

CURRICULUM FOR PERFUSION TECHNOLOGY

UNIT 1. BASIC SCIENCE

A. Cardiovascular Anatomy

1. Mediastinum Cardiovascular Anatomy
2. Heart
3. Cardiac Arteries, Veins and Microcirculation
4. Conduction System
5. Major Arteries, Veins and Branches
6. Developmental and Cardiac Embryology
7. Vascular Embryology

B. Pathology and Surgical Repair

1. Adult Cardiac Valvular Pathology and Surgical Repair
2. Adult Coronary Artery Pathology
3. Perfusion Techniques for Aortic Aneurysm Dissections: thoracic and thoracoabdominal
4. Congestive heart failure
5. Congenital heart defects: Left to Right Shunts
6. Congenital heart defects: Cyanotic Anomalies
7. Congenital heart defects: Obstructive Anomalies
8. Congenital heart defects: Miscellaneous Anomalies

C. Physiology

1. Cardiovascular Physiology
2. Cardiovascular Hemodynamics
3. Renal Physiology
4. Ventilation, Oxygenation, Respiration
5. Myocardial Physiology
6. Hematology
7. Coagulation Management

D. Pharmacology

1. Pharmacodynamics and Pharmacokinetics
2. Pharmacology of Anesthetic Agents
3. Anti-arrhythmic Pharmacology
4. Inotropic and Vasopressor Pharmacology
5. Vasodilators
6. Pharmacological treatment of Congestive Heart Failure (CHF)
7. Antimicrobial Agents / Antibiotics
8. Anticoagulants
9. Serine - Protease Inhibitors
10. Heparin Induced Thrombocytopenia (HIT)
11. Antithrombin III Deficiency

12. Chemotherapeutic, Immunosuppressive and Diabetic Agents

E. **Physics**

F. **Chemistry**

G. **Mathematics**

H. **Immunology**

1. Immunology of Blood Contact with Artificial Materials

2. Immunology of Reperfusion injury

UNIT 2. CARDIOPULMONARY BYPASS

A. **Extracorporeal Circuit Components for Cardiopulmonary Bypass**

1. Perfusion Circuits

2. Tubing

3. Pumps

4. Extracorporeal Filters

5. Oxygenators

6. Heat Exchangers

7. Reservoirs

8. Hemoconcentrators / Ultrafilters

B. **Cardiopulmonary Bypass Techniques**

1. Conduct of Cardiopulmonary Bypass

2. CPB Cannulation and Monitoring

C. **Adequacy of Perfusion**

D. **Myocardial Preservation**

1. Cardioplegia Administration Techniques

2. Cardioplegia Solutions

E. **Systemic Hypothermia**

F. **Blood Conservation Techniques**

1. Standards for perioperative Autologous Blood Collection and Administration

2. Hemodilution

3. Intraoperative Autotransfusion

4. High volume Autologous Platelet Concentration

5. Low Volume Autologous Platelet concentration systems

6. Hemoconcentration

7. Pharmacological interventions

G. **Special Considerations in Perfusion**

1. Malignant Hyperthermia

2. Perfusion of the Pregnant Patient

3. Sickle Cell and other blood disorders

H. **Catastrophe Management**

I. **Adjunctive Techniques**

1. Assisted Venous Drainage

2. Selective Cerebral Perfusion

J. Patient Monitoring

K. Organ Transplantation

1. Heart Transplantation: Donor Recipient Considerations
2. Lung and Heart-Lung Transplantation
3. Liver Transplantation - Perfusion Support

UNIT 3. MECHANICAL ASSIST

A. Extracorporeal Life Support Techniques

1. ECMO
2. CPS

B. Intra-Aortic Balloon Pumping (IABP)

C. Ventricular Assist Devices

UNIT 4. PRINCIPLES OF LABORATORY ANALYSIS

A. Overview - Laboratory Analysis

B. Laboratory Analysis - Special Chemistry

C. Laboratory Analysis - Blood Chemistry

D. Laboratory Analysis - Coagulation

UNIT 5. BIOMEDICAL ENGINEERING

A. Biomedical Instrumentation

B. Biophysical Transport Phenomenon

C. Biomedical Electrical Safety

D. Medical and Diagnostic Imaging Technology

UNIT 6. SAFETY

A. Blood / Fluid Exposure

B. Patient Safety

UNIT 7. CONTINUOUS QUALITY ASSURANCE

A. CQI for the Perfusionist

UNIT 8. ETHICS

A. Medical Ethics

UNIT 9. HISTORY

A. Historical Development of Extracorporeal Technology

UNIT 10. RESEARCH

A. Introduction to Research Methods