- Clinical Pharmacy Specialty



## **Description of the Fellowship Program**

### **A. Overview**

The critical care pharmacotherapy fellowship program, offered by School of Pharmacy at Tehran University of Medical Sciences (TUMS) and Sina Hospital, is a new program whose primary goal is to provide ICU pharmacists with the skills necessary to monitor pharmacotherapy-related interventions posed in every day clinical practice through the design, implementation and evaluation of the methodologically-sound studies. The fellowship program will integrate didactic training, clinical experience and active participation in the development and completion of original research studies in the critically-ill patient populations. Development of laboratory-based analytical skills and proficiency in pharmacokinetic data analysis are additional major goals of this fellowship program. Research participation will account for more than 50% of the fellow's activities.

Over the course of the two-year program, the fellow will be expected to assume responsibility for developing 2-3 research proposals for which he or she will act as the principal researcher. Through these proposals, the fellow will gain experience at protocol development including methodological and statistical design considerations, budget preparation, the IRB submission process, grantsmanship, patient enrollment including obtainment of informed consent, chart documentation and adverse event reporting, appropriate study record keeping and data analysis. The fellow will also collaborate (in a co-researcher capacity) with the preceptor, other residents and fellows, and researchers outside the department in the design and implementation of several additional research proposals.

While independent research is the primary focus of the program, the fellow will also be exposed to multi-center Phase II, III and IV studies in terms of patient enrollment, case report documentation and IRB-related documentation. The fellow will be responsible for the preparation and submission of their research results for national presentation in the form of platform and/or poster presentation in addition to subsequent preparation and submission of a manuscript to an appropriate peer-reviewed journal for publication. He or she will have the opportunity to didactically teach pharmacy and medical resident students and other health care professionals and to precept both pharmacy residents and Pharm.D. students during their ICU rotation.

### **B. Length and Distribution of the Fellowship Activities**

Duration of the program: 2 years

Percentage of the fellow's time spent on each activity category:

Research: 50%

Teaching: 10%

Patient Care: 40%

## **C. Experiences Enabling the Fellow to Become an Independent Researcher**

The fellow will gain clinical research experience at Sina Hospital and laboratory research experience in Toxicology and Pharmacokinetics at TUMS. Throughout the program, he or she will be required to attend the daily rounds at Sina Hospital, the bi-weekly department of critical care research rounds, and pertinent lectures at the TUMS School of Pharmacy. The fellow will also be encouraged to attend all relevant seminars and workshops offered throughout the academic year at both TUMS and Sina Hospital, including the monthly ICU Fellowship Forum, medical grand rounds, and visiting professor presentations.

### **1. Clinical Research**

The fellow will gain experience developing a bedside pharmacotherapy-related drug and physiological monitoring into a precise research hypothesis. Through interaction with the preceptor and collaboration with expert intensivists and physician researchers, the fellow will learn how to develop a methodologically-sound and feasible research protocol. The fellow will learn how to identify appropriate research funding sources. An emphasis will be given to participation in the application process for competitive research grants by working with the preceptor in addition to members of the Division of Critical Care Medicine at Sina Hospital, the Department of Pharmacy at TMC, and the Department of Pharmacy Practice at TUMS.

Fellows will learn how to develop a study budget that incorporates institutional or university overhead costs. They will gain experience in identifying appropriate funding agencies from discussions with the preceptor, by example (preceptor, other faculty members), and by circulation of Tehran University of Medical Sciences postings of potential grant funding agencies. The fellow will gain experience in the IRB application process (i.e. drafting consent forms and completing protocol summary forms) in addition to gaining a general appreciation for the role of the IRB and the mandatory communications (e.g. adverse event reporting, protocol extensions etc.) often necessary throughout the duration of the research protocol.

