

## CURRICULUM VITAE

### Patrick P. Sanvanson MD

Associate Professor  
Department of Medicine  
Division of Gastroenterology

#### OFFICE ADDRESS:

Hub for Collaborative Medicine  
8701 Watertown Plank Road  
Milwaukee, WI 53226

#### EDUCATION:

- 05/2003 B.S., Biochemistry, University of Illinois at Chicago, Chicago, IL
- 05/16/2008 M.D., Medical College of Wisconsin, Milwaukee, WI

#### POSTGRADUATE TRAINING AND FELLOWSHIP APPOINTMENTS:

- 06/2008 - 06/2011 Resident, Internal Medicine, Washington University in St. Louis/Barnes-Jewish Hospital, St. Louis, MO
- 07/2011 - 06/2014 Gastroenterology and Hepatology NIH-Funded T32 Fellowship, Gastroenterology & Hepatology, Medical College of Wisconsin, Milwaukee, WI

#### FACULTY APPOINTMENTS:

- 07/2014 - 06/30/2021 Assistant Professor, Medicine, Gastroenterology & Hepatology, Medical College of Wisconsin, Milwaukee, WI
- 07/01/2021 - Present Associate Professor, Medicine, Gastroenterology & Hepatology, Medical College of Wisconsin, Milwaukee, WI

#### ADMINISTRATIVE APPOINTMENTS:

- 08/2018 - Present Innovation Lead for Division of GI: Innovation leads facilitate the transfer of ideas and information back and forth between Inception Health and operations/research leaders within their Division, Medicine, Gastroenterology and Hepatology, Medical College of Wisconsin, Milwaukee, WI
- 01/2020 - 01/2022 Secretary/Treasurer, Milwaukee Gastroenterological Society, Milwaukee, WI
- 01/2023 - Present President, Milwaukee Gastroenterological Society, Milwaukee, WI

#### RESEARCH ADMINISTRATIVE APPOINTMENTS:

- 2019 - 2023 Associate Director, Neurogastroenterology, Motility, and Airway Protections Research Laboratory, Medicine, Gastroenterology and Hepatology, Medical College of Wisconsin, Milwaukee, WI
- 2019 - Present Director of the Edmund M. Barbour, MD Endowed Research Fellowship: Research focused GI fellowship position, Medicine, Gastroenterology and Hepatology, Medical College of Wisconsin, Milwaukee, WI
- 01/01/2023 - Present Director, Neurogastroenterology, Motility, and Airway Protections Research Laboratory, Medical College of Wisconsin, Milwaukee, WI, Medicine, Gastroenterology and Hepatology, Medical College of Wisconsin, Milwaukee, WI

#### HOSPITAL STAFF PRIVILEGES:

- 07/2014 - Present Froedtert Hospital, Milwaukee, WI
- 07/2014 - Present Clement J. Zablocki VA Medical Center, Milwaukee, WI
- 07/2014 - Present Froedtert Surgery Center, Milwaukee, WI

**SPECIALTY BOARDS AND CERTIFICATION:**

<u>Board Certified</u>	<u>Issue Date</u>	<u>Expiration</u>
Internal Medicine	2011	2021
Gastroenterology	2014	2024

<u>Licensure</u>	<u>Number</u>	<u>Issue Date</u>	<u>Expiration</u>
State of Wisconsin	56362-20	09/29/2011	10/31/2023

