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Biology of spermatogenesis – The challenges ahead

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The first issue of this Special Issue on the “Biology of Spermatogenesis” contains eight articles, and this issue contains nine articles. As a whole, these articles cover topics that include (i) the regulation of spermatogenesis at hormonal, cellular, molecular and transcriptional levels, (ii) the biology, regulation, and immunology of Sertoli cells and germ cells, including the role of Sertoli cells in conferring the testis its immune-privileged status, (iii) spermatogonial stem cell/spermatogonial regulation, (iii) the biology of small regulatory RNAs in spermatogenesis, (iv) role cytoskeletons in spermatogenesis, and (v) emerging regulators of spermatogenesis such as intercellular adhesion molecule 1, CFTR (cystic fibrosis transmembrane conductance regulator), CD147 (cluster of differentiation 147), and CT (cancer/testis) antigens. I have also included a chapter that discusses the latest findings in the biology of spermatogenesis in *C. elegans*, which together with *Drosophila*, are the two species that provide much new information on spermatogenesis. Since the final fate of sperm, the product of spermatogenesis, is to fertilize the egg, the last chapter examines the role of the zona pellucida receptor on spermatozoa based on some recent findings in the field. In short, the articles in both issues cover the latest research in spermatogenesis.

The goal of assembling this Special Issue is to provide a general updated view of research in spermatogenesis, making it easier for young investigators to identify an area of research for a productive career. In my opinion, the challenge that many investigators face today is not so much in selecting a research field to pursue as it is to maintain a productive research laboratory and to secure continuous support from the National Institutes of Health (NIH) or other funding sources. At this writing, the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) is the institute at the NIH that supports the bulk of basic research on spermatogenesis, since many foundations such as the Rockefeller Foundation and Ford Foundation no longer finance reproductive research. Furthermore, the Lalor Foundation is the only source of support for postdoctoral fellows. At present, the 2013 NICHD pay-line for new and competitive renewal R01 grants is only 9% *versus* 13% for New and Early Stage Investigators. The payline is also set at 9% for smaller funding mechanisms such as R03s and R21s. This essentially means that only 0.9, not even one, out of 10 established investigators can secure support from NIH to pursue the reproductive sciences, including spermatogenesis. As difficult as it seems, I, along with some of my colleagues, remain optimistic and hopeful since recent developments in technology have opened up many new fronts and possibilities for investigators, many of which were unavailable just a few years ago. On the other hand, policy makers are realizing the needs of increasing basic research funding. For instance, the NIH budget in 2014 is set at \$30.15 billion, which is ~\$1 billion more than its 2013 budget. While this increase is modest, it is still a positive trend, and we wish the NIH budget further improves in future years.

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