The fellow will develop skills to efficiently identify patients for both their own primary research projects in addition to those of the preceptor and attending intensive care specialists. Experience will be gained in obtaining informed consent from both patients and next-of-kin, appropriate chart documentation, as well as overcoming the barriers that can arise during the enrollment phase. Familiarity with case report form reporting procedures will also be gained, and the fellow will have the opportunity to participate in meetings with pharmaceutical study monitors, co-researchers, and research nurses. The fellow will learn to use the appropriate spreadsheet and statistical software to analyze, summarize, and interpret study results. Study results will be incorporated into an abstract and submitted for presentation to national meetings. Subsequently, the fellow will participate in the writing of a study manuscript for submission to a peer-reviewed journal.

### **2. Laboratory Research**

The fellow will complete two months of laboratory research in either: 1) the Laboratory of Pharmacokinetic, or 2) the Toxicology Research Laboratory at TUMS.

A number of different experimental approaches are used to study these disorders in rat models. Fellows will have an opportunity to become involved in electrophysiological,

anatomical, or behavioral research aimed at Sepsis, Shock, MODS, respiratory failure, Trauma etc. Extensive pharmacokinetic drug studies following acute-care illnesses could be selected.

### 3. Educational Opportunities

- A. Coursework: The fellow is required to complete coursework offered by the Graduate Program in Public Health, School of Medicine, and/or Department of Biostatistics, in the areas of Research Design, Epidemiology, and Biostatistics.
- B. Didactic or experiential teaching: The fellow will be actively involved in Doctor of Pharmacy courses, the research design course, and the cardiology/critical care module of the therapeutics course. Other opportunities to teach medical students, medical residents, and other allied health professionals are available. The fellow will have the opportunity to precept pharmacy residents and doctor of pharmacy students during their ICU rotation. He or she will also be expected to act as a clinical resource to other pharmacists. The fellow will also have the opportunity to complete rotations in the SICU and CCU and radiology at Sina Hospital. The fellow will not be required to provide clinical or distributive coverage.

Advance training in the areas of hemodynamic monitoring respiratory, renal, G.I etc. monitoring, and mechanical ventilation will be offered. Molecular patterns of shock, MODS sepsis and trauma, as well as advance pharmacokinetic modeling shall be discussed.

### 4. Other Professional Experience

The fellow will actively participate with the preceptor in academic reviewing of Critical Care Medicine, Pharmacotherapy, Annals of Pharmacotherapy, and ACCP and SCCM research abstracts. He or she will be encouraged to further develop critical appraisal and writing skills by participating in the preparation of review articles, textbook chapters, and letters to the editor. The fellow may also be required to perform minor administrative functions in the Department of Pharmacy Practice at TUMS.

### **D. Available Facilities**

Sina Hospital is the oldest permanent medical facility in Tehran. The 500-bed medical center serves as the principal teaching hospital for TUMS and is internationally renowned for its transplantation services, general surgery by using both traditional and minimally invasive techniques, vascular surgery, cancer care, cardiology and infectious diseases. Sina Hospital is in the top ten percent of all institutions nation-wide receiving National Institute of Health Funding. Pharmacy residents have been trained in an accredited training program for more than 20 years.

Sina hospital provides care to the critically ill in a 14-bed medical intensive care unit (MICU), a 10-bed surgical ICU, a 10-bed coronary ICU. More than 300 patients are admitted each year to the hospital's ICU. Members of the Critical Care Division of the anesthesiology Department lead a multidisciplinary approach to critical care that incorporates nursing, nutrition support, respiratory care, social work and pharmacy expertise. The ICU at Sina

Hospital is a part of the project, is the site for numerous research studies, and will be the major practice, teaching and research site for the fellowship program.

## **Main Fellowship Topics and Course Titles**

### **COMMON PROBLEMS**

Sudden Deterioration in Neurologic Status

Agitation and Delirium

Management of Acute Pain in the Intensive Care Unit

Fever and Hypothermia

Very High Systemic Arterial Blood Pressure

Low Systemic Arterial Blood Pressure

Tachycardia and Bradycardia

Respiratory Distress with Arterial Hypoxemia

Acute Respiratory Failure

Polyuria

Oliguria

Acid-Based Disorders

Hypernatremia and Hyponatremia

Hyperkalemia and Hypokalemia

Hypophosphatemia and Hypophosphatemia

Hypomagnesaemia

Hypocalcaemia and Hypercalcaemia

Hypoglycemia

Anemia of Critical Illness

Thrombocytopenia

Coagulopathy

Hyperbilirubinemia

The Management of Gastrointestinal Bleeding

Ileus

Diarrhea

Rashes

Chest Pain

### **CENTRAL NERVOUS SYSTEM**

Biochemical, Cellular, and Molecular Mechanisms of Neuronal Death and Secondary Brain Injury in Critical Care

