Engineered Stem Cells Delivered Directly into Digestive Organs for Multiple Applications

(VA Reference No. 02-030)

Use of embryonic and adult stem cells for gene therapy, drug delivery and cell replacement in the adult digestive tract

Technology
Stem cell therapy for use in the gastrointestinal tract

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Key Features
- Enables permanent expression of genes
- Could deliver therapeutic nitric oxide
- Broad range of applications including gene therapy, drug delivery and cell replacement

Stage of Development
Reduced to practice with successful demonstration in both in vitro and animal models

Keywords
Therapeutic
- Stem cell therapy
- Gene therapy
- Drug delivery
- Cell replacement
- Gastrointestinal

Patent Status
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Technology
The Department of Veterans Affairs has developed a technology that uses embryonic and adult stem cells for gene therapy, drug delivery and cell replacement in the adult digestive tract.

Description
The stem cells can be implanted into the gut and can differentiate into specialized cells such as nerves, muscles and epithelia. Before implantation, these cells can be engineered to stably express a variety of gene products. Upon implantation, they remain at the site of injection and maintain the local tissue organization. In addition, the cells can also permanently express the transfected genes. The technology is targeted at diseases including inflammatory bowel disease, gastroparesis, infantile pyloric stenosis, Hirschsprung's disease and diabetes. Furthermore, the technology also can be used for gene therapy and cell replacement.

Competitive Advantage
The embryonic and non-embryonic stem cells can be delivered by endoscopic, transcutaneous, or intravascular seeding of the gastrointestinal/ hepatobiliary organs.

This invention:

- Enables permanent expression of genes manipulated in embryonic stem cells.
- Results in establishment of expressing embryonic stem cells within the fabric of the gut lining, avoiding the shedding of the lining that occurs every few days within the gastrointestinal tract.
- Could deliver a previously undeliverable therapeutic nitric oxide, a highly diffusible gas.

Status
The Department of Veterans Affairs is looking for a partner for further development and commercialization of this technology through a license, and the VA inventors are available to collaborate with interested companies through a Cooperative Research and Development Agreement (CRADA).