**AWARDS AND HONORS:**

12/1999 - 05/2003 College of Liberal Arts & Sciences Dean's List, University of Illinois at Chicago  
05/2000 Induction in the National Society of Collegiate Scholars, The National Society of Collegiate Scholars  
12/2001 - 05/2003 Honors College Dean's Honor Roll, University of Illinois at Chicago  
05/2002 Induction in the Golden Key International Honour Society, Golden Key International Honour Society  
04/2003 Phi Kappa Phi Honors Society  
04/2003 Phi Beta Kappa Honors Society  
05/2003 College of Liberal Arts & Sciences Honors, University of Illinois at Chicago  
05/2003 Graduated with Highest Distinction in Biochemistry, University of Illinois at Chicago  
05/2005 - 05/2008 National Heart, Lung, and Blood Institute/National Institutes of Health Research Fellowship Grant, Medical College of Wisconsin  
03/18/2016 Best Poster Award in the category of Early Career Faculty – Basic or Translational Research, Department of Medicine Research Retreat, Medical College of WI  
06/2017 Certificate of Recognition for Scientific Accomplishment as an Early Career Investigator , Digestive Disease Week  
2017 - 2018 MCW Outstanding Medical Student Teacher Pin, Medical College of Wisconsin  
06/2018 Certificate of Recognition for Scientific Accomplishment as an Early Career Investigator , Digestive Disease Week  
2018 - 2019 MCW Outstanding Medical Student Teacher Pin, Medical College of Wisconsin

**MEMBERSHIPS IN HONORARY AND PROFESSIONAL SOCIETIES:**

2014 - Present American Gastroenterological Association (Member)  
2015 - Present Milwaukee Gastroenterological Society (Member)  
01/2020 - 01/2022 Milwaukee Gastroenterological Society (Secretary/Treasurer)  
01/2022 - Present Milwaukee Gastroenterological Society (President)

**EDITORSHIPS/EDITORIAL BOARDS/JOURNAL REVIEWS:**

Journal Review  
2016 - Present Archives of Physical Medicine and Rehabilitation  
2017 - Present Diseases of the Esophagus  
2019 - Present American Journal of Physiology-Gastrointestinal and Liver Physiology  
2020 - Present Dysphagia

**RESEARCH GRANTS/AWARDS/CONTRACTS/PROJECTS:****Active****Peer Review**

Title: Deglutitive and Airway Protective Functions of Proximal/Striated Muscle Esophagus in Health and Disease  
Source: NIH/NIDDK R01 DK132082  
Role: CO-I  
Dates: 04/20/2022 - 02/28/2026

**Prior**

**Peer Review**

Title: Neuromolecular Mechanisms of Chronic Pelvic Pain in Neonatally-induced Cystitis  
Source: NIH  
Role: Multi-Principal Investigator  
Dates: 09/01/2018 - 05/31/2022  
Direct Funds: \$668,235 (Per Year)

**INVITED LECTURES/WORKSHOPS/PRESENTATIONS:****Local**

Esophageal Acid-Related Sensory Physiology: "Why Do I Have Heartburn?", Medicine Grand Rounds, Medical College of Wisconsin, 02/06/2015  
Approach to Chronic Abdominal Pain, "State of the Gut" An Update on Gastrointestinal Disorders, Milwaukee, WI, 09/18/2015  
Esophageal Disorders, "State of the Gut" An Update on Gastrointestinal Disorders, Milwaukee, WI, 09/30/2016  
Dysphagia in the Elderly, Medical College of Wisconsin Division of Geriatrics/Gerontology Research Seminar, Milwaukee, WI, 10/28/2016  
Functional Abdominal Pain, "State of the Gut" An Update on Gastrointestinal Disorders, Milwaukee, WI, 09/29/2017  
GERD and Effect on Sleep, Sleep Medicine Grand Rounds, Medical College of Wisconsin, 02/23/2018  
Esophageal Disorders Including GERD, "State of the Gut" An Update on Gastrointestinal Disorders, Milwaukee, WI, 09/28/2018  
Functional Disorders, 2018 Digestive Disease Week Meeting Review, Milwaukee, WI, 09/29/2018  
GERD, Medical Management and Diagnostic Procedures, Word on Medicine Radio Show, WISN Studios, Milwaukee WI, 04/13/2019  
Eosinophilic Esophagitis: Gastroenterologist's Perspective, Allergy/Immunology Grand Rounds, Children's Hospital of Wisconsin, Milwaukee, WI, 04/26/2019  
Approach to the Patient with Dysphagia, "State of the Gut" An Update on Gastrointestinal Disorders, Milwaukee, WI, 09/13/2019  
Functional Disorders, 2019 Digestive Disease Week Meeting Review, Milwaukee, WI, 09/14/2019  
Ranitidine Recall, Word on Medicine Radio Show, WISN Studios Milwaukee, WI, 10/12/2019  
"Alteration of Anterior Cingulate Functional Connectivity following Colorectal Distension in Rats Exposed to Early Adverse Life Events", Monday Night Gastroenterology Conference, Medical College of Wisconsin, 05/04/2020  
Eosinophilic Esophagitis: Approaches to Management and Future Directions, Medicine Grand Rounds, Medical College of Wisconsin, 04/16/2021

