MOTILITY

Bioengineered internal anal sphincter constructs successfully implanted into mice

Researchers at the University of Michigan Medical School have successfully implanted bioengineered internal anal sphincter (IAS) constructs into mice.

The IAS is vital for maintaining rectoanal continence. Damage or dysfunction of the IAS can cause fecal incontinence, and the currently available treatment options in these cases produce limited results.

"The [ongoing] aim of this project is to bioengineer a three-dimensional IAS as a treatment for anal incontinence," explains Khalil N. Bitar, corresponding author of the study. "Generation of tissue-engineered replacement organs by extracting cells from patients, growing them outside the human body and re-introduction into the body represents an ideal source for corrective treatment."

Bitar and his colleagues have previously bioengineered functional IAS constructs from mice, rabbits and humans. In this study, the researchers wanted to test whether these bioengineered constructs could be successfully implanted.

Bioengineered IAS constructs were developed using smooth muscle cells from the IAS of mice. These IAS constructs were then implanted into mice of the same strain. The mice were killed 28 days after surgery and the implanted IAS constructs were harvested for investigation.

Courtesy of K. N. Bitar

Bitar and colleagues found that the bioengineered constructs had maintained the characteristics of sphincteric smooth muscle and had not reverted to nonsmooth muscle or to a different smooth muscle type. In addition, the implanted tissue remained physiologically functional and had neovascularized.

"The next step is to implant intrinsically innervated human IAS constructs in immunosuppressed mice, and then go to a larger animal model with *in situ* implantation," concludes Bitar. "Our ultimate goal will be to do autologous implantation (bioengineering constructs from patient's own cells) of bioengineered IAS tissue constructs into adults and children with anal incontinence."

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