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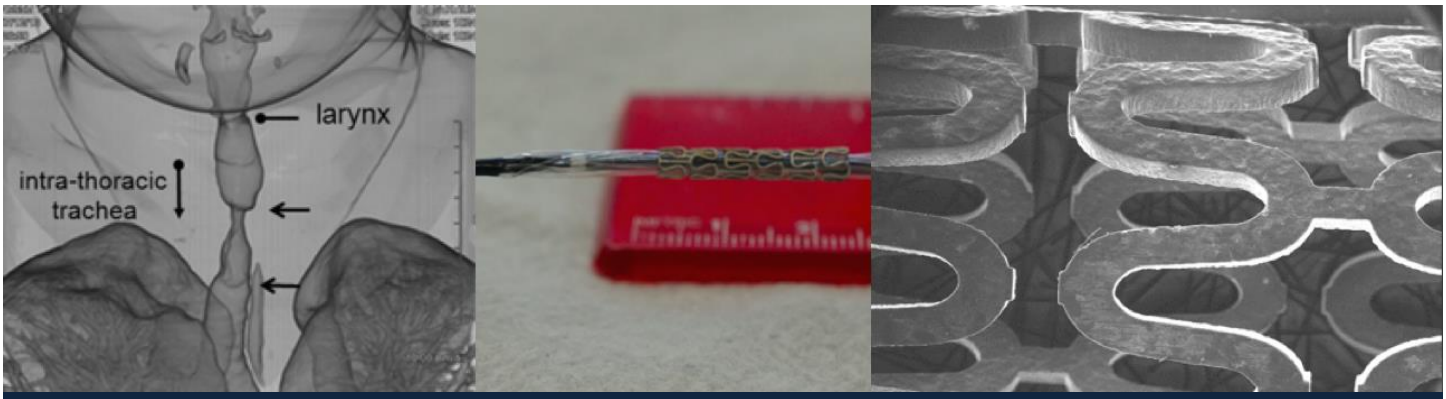

TracheoMag ID: 3396

Featured Innovators: Prashant Kumta, PhD, Puneeth Shridhar, MD, and Jingyao Wu

Many disease complications constrict or block the airway, causing shortness of breath. Although surgical correction is preferred when technically feasible and permitted by the clinical status of patient, stenting is by far a reliable alternative. Our innovative technology platform is potentially, a cost-effective biodegradable tracheal stents solution that will alleviate the problems caused by existing stents made of materials such as silicone and Nitinol. The TracheoMag's novel magnesium alloy exhibits ultra-high ductility – with elongation in the range of 50 percent – matching that of stainless steel. Since the constituent metals are already present in the human body the stents simply degrade over time, which helps with healing and normal airway relaxation.

Technology Description

The core technology is a biometal – a novel magnesium-based alloy that can be used to design and develop the biodegradable medical devices. The invention provides a material composition for medical device implants such as stents that includes an alloy involving magnesium and lithium along with other elements. While silicone stents cause difficulties during deployment combined with migration and distortion, nitinol stents lead to scarring, inflammation and infection. Permanent stents usually demand removal and replacement procedures. The invented material exhibits more natural properties than ever before. There is no more stent closure or no need for stent replacement.

Advantages

- Biodegradable
- Ultra-high ductility
- Devoid of rare earth elements
- Helps with tissue remodeling and regeneration

Applications

- Airway stent for lung cancer, lung transplantation and other causes of stenosis
- Stent for airway burns and trauma
- Coronary stents for heart attack

Stage of Development

Pre-clinical stage (animal studies)

IP Status

US non-provisional patent application 15/532,149 and European and Canadian patent applications

Notable Mentions

- Pitt Innovation Challenge (PInCh) Award - $25,000
- McGowan Pediatric Device Initiative - $40,000
- National Science Foundation I-Corps Award - $50,000
- Idea Foundry Impact Innovation Accelerator Funding – $20,000

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Innovators

Prashant Kumta, PhD

Edward R. Weidlein Chair Professor
Bioengineering
Chemical and Petroleum Engineering
Mech. Engineering & Materials Science
Oral Biology
McGowan Inst. of Regenerative Medicine
University of Pittsburgh

Dr. Kumta has over 27 years of experience in the field of materials science and engineering with particular expertise in the innovative synthesis, design and engineering of novel materials (ceramics, metals and polymers) and systems for a variety of electrochemical applications such as energy storage, conversion as well as bioengineering and biotechnology related applications including bioresorbable materials for bone tissue engineering, non-viral gene delivery, stem cell plasticity and delivery platforms. He is a Fellow of the American Ceramic Society (ACerS) and the American Institute of Medical and Biological Engineering (AIMBE) and is the Editor in Chief of Materials Science and Engineering B, Advanced Functional Solid-State Materials, an International Journal.

Education

PhD University of Arizona
MS University of Arizona
BTech Indian Institute of Technology, Bombay, India

Publications

- Perkins J, Xu Z, Smith C, Roy A, Kumta PN, Waterman J, Conklin D, Desai S. Direct writing of polymeric coatings on magnesium alloy for tracheal stent applications. Annals of biomedical engineering. 2015 May 1;43(5):1158-65.
- Luffy SA, Chou DT, Waterman J, Wearden PD, Kumta PN, Gilbert TW. Evaluation of magnesium‐yttrium alloy as an extraluminal tracheal stent. Journal of Biomedical Materials Research Part A. 2014 Mar 1;102(3):611-20.
- Chou DT, Hong D, Saha P, Ferrero J, Lee B, Tan Z, Dong Z, Kumta PN. In vitro and in vivo corrosion, cytocompatibility and mechanical properties of biodegradable Mg–Y–Ca–Zr alloys as implant materials. Acta biomaterialia. 2013 Nov 30;9(10):8518-33.

Puneeth Shridhar, MD

PhD Student
Bioengineering
University of Pittsburgh

Dr. Shridhar is a physician-scientist pursuing his PhD in bioengineering with a focus on interventional devices. He has special interest in biodegradable magnesium technology due to his personal experiences of undergoing cardiac intervention with non-biodegradable (permanent) metallic implant. Puneeth has received post-doctoral training from University of South Florida, Drexel University and University of Pittsburgh. Dr. Shridhar is the Founder of Curehub (a medical device hub), Co-Founder of Docubator (life science incubator for physicians) and board member of Zippay (healthcare fintech). Puneeth is also the recipient of Business Plan Competition Award and STAR Award from Society for Biomaterials, Pittsburgh Innovation Challenge Award and many others.

Education

MD Rajiv Gandhi University of Health Sciences, India;
MS University of Pittsburgh, Pittsburgh

Jingyao Wu

PhD Student
Department of Bioengineering
University of Pittsburgh

Mr. Wu has been conducting research on biodegradable magnesium stents for the past 5 years. He has participated in various competitions, winning $25K from the Pitt Innovation Challenge and first place in New York division at the 10th Chunhui Cup Innovation and Entrepreneurship Competition. He also received a research grant from Children's Hospital of Pittsburgh.

Education

BS University of Science and Technology of China

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