University of Pittsburgh

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Featured Inventors: Philip Carullo, MD and Youngjae Chun, PhD

Esophocclude: Providing Temporary Esophageal Occlusion for Emergency Surgery

During emergency surgery patients have not properly fasted so they run the risk of aspirating harmful stomach contents into the lungs, causing inflammation, pneumonia or even death. To prevent aspiration, researchers at the University of Pittsburgh developed Esophocclude, which is a self-expanding stent that temporarily blocks the esophagus until tracheal intubation – placement of a breathing tube – can occur. Unlike current solutions, such as the nasogastric tube insertion or gastric emptying drugs and devices, Esophocclude does not cause nausea or vomiting.

Technology Description

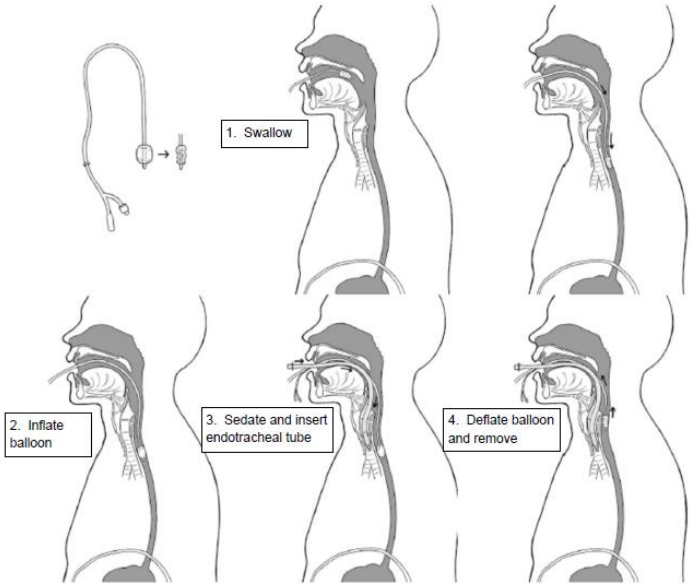
Esophocclude is an encapsulated self-expanding stent that resembles a pill attached to a flexible guidewire. It is intended to be swallowed by patients prior to sedation, at which point the stent would expand and prevent inadvertent flow of gastric juices into the lungs until tracheal intubation can occur. Esophocclude has been tested *in vitro* with a custom-built apparatus that mimics the musculature of the esophagus and measures leakage under extreme compression and expansion.

Advantages

- Quickly and easily swallowed
- Does not induce nausea or vomiting
- Unlike pharmacological solutions that simply neutralize gastric juices, Esophocclude fully blocks aspiration

Applications

- Emergency surgery (e.g., trauma, appendicitis, sudden worsening of heart or lung disease, or unplanned cesarean section)



Esophocclude provides temporary occlusion of the esophagus prior to sedation for emergency surgery. Blocking the esophagus prevents aspiration of harmful stomach contents into the lungs until a breathing tube can be inserted.

Stage of Development

The Esophocclude is a working prototype that has been tested *in vitro*. Current focus is on development of an optimized prototype to use in animal studies.

IP Status

Provisional patent filed. Conversion to a PCT application is in progress.

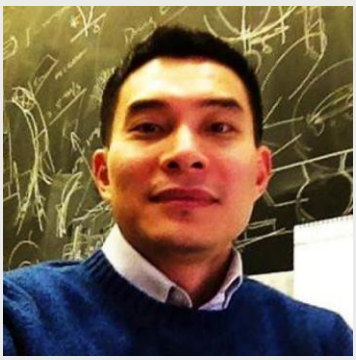
FEATURED INVENTORS:

Philip Carullo, MD

3rd Year Resident
Department of Anesthesiology
University of Pittsburgh Medical Center

Dr. Carullo earned a BA in 2010 from the University of Pittsburgh and an MD in 2015 from the University of Chicago. He is currently in his third year of residency in the Department of Anesthesiology at the University of Pittsburgh Medical Center. During his residency, he has also participated in the First Gear program at the Innovation Institute and secured a successful grant from the Center for Medical Innovation to fund the prototyping stage of the Esophocclude project.

His research interests include trauma and cardiac anesthesia.



Youngjae Chun, PhD

Assistant Professor
Department of Industrial Engineering
University of Pittsburgh

Dr. Chun received a BS in mechanical and aerospace engineering from Inha University in South Korea in 2003. He went on to earn a MS in mechanical engineering at Inha University and UCLA and ultimately a PhD in mechanical engineering at UCLA in 2009. After a postdoctoral fellowship at UCLA that earned him the 2010 Chancellor's Award, he joined the faculty in the Swanson School of Engineering at the University of Pittsburgh.

His research interests include artificial biomaterials and the design and manufacturing of medical devices.

Publications

1. Chen Y, Howe C, Lee Y, Cheon S, Yeo WH, Chun Y (2016). Microstructured Thin Film Nitinol for a Neurovascular Flow Diverter. *Nature Scientific Reports*, 6.
2. Chun Y, Levi DS, Mohanchandra KP, Carman GP (2009). Fabrication Processes for Creating Micro Features in Thin Film NiTi Endovascular Grafts. *ASME Conference on Smart Materials*, Oxnard, CA.
3. Chun Y, Levi DS, Mohanchandra KP, Vinuela F, Carman GP (2009). Thin Film Nitinol Microstent for Aneurysm Occlusion. *Journal of Biomechanical Engineering*, 5: 1-8.

For more information contact:
Janice L. Panza, PhD
Technology Licensing Manager
(412) 648-2225
jpanza@innovation.pitt.edu

Innovation Institute
200 Gardner Steel Conference Center
130 Thackeray Avenue
Pittsburgh, PA 15260
(412) 383-7680
www.innovation.pitt.edu