**National**

Interplay of Spinal and Vagal Pathways on the Esophageal Acid-Related Anterior Cingulate Cortex Functional Networks in Rats, Digestive Disease Week, Chicago, IL, 05/06/2017  
Impact of Esophageal Acid Exposure on the Periaqueductal Gray Functional Networks in Rats: an fMRI Study, Digestive Disease Week, Washington DC, 06/04/2018  
Live demonstrations from the Froedtert & the Medical College of Wisconsin: Pharyngeal manometry and UES stress test – an emerging technique, 13th Postgraduate Course on Gastrointestinal Motility and Neurogastroenterology in Clinical Practice, Milwaukee, WI, 07/27/2018  
Case Presentations and Expert Opinions: Challenging Problems in GERD, 13th Postgraduate Course on Gastrointestinal Motility and Neurogastroenterology in Clinical Practice, Milwaukee, WI, 07/28/2018

**COMMITTEE SERVICE:****Medical College of Wisconsin**

10/2014 - Present Reviewing Fellowship Applications and Interviewing Prospective Applications, Fellowship Program, Gastroenterology & Hepatology, Medical College of Wisconsin  
2014 - 2017 Interview Prospective Internal Medicine Residents, Internal Medicine Residents,

Gastroenterology & Hepatology, Medical College of Wisconsin  
2018 - Present Fellowship Program Evaluation Committee, Gastroenterology & Hepatology, Medical College of Wisconsin  
07/2019 - Present Participant, CTSI Incontinence Ensemble, Medical College of Wisconsin  
05/2022 - Present GI Physician Advisory Workgroup, Clinical Committee of Froedtert and Medical College of Wisconsin  
07/2022 - Present Standing Member of the MSSRP (Medical Student Summer Research Program) Advisory Committee, Medical College of Wisconsin

## **MEDICAL COLLEGE TEACHING ACTIVITIES:**

### **Medical Student Education**

01/26/2016 M2 GI/Nutrition Course: Case-Based Discussion Session "The Breakfast Club"  
08/2017 - 12/2017 Brandy Norman, Clinical Apprenticeship  
01/2018 - 12/2018 Matthew Hadiono: Clinical Apprenticeship  
01/03/2019 M2 GI and Nutrition Subunit: Esophagus: Clinical Correlation  
01/03/2019 M2 GI and Nutrition Subunit: Esophageal Disorders Overview: Dysphagia/Motility  
01/03/2019 M2 GI and Nutrition Subunit: Esophageal Motor Disorders  
01/03/2019 M2 GI and Nutrition Subunit: Esophagus: Esophagitis & GERD  
01/03/2019 M2 GI and Nutrition Subunit: Esophagus: Barrett's & Neoplasia  
01/2019 - 12/2019 Quinn Mallery: Clinical Apprenticeship  
01/03/2020 M2 GI/Nutrition Unit: Interactive Clinical Correlations: Esophagus  
01/2020 - Present Laura Grogan: Clinical Apprenticeship  
01/05/2021 GI and Nutrition Unit: Interactive Clinical Correlation-Esophagus  
01/05/2022 M2 GI and Nutrition Unit: Interactive Clinical Correlation-Esophagus  
01/05/2022 M2 GI and Nutrition Unit: Podcast open study: Esophagus  
01/05/2023 M2 GI and Nutrition Unit: Podcast open study: Esophagus  
01/05/2023 M2 GI and Nutrition Unit: Interactive Clinical Correlation-Esophagus

