Introduction to the Symposium on Regenerative Medicine

Beginning with the current issue, *Mayo Clinic Proceedings* launches a multidisciplinary forum dedicated to the emerging field of regenerative medicine. The series of comprehensive articles, authored by leading experts, spans specialties and offers to the readership a first-in-kind regenerative medicine compendium from state-of-the-art current knowledge to transformative health care solutions. Addressing unmet patient needs in an increasingly aging population plagued with debilitating chronic conditions, regenerative technologies aim to repair degenerated, diseased, or damaged tissues. Regenerative medicine thereby enables the deployment of unprecedented strategies targeted to restore physiologic function, and ultimately restitute normative impact, driving radical innovation in patient management.[1]

The concepts and goals of regenerative medicine are as enduring as humankind, from the ancient Prometheus myth that epitomizes inherent healing powers[2] to the most recent Nobel Prize in Physiology and Medicine that recognizes the groundbreaking decoding of cell fate decisions.[3] Supported by a firm scientific understanding of organ development and reconstitution and validated through early clinical adoption in transplant medicine, incorporation of regenerative principles into daily practice is at the forefront of health care blueprints, with institutions in the United States and around the world developing specialized regenerative medicine clinics, centers, and institutes to accelerate the implementation and catalyze the convergence of best practices across medical and surgical disciplines.[4] Concomitantly, the enthusiasm for regenerative medicine, along with the hope and solutions that it engenders, continues to grow among patients, families, and society at large.

The potential applications of regenerative medicine are virtually limitless. They extend from bone marrow transplant to treat hematologic malignancies and islet cell transplants for diabetes mellitus to use of proregenerative adjuvants in wound healing, nerve reconstruction, facial reanimation and composite allografts in plastic surgery, hybrid core decompression and osteochondral grafting in orthopedics, stem cell–based visual restoration, platelet-rich plasma interventions in sports medicine, cell therapies for liver diseases, bionic regeneration in otherwise untreatable tracheal pathologies, or assist devices in heart failure management, to name a few prototypes illustrating the diverse scope of already implemented strategies in clinical practice.[5-11] Beyond initially established regenerative procedures, a number of ongoing clinical trials—including Mayo Clinic studies involving amyotrophic lateral sclerosis, myocardial ischemia, heart failure, hypoplastic left heart syndrome, osteoarthritis, and renal artery stenosis to name a few—highlight the future prospects of the field.

The common principle of regenerative medicine, at a more fundamental level, is concerned with securing robust tissue regeneration leveraging the innate ability for self-repair of a dysfunctional organ.[12] To this end, the regenerative armamentarium encompasses a range of ever-growing technological platforms that include, but are not limited to, biotherapies exemplified by stem cells and their derivatives, tissue engineering methods, and reparative signaling approaches or alternatively used device-based means to fortify failing function en route to ensuring a more definitive outcome.[12-16] The rapid advances of regenerative medicine are reflected in the ongoing transition from the initial recognition of enormous promise to demonstration of tangible and scalable results in both diagnosing and treating the root cause of disease, with the rollout of individualized regenerative products and services adding value to existing models of care.[17-19]

Accordingly, the inauguration of the *Mayo Clinic Proceedings* Symposium on Regenerative Medicine mirrors the massive evolution of the field. The Symposium is structured to first introduce the readers to the breadth and depth of the subject through an overarching regenerative medicine primer offered as a point of reference.[20] Then, sequentially through a series of specialized articles, a more in-depth review of the science and clinical applications of regenerative medicine

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is presented. The successive articles will address key topics including the innate regenerative capacity of an adult organ, the biotechnology underlying regenerative approaches, the practices of whole-organ reconstruction, and the clinical experiences in regenerative thoracic surgery, cardiovascular medicine, wound healing, hepatology, orthopedics, and neuroregeneration.

The series will further explore the social and societal dimension of regenerative medicine and the current opportunities for point-of-care regenerative medicine options. The role of the National Institutes of Health as a federal body promoting regenerative medicine from discovery to health is the subject of a final contribution. Collectively, all articles presented in the *Mayo Clinic Proceedings* Symposium on Regenerative Medicine will be compiled into a singular book that should provide a valuable resource for a broad audience interested in the principles and practices of regenerative medicine. This newest endeavor expands on the long tradition and leadership of *Mayo Clinic Proceedings* in showcasing the advances in regenerative medicine and surgery across specialties.[21-25]

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