The developmental capabilities and therapeutic potential of stem cells are being revealed in studies of cellular signaling mechanisms that regulate their proliferation, differentiation and survival. "Stem Cells: A Cellular Fountain of Youth" reviews the current state of understanding of the molecular mechanisms that regulate embryonic and adult stem cells with an emphasis on how aging and age-related disease impact on these mechanisms. Leading authorities detail the properties and therapeutic potential of embryonic stem cells, and stem cell precursors of blood, nervous and muscle and bone cells. Recent advances in deciphering the environmental signals and intrinsic signal transduction pathways that regulate embryonic stem cells are described, and the potential therapeutic uses of these totipotent cells is considered. Analyses of hematopoietic stem cells during aging suggest an important genetic component to the control of their self-renewing capability which may contribute to determination of lifespan. The contribution of lymphocyte depletion to impaired immune function during aging is considered, as is the potential of hematopoietic cells to form other types of cells including neurons. Several chapters cover the remarkable and rapidly advancing field of neural stem cells. The adult brain contains populations of stem cells capable of forming new neurons and glial cells; the signals that regulate these neural stem cells and the involvement of neurogenesis in normal brain function is described. Because of their potential to replace lost or damaged neurons, there has been intense interest in determining the therapeutic potential of stem cells for the treatment of patients with Parkinson's and Alzheimer's diseases, stroke and traumatic brain and spinal cord injuries. Heart and skeletal muscle contain stem cells and the impact of aging and disease on these stem cell populations and the potential of stem cell therapy to recover function of these organs is reviewed. A final example of the fascinating world of stem cells is a review of the roles of stem cells in bone formation and remodeling. Collectively, this book provides a comprehensive, yet concise, view of stem cell molecular biology in the context of aging and age-related disease. This book will be a valuable reference for graduate students and senior scientists interested in the fascinating world of stem cells and their potential use in the clinic.

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