Critical Neuropathophysiology

Advanced Bedside Neuromonitoring

Coma

Cardiopulmonary-Cerebral Resuscitation

Management of Acute Ischemic Stroke

Non-traumatic Intracerebral and Subarachnoid Hemorrhage

Seizures in the Critically Ill

Neuromuscular Disorders in the ICU

Traumatic Brain Injury

Spinal Cord Injury

Neuroimaging

Intensive Care after Neurosurgery

Key Issues in Pediatric Neurointensive Care

### **RESPIRATORY DISORDERS**

Bedside Monitoring of Pulmonary Function

Principles of Gas Exchange

Arterial Blood Gas Interpretation

Respiratory System Mechanics and Respiratory Muscle Function

Heart-Lung Interactions

Assist-Control Mechanical Ventilation

Patient-Ventilator Interaction

Weaning from Mechanical Ventilation

Non-invasive Positive-Pressure Ventilation

High-Frequency Ventilation

Extracorporeal Life Support

Adjunctive Respiratory Therapy

Indications for and Management of Tracheostomy

Hyperbaric Oxygen in Critical Care

Imaging of the Chest in the ICU

Acute Lung Injury and Acute Respiratory Distress Syndrome

Aspiration Pneumonitis and Pneumonia

Severe Asthma Exacerbation

Chronic Obstructive Pulmonary Disease

Pulmonary Embolism

Other Embolic Syndromes

Pulmonary Hypertension

Pleural Disease in the Intensive Care Unit

Community-Acquired Pneumonia

Nosocomial Pneumonia

Pulmonary Infections in the Immunocompromised Patient

Lung Transplantation

Burns and Inhalation Injury



Drowning

Acute Parenchymal Disease in Infants and Children

Pulmonary Edema

## **CARDIOVASCULAR DISORDERS**

Hemodynamic Monitoring

Acute Coronary Syndromes: Pathophysiology and Diagnosis

Acute Coronary Syndromes: Management and Complications

Invasive Cardiac Procedures: Percutaneous Transluminal Coronary Angioplasty, Mitral and Aortic Valvuloplasty

Supraventricular Arrhythmias

Ventricular Arrhythmias

Conduction Disturbances and Cardiac Pacemakers

Sudden Cardiac Death: Implantable Cardioverter-Defibrillators

Severe Heart Failure

Myocarditis in the Intensive Care Unit

Acquired and Congenital Heart Disease in Children

Pericardial Diseases

Emergent Valvular Disorders

Infectious Endocarditis

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Acquired and Congenital Heart Disease in Children

