AMERICAN ASSOCIATION OF ENDOCRINE SURGEONS

45TH ANNUAL MEETING

May 17-19, 2025

Philip Haigh, MD, MSc
Program Chair

Sophie Dream, MD, MPH
Local Arrangements Chair

www.endocrinesurgery.org

PROGRAM BOOK

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as of April 3, 2025

THE AMERICAN ASSOCATION OF

ENDOCRINE SURGEONS

45th Annual Meeting
May 17 - 19, 2025

American Association of Endocrine Surgeons
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2019-2020	Allan Siperstein	Richard Hodin	James Lee	Paul Gauger	Tracy Wang
2018-2019	Herbert Chen	Sonia Sugg	James Lee	Paul Gauger	Sareh Parangi
2017-2018	Martha Zeiger	Carmen Solórzano	Rebecca S. Sippel	Paul Gauger	Sareh Parangi
2016-2017	Peter Angelos	Samuel Snyder	Rebecca S. Sippel	Cord Sturgeon	Sareh Parangi
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2014-2015	Gerard Doherty	William B. Inabnet, III	Nancy D. Perrier	Cord Sturgeon	
2013-2014	Sally E. Carty	Julie Ann Sosa	Nancy D. Perrier	Herbert Chen	
2012-2013	Miguel F. Herrera	Allan Siperstein	Nancy D. Perrier	Herbert Chen	
2011-2012	Ashok R. Shaha	Thomas J. Fahey, III	Peter Angelos	Herbert Chen	
2010-2011	Douglas B. Evans	Gerard M. Doherty	Peter Angelos	Steven K. Libutti	
2009-2010	Janice L. Pasieka	Jeffrey E. Lee	Peter Angelos	Steven K. Libutti	
2008-2009	Michael J. Demeure	Jeffrey F. Moley	Sally E. Carty	Steven K. Libutti	
2007-2008	Geoffrey B. Thompson	Terry C. Lairmore	Sally E. Carty	Douglas B. Evans	
2006-2007	Christopher R. McHenry	John B. Hanks	Sally E. Carty	Douglas B. Evans	
2005-2006	Robert Udelsman	Collin J. Weber	Janice L. Pasieka	Douglas B. Evans	
2004-2005	John A. Kukora	Andrew W. Saxe	Janice L. Pasieka	Geoffrey B. Thompson	
2003-2004	Paul LoGerfo	Ashok R. Shaha	Janice L. Pasieka	Geoffrey B. Thompson	
2002-2003	Quan-Yang Duh	Gary B. Talpos	Christopher R. McHenry	Geoffrey B. Thompson	

Year	President	Vice President	Secretary	Recorder	Treasurer
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2000-2001	Barbara K. Kinder	Martha A. Zeiger	Christopher R. McHenry	Michael J. Demeure	
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1998-1999	George L. Irvin, III	Barbara K. Kinder	Paul LoGerfo	Quan-Yang Duh	
1997-1998	Blake Cady	E. Christopher Ellison	Paul LoGerfo	Quan-Yang Duh	
1996-1997	Jon A. van Heerden	George L. Irvin, III	Jay K. Harness	Quan-Yang Duh	
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1994-1995	John M. Monchik	Jon A. van Heerden	Jay K. Harness	George L. Irvin, III	
1993-1994	Orlo H. Clark	Glen W. Geelhoed	Blake Cady	George L. Irvin, III	
1992-1993	Robert C. Hickey	Patricia J. Numann	Blake Cady	Robert D. Croom, III	
1991-1992	Stuart D. Wilson	Joseph N. Attie	Blake Cady	Robert D. Croom, III	
1990-1991	Caldwell B. Esselstyn	Brown M. Dobyns	Richard A. Prinz	Robert D. Croom, III	
1989-1990	Colin G. Thomas, Jr.	Carl R. Feind	Richard A. Prinz	Jon A. van Heerden	
1988-1989	John R. Brooks	Melvin A. Block	Richard A. Prinz	Jon A. van Heerden	
1987-1988	Edward Paloyan	Caldwell B. Esselstyn	Stuart D. Wilson	Jon A. van Heerden	
1986-1987	Oliver Beahrs	Robert C. Hickey	Stuart D. Wilson		
1985-1986	Chiu-An Wang	Edward Paloyan	Stuart D. Wilson		
1984-1985	Leonard Rosoff	John M. Monchik	Stuart D. Wilson		
1983-1984	Stanley R. Friesen	John A. Palmer	John M. Monchik		
1982-1983	Edwin L. Kaplan	Blake Cady	John M. Monchik		
1981-1982	Norman W. Thompson	Orlo H. Clark	John M. Monchik		
1980-1981	Norman W. Thompson	Orlo H. Clark	John M. Monchik		

