



## Esophoclude: Making Emergency Care Safer ID: 3742

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

The flow of gastric contents from the stomach into the lungs – also known as aspiration – can result in deadly symptoms, such as pneumonia and damage of the lungs. Aspiration often occurs from the time between sedation and placement of the breathing tube into a patient. Current solutions to prevent aspiration – such as cricoid pressure, naso-gastric tubes, and gastric-emptying drugs – are unreliable, uncomfortable for the patient, and may have harmful side effects. Esophoclude prevents aspiration by temporarily blocking the esophagus and stopping the flow of gastric content from traveling into the lungs. Compared to the alternatives, Esophoclude is both more efficient and safer.

### Technology Description

Esophoclude is a small pill that is attached to a string and swallowed by the patient. The device takes advantage of the natural physiological process of swallowing which ensures that the stent properly goes down into the esophagus. Once the device is swallowed by the conscious patient, the pill deploys and effectively blocks the esophagus for a period of time. A functioning prototype has been developed and has shown promising results on human cadaver and pig testing. Our device provides a much more comfortable experience for the patient, can be used minutes before surgery, and would primarily function to prevent aspiration unlike existing alternatives.

### Advantages

- Faster and more complete protection against aspiration
- Less invasive than other methods of protection
- Ease of insertion and removal

### Applications

- Emergency breathing tube placement for medical and surgical indications
- In-patient surgeries
- Out-patient surgeries (patients that forget to fast)
- Surgeries involving patients with chronic diseases such as diabetes, obesity and pregnancy (higher risk of aspiration for every surgery)

### Stage of Development

The Esophoclude is a working prototype that has been tested *in vitro*. Currently finalizing prototype design on pig and human cadaver tissue

### IP Status

Provisional patent filed on Oct. 18, 2016. Conversion to a PCT application is in progress.

### Notable Mentions

- Pitt 1<sup>st</sup> Gear Program, 2015: \$3,000
- Pitt Center for Medical Innovation Grant, 2016: \$20,000, 2017: \$20,000
- UPMC Department of Anesthesiology Seed Grant Funding, 2017: \$8,000
- Recognized as a novel innovation in UPMC Magazine, 2017
- Invitation for present at 11<sup>th</sup> 3 Rivers Venture Fair- Pittsburgh 2017

## Innovators



### Philip Carullo, MD

Medical Resident  
Department of Anesthesiology  
University of Pittsburgh  
Medical Center

Dr. Carullo 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, which helps shape Pitt inventions originating from University research from early-stage discovery to products and services that can be taken to market. Dr. Carullo also secured a grant from the Pitt Center for Medical Innovation to fund the prototyping stage of the Esophocclude project.

His research interests include trauma and cardiac anesthesia.

#### Education

MD University of Chicago  
BA University of Pittsburgh



### Youngjae Chun, PhD

Associate Professor  
Industrial Engineering  
Bioengineering  
University of Pittsburgh

Dr. Chun's research interests include artificial biomaterials and the design and manufacturing of medical devices. In 2010 he earned the UCLA Chancellor's Award for his postdoctoral research and in 2013 he earned the distinction of Bench to Bedside Scholar through the Office of Enterprise Development at Pitt.

#### Education

PhD University of California, Los Angeles  
MS University of California, Los Angeles  
MS Inha University, South Korea  
MBA Inha University, South Korea  
BS Inha University, South Korea

#### Publications

- 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.
- 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.
- 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.

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