

Normal and Neoplastic Stem Cells:

Irving Weissman, Stanford University School of Medicine, Ca. USA

Self renewal is the principal property that distinguishes stem cells from their daughter cells; when stem cells divide they give rise to stem cells (by self-renewal) and progenitors (by differentiation). The balance between self-renewal and differentiation is what generates and then maintains tissues and enables them to respond to injury or other stressors. Studies identifying hematopoietic stem cells (HSC) and progenitors have made hematopoiesis one of the best systems for studying the molecular changes in cell fate decision-making and oncogenesis. Further, it serves a paradigm for finding preclinical and clinical platforms for tissue and organ replacement and regeneration, Stem cell isolation and transplantation is the basis for regenerative medicine. Self-renewal is dangerous, and therefore strictly regulated. Poorly regulated self-renewal can lead to the genesis of cancer stem cells (CSC), the only cells within a tumor or leukemia that have the ability to self renew and therefore, the cells that maintain the cancer. Thus, it is predicted that CSC elimination is required for cure. This prediction necessitates profoundly different approaches to cancer research, compelling investigators to prospectively isolate CSCs and to characterize the molecular pathways regulating their behavior in order to identify targeted and truly effective therapies.