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Editorial

Bioengineering Kidneys What Is the Outlook?

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End-Stage Renal Disease (ESRD) is common. Transplantation is the only curative treatment [1]. However, waiting times have increased. To create a bioengineered kidney a scaffold is needed with cell attachment. Native and cadaveric kidneys could be used. Decellularization of kidneys is performed by using detergent perfusion. Vascular, glomerular, and tubular components will stay intact. Decellularization leads to loss of Cell-Mediated functions. Scaffolds are repopulated with endothelial and epithelial cells. These cells come from human umbilical venous endothelial cells and rat neonatal kidney cells through the ureter. Studies showed that the renal papilla is a niche for adult kidney stem cells and is involved in organ maintenance and repair after injury [2]. Allogeneic transplantation is effected by donor shortage; surgical morbidity and the need for immunosuppression [3].

Sheep kidneys comprise a suitable source [4]. These can be seeded with human cells, and then used. Rhesus monkey kidney could also be used [5]. Since the kidney is derived from the ureteric bud and the metanephrogenic mesenchyme [6], single metanephric mesenchymal cell can generate all the epithelial cells of the nephron (except the collecting duct), Renal stem cells are not suitable for whole kidney regeneration. Quite the opposite, mesenchymal stem cells are accessible, e.g from adipose tissue and they do not need technical handling [7]. Internationally the donor organs meet about one-fifth of the need. Regenerative medicine is a potential option [8]. We are looking forward to the availability in the near future of kidneys and other organs as they become on demand. We are expecting shorter waiting lists and unnecessary immunosuppression.

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