### **Resident and Fellow Education**

12/16/2015 Academic Half Day Lecture: Diarrhea/Constipation  
12/21/2016 Academic Half Day Lecture: Esophageal Disorders and PUD  
12/13/2017 Academic Half Day Lecture: Esophageal Disorders  
12/05/2018 Academic Half Day Lecture: Esophageal Disorders/Dysphagia  
11/07/2019 Fellowship Board Review: GERD and Eosinophilic Esophagitis  
12/04/2019 Academic Half Day Lecture: Esophageal Disorders  
08/05/2020 Fellowship Board Review: Approach to Eosinophilia on Esophageal Biopsies, Standard of care and future therapies for EoE  
01/06/2021 Academic Half Day Lecture: Esophageal/Gastric Disorders  
03/31/2021 Academic Half Day Lecture: Esophageal Disorders  
04/07/2021 Fellowship Board Review: Contemporary Review of PPI therapy  
11/03/2021 Fellowship Board Review-GERD and EoE  
12/01/2021 Academic Half Day Lecture: Functional Bowel Disease  
12/08/2021 Academic Half Day Lecture: Esophageal Disorders  
11/16/2022 Academic Half Day Lecture: Functional Bowel Disease  
12/14/2022 Academic Half Day Lecture: Esophageal Disorders

## **MCW STUDENTS, FACULTY, RESIDENTS AND CLINICAL/RESEARCH FELLOWS MENTORED:**

### **Medical Students**

Michael Sobin, Medical College of Wisconsin, 08/2016 - 05/2020 Research, Resulted in summer research funding, abstract/poster at a national meeting, submitted manuscript, and Honors in Research  
Alex Kerschner, Medical College of Wisconsin, Research

### **Clinical/Research Fellows**

Gokulakrishnan Balasubramanian, Medical College of Wisconsin, 07/2014 - 06/2016 T32 Research Fellow, Resulted in accepted manuscript, presentation at a national meeting, and faculty position at

Ohio State University  
Francis Edeani, Medical College of Wisconsin, 07/2016 - 06/2020 T32 Research Fellow, Resulted in presentation at a national meeting, accepted abstracts, and faculty position at the Medical College of Wisconsin  
Karlo Kovacic, Medical College of Wisconsin, 10/2017 - 06/2021 T32 Research Fellow, Resulted in accepted manuscripts at a national meeting and faculty position at Medical College of Wisconsin  
Krupa Patel, Medical College of Wisconsin, 06/2019 - Present T32 Research Fellow, Resulted in accepted abstracts for a national meeting  
Elliot Yu, Medical College of Wisconsin, 07/2020 - Present T 32 Research Fellow, Resulted in accepted manuscripts at a national meeting and faculty position at Medical College of Wisconsin  
Hamza Hassan, Medical College of Wisconsin, 07/2021 - Present T 32 Research Fellow, Resulted in accepted manuscripts at a national meeting and faculty position at Medical College of Wisconsin

**EXTRAMURAL STUDENTS, FACULTY, RESIDENTS, AND CLINICAL/RESEARCH FELLOWS MENTORED:**

**Undergraduate Students**

Kalice Allen, St. Catherine University, DSHREP program, 06/2015 - 08/2015 Research, Resulted in a submitted abstract and presentation for the DSHREP program  
Michael Sobin, University of Minnesota, 06/2015 - 08/2016 Research, Resulted in a submitted abstract, presentation at a local meeting, and acceptance into medical school  
Kiara Patton, University of Michigan, DSHREP Program, 06/2016 - 12/2017 Research, Resulted in a submitted abstract and presentation for the DSHREP program

