

RADIOLOGY RESEARCH UPDATE *January 2018 Issue 7*

Department of Diagnostic Radiology and Nuclear Medicine

FACULTY SPOTLIGHT

Prashant Raghavan, MBBS



You may know Prashant Raghavan, MBBS, for his oil paintings (see October 2017 *Radiology Research Update*) but he's also an accomplished neuroradiologist, with clinical interests in imaging of brain, head, neck, and spine diseases. Dr. Raghavan joined the department in 2013 as an assistant professor, was promoted to associate professor in 2016 and became section chief of diagnostic neuroradiology this past July.

Dr. Raghavan's research interests include resting state functional MRI (rsfMRI) in the assessment of neonatal neurodevelopmental outcomes. In support of this research, he was awarded an RSNA seed grant to investigate neural network disruption to predict neurodevelopmental outcome in perinatal hypoxic-ischemic injury. Infants who survive hypoxic ischemic encephalopathy (HIE) exhibit a wide spectrum of motor, visual, hearing and cognitive deficits. However, conventional MR imaging fails to reveal brain abnormalities. Dr. Raghavan and his team (among them, Drs. Rao Gullapalli and Jiachen Zhuo) hypothesize that HIE disrupts neural functional cortical and subcortical networks, and that rsfMRI will yield specific prognostic biomarkers for neurodevelopmental outcomes. Such

biomarkers will be invaluable in developing targeted neuro therapeutic interventions for affected infants.

Dr. Raghavan also has an interest in imaging tinnitus, and with Dr. Dheeraj Gandhi, was co-editor of the May 2016 issue of the *Neuroimaging Clinics of North America*, "Imaging in Tinnitus." Dr. Raghavan published three articles in this issue, including "Tinnitus: More than Ringing in the Ears," "Advanced Neuroimaging of Tinnitus," and "Venous Abnormalities Leading to Tinnitus: Imaging Evaluation" and one in the *American Journal of Neuroradiology*, "Postoperative Imaging Findings following Sigmoid Sinus Wall Reconstruction for Pulse Synchronous Tinnitus." (Coauthors on some of these publications include Drs. Dheeraj Gandhi and Robert Morales.)

Another area of interest that Dr. Raghavan has been exploring recently is carotid webs, which are intraluminal shelf-like filling defects at the carotid bulb. He and his team were among the first to determine that carotid webs are an under-recognized cause of recurrent ischemic stroke, and their presence should be suspected in patients lacking other risk factors, particularly African-American females. His paper, "Carotid Bulb Webs as a Cause of 'Cryptogenic' Ischemic Stroke" was published this past July in the *American Journal of Neuroradiology*. Since then, Dr. Raghavan and his team have culled fourteen retrospective cases of carotid webs from UMMC over a period of 18 months and the report of this series is under review with the *Journal of Neuroradiology*.

Currently Dr. Raghavan is part of a team of researchers from the department applying for an NIH grant to develop novel MR imaging methods and multi-modal feature

classification methods to segment the thalamus and test the hypothesis that alterations in the integrity of the thalamus and thalamocortical disruptions are associated with neuropsychological and cognitive deficits.

RSNA Highlight

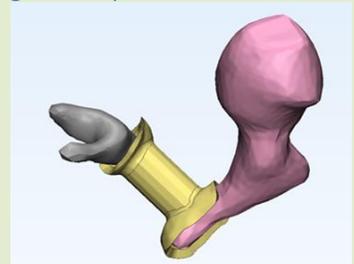
Custom 3D Printed Ossicular Prosthesis

Can data from CT scanners be used to design custom-made ossicular prostheses?

Can current 3D printing technology produce these prostheses?

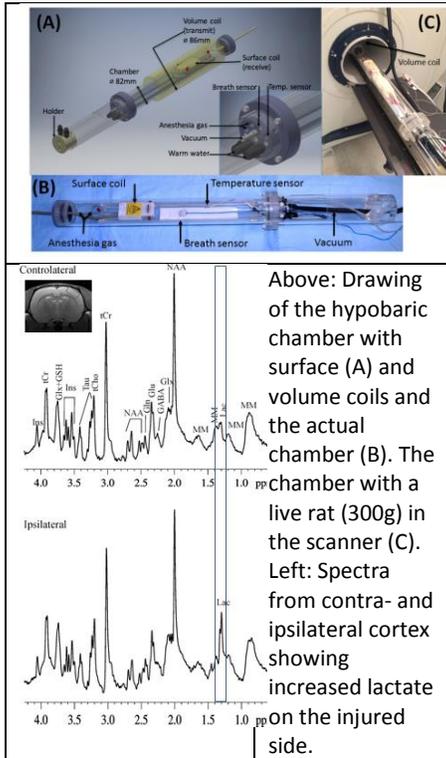
Can otologic surgeons detect the variations in the resultant prostheses?

The answer to these questions, according to **Jeffrey Hirsch, MD**, is yes and he presented his proof of concept in an RSNA Science Paper this past November and an article in *3D Printing in Medicine* (2017) 3:7, "Surgical Reconstruction of the Ossicular Chain with Custom 3D Printed Ossicular Prosthesis" (with Richard L. Vincent, MD and David J. Eisenman, MD). In the study, Dr. Hirsch et al. removed the incus from 3 cadaveric temporal bones, imaged the cadaveric bones using a standard temporal bone CT protocol, and then created a custom prosthesis for each and fabricated them on a 3D printer. Quantitative measures showed that each prosthesis was unique. Four surgeons, blinded to the correct pairing, were independently able to correctly match each unique model to its intended temporal bone, supporting their claim that a custom 3D printed ossicular prosthesis is a viable treatment for conductive hearing loss due to ossicular chain defects. The figure below shows the design of the prosthesis *in situ*.



TECHNIQUE HIGHLIGHT: MRI Compatible Hypobaric Chamber to Study TBI

by Su Xu, PhD & Sijia Guo, PhD



Our goal in constructing an MRI compatible hypobaric chamber is to mimic the environment in which wounded soldiers are airlifted from the battlefield (e.g., Afghanistan) to a medical facility (e.g., Landstuhl, Germany) and to be able to understand changes in brain physiology and metabolism when transported at high altitude. The chamber also allows us to manipulate between normoxic and hyperoxic conditions, which enables us to experiment with therapeutic interventions to limit secondary brain damage.

FEATURED PUBLICATIONS

Qiu L, Chen M, Wang X, Qin X, Chen S, Qian Y, Liu Z, **Cao Q**, Ying Z. Exposure to Concentrated Ambient PM2.5 Compromises Spermatogenesis in a Mouse Model: Role of Suppression of Hypothalamus-Pituitary-Gonads Axis. *Toxicol Sci.* 2017 Nov 20. [Epub ahead of print].

Malhotra A, Wu X, Forman HP, Matouk CC, **Gandhi D**, Sanelli P. Management of Tiny Unruptured Intracranial Aneurysms: A Comparative Effectiveness Analysis. *JAMA Neurol.* 2018 Jan 1;75(1):27-34.

Lynch DA, Sverzellati N, Travis WD, Brown KK, Colby TV, **Galvin JR**, Goldin JG, Hansell DM, Inoue Y, Johkoh T, Nicholson AG, Knight SL, Raoof S, Richeldi L, Ryerson CJ, Ryu JH, Wells AU. Diagnostic Criteria for Idiopathic Pulmonary Fibrosis: a Fleischner Society White Paper. *Lancet Respir Med.* 2017 Nov 15. [Epub ahead of print].

GRANT AWARDED

Congratulations to **Pavlos Anastasiadis, PhD** (a Postdoctoral Fellow working with **Victor Frenkel, PhD**), who has been awarded an NIH/Cancer Biology training grant (T32CA154274) for 3 years to study Acoustic activation of the glioma-brain microenvironment for improved T-cell immunotherapy.

MANDATORY RESEARCH TRAINING

Did you know that it is a federal requirement that anyone involved in conducting human subject research must have training? It is also required that anyone engaged in such research be included on the study's protocol. UMB's Human Research Protection Office provides this required training via online modules to faculty, fellows, residents, and staff requiring it. Per the department's research compliance policy, only faculty may apply for IRB approval. Residents and fellows must work with SOM Faculty on all SOM/UMMC/Baltimore VA research projects.

Lauren Spiller, one of the department's clinical research specialists, has provided this summary of training requirements (CITI, HIPAA, GCP) and how to complete them. Both Lauren (Lauren.Spiller-Holtzman@umm.edu) and **Ranyah Almardawi** (RanyahAlmardawi@umm.edu) are available to help you and they encourage you to contact them.

<p>1. Set up a CICERO account. https://cicero.umaryland.edu/Cicero/Rooms/DisplayPages/LayoutInitial?Container=com.webridge.entity.Entity%5BBOID%5B875E0245CF1AE3438767F9707A13BE7F%5D%5D</p>	<ul style="list-style-type: none"> The employee ID is the six digit one that appears on your paycheck. The use of any address, phone number, and email is fine. Select "IRB modules."
<p>2. Take the Protection of Human Subjects Training. [University of Miami's Collaborative IRB Training Initiative (CITI)]. This training is lengthy and it is advised you break up the sessions by completing five modules at a time. The training is good for three years and those who have completed it once are eligible to take a shorter refresher course. http://www.umaryland.edu/hrp/for-researchers/required-training/</p>	<ul style="list-style-type: none"> Use the affiliation "University of Maryland Baltimore" (NOT "University of Maryland Baltimore, School of Medicine"). Choose 18 basic modules, Course Title: Group 1. Biomedical Research Investigators and Key Personnel.
<p>3. Take the Online HIPAA Training. This takes approximately ten minutes to complete and is only required one time: http://issomvweb4.som.umaryland.edu/hipaa/quiz/index.asp</p>	<ul style="list-style-type: none"> After logging in, click "TRAINING." Take courses 125 and 201.
<p>4. Take the Good Clinical Practice (GCP) Training (if applicable). http://www.umaryland.edu/hrp/for-researchers/required-training/</p>	<ul style="list-style-type: none"> Training applies to investigators of NIH-funded studies & is good for three years.