Preface

Translational research in kidney disease

I was honored to be invited as editor of a kidney disease special edition in the journal *Translational Andrology and Urology*. I find it difficult to separate kidney disease from urology. It seems to me that urology, as a branch of medicine that specializes in diseases of the male and female urinary tract system and the male reproductive system, and nephrology, specializing in the study of kidney disease and preservation of kidney health, should have closer links. I hope this special edition strengthens links with urology (in this special edition, with kidney cancer) and reminds readers of the importance of basic translational research in nephrology, urology, and outcomes of surgical intervention. I would like to thank all the authors for their ready agreement to contribute and make the present issue a success. Especially, I thank the editorial staff of *Translational Andrology and Urology* for their help for this special issue.

Worldwide, the kidney is the ninth and fourteenth most common primary site of cancers in men and women respectively. Renal cell carcinoma (RCC) is the most common solid neoplasm of the adult kidney and has a high potential for developing metastatic spread. Surgical management with either radical or partial nephrectomy is the mainstay of treatment, however there is now a dilemma regarding how to identify and manage small renal masses, potentially RCC, that are found, increasingly and incidentally, because of increased use of abdominal imaging. There is a need for increased confidence in characterization of renal masses prior to surgical intervention. The first papers in this edition consider distinct differences in molecular signatures that may exist between kidney cancer subtypes. Chromophobe RCC and benign renal oncocytoma have overlapping histological and morphological features, but a big difference in the danger of leaving the cancer *in situ*, for monitoring. In the study by Ng *et al.*, a panel of immunohistochemical biomarkers (CK7, Cav-1 and S100A1) were investigated to aid in this difficult differentiation.

Given the growing links between development of kidney cancers and obesity, in the review article by Perumal *et al.* on obesity-associated biomarkers for diagnosis and prognosis of RCC, they present information on the adipokine adiponectin as a predictive marker for determining risk of developing RCC, and tissue leptin/leptin receptor as a distinguishing biomarker for RCC subtypes. In the original research article by Morgantetti *et al.*, prostate specific membrane antigen (PSMA), a glycoprotein that is extensively used in prostate cancer diagnostics, is demonstrated as a useful vascular marker of neoangiogenesis in RCC, particularly clear cell RCC (ccRCC). Their data also suggest a possible role for PSMA in neoangiogenesis in ccRCC and therefore its usefulness as a biomarker of neoangiogenesis for future diagnostic and therapeutic advancements.

Advanced kidney cancer is deadly and difficult-to-treat. Personalised treatment regimens will improve treatment effectiveness. To this end, pre-clinical models of kidney cancer therapies using patient-derived cancer material is presented by Patel *et al.* They discuss the advantages and disadvantages of various mouse xenograft methods for screening novel and effective RCC treatments.

Chronic kidney disease (CKD) is a clinical syndrome with many adverse sequelae and is currently a major global health and economic burden. The worlds of CKD and kidney cancer collide when renal mass is drastically reduced during surgical management of the cancer with either radical or partial nephrectomy. Surgical resection of functional kidney parenchyma is associated with reductions in glomerular filtration rate (GFR), and can lead to the development of CKD; however, there is currently debate as to whether CKD secondary to surgical removal of a kidney is of clinical significance. Ellis *et al.* argue that CKD is of clinical significance regardless of aetiology, due to higher cardiovascular disease risk and increased mortality risk which is associated with low GFR. It is certainly worthwhile bringing this important correlate of CKD development or progression with renal mass reduction from surgery to the forefront. Robust prognostic and early diagnostic biomarkers of CKD are lacking. One immune cell population that has received little attention in the pathogenesis of CKD is the mast cell (MC) population. Owens *et al.* examines the role of MCs as facilitators of kidney inflammation and fibrosis, and proposes a mechanistic framework for MCs in CKD. Novel means of investigating causes of CKD are also needed. The high sensitivity and spatial resolution of the synchrotron X-ray fluorescence microprobe may give a robust means to investigate spatial distribution of heavy metals in correlation with specific kidney pathologies. The article by Gobe *et al.* reviews some of the literature and provides pilot data from an investigation of localization of kidney fibrosis with selected heavy metals known for their kidney toxicity, including cadmium.

With the increasing incidence of CKD comes progress through to end stage kidney disease and the need for kidney replacement therapies, including renal transplant. Morgantetti *et al.* present a literature review of cytomegalovirus (CMV) infection as an important cause of renal transplantation complications. As an important differential diagnosis and etiological agent to acute and chronic transplant rejection, the possibility of direct infection of CMV in the kidney needs prompt recognition for effective treatment. Renal transplantation is also increasing rapidly in the elderly, however long-term patient outcomes are relatively poorly reported compared with younger adults. Cossart *et al.* review the pharmacokinetics, pharmacodynamics, and patient outcome of the commonly prescribed immunosuppressant medicines, tacrolimus, cyclosporine, mycophenolate and prednisolone, in elderly renal transplant recipients. An optimal balance between immunosuppressant medicine efficacy and toxicity is needed now for elderly transplant recipients, and further studies are needed to foster long-term graft and patient survival. Different biochemical markers exist in both blood and urine for assessing renal function, but clinical utility of some of the newer biomarkers is limited. The article by Treacy *et al.* attempts to compare and contrast utilization of established and emerging kidney disease biomarkers.

Finally, worldwide, there is recognition that biobanks of patient specimens and clinical data are needed. Del Vecchio *et al.* describe development of the Princess Alexandra Hospital Kidney Cancer Biobank, housed at the Translational Research Institute in Brisbane. This Australian biorepository now contains fixed and fresh-frozen cancer and non-cancer kidney tissue, perinephric fat, urine and peripheral blood, along with matching de-identified clinical data. No real translational research will be possible without these sorts of resources. Via biobanks, the active provision of tissue for research will improve health outcomes.

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