**BIBLIOGRAPHY**

**Refereed Journal Publications/Original Papers**

1. Zahedi FM, Zhao H, Walia H, Jain N, Sanvanson P, Shaker R. Treating Patients Real Avatars in Virtual Medical Office. *IEEE Intelligent Systems Journal* 2014; 29(2): 67-71.
2. Abbasi A, Adjeroh D, Dredze M, Paul MJ, Zahedi FM, Zhao H, Walia N, Jain H, Sanvanson P, Shaker R, Huesch MD, Beal R, Zheng W, Abate M, Ross A. Social media analytics for smart health *IEEE Intelligent Systems*. March/April 2014;29(2):60-80.
3. Shaker R, Sanvanson P, Balasubramanian G, Kern M, Wuerl A, Hyngstrom A. Effects of laryngeal restriction on pharyngeal peristalsis and biomechanics: Clinical implications. *Am J Physiol Gastrointest Liver Physiol*. 2016 Jun 01;310(11):G1036-43. PMID: 27079611
4. Jiao H, Mei L, Sharma T, Kern M, Sanvanson P, Shaker R. A human model of restricted upper esophageal sphincter opening and its pharyngeal and UES deglutitive pressure phenomena. *Am J Physiol Gastrointest Liver Physiol*. 2016 Jul 01;311(1):G84-90. PMID: 27198193
5. Bhandari S, Sanvanson P and Perera LP. A Case of Steroid-Refractory Nongranulomatous Chronic Idiopathic Enterocolitis Successfully Treated with Anti-TNF Agent. *J Gastroenterol Liver Dis*. 2016; 1(1): 1006.
6. Kern MK, Balasubramanian G, Sanvanson P, Agrawal D, Wuerl A, Shaker R. Pharyngeal peristaltic pressure variability, operational range, and functional reserve. *Am J Physiol Gastrointest Liver Physiol*. 2017 May 01;312(5):G516-G525. PMID: 28254773
7. Balasubramanian G, Sharma T, Kern M, Mei L, Sanvanson P, Shaker R. Characterization of pharyngeal peristaltic pressure variability during volitional swallowing in healthy individuals. *Neurogastroenterol Motil*. 2017 Nov;29:e13119. PMID: 28635131
8. Mei L, Jiao H, Sharma T, Dua A, Sanvanson P, Jadcherla SR, Shaker R. Comparative effect of the sites of anterior cervical pressure on the geometry of the upper esophageal sphincter high-pressure zone. *Laryngoscope*. 2017 Nov;127(11):2466-2474. PMID: 28543926
9. Jiao H, Mei L, Liang C, Dai Y, Fu Z, Wu L, Sanvanson P, Shaker R. Upper esophageal sphincter augmentation reduces pharyngeal reflux in nasogastric tube-fed patients. *Laryngoscope*. 2018 Jun;128(6):1310-1315. PMID: 28988414
10. Mei L, Dua A, Kern M, Gao S, Edeani F, Dua K, Wilson A, Lynch S, Sanvanson P, Shaker R. Older Age Reduces Upper Esophageal Sphincter and Esophageal Body Responses to Simulated Slow and Ultraslow Reflux Events and Post-Reflux Residue. *Gastroenterology*. 2018 Sep;155(3):760-770.e1. PMID: 29803837

