

Scientists move closer to bio-engineered bladders

August 1 2007

Researchers at the University of York are using an understanding of the special cells that line the bladder to develop ways of restoring continence to patients with serious bladder conditions, including cancer.

The research, highlighted in the quarterly magazine of the Biotechnology and Biological Sciences Research Council (BBSRC) this week, is looking at urothelial cells. These are the specialised lining cells of the bladder that enable it to retain urine. The cells have a very low turnover rate, but scientists have found that if the bladder is damaged, the urothelial cells are able to rapidly re-grow to repair the wound. The researchers hope to harness this property to engineer new bladders.

The York researchers have developed a series of models that mean they can study human urothelial cells in the laboratory. Of these models, the most important is their development of a urothelial cell sheet that functions as it would in the bladder. When the researchers create a wound in this model, the cells regenerate to repair the damage - just as they would in the body.

Pharmaceutical companies should soon be able to use the research models to test therapies for the bladder, but the longer term aim for this research is to help patients who have lost bladder function or have had all or part of their bladder removed because of cancer.

Research leader, Professor Jenny Southgate, explains: "The models we have developed mean that we have been able to examine how urothelial

cells in the bladder self-renew to cope with injury.

"With this basic understanding of how the cells work, we are moving towards being able to engineer new bladders. Currently, substitute bladders can be created by using a section of the patient's bowel, but this can lead to complications, as the bowel does not have the same urine-holding properties as urothelial cells. One solution could be to use laboratory-grown urothelial cells to line a section of bowel."

The hope in the long term is that collaborative research to combine Professor Southgate's work with biomaterial studies at the Universities of Durham and Leeds could mean engineered bladder tissue ready for transplantation.

Professor Southgate, who is Director of the Jack Birch Unit for Molecular Carcinogenesis, in the Department of Biology at the University of York said: "Our most exciting work moving forward is to develop natural and synthetic biomaterials that could be combined with regenerating urothelial cells. This has the potential to produce viable bladder tissue for transplant into patients who need replacement bladders."

The York research highlights the importance of basic biology research in underpinning medical advances. Professor Nigel Brown, BBSRC Director of Science and Technology, commented: "Fundamental bioscience research forms the foundation for much of the medical advances we have today and hope for in the future. We need a solid understanding of how our bodies work and maintain themselves before we can understand what goes wrong when they become diseased and how the disease can be treated."

Source: Biotechnology and Biological Sciences Research Council

Citation: Scientists move closer to bio-engineered bladders (2007, August 1) retrieved 19 April 2024 from <https://medicalxpress.com/news/2007-08-scientists-closer-bio-engineered-bladders.html>

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