

BSCB Newsletter, Spring 2009

The Kidney: Development, Repair and Regeneration 17-19 September 2008. Liverpool, UK

This conference, organized by the European KIDSTEM network, brought together scientists and clinicians in the field of kidney development, stem cell biology, nephrology and tissue engineering to present their latest findings and discuss the feasibility of developing stem cell therapies for the treatment of kidney disease.

The first plenary talk, which opened the Stem Cells and Renal Regeneration session, was given by Melissa Little (University of Queensland, Australia), who asked a very important question: do we need stem cells to regenerate kidney? She highlighted the need for alternative approaches to treating kidney disease and outlined the feasibility of potential regenerative therapies. She also provided information about the latest findings of her group, showing that macrophages play a role in ureteric bud branching and nephrogenesis.

The next speaker, Gregory Dressler (University of Michigan, USA), explained the influence of the canonical WNT-signalling pathway on kidney development, focusing on how this pathway interacts with two very important kidney development genes: Pax2 and Six2. Takashi Yokoo (Jikei School of Medicine, Japan) presented a very interesting and novel method for culturing organs as complex as kidney, de novo from human mesenchymal stem cells (hMSC). This method could make it feasible, in the future, to produce humanized organs and might transfer our thinking from RE-generative medicine to NEO-generative medicine. Qais Al-Awqati (Columbia University School of Physicians and Surgeons, USA) spoke about the typical characteristic of the stem cells niche and showed that within kidney, the papilla is such place, and contains a high number of BrdU positive (slow cycling) cells.

An outstanding plenary talk by Jamie Davis (University of Edinburgh, UK) opened second day of the conference, which was dedicated to Kidney Development. He pointed out that looking for appropriate stem cells sources to treat kidney disease is an important process, but once we have them, other obstacles may appear. Important issues that would need consideration include the requirement for properly organized nephrons that would be correctly orientated in the organ. Although we know quite a lot about kidney development and stem cells themselves, developing stem cell based therapies to treat kidney disease is still challenging area for scientists. Seppo Vainio (University of Oulu, Finland) presented data showing how growth factors and their antagonists, control kidney development, and using knock-ins and knock-outs of the key developmental genes, Wnt4, FGF8 or Pax8 elegantly illustrated the role played by these genes in the kidney organogenesis. His presentation was followed by two interesting talks focusing on role of Wt1 in kidney development. Colin Miles (Institute of Human genetics, Newcastle, UK) showed novel data showing the role of Wt1 in Denys-Drash syndrome, and Peter Hohenstein (MRC Human Genetics Unit, Edinburgh, UK) showed that the Wt1 dependent mesenchymal-to-epithelial

transition, which is required to initiate nephrogenesis, is mediated by Wnt4.

The afternoon session began with Benedetta Busolatti (University of Torino, Italy) who talked about resident stem cells in the adult kidney. She highlighted difference between renal stem cells derived from normal adult kidney with those from polycystic kidneys (PKD), and showed that stem cells from the latter had an increased resistance to apoptosis and had reduced differentiation potential. Giuseppe Remuzzi (Mario Negri Institute for Pharmacological Research, Bergamo, Italy) delivered an outstanding plenary talk and gave an overview of the progress that had been made in the treatment of kidney disease, highlighting the breakthroughs that had been made using pharmacological agents. Richard Poulson (London Research Institute, UK) then focused our attention on the cell fusion problem. Fusion is quite common in nature and it is now well recognized that following transplantation, some stem cells fuse with those of host, generating aneuploid cells that could form tumours. Francesco Frasson (University of Genoa, Italy), presented interesting data showing how mesenchymal stem cells have an immunosuppressive effect and can help prevent graft versus host disease following kidney transplantation.

On the last day of the conference, the focus turned to the field of Biomaterials and Tissue Engineering. The plenary talk was given by James Yoo (Wake Forest University, North Carolina, USA) who presented fascinating data showing how biomaterial scaffolds can support the development of nephrons from a dissociated population of stem cell. His talk was complemented by Matthias Lutolf (Institute of Bioengineering, Lausanne, Switzerland) who presented interesting data showing how bioengineering strategies can be used to construct artificial stem cell niche that can help to understand adult stem cell regulation. Shimon Uterman (John Hopkins University, Baltimore, USA), then showed the importance of understanding the mechanisms regulating tissue development on scaffolds, and presented novel data showing how stem cells can be used to promote musculoskeletal repair. Rachel Williams (University of Liverpool, UK) explained how biomaterial scaffolds need to have specific physiochemical and functional properties in order to be suitable for transplantation, and then went on to show some exciting results how novel biomaterials could support the propagation of retinal pigment epithelial cells that could potentially be used for the treatment of age-related macular degeneration.

The conference was a great success, bringing together scientists interested in stem cells of all kinds in the context of kidney development and regeneration, supported by new biotechnology. I would like to thank to British Society for Cell Biology for their support and take this opportunity to recommend the forthcoming 2nd KIDSTEM Conference which will take place on 29-31 July 2009 in Edinburgh (for further information, go to: www.kidstem.org).

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