

Method for Engineering Functional 3-Dimensional Kidney Tissue

Tech ID: 22717 / UC Case 2007-300-0

BACKGROUND

End stage renal disease (ESRD) affects approximately 400,000 individuals in the United States alone, and this number continues to increase rapidly. While dialysis provides life-saving treatment to patients with ESRD and/or can bridge the time between kidney failure and the receipt of a transplant, only 78% of patients are reported to survive the first year of dialysis and the 10-year survival rate is only 9%. With over 60,000 people waiting for kidney transplants, the improvement in short-term allograft survival has shifted attention to the two major remaining challenges in kidney transplantation: the shortage of organs and the lack of improvement in the rate of allograft failure after the first post-transplant year. To address the shortage of donor organs, a variety of tissue-engineering strategies are being pursued, including the extracorporeal renal tubule assist device, the transplantation of renal primordia, the injection of stem-like cells into diseased kidneys and the *in vitro* engineering of kidneys. The engineering of a kidney-like tissue from cells with appropriate 3D spatial relationships of nephrons has yet to be achieved.

TECHNOLOGY DESCRIPTION

Scientists at the University of California have developed a novel *in vitro* method that utilizes elements of kidney primordia, the Wolffian duct (WD) and metanephric mesenchyme (MM), to engineer *in vitro* kidney-like tissue containing functional tubular transporters and glomeruli with apparent early vascularization. This method provides a potential strategy for engineering a 3D vascularized kidney-like tissue from cells *in vitro*, if a tubular structure can be formed from adult, amniotic, embryonic stem cells or other cell types. Moreover, this *in vitro* stepwise approach provides the potential for introduction of immunomodulatory or other genes.

PUBLICATION

Nigam, S. K., *Staged in vitro reconstitution and implantation of engineered rat kidney tissue*, PNAS 2007 104: 20938-20943

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,460,929	06/04/2013	2007-300

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Methods of Tissue Repair, Regeneration, and Tissue Engineered Compositions](#)
- ▶ [A Method for Rapid Generation of Many Different Branched Epithelial Proto-Organs](#)

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OTHER INFORMATION

KEYWORDS

renal disease, dialysis, kidney, Wolffian duct, metanephric mesenchyme

CATEGORIZED AS

- ▶ **Medical**
 - ▶ Disease: Kidneys and Genito-Urinary System

RELATED CASES

2007-300-0