Pericardial Diseases

Emergent Valvular Disorders

Infectious Endocarditis

Metronidazole and Other Antibiotics for Anaerobic Infections

Prevention and Control of Nosocomial Pneumonia

Vascular Catheter-Related Infections

Pathophysiology of Sepsis and Multiple Organ Dysfunction

Sepsis and Multiple Organ System Failure in Children

Acute Bacteremia

Infections of the Urogenital Tract

Central Nervous System Infections

Infections of Skin, Muscle and Soft Tissue

Head and Neck Infections

Human Immunodeficiency Virus Infection

Infections in the Immunocompromised Patient

Infectious Endocarditis

Fungal Infections

Tuberculosis

Malaria and Other Tropical Infections in the Intensive Care Unit

Rickettsial Diseases

Acute Viral Syndromes

Clostridium Difficile Colitis

Tetanus

Botulism

Dengue Hemorrhagic Fever

### **PHARMACOTHERAPY of HEMATOLOGIC and ONCOLOGIC DISORDERS**

Anemia and Red Blood Cell Transfusion in Critically Ill Patients

Blood Component Therapy Management of Neutropenic Cancer Patients

Venous Thromboembolism in Medical Surgical Critically Ill Patients

Hematologic Malignancies in the Intensive Care Unit

The Hematopoietic Stem Cell Transplantation Patient

Organ Toxicity of Cancer Chemotherapy

Hematology and Oncology in Children

### **PHARMACOTHERAPY of ENDOCRINE DISORDERS**

Hyperglycemic Comas

Hyperglycemia and Blood Glucose Control in the Intensive Care Unit

Adrenal Insufficiency

Thyroid Gland Disorders

Diabetes Insipidus

Metabolic and Endocrine Crises in the Pediatric Intensive Care Unit

### **THE OBSTETRIC PATIENT**

Cardiovascular and Endocrinologic Changes Associated with Pregnancy

Hypertensive Disorders in Pregnancy

Acute Pulmonary Complications in Pregnancy

Postpartum Hemorrhage

Trauma in the Gravid Patient

### **PHARMACOLOGY AND TOXICOLOGY**

General Principles of Pharmacokinetics and Pharmacodynamics

Poisoning: Overview of Approaches for Evaluation and Treatment

Ethanol, Methanol and Ethylene Glycol

Anticonvulsants in the Intensive Care Unit

Calcium Channel Blocker Toxicity

Drug Dosing in the Patient with Renal Failure

Antidepressant Drug Overdose

Clinical Use of Immunosuppressants

Digitalis

Heavy Metals

Hydrocarbons

Lithium

Theophylline and Other Methylxanthines

Antipsychotics

Principles of NSAID Therapy in Critical Care Medicine

Opioids

Pesticides and Herbicides

Sedatives and Hypnotics

Toxic Inhalations

Pharmacoeconomics in Critical Care

### **PHARMACOKINETICS**

Dose Effect Relationships

ICU Drug Distribution and Pharmacologic Effects

Multiple Receptor Responses

Pharmacokinetic and Shock Modeling in – Vivo

Clearance Following Mechanical Ventilation

Drug and Tissue Binding in ICU

Sequential and Parallel Metabolic Pathways

Blood Flow, Oxygenation and Drug Clearance

Computer Simulation for Accumulation Parameters and Non-Linear Pharmacokinetics

Drug Assay Procedures

### **SURGERY AND TRAUMA**

Resuscitation of Hypovolemic Shock

Mediasinitis

Epistaxis

Management of the Postoperative Cardiac Surgical Patient

Management of Patients with Heart and Lung Transplants

Management of Patients with Kidney Pancreas, or Kidney/Pancreas Transplantation

Liver Transplantation

Intestinal and Multiple Organ Transplantation

Aortic Dissection

Splanchnic Ischemia

Abdominal Compartment Syndrome

Thrombolytics

Atheromatous Embolization

Pressure Ulceration

Management of Pain, Anxiety and Delirium

Burns

Thoracic Trauma

Abdominal Trauma

Pelvic and Major Long Bone Fractures

Pediatric Trauma

Management of the Brain-Dead Organ Donor

Non-Heartbeating Organ Donation

### **ETHICAL AND END-OF-LIFE ISSUES**

Technology: Caring for the Critically Ill

Resource Allocation in the Intensive Care Unit

Ethical Issues in the Intensive Care unit

Ethical Controversies in Pediatric Critical Care

End-of-Life Issues in the Intensive Care Unit

Determination of Death by Neurologic Criteria

### **ORGANIZATION, MANAGEMENT AND EDUCATION**

Building Bedside Collaborative Practice

The Pursuit of Performance Excellence

Severity of Illness Indices and Outcome Prediction: Development and Evaluation

Evaluating Pediatric Critical Care

Key Issues in Critical Care Nursing

Transport Medicine

Disaster Medicine for the ICU Physician

Evidence-Based Critical Care

Teaching Critical Care

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All interested applicants are welcome to [apply to TUMS](#) by completing and submitting TUMS online application form in which they need to specify their school, level, and major of interest.