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Preface

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Guest Editors

The discovery of neural stem cells holds tremendous implications for neuroscience and neurosurgery. Although our current practices are rooted in the belief that in the adult brain, as Ramon y Cajal[1] once observed, "Everything may die, nothing may be regenerated," we now know this not to be the case. This emerging paradigm shift in neurosurgery is the focus of our current issue.

Despite their remarkable potential, neural stem cells are an extraordinarily rare phenomenon. Although their capacity for self-renewal and multipotentiality could transform modern neurosurgical therapies from ablative to restorative, there is still much to be learned before the neurosurgeon will be in a position to harness stem cells for clinical benefit. The fundamental mechanisms of neural stem cell proliferation, migration, and differentiation have yet to be elucidated. Furthermore, the stem cell's role in disease states such as brain cancer, stroke, demyelination, neurodegeneration, radiotoxicity, and traumatic injury are just now being uncovered. Translating such insight into effective clinical therapeutics represents a final challenge in our quest for neurorestoration.

Nevertheless, we are now entering a period of unprecedented scientific discovery in neurosurgery. Pioneers in neural stem cell biology, including those contributing to this issue, are revealing the avenues through which neural stem cells can contribute to both the origin and treatment of neurologic disease. For the modern neurosurgeon, a thorough understanding of the science behind neural stem cells will be indispensable in navigating the upcoming revolution. With this in mind, we have assembled the current selection of articles to provide a cross-sectional perspective of neural stem cells and the neurosurgeon.

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[1] Professor Cajal began to publish scientific works in the 1880s; some which are of direct relevance to neurosurgery are: *Manual de Anatomía patológica general* (Manual of General Pathological Anatomy), 1890 (3rd ed., 1900); *Les nouvelles idées sur la fine anatomie des centres nerveux* (New Ideas on the Fine Anatomy of the Nerve Centers), 1894; *Textura del sistema nervioso del hombre y de los vertebrados* (Textbook on the Nervous System of Man and the Vertebrates), 1897–1899. Cajal published more than 100 articles in French and Spanish scientific periodicals, especially on the fine structure of the nervous system and especially of the brain and spinal cord. (Excerpted from *Nobel Lectures, Physiology or Medicine 1901-1921*, Elsevier Publishing Company, Amsterdam, 1967; http://nobelprize.org/nobel_prizes/medicine/laureates/1906/cajal-bio.html)