Introduction to the 12th International Workshop on Developmental Nephrology

Jordan Kreidberg

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The 12th International Workshop on Developmental Nephrology was held at the University of Edinburgh on June 24–26, 2013. The meeting was organized by Jordan Kreidberg (Boston Children's Hospital and Harvard Medical School) serving as Chair and Carlton Bates (Pittsburgh Children's Hospital and University of Pittsburgh) serving as Co-Chair, with the involvement of an Organizing Committee representing researchers in this field from around the world. Jamie Davies (University of Edinburgh) served as the local Chair. Support for this meeting was obtained through grants provided by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) and the March of Dimes Birth Defects Foundation, as well as from the sponsoring organization, the International Pediatric Nephrology Association, for which we were extraordinarily grateful.

The theme of the 12th Workshop was “From Basic Science to Therapeutics.” The choice of this title reflected the current status of the field, whereby extraordinary advances have been made over the past two decades in the understanding of the molecular mechanisms involved in the development of the kidney and genitourinary tract, such that we are now arriving at the point where some of these advances may begin to be translated into novel therapeutic modalities.

The meeting began with summaries of the GUPMAP and ENCODE projects. GUDMAP is a web-based data repository of gene expression information for the kidney and genitourinary tract that has been available to the community over the past 10 years. ENCODE is a very large project cataloging gene expression, transcription factor binding, and epigenetic modifications at a genome scale in multiple cell lineages; it serves as a major resource for the biomedical community.

The articles in this issue of *Pediatric Nephrology* represent most of the talks at this meeting. The Workshop included over 50 invited presentations and was divided into six major sessions entitled: “Progenitors, Stem Cells: Basic Biology,” “Progenitors, Stem cells: Therapeutic Implications,” “Branching Morphogenesis,” “Nephron Differentiation, Hypoplastic Development and the Determination of Nephron Number,” “Developmental Physiology, Congenital Urological Malformations,” and “Genetic Diseases in Pediatric Nephrology”. Each session included presentations by leaders in these areas and by young investigators selected from among the poster abstract submissions. Two poster sessions were held during which 60 posters were presented.

Many of the current leaders in this field were just starting out on their research careers when the first mouse knockouts affecting the urogenital system were beginning to be published. Indeed, these knockouts, such as *Wt1*, *Pax2*, *GDNF*, *c-Ret*, *Bmp7*, *Wnt4*, fibroblast growth factor receptors (FGFRs), among others, were among the very first knockouts published in the mid-1990s. In parallel with these studies were the first analyses of transcription factors involved in kidney development at the molecular level. Together, these studies marked a turning point in the field—when we began to understand at both the genetic and molecular levels the mechanisms important in basic developmental processes. At the 12th Workshop we heard how studies in these areas have continued to provide an even more comprehensive picture of the forces in play during urogenital development. When the modern study of kidney and urogenital development began in the mid-1950s, with the studies of investigators such as Clifford Grobstein and Lauri Saxen, the aim was twofold: to understand both basic developmental processes and how congenital abnormalities of the kidneys and urogenital tract may arise in humans. We now have a molecular basis for this understanding, particularly with regard to how nephrons differentiate and

J. Kreidberg (✉)
Department of Pediatrics, Harvard Medical School, Boston,
MA 02115, USA
e-mail: Jordan.kreidberg@childrens.harvard.edu

how nephron number is determined. Moreover, as we heard from several presentations, intensive efforts by many laboratories have resulted not only in the identification of human genetic mutations in many of the genes we have been studying for the past 20 years, but also in the identification of many novel genes involved in development.

One of the great new frontiers in biomedical research is regenerative medicine. Early efforts in this area were presented at the workshop, as we heard about efforts in reprogramming to obtain kidney progenitor cells and about the factors involved in maintaining and regulating self-renewal and differentiation of progenitor populations.

Finally, wonderful keynote addresses by Professors Nicholas Hastie and Adrian Bird, both of the University of Edinburgh, provided great insights and inspiration to all attendees by providing cutting edge views of how differentiation may be

regulated in the kidney and in the nervous system. As with every good meeting, there was ample time for interchange and enjoyment, with a Ceilidh band instructing us on traditional Scottish folk dancing and local students introducing us to the famous (and infamous) pubs of Edinburgh.

The field of urogenital development has come a long way from the earliest studies of Caspar Friedrich Wolff and Marcello Malpighi in the 1700s and the general guidance of how to think about development from Karl Ernst von Baer in the early 1800s. We finished the Workshop hearing a historical overview of the more recent past and the past 11 workshops from Russell Chesney (University of Tennessee). We are grateful to the International Pediatric Nephrology Association (IPNA) for their continued support of this Workshop and we look forward to the 13th Workshop in 2015.