11. Agrawal D, Kern M, Edeani F, Balasubramanian G, Hynstrom A, Sanvanson P, Shaker R. Swallow strength training exercise for elderly: A health maintenance need. *Neurogastroenterol Motil.* 2018 Oct;30(10):e13382. PMID: 29956861
12. Sanvanson P, Li Z, Mei L, Kounev V, Kern M, Ward BD, Medda B, Shaker R. Interplay of spinal and vagal pathways on esophageal acid-related anterior cingulate cortex functional networks in rats. *Am J Physiol Gastrointest Liver Physiol.* 2019 May 01;316(5):G615-G622. PMID: 30817181
13. Wang L, Echeveste CE, Yu J, Huang Y, Lechner J, Mei L, Sanvanson P, Yearsley M, Wang C, Stoner G. Can Natural Products Suppress Resistant *Helicobacter pylori* to Fight Against Gastric Diseases in Humans? *eFood Vol. 1*(1); February (2020), pp. 53–60. PMID: 34308385
14. Mei L, Patel K, Lehal N, Kern MK, Benjamin A, Sanvanson P, Shaker R. Fatigability of the external anal sphincter muscles using a novel strength training resistance exercise device. *Am J Physiol Gastrointest Liver Physiol.* 2021 Apr 01;320(4):G609-G616. PMID: 33596155
15. Terashvili M, Talluri B, Palangmonthip W, Iczkowski KA, Sanvanson P, Medda BK, Banerjee B, Cunningham CW, Sengupta JN. Peripheral antinociceptive effects of a bifunctional  $\mu$  and  $\delta$  opioid receptor ligand in rat model of inflammatory bladder pain. *Neuropharmacology.* 2021 Sep 15;196:108701. PMID: 34256047
16. Patel K, Mei L, Yu E, Kern M, Lehal N, Edeani F, Sanvanson P, Davidson ERW, Shaker R. Differences in fatigability of muscles involved in fecal continence: Potential clinical ramifications. *Physiol Rep.* 2021 Dec;9(24):e15144. PMID: 34927399
17. Talluri B, Hoelzel F, Medda BK, Terashvili M, Sanvanson P, Shaker R, Banerjee A, Sengupta JN, Banerjee B. Identification and characterization of rostral ventromedial medulla neurons synaptically connected to the urinary bladder afferents in female rats with or without neonatal cystitis. *J Comp Neurol.* 2022 Jun;530(8):1129-1147. PMID: 34628661
18. Edeani FO, Kern M, Ulualp K, Kovacic K, Sanvanson P, Mei L, Shaker R. Variables influencing manometric parameters of deglutitive and non-deglutitive upper esophageal sphincter: A study of 89 asymptomatic participants. *Neurogastroenterol Motil.* 2022 Feb;34(2):e14175. PMID: 34431179
19. Zahedi FM, Zhao H, Sanvanson P, Walia N, Jain H, Shaker R. My Real Avatar has a Doctor Appointment in the Wepital: A System for Persistent, Efficient, and Ubiquitous Medical Care Information and Management. December 2022;59(8).
20. Edeani F, Sanvanson P, Mei L, Agrawal D, Kern M, Kovacic K, Shaker R. Effect of inter-swallow interval on striated esophagus peristalsis; a comparative study with smooth muscle esophagus. *Neurogastroenterol Motil.* 2023 Aug;35(8):e14608. doi: 10.1111/nmo.14608. Epub 2023 May 8. PMID: 37154414.
21. Patel PD, Doucette S, Sanvanson P. Clinical and Pathologic Response to Vedolizumab in a Young Female Patient With Collagenous Gastritis. *ACG Case Rep J.* 2023 Oct 19;10(10):e01175. PMID: 37868366
22. Kerschner A, Hassan H, Kern M, Edeani F, Mei L, Sanvanson P, Shaker R, Yu E. Parkinson's disease is associated with low striated esophagus contractility potentially contributing to the development of dysphagia. *Neurogastroenterol Motil.* 2024 Aug;36(8):e14822. PMID: PMC11246227

### **Books, Chapters, and Reviews**

1. Ling Mei, Patrick Sanvanson (2017). UES restrictive disorders. In Barden, E, Shaker, R (Ed), *Gastrointestinal Motility Disorders. A point of care clinical guide.* (pp79-90) Springer International Publishing.
2. Patrick Sanvanson (2017). Painful Swallowing. In Barden, E, Shaker, R (Ed), *Gastrointestinal Motility Disorders. A point of care clinical guide.* (pp. 235-237) Springer International Publishing.
3. Patrick Sanvanson, Reza Shaker (2020). Disorders of Oropharyngeal Dysphagia. In Richter, J, Castell, D (Ed), *The Esophagus, 6th Edition.* Wiley-Blackwell.
4. Sanvanson P, Shaker R. Disorders Causing Oropharyngeal Dysphagia *The Esophagus: Sixth Edition.* 1 January 2021:38-52.
5. Sanvanson P, Shaker R. "Oropharyngeal dysphagia and cricopharyngeal disorders". *Handbook of Gastrointestinal Motility and Disorders of Gut-Brain Interactions 2nd Edition.* Rao S, Parkman HP, McCallum RW (eds), 20 June 2023:59-72

### **Abstracts**

1. Kern MK, Kounev V, Sanvanson P, Lawal A, Hofmann C, Ward BD, Shaker R. Deterioration of rectal distension-sensitive afferent neural pathways in the elderly: a study of the subliminal viscerosensory domain by fMRI. May 2007 *Gastroenterology* 132(4) Suppl 2: A720, 2007.
2. Kern MK, Kounev V, Sanvanson P, Lawal A, Hofmann C, Ward BD, Shaker R. Effect of aging on cortical

