



## ADAPTIVE, MULTI-INJECTION PORT, DOUBLE BALLOON CATHETER FOR ORGAN-BASED LOCAL DELIVERY GENE THERAPY

[View U.S. Patent Application Publication No. US-2025-0360295 in PDF format.](#)

**WARF: P240051US01**

Inventors: John Booske, Paul Laeseke, Susan Hagness

Genetic mutation based metabolic diseases significantly reduce quality of life for hundreds of millions of people in the world and account for 70% of child hospitalizations and 10% of adult hospitalizations. There are hundreds of such diseases, including diabetes, cystic fibrosis, sickle cell anemia, hemophilia, and thalassemia. Many of them involve the liver due to its central role in metabolism.

Gene therapy is a promising treatment strategy for these diseases, potentially curing them by inserting functional genes (i.e., a functional portion of a DNA sequence) into a portion of cells within the target organ, for example, liver cells, thus correcting the inherited metabolic discrepancy. Only a small fraction of liver cells (hepatocytes) need to be converted, for example, about 5% in the liver, in order to produce therapeutic gene products sufficient to cure Type 1 diabetes. Gene therapy is also being actively investigated for curing diseases involving vascularized tissue mass bodies, e.g., cancer tumors.

### The Invention

UW-Madison researchers have developed a "localizable" liver gene therapy system that substantially reduces the escape of the gene vectors from the tissue mass or organ, e.g., the liver, such that the waste of vector through systemic dilution is minimized, which also limits undesired immune reactions. The device uses two inflatable balloon catheters that deliver a volume of vectors into a contained length of blood vessel to precisely deliver a high concentration of virus to the surrounding tissue. The high concentration of virus to a small, contained volume of tissue increases the uptake of vectors with reduced vector loss. While the contained length of vector delivery would seem to be counter to the intent of treating a large amount of tissue, parallel electrodes used in conjunction with vector delivery produce increased cell membrane permeability for viral vector transport in the tissue region between the electrodes offsetting this localization of vector delivery and improving uptake of the vector.

### Additional Information

#### For More Information About the Inventors

- [John Booske](#)
- [Susan Hagness](#)

#### Tech Fields

- [Medical Devices : Other medical devices](#)

For current licensing status, please contact Jeanine Burmania at [jeanine@warf.org](mailto:jeanine@warf.org) or 608-960-9846

We use cookies on this site to enhance your experience and improve our marketing efforts. By continuing to browse without changing your browser settings to block or delete cookies, you agree to the storing of cookies and related technologies on your device. [See our privacy policy.](#)

OK



**WARF**  
Wisconsin Alumni Research Foundation

| [info@warf.org](mailto:info@warf.org) | 608.960.9850