

STEM CELL BIOLOGY AND REGENERATIVE MEDICINE

Tentative Schedule - 2 weeks - we require a minimum of 2.5 –4 hours/day

Module – 1st week

Day 1 (Monday)

- **Basics And Applications Of Mesenchymal Stem Cells**
By Dr Ramachandran MS, MCh (Plastic Surgeon)

Day 2 (Tuesday)

Basic Cell Biology

- **Organization of Cells and Its Components**
- **Replication, Transcription and Translation**

Day 3 (Wednesday)

Basic Stem Cell Biology

- **Definition and Types**
- **Self-Renewal and Differentiation**
- **Pluripotent – ESCs And iPSCs**
- **Fetal – Amniotic Membrane, Fluid, Placenta, Umbilical Cord**
- **Adult – Hematopoietic, Mesenchymal**
- **Mesenchymal Stem Cells – Definitions, Sources and Applications**

Day 4 (Thursday)

Laboratory basics and culture media

- **Design and Layout Of Stem Cell Laboratories**
- **Major and Minor Equipment**
- **Lab Safety, Do's and Don'ts**
- **Culture Media – Basic Components and Their Functions**
- **Preparation of Powder / Liquid Media – Sterilization, Standardization**

Day 5 (Friday)

Establishment and Routine Maintenance Of Stem Cells

- **Liquid Samples – Bone Marrow, Peripheral Blood, Amniotic Fluid and Others**
- **Solid Tissues – Adipose Tissue, Umbilical Cord, Placenta, Amniotic Membrane, Skin, Dental Pulp**
- **Isolation Methods – Explant and Digestion**
- **Culture Method – Adherent Cell Culture and Suspension Cell Culture**
- **Daily Maintenance – Media Replenishment**

Day 6 (Saturday)

Harvesting, Cryopreservation and Reviving Stem Cells

- Concepts Of Cell Adherence and Confluency
- Harvesting Of Cells – Adherent and Suspension
- Cryopreservation – Basics and Protocols
- Resuscitation – Direct Seeding and Centrifugation

Module – 2nd week

Day 8 (Monday)

Stem Cell Behavior and Mechanisms

- Mechanism of Action Of Stem Cells
- Differentiation
- Fusion
- Paracrine Mechanism
 - Release of Growth Factors and Cytokines
 - Release of Microvesicles and Exosomes
 - Exchange of Mitochondria and Other Ions

Mock Handling

- Gaining Familiarity of Working In A Laminar Flow Hood
- Operating Serological and Micropipettes
- Handling T-Flasks and Centrifuge Tubes
- Media Preparation
- Media Change

Day 9 (Tuesday)

Ethical Considerations & Clinical Practices Involving Stem Cells

- Ethical Consideration in Stem Cell Biology
- Clinical Applications of Stem Cells
 - Clinical Trials
 - Case Studies

Mock Handling

- Gaining Familiarity of Working In A Laminar Flow Hood
- Operating Serological and Micropipettes
- Handling T-Flasks and Centrifuge Tubes
- Media Preparation and Media Change

Day 10 (Wednesday)

Practical Classes

- **Demonstration - Thawing and seeding**
- **Thawing and Seeding (Students)**

Day 11 (Thursday)

Practical Classes

- **Demonstration – Media Change**
- **Media change (students)**

Day 12 (Friday)

Practical Classes

- **Imaging of cells (Students)**
- **Troubleshooting and general discussion**

Day 13 (Saturday)

Practical Classes

- **Certification**

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ADDING LIFE TO YEARS