- neural and neurocognitive central processing of rectal mechanoreceptor signals. May 2007 *Gastroenterology* 132(4) Suppl 2: A324.
3. Sanvanson P, Kounev V, Ward BD, Medda BK, Hyde JS, Shaker R. Characterization of a Rodent Model for Functional MRI Studies of Esophageal Acid Related Sensory Physiology. May 2012 *Gastroenterology*, Vol. 142, Issue 5, S-549–S-550.
  4. Mei L, Kounev V, Sanvanson P, Li R, Li SJ, Medda BK, Shaker R. Effect of Vagotomy on Cortical fMRI Activity Induced by Esophageal Acid Stimulation in Rats: Further Validation of the Model. May 2013 *Gastroenterology*, Vol. 144, Issue 5, S-558.
  5. Sanvanson P, Kounev V, Mei L, Li R, Hyde JS, Medda BK, Shaker R. Esophageal Acid Induced Brain Functional Connectivity Changes Are Vagally Mediated. May 2013 *Gastroenterology*, Vol. 144, Issue 5, S-562–S-563.
  6. Sharma T, Babaei A, Demara-Hoth M, Mei L, Sanvanson P, Kern M, Jiao H, Shaker R. Effect of Neck Positions, Bolus Volume and Body Posture on High Resolution Pharyngo-UES Manometry. May 2013 *Gastroenterology*, Vol. 144, Issue 5, S-785.
  7. Jiao H, Mei L, Babaei A, Sharma T, Sanvanson P, Kern M, Jadcherla SR, Shaker R. A Human Model of Restricted UES Opening and Its Characteristic Pharyngeal and UES Deglutitive Pressure Phenomena. May 2014 *Gastroenterology*, Vol. 146, Issue 5, S-77.
  8. Mei L, Jiao H, Sharma T, Sanvanson P, Jadcherla SR, Shaker R. Effect of External Anterior Cervical Pressure Location on the UES High-Pressure Zone Is Site Specific. May 2014 *Gastroenterology*, Vol. 146, Issue 5, S-895–S-896.
  9. Mei L, Sanvanson P, Kounev V, Li R, Medda BK, Shaker R. Effect of Chronic Esophageal Acid Exposure and Acute Acid Re-Challenge on Functional Connectivity of Anterior Cingulate Cortex in Rats. May 2014 *Gastroenterology*, Vol. 146, Issue 5, S-846.
  10. Sanvanson P, Mei L, Kounev V, Li R, Hyde JS, Medda BK, Shaker R. Functional Connectivity of Somatosensory Cortex Is Enhanced by Acute Esophageal Acid Exposure in Rats. May 2014 *Gastroenterology*, Vol. 146, Issue 5, S-846.
  11. Kern M, Babaei A, Siwec RM, Samuel EA, Mei L, Sanvanson P, Shaker R. Differences in Amygdala Functional Connectivity Between Erosive (ERD) and Non-Erosive Reflux Disease (NERD) Patients During Esophageal Acid Exposure. May 2014 *Gastroenterology*, Vol. 146, Issue 5, S-844.
  12. Mei L, Gokularkrishnan B, Manderle R, Kern M, Sanvanson P, Jiao H, Shaker R. Pharyngeal Bolus Transit in a Human Model of Restricted Swallowing; A Multi-Channel Intraluminal Impedance Study. April 2015 *Gastroenterology*, Vol. 148, Issue 4, S-895.
  13. Balasubramanian G, Kern M, Manderle R, Mei L, Sanvanson P, Babaei A, Shaker R. Dynamics of Pharyngeal Contraction During Vocalization, Cough and Swallowing Maneuvers Using High Resolution Manometry. April 2015 *Gastroenterology*, Vol. 148, Issue 4, S-895.
  14. Liu X, Kern M, Babaei A, Sanvanson P, Shaker R. Subliminal Esophageal Acid Exposure is Associated with an Increase of Right Insula Functional Connectivity in the Homeostatic Afferent Processing Network. April 2015. *Gastroenterology*, Vol. 148, Issue 4, S-386.
  15. Kern M, Balasubramanian G, Sanvanson P, Mei L, Wuerl A, Shaker R. Safety of Restricting the Deglutitive Hyo-Laryngeal Excursion for Overloading and Strength Training of Swallow Muscles. April 2016 *Gastroenterology*, Vol. 150, Issue 4, S861.
  16. Jiao H, Mei L, Liang C, Dai Y, Fu Z, Wu L, Sanvanson P, Shaker R. UES Assist Device Reduces the Aspiration Risk By Decreasing Trans-UES Reflux of Gastric Content in Long-Term Nasogastric Tube Fed Patients: A Combined pH-Multichannel Intraluminal Impedance Study. April 2016 *Gastroenterology*, Vol. 150, Issue 4, S110–S111.
  17. Gao S, Kern M, Balasubramanian G, Sanvanson P, Mei L, Hyngstrom A, Shaker R. Effect of Repeated Swallowing Against Laryngeal Resistance on the Deglutitive Trajectories of the Hyoid and Larynx; A Study of Post-contraction Relaxation Velocity. April 2016 *Gastroenterology*, Vol. 150, Issue 4, S862.
  18. Kern M, Balasubramanian G, Sanvanson P, Mei L, Wuerl A, Shaker R. Biomechanical Evidence of UES Opening Muscle Fatigue Induced by Resistance to Deglutitive Hyo-Laryngeal Excursion. April 2016 *Gastroenterology*, Vol. 150, Issue 4, S860.
  19. Sanvanson P, Sobin M, Balasubramanian G, Mei L, Wuerl A, Kern M, Shaker R. Effect of Repeated Swallows Against Resistance on Proximal Striated Muscle Segment of Esophagus in the Elderly. April 2016 *Gastroenterology*, Vol. 150, Issue 4, S293–S294.
  20. Kern M, Sanvanson P, Mei L, Wuerl A, Shaker R. Differences in Resting State Connectivity of the Homeostatic Interoceptive Network in Erosive as Well as Non-Erosive GERD Patients and Healthy Controls. April 2016 *Gastroenterology*, Vol. 150, Issue 4, S107–S108.

