

A jetless intravenous catheter that reduces the risk of contrast agent leakage into surrounding soft tissue

Unmet Need

More than 62 million CT scans are performed each year in the United States in about 7,200 facilities, and approximately 40 million of these procedures require the intravenous administration of iodinated contrast material. This material is typically delivered via a power injector that is programmed prior to the CT acquisition. However, for 0.1% to 0.9% of cases, the use of a power injector results in leakage outside the vein into the surrounding soft tissue. This can cause a reduction in image quality which diminishes diagnostic capability or a delay in patient throughput in a busy radiology practice. Additionally, leakage caused by a power injector can also cause adverse patient effects, such as skin ulcerations and compartment syndrome, which require additional medical attention. The technologist or nurse can administer the contrast material by hand with one or more syringes to reduce the risk of contrast media leakage, but this results in a suboptimal CT scan from a diagnostic standpoint. There is a need for technologies that enable the delivery of iodinated contrast material effectively without the risk of leakage into the soft tissue surrounding the vein.

Technology

Duke inventors have developed a new intravenous catheter that reduces the risk of fluid deposited outside the vein into surrounding tissue during injection. This is intended to be used by technologists or nurses who administer fluids such as contrast agents to patients. This invention can deliver fluid into a peripheral vein without producing a jet from the catheter tip. This is achieved by introducing side holes or slits into the catheter. A prototype of the technology has been developed and compared to a standard peripheral end-hole angiocatheter. The maximum wall shear stress from the tip of the catheter was demonstrated to be lower for this technology.

Other Applications

This technology can be used to facilitate delivery of a variety

Duke

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Duke File (IDF) #

T-003106



Inventor(s)

- Nelson, Rendon
- Coursey, Courtney
- Howle, Laurens "Laurens"
- Nichols, Eli
- Schindera, Sebastian
- Weber, Paul



Links

- [From the lab of Dr. Rendon Nelson](#)
- [From the lab of Dr. Laurens Howle](#)



College

School of Medicine (SOM)

**For more information
please contact**

Koi, Bethany
919-681-7552
bethany.koi@duke.edu

of fluids including crystalloids (normal saline, 5% dextrose in water, lactated ringers) or blood products (whole blood, packed red blood cells, platelets) with reduced potential for extravasation. Higher flow rates are advantageous in patients who have severe fluid depletion such as those in hemorrhagic shock following trauma.

Advantages

- Reduces risk of leakage to soft tissue surrounding the vein during injection of contrast media and other fluids by reducing the velocity of contrast material leaving the angiocatheters by 9-30%
- Allows for safer delivery of a higher volume of fluid in a shorter period of time
- Can allow rapid and safe infusion of even the most viscous iodinated contrast agents in CT
- Obviates the need for larger caliber angiocatheters

Publications

- [Modifying Peripheral IV Catheters With Side Holes and Side Slits Results in Favorable Changes in Fluid Dynamic Properties During the Injection of Iodinated Contrast Material \(Vascular and Interventional Radiology, 2009\)](#)
- [Issued patent 9,884,166](#)

Patents

Patent Number: 9,884,166

Title: JETLESS INTRAVENOUS CATHETERS AND MECHANICAL ASSIST DEVICES FOR HAND-INJECTION OF CONTRAST MEDIA DURING DYNAMIC COMPUTER TOMOGRAPHY AND METHODS OF USING SAME

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