

Pre-requisites: Nil

Introduction to stem cells: Types, characteristics, potency, differentiation; Stem cell isolation and culture; Embryonic, tissue specific and germ line stem cells; Induced pluripotent stem cells: direct reprogramming, transcription factors and RNAi, Stem cell specification and trans-differentiation; Stem cell niche, signaling and metabolism; Epigenetics; Cancer types, oncogenes and tumor suppressor genes; Cancer origin, progression and relapse; Cancer stem cells; Cancer and normal stem cells: common and shared pathways; Cancer microenvironment; Cancer therapy: Chemotherapy, radiation, cell and integrative therapy; Cancer multidrug resistance; Stem cells for cancer therapy; Degenerative diseases; Tissue repair and regeneration; Disease modeling and drug discovery; Ethical guidelines and issues: embryonic and induced pluripotent stem cells; Pharmacogenomics and Personalized medicine.

Texts:

1. M. A. Hayat, Stem Cells and Cancer Stem Cells, Vol 2, Springer, 2012.
2. N. M. Bilko, B. Fehse, W. Osterta, C. Stocking and A.R. Zander, Stem Cells and their potential for clinical applications, Springer, 2008.
3. R. A. Weinberg, The Biology of Cancer, Garland Science, 2007.

References:

1. R.G. Bagley, B.A. Teicher, Stem Cells and Cancer, Humana Press, 2009.
2. A. Bongso and E.H. Lee, Stem Cells: From bench to bedside, 2nd Edition, World Scientific, 2011.