

BIO569

Regenerative Biology & Stem Cells

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Module 1: Embryonic stem cells and Induced pluripotent stem cells

Disease modelling using induced pluripotent stem cells

Module 2: Introduction to regenerative medicine

1. Adult stem cells and regeneration
 - Zebra fish and mammalian heart regeneration
 - Adult Neurogenesis
 - Hematopoietic stem cells
2. Cellular factors influencing tissue regeneration during tissue injury
3. Cell interactions with the microenvironment in tissue regeneration

Module 3: Molecular signalling regulating stem cell proliferation and differentiation

1. Notch Signalling
2. Wntsignalling
3. Hedgehog signalling
4. FGF
5. LIF- smad
6. Protein Kinase A

Module 4: Stem cells and tissue engineering (Stem cell based therapies)

1. Stem cell derived skin tissue and cartilage
2. Bone marrow transplantation
3. Umbilical cord blood stem cells and its therapeutic use
4. Experimental stem cell therapies in heart diseases, spinal cord injury
5. Boosting one's own stem cells: stem cells and aging

Module 5: Ethics and Policies in stem cell research

Module 6: Paper Presentations and discussions on recent advances in stem cell biology

References:

1. *Mostly based on Research and Review articles from journals in stem cells and regenerative biology and medicine*
2. *Essentials of Stem Cell Biology by Robert Lanza and Anthony Atala*
3. *The Cell Biology of Stem Cells by Eran Meshorer and Kathrin Plath*
4. *Advances in Stem Cell Therapy by Nagwa El-Badri*