

Carlos Roberto Estrada, Jr., MD**Young Clinician Award 2008****Investigator Profile**

Education

- AB, College of the Holy Cross
- MD, Wright State University, Boonshoft School of Medicine

Clinical /Professional Appointment

- Instructor in Surgery (Urology), Harvard University
- Assistant in Urology, Children's Hospital Boston



Recent Honors and Awards

- Support for Pilot Studies Research Grant, Children's Hospital Boston
- Career Faculty Development Award, Children's Hospital Boston
- National Institutes of Health Loan Repayment Award Grant Renewal, NIH
- First Place Clinical Research Prize, American Academy of Pediatrics Section on Urology
- American Urological Association - New England Section Research Award Grant, American Urological Association
- Society for Pediatric Urology Research Award Grant, Society for Pediatric Urology

Impact on Care

- 400 million people worldwide suffer from bladder dysfunction.
- In several different urologic conditions, the urinary tract is anatomically or functionally obstructed, resulting in bladder decompensation and consequently, urinary incontinence and renal damage.
- Treatment requires major surgical intervention with bladder augmentation to lower intravesical pressure, improve compliance, achieve urinary continence, and protect renal function.
- Invasive bladder carcinoma requires radical cystectomy with urinary diversion.
- Bladder augmentation and urinary diversion rely on incorporating bowel segments into the urinary tract. These current techniques are plagued by complications and the need for a better solution is critical.

Abstract

Due to the lack of optimal clinical therapies for the treatment of bladder dysfunction, the overall goal of this study will be to develop and evaluate novel approaches for functional tissue engineering (FTE).

FTE combines the principles of cell biology, materials science, and engineering to construct biological substitutes that will restore and maintain normal function in target tissues. Biomaterial scaffolds provide a defined microenvironment that promotes functional tissue regeneration and/or repair. There is a multitude of biomaterials that are available; a bladder-optimized one has not been identified. Tissue scaffolds are populated with cells specific to the target tissue. In bladder tissue engineering, autologous cells derived from a bladder biopsies engrafted onto polyglycolic acid (PGA)/collagen hybrid scaffolds have already been described in a small clinical series. However, this biomaterial has not undergone rigorous testing for compatibility with bladder function, and these cells are derived from diseased bladders and may not be appropriate. In addition, in the case of bladder cancer, the use of autologous cells is contraindicated. While these pioneering efforts have provided fundamental methodology and proof of the translational potential of bladder tissue engineering, a patient-specific and non-diseased cell source and an optimal scaffold material for bladder regeneration have not been elucidated. We propose to utilize silk-based biomaterials in combination with induced pluripotent stem cells to address the critical need for functional bladder tissue replacement constructs.