21. Kern M, Balasubramanian, Sanvanson P, Mei L, Wuerl A, Shaker R. Characterization of the Biomechanical Effects of Externally Applied Resistance to Deglutitive Hyo-Laryngeal Excursion. April 2016 Gastroenterology, Vol. 150, Issue 4, S859–S860.
22. Kern M, Balasubramanian G, Sanvanson P, Mei L, Wuerl A, Hynstrom A, Shaker R. Augmenting the Training Effect of a Swallow Resistance Exercise Device (sRED): Lessons From Exercise Physiology. April 2016 Gastroenterology, Vol. 150, Issue 4, S860.
23. Sanvanson P, Li Z, Mei L, Kounev V, Medda BK, Ward BD, Kern M, Shaker R. Alterations of Thalamic Networks in Response to Esophageal Acid Infusion: A Functional Connectivity Study in Rats. April 2016 Gastroenterology, Vol. 150, Issue 4, S528.
24. Mei L, Sanvanson P, Balasubramanian G, Kern M, Wuerl A, Shaker R. Characterization of Impedance Signature of Pharyngo-UES Bolus Transit: A Comparative Study With Fluoroscopy. April 2016 Gastroenterology, Vol. 150, Issue 4, S96.
25. Sanvanson P, Li Z, Mei L, Kounev V, Medda Bk, Ward BD, Kern M, Shaker R. A Novel Method for Characterizing Cerebral Response to Esophageal Acid Exposure by fMRI and fcMRI. April 2016 Gastroenterology, Vol. 150, Issue 4, S527–S528.
26. Kern M, Sanvanson P, Li Z, Wilson A, Mei L, Shaker R. Comparison of Brain Function During Normal Swallow and Swallow Against Resistance: The Effect of Effort. April 2017 Gastroenterology, Vol. 152, Issue 5, S923.
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