Generation of functional prostate tissue and organoids for drug screening and development

Technology #cu12242

This technology is an in vivo platform for reprogramming fibroblasts into mature, functional prostate organoids that may be used for drug screening and clinical research.

Unmet Need: Method to reprogram cells for in vivo generation of functional prostate tissue

Current efforts to diagnose and treat prostate cancer are hindered by inaccurate prognostic markers and poor understanding of tumorigenesis. Stem cell technologies provide the ideal platform for oncology research by simulating whole-organism biology while preserving the ease and throughput of cell culture. Despite these advances, there are no robust methods for the generation of prostate organoids from stem cells that sufficiently recapitulate the complexity of normal prostate tissue.

The Technology: Generation of prostate organoids from fibroblasts enables improved clinical research and personalized therapy

This technology describes a method for reprogramming fibroblasts directly into prostate epithelial cells by retroviral expression of specific reprogramming factors. Importantly, this method does not require an intermediate pluripotent state. After forced expression of prostate master regulatory genes, the fibroblasts are reprogrammed into prostate tissue and then co-engrafted with rat urogenital mesenchyme (UGM) into immunodeficient mice. Compared with existing approaches for prostate cell differentiation, fibroblasts are readily available and enable production of patient-specific prostate tissue and organoids for personalized medicine. As such, this technology provides a facile method for the generation of prostate tissue for improved drug development and screening.

This technology has been validated by generating prostate organoids from a single luminal stem cell.
Applications:

• Research tool for studying prostate cancer
• Patient-specific drug screening for personalized medicine
• Rapid diagnosis of malignant disease in human specimens
• Platform for pharmaceutical development
• Generation of other epithelial cell tissues such as bladder, mammary gland, and lung

Advantages:

• Allows long-term maintenance and culture of human prostate tissue, both cancerous and healthy
• Reprogrammed cells display the signatures of real prostate tissue
• Enables use of patient-specific cells to study normal prostate development and cancer initiation
• Utilizes fibroblasts as a precursor cell, which is a well-understood cell type that is easily accessible from patients and animal models
• Does not require a pluripotent intermediate stage

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Patent Information:

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Related Publications:


Tech Ventures Reference:

• IR CU12242, IR CU13124

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