Stem Cell Urinary Tract Reconstruction Therapy

Tech ID: 20293 / UC Case 2004-084-0

SUMMARY

Researchers from the UCLA Department of Urology have successfully harvested stem cells from adipose tissue and differentiate them into functioning smooth muscle cells. These adipose derived stem cells can then be used for reconstruction or tissue engineering of smooth muscle containing organs, especially the urethra to treat urinary and stress incontinence.

BACKGROUND

Urinary incontinence (UI) and stress urinary incontinence (SUI) are medical and social conditions that greatly erode ones quality of life. These conditions are embarrassing and cause significant hospitalization. There is a great prevalence of UI in women of all ages (13 million), and approximately 50% of all incontinent women are classified as having SUI. SUI is caused by the loss of anatomic support and/or atrophy and dysfunction of the sphincteric mechanism of the urethra. This loss of support and/or atrophy then results in involuntary urine loss during any activity that causes abdominal straining (i.e. laughing, coughing, and sneezing). One of the current treatments for SUI involves injecting bulking materials into the urethral tissues. However, multiple injections are required, cure rates are low, and there are significant problems with material loss and migration. Treatments of bladder conditions and bladder substitution involve attempts at urinary tract reconstruction, using mature smooth muscle cells obtained from the host. The procurement process is morbid, and only small amounts of cells are obtained. Thus, there is a need for a better curative treatment that can improve the quality of life of these patients.

INNOVATION

UCLA researchers have successfully induced the differentiation of adipose derived stem cells into contractile smooth muscle cells. Researchers have also developed ways to deliver these cells into the smooth muscle layer of the urinary tract (bladder and urethra). These adipose derived stem cells can be used for the reconstruction of the urethra in the treatment of urinary stress incontinence and for reconstruction of the bladder in conditions such as neurogenic bladder, bladder augmentation, and bladder extrophy.

APPLICATIONS

- Harvest stem cells from adipose tissue and differentiate them into functioning smooth muscle cells
- Utilize adipose derived stem cells for reconstruction or tissue engineering of smooth muscle containing organs
- Use developed delivery methods to deliver adipose derived stem cells into smooth muscle layer of the urinary tract

ADVANTAGES

- Human adipose tissue is abundant, can be maintained in vitro for extended periods, can be easily obtained with minimal discomfort to the patient, and can be maintained in vitro for extended periods
- No ethical or political considerations

STATE OF DEVELOPMENT

Stem cells have been harvested from human and animal adipose tissues and successfully induced to differentiate into smooth muscle cells.

RELATED MATERIALS

CONTACT

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OTHER INFORMATION

KEYWORDS

tissue engineering, adipose derived stem cells, reconstruction, urethra, urinary incontinence, stress urinary incontinence, smooth muscle cells

CATEGORIZED AS

- **Medical**
  - Disease: Kidneys and Genito-Urinary System
  - Stem Cell

RELATED CASES

2004-084-0

- Processed lipoaspirate cells for tissue engineering of the lower urinary tract: implications for the treatment of stress urinary incontinence and bladder reconstruction. *J Urol.* (2005)
- Urinary bladder smooth muscle engineered from adipose stem cells and a three dimensional synthetic composite. *Biomaterials.* (2009)

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	7,531,355	05/12/2009	2004-084

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