OLIVER COPE MERITORIOUS ACHIEVEMENT AWARD

In April of 1984 at the American Association of Endocrine Surgeons Meeting in Kansas City, Drs. Edward Kaplan, Jack Monchik, Leonard Rosoff, Norman Thompson and Stuart Wilson proposed to the Council a new achievement award. The award honors a member of the AAES in recognition for contributions in the field of endocrine surgery as an investigator, teacher and clinical surgeon. It is not an annual award but is to be given to members of our Association who truly aspire to the spirit of this award.

On April 15, 1985 at the annual meeting of the AAES in Toronto, our President, Leonard Rosoff announced the first member to receive this award, Dr. Oliver Cope. In giving this award to Dr. Cope the decision of the Council was that from this day forward the award would be known as the Oliver Cope Meritorious Achievement Award for the American Association of Endocrine Surgeons.

Oliver Cope, MD
Professor of Surgery, Harvard University and the Massachusetts General Hospital
Awarded in Ontario in April 1985.

Stanley R. Friesen, MD, PhD
Professor of Surgery, University of Kansas
Awarded in Detroit, MI in April 1994.
Dr. Friesen served as the President of our Association in 1983-1984.

Norman W. Thompson, MD
Henry King Ransom Professor of Surgery, University of Michigan
Awarded in Atlanta, GA in April 2001.
Dr. Thompson served as our inaugural President from 1980-1982.

Jon A. van Heerden, MD
Professor of Surgery Mayo Clinic
Awarded in Charlottesville, NC in April 2004.
Dr. van Heerden served as our Recorder from 1987-1990, as our Vice-President in 1994-1995, and as President in 1996-1997.

Orlo H. Clark, MD
Professor of Surgery, UCSF Mount Zion Medical Center
Awarded in New York, NY in May 2006.
Dr. Clark served as our inaugural Vice-President from 1980-1982, and as President in 1993-1994.

Edwin L. Kaplan, MD
Professor of Surgery, University of Chicago
Awarded in Madison, WI in May 2009.
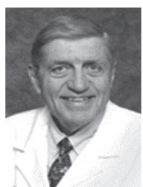Dr. Kaplan served as our President in 1982-1983.

George L. Irvin, III, MD
Professor Emeritus of Surgery, University of Miami
Awarded in Pittsburgh, PA in April 2010.
Dr. Irvin served as our Recorder from 1993-1996, as
Vice-President in 1996-1997, and as President in 1998-
1999.

Stuart D. Wilson, MD
Professor Emeritus of the Department of Surgery,
Medical College of Wisconsin Awarded in Baltimore, MD
in April 2016.
Dr. Wilson served as our Secretary-Treasurer from 1984-
1988 and President in 1991-1992.

Quan-Yang Duh, MD
University of California San Francisco
Awarded in Los Angeles, CA in April 2019.
Dr. Duh served as our Recorder from 1996-1999 and
President in 2002-2003.

Janice Pasieka, MD
University of Calgary
Awarded virtually in April 2021
Dr. Pasieka served as our Secretary-Treasurer from
2003-2006 and President from 2009-2010.

Ashok Shaha, MD
Memorial Sloan Kettering Cancer Center
Awarded in Birmingham, AL in April 2023
Dr. Shaha served as our Vice President from 2003-2004
and President from 2011-2012

AAES MEMBERS OF DISTINCTION

**Individuals who have made outstanding contributions
to the discipline of Endocrine Surgical Disease:**

J. Aidan Carney, MD, PhD, FRCPI, FRCP - Pathologist

Stuart D. Flynn, MD - Pathologist

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Akira Miyauchi, MD, PhD – Surgeon

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Histochemist

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William F. Young, MD, MSc – Endocrinologist

RESIDENT/FELLOW PODIUM & POSTER COMPETITION WINNERS

The AAES Resident/Fellow Podium Competition was established in 1990 to encourage interest in endocrine surgery by those training as students and residents or fellows in general surgery. Presented work may be honored in either the Clinical or Basic Research categories. The AAES Poster Competition was established in 2007. The most recent competition winners are shown below. For a complete list of past winners, visit www.endocrinesurgery.org/competition-awards

2024

PODIUM: Rajam Raghunathan, MD - New York University, Grossman School of Medicine
"Can Large Language Models Address Unmet Patient Information Needs and Reduce Provider Burnout in the Management of Thyroid Disease?"

PODIUM: Christopher Carnabatu, MD - UT Southwestern
"Avoidable Biopsies? Validating computer-aided diagnosis (CAD) software in indeterminate thyroid nodules"

POSTER: Jordan Broekhuis, MD - Beth Israel Deaconess Medical Center
"An Assessment of Risk Factors for Bankruptcy Among Thyroid Cancer Patients in Massachusetts"

POSTER: Daniel Chopyk, MD, PhD - The Ohio State University
"Single-nuclei RNA sequencing of Adrenocortical Carcinoma Identifies Replication Stress and ATR Dependency"

2023

PODIUM: Omair Shariq, MD – Mayo Clinic
"Primary Hyperparathyroidism in Patients with Multiple Endocrine Neoplasia Type 1: Impact of Genotype and Surgical Approach on Long-term Postoperative Outcomes"

PODIUM: Grayson Gimblet, BS – University of Alabama at Birmingham
"Thyroid Stimulating Hormone (TSH) Receptor as a Target for Imaging of Thyroid Cancer"

PODIUM - HEALTH EQUITY: **Maeve Alterio, BS** – WSU Elson S. Floyd College of Medicine
"Who Serves Where: A Geospatial Analysis of Access to Endocrine Surgeons in the United States and Puerto Rico"

POSTER: Alexis Antunez, MD, MS – Brigham and Women's Hospital
"Cancer-related Fear and Worry in Patients with Low-Risk Thyroid Cancer: A Longitudinal Study"

POSTER: Rachael Guenter, PhD – University of Alabama at Birmingham
"Understanding Transcriptional Regulations of Notch3 Signaling in Pancreatic Neuroendocrine Tumor Cells"

All past awardees can be viewed online at
www.endocrinesurgery.org/competition-awards

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MEDICAL STUDENT MEMBERS

Diana Hla
Leilani Lopez-Haslam

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Thank you to all of our members who have generously donated to the AAES Foundation. Your contributions help support critical activities like Endocrine Surgery University, fantastic programming such as the Clark, Wilson, and Zeiger Lectures, as well as supporting and recognizing cutting-edge research through the LoGerfo Award and ThyCa Awards and scientific research prizes. With your help, the Foundation will support even more activities in the future. The Foundation recognizes cumulative lifetime giving according to these categories:

Rhino: $2,500

Thompson Fellow: $10,000

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As of March 31, 2025, the following individuals and organizations have made contributions to the AAES Foundation. An asterisk (*) indicates a pledge is in the process of being fulfilled.

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www.aaesfoundation.org

PAST MEETINGS

The AAES Annual Meeting has been hosted in cities throughout the U.S., Canada, Latin America and elsewhere around the world since the first meeting in 1980. For a complete, historical list of all past AAES Annual Meeting locations, visit www.endocrinesurgery.org/past-meetings.

2024 **Dallas, Texas**
Local Arrangements Co-Chairs:
Ana Islam and Sarah Oltmann

2023 **Birmingham, Alabama**
Local Arrangements Co-Chairs:
Brenessa Lindeman and Jessica Fazendin

2022 **Cleveland, Ohio**
Local Arrangements Chair:
Vikram D. Krishnamurthy

2021 **Virtual**
Program Chair:
Carrie Cunningham

2020 Canceled due to COVID-19 pandemic

2019 **Los Angeles, California**
Local Arrangements Co-Chairs:
Michael Yeh, Masha Livhits

2018 **Durham, North Carolina**
Local Arrangements Co- Chairs:
Sanziana Roman, Julie Ann Sosa

2017 **Orlando, Florida**
Local Arrangements Chair:
Mira Milas

2016 **Baltimore, Maryland**
Local Arrangements Chair:
John A. Olson, Jr.

2015 **Nashville, Tennessee**
Local Arrangements Chair:
Carmen Solórzano

2014 **Boston, Massachusetts**
Local Arrangements Chair:
Richard A. Hodin

2013 **Chicago, Illinois**
Local Arrangements Chair:
Peter Angelos

2012 **Iowa City, Iowa**
Local Arrangements Chair:
Ronald Weigel

2011 **Houston, Texas**
Local Arrangements Chair:
Nancy D. Perrier

2010 **Pittsburgh, Pennsylvania**
Local Arrangements Chair:
Sally E. Carty

2009 **Madison, Wisconsin**
Local Arrangements Chair:
Herbert Chen

2008 **Monterey, California**
Local Arrangements Chair:
Quan-Yang Duh

2007 **Tucson, Arizona**
Local Arrangements Chair:
Michael J. Demeure

2006 **New York, New York**
Local Arrangements Chair:
Ashok R. Shaha

2005 **Cancun, Mexico**
Local Arrangements Chair:
Miguel F. Herrera

2004 **Charlottesville, Virginia**
Local Arrangements Chair:
John B. Hanks

PANEL SESSIONS

Attendees are welcome to attend any sessions unless specifically stated.

Lunch Session: Treatment of Thyroid Cancer in the Era of Targeted Agents

Saturday, May 17, 2025, 12:30 PM – 1:30 PM

This multidisciplinary panel of experts will discuss mutational testing and targeted treatments for poorly differentiated, anaplastic, and medullary thyroid cancer in the neoadjuvant and adjuvant settings. The timing and conduct of surgery for these cancers will be discussed and a case discussion will provide practical tips for management of these patients.

Breakfast Session: Using the EHR to Optimize Surgical Care

Sunday, May 18, 2025, 7:00 AM – 8:00 AM

This session will delve into the ways surgeons can leverage technology to improve care of patients with endocrine disease, derive more value from their hospital systems, and improve patient and provider wellness. In this interactive session, the audience will participate via a web-based polling system to give speakers and moderators real-time feedback about the content presented.

Panel Session: The Challenges of Reoperative Parathyroid Surgery

Sunday, May 18, 2025, 9:30 AM – 10:30 AM

Parathyroid surgery can be some of the most fun and rewarding surgeries we do, but they can also be some of the most challenging. When a first parathyroid operation has failed to cure the disease, the challenges of a reoperative parathyroidectomy can be daunting. In this interactive case based panel discussion, learn from the experts on how they approach reoperative parathyroid cases and what adjuncts and tips and tricks they use to maximize their success rates.

Panel Session: Collaborative Efforts to Improve Quality

Sunday, May 18, 2025, 1:45 PM – 2:45 PM

This session will explore the concept of quality in endocrine surgery. We will discuss key quality metrics, measurement tools, and the critical role of multidisciplinary collaboration in enhancing quality outcomes.

Panel Session: Streamlining Perioperative Care in Endocrine Surgery: Real-World Implementation Strategies for Success

Monday May 19, 2025, 11:20 AM – 12:30 PM

Join us for a dynamic discussion with experts who have successfully implemented innovative strategies to optimize perioperative care in endocrine surgery. This panel will explore cutting-edge, real-world approaches focusing on implementation strategies to improve patient outcomes, standardizing care, and enhancing efficiency.

SPECIAL TOPIC BREAKOUT SESSIONS

These sessions are new for the 2025 Meeting. Pre-registration is required.

Starting a Robotic Adrenalectomy Program

Saturday, May 17, 2025, 11:15 AM – 12:15 PM

In this panel session, you will hear from endocrine surgeons in various stages of practice who will describe their experiences in developing a robotic adrenalectomy program. The panel will discuss the advantages and challenges of bringing this surgical approach to your institution. Key themes will include training considerations and program integration into daily practice. The panel features speakers from diverse practice settings who will review the essential success strategies and common pitfalls to equip surgeons with the tools necessary to start their own robotic adrenalectomy program.

Should I Invest in Parathyroid Autofluorescence Technology

Saturday, May 17, 2025, 2:45 PM – 3:45 PM

This session will feature two experts sharing their perspectives and experience with this technology. Expert surgeons will share their insights on how they are currently utilizing parathyroid autofluorescence, limitations they have encountered, cost considerations, and challenges related to implementing it in clinical practice. Hear practical advice for integrating this technology into everyday use.

Integrating an APP Into Your Practice

Sunday, May 18, 2025, 7:45 AM – 8:45 AM

This session will offer perspectives from those in academic and multidisciplinary community-based academic practices. Our panelists will share their experiences around identifying the need for an APP, the hiring process, integration into office and OR settings, salary and benefits, reimbursement considerations, and long-term retention. Expect a candid conversation on both the successes and challenges of maintaining APPs in surgical practice.

Lobectomy vs. Total Thyroidectomy – The Debate Goes On

Sunday, May 18, 2025, 11:15 AM – 12:15 PM

In this engaging sixty-minute session, we will explore best practices for determining the extent of surgery for indeterminate and malignant thyroid nodules. Our expert panelists will discuss their insights and experiences in both the community and academic settings, focusing on the pre-operative, intra-operative, and post-operative findings that influence their preferred approach. This session will be a case-based format with real-life scenarios as well as an open forum for lively debate and discussion.

Making the Most of Your RFA Program: Tips and Tricks

Sunday, May 18, 2025, 1:45 PM – 2:45 PM
In this informal session, meet with two experts from academic and private practices who will share their unique perspectives on optimizing and growing an RFA program at your institution with a focus on lessons learned along their journeys with this burgeoning technology. Participants are encouraged to bring specific business plans and/or questions that they would like addressed, and to be prepared to engage in active discussion.

Securing Funding for Your Research Program

Sunday, May 18, 2025, 2:45 PM – 4:15 PM
In this session, we will discuss research funding opportunities, including NIH, society, philanthropic, intramural, and other funding options. Following the didactic sessions, participants will work in small groups along with dedicated faculty with expertise in health outcomes, basic, and translational research to review and refine specific aims. Participants are encouraged to bring a Specific Aims page for personalized feedback. This session will be 90 minutes in length.

UCSF CAROL & ORLO H. CLARK DISTINGUISHED LECTURE IN ENDOCRINE SURGERY

Jackie Seibel BS, MFC
Vice President of Product Development and Quality Sartori Company

Saturday, May 17, 2025 at 1:45 PM

Jackie Seibel is a dynamic professional in the food industry, recognized for her expertise in cheese product development and dairy innovation. Jackie has spent her career in the dairy industry and is currently working for Sartori Cheese, where she strives to live up to Sartori's Mission of delivering the "Best Cheese in the World" to consumers. Jackie leads a team of R&D professionals and Master Cheesemakers who work to craft premium cheeses that consistently exceed consumer expectations and set industry benchmarks.

Jackie holds a bachelor's degree in food science from the University of Minnesota-Twin Cities and a master's degree in food science from the University of Wisconsin-Madison, where she developed a strong foundation in food technology and dairy science. In addition to her industry role, Jackie serves as an adjunct professor at Mount Mary University, where she shares her knowledge and passion for food science with the next generation of professionals. Her commitment to education is evident in her engaging teaching style, dedication to mentoring students, and focus on growing her team at Sartori.

Jackie and her husband, Andy, have 2 children. While Jackie is originally from Minnesota, her Wisconsin-raised husband helped her become the "cheesehead" that she is today!

UCSF CAROL & ORLO H. CLARK DISTINGUISHED LