

Innovations in Gastroenterology & GI Surgery



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focused solely on children.*



PEOPLE

Dr. Hassan selected for new motility disorders fellowship



Maheen Hassan, M.D., is the first physician participating in a new fellowship on neurogastroenterology and motility disorders within the Division of Gastroenterology, Hepatology & Nutrition at Rady Children's Hospital-San Diego.

The Advanced Pediatric Neurogastrointestinal Motility Fellowship offers the most promising physician-scientists the opportunity to learn the best approaches in bridging groundbreaking research in motility disorders and clinical care. Through the fellowship, Dr. Hassan will have the opportunity to observe the [Neurogastroenterology and Motility Center's](#) large case volume and to become proficient in a variety of diagnostic and interventional techniques, including anorectal manometry, esophageal manometry, antroduodenal manometry, colonic manometry, pH/impedance testing, wireless motility capsule, rectal suction biopsies, anal sphincter botox, pyloric botox and stricture dilations.

Dr. Hassan's passion is providing clinical care for medically complicated children. Her primary interests include the evaluation and management of swallowing disorders, gastroesophageal reflux, gastroparesis, rumination, constipation, Hirschsprung's disease and functional disorders. She aims to play an active role in managing patients in multidisciplinary settings, including the multidisciplinary [Aerodigestive Clinic](#) (see "Programs" story below), the colorectal clinic and integrative medicine.

After earning her medical degree at the University of California, Irvine School of Medicine, Dr. Hassan completed her internship and residency in pediatrics at UCSF Benioff Children's Hospital Oakland. She then completed her fellowship in pediatric gastroenterology, hepatology and nutrition at Rady Children's.



PROGRAMS

Aerodigestive clinic offers expert, collaborative care

At the beginning of the year, Rady Children's Hospital launched the multidisciplinary [Aerodigestive Clinic](#), bringing together specialists in gastroenterology, pulmonology and otolaryngology to provide diagnosis and management of a variety of disorders involving the respiratory and digestive systems. These specialists are [Hayat Mousa, M.D.](#), from the Division of Gastroenterology, Hepatology & Nutrition; [Daniel Lesser, M.D.](#), and [Annabelle Quizon, M.D.](#), from the [Division of Respiratory Medicine](#); and [Matthew Brigger, M.D., M.P.H.](#), from the [Division of Otolaryngology](#).

The conditions treated at the clinic include aspiration syndrome, feeding difficulties, failure to thrive, genetic syndromes associated with airway and/or gastrointestinal morbidities, congenital airway abnormalities, chronic cough and recurrent pneumonia.

A comprehensive evaluation and treatment plan are provided to patients in a single visit. Typically, the treatment is a "triple endoscopy under single anesthesia" procedure – an upper and lower airway bronchoscopy plus a gastrointestinal endoscopy. The clinic also offers a dysphagia study, esophageal manometry, esophageal impedance and pH studies, functional endoscopic evaluation of swallowing and specialized imaging studies (e.g. chest CT scan, UGIS).



About 75 patients have been seen to date, with parents providing extremely positive feedback, especially regarding the collaborative care approach and ease of obtaining a treatment plan in one visit. Healthcare costs are also reduced by an efficient use of resources, performing procedures in a single visit and/or under a single anesthesia session.

Ongoing activities and upcoming plans include developing and refining clinic protocols, maintaining a patient registry/database that can provide resources for research questions, attending regional, national and international aerodigestive conferences, and including additional specialties in patient care, such as speech therapy, occupational therapy, radiology, surgery and anesthesia. The clinic seeks to collaborate with other aerodigestive programs in California, such as those at Children's Hospital Los Angeles and Lucile Packard Children's Hospital Stanford, particularly on research. Benchmarking will also be used to evaluate how the clinic compares to these programs.

The clinic is held in Otolaryngology twice monthly on the first and third Wednesdays of the month. Triple endoscopy procedures are also scheduled twice monthly on the second and fourth Thursdays of the month. To refer a patient, please contact the Otolaryngology division at 858-309-7701.



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RESEARCH

New, noninvasive technology to diagnose motility disorders

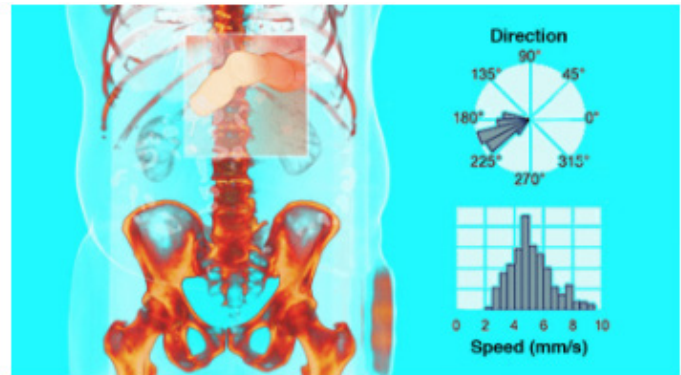
[Hayat Mousa, M.D.](#), director of clinical operations and director of the [Neurogastroenterology and Motility Center](#) in the Division of Gastroenterology, Hepatology & Nutrition at Rady Children's, and [Armen Gharibans, Ph.D.](#), a postdoctoral research fellow with a joint appointment in the Department of Bioengineering and the Department of Pediatrics at UC San Diego, and his colleagues have developed a novel, noninvasive method for determining gastric slow-wave direction and speed.

The gastric slow-wave is generated in a pacemaker region of the stomach, analogous to the heart, and propagates axially down the length of the stomach to the small intestines. This slow-wave leads to the mechanical contractions (i.e. peristalsis) that break down food and propel it along the GI tract. Recent studies have established the link between gastric slow-wave propagation abnormalities and gastric functional motility diseases, such as gastroparesis, chronic nausea and vomiting, and functional dyspepsia.

Current clinical tools to diagnose most GI conditions are invasive (e.g. endoscopy or manometry) or require radiation (e.g. gastric emptying scintigraphy). The electrogastrogram (EGG) is a noninvasive technique for measuring gastric myoelectric activity, but it has reported limitations.

The researchers have developed the high-resolution electrogastrogram (HR-EGG), a method of extracting features of gastric wave propagation using a noninvasive multi-electrode array. Along with identifying the presence of peristaltic waves, the HR-EGG can determine their propagation direction and speed. This technology has the potential to improve the diagnosis of GI diseases and to inspire novel drugs and therapies, ultimately improving clinical outcomes.

Recently, the team showed a correlation between manometry and the HR-EGG in children ([read the abstract](#)). Additionally, in an abstract for the 2017 North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) Annual Meeting, the researchers documented their results using the HR-EGG in children to separate both antral and pyloric activity; in nearly half of the patients, they succeeded in accomplishing this. The team believes that these results can be improved in future studies with high-resolution manometry and further refinement of the technique.



Volume reconstruction of torso from CT images with an overlay of electrical slow-wave activity recorded from noninvasive electrode array (left). Polar histogram of the estimated slow-wave direction and histogram of the estimated slow-wave speed (right).



INNOVATIONS

Clinical expertise, genome sequencing lead to timely treatment for critically ill newborn

[Hayat Mousa, M.D.](#), recently used data from rapid genomic sequencing to identify a treatment for a critically ill newborn with an extremely rare motility disorder. The prompt diagnosis and treatment enabled the patient to avoid risky exploratory surgery and may help her avoid small bowel and liver transplants.



The newborn had been admitted to the Rady Children's neonatal intensive care unit and was experiencing feeding intolerance with vomiting. She was found to have intestinal malrotation, which required a Ladd procedure on the third day of her life. Despite this procedure, the baby's feeding intolerance persisted. She required total parenteral nutrition, which resulted in liver distress. Standard tests returned no conclusive diagnosis to explain the newborn's symptoms, and she was not responding to treatments.

Under the [Rady Children's Institute for Genomic Medicine](#) clinical research protocol, the newborn underwent rapid whole genome sequencing (WGS). Through WGS, she was soon diagnosed with megacystis microcolon intestinal hypoperistalsis syndrome (MMIHS), an extremely rare motility disorder associated with a specific gene mutation. Dr. Mousa, who was familiar with the condition, was able to identify a medication that requires Food and Drug Administration (FDA) approval for its prescription and administration; the FDA granted the approval. As soon as the medication was given, some of the newborn's most severe symptoms were immediately mitigated, and her liver function improved dramatically.

Without the rapid WGS, it could have taken more than six months to diagnose the condition, as standard motility testing cannot be administered to a newborn; infants' organs are too small and underdeveloped for safe and effective testing. Exploratory surgery would also pose serious risks.

Most children with MMIHS must receive a small bowel transplant to survive, but if their condition is diagnosed early enough, the procedure can be anticipated and planned. These patients may also require a liver transplant, since by time they are diagnosed, most have suffered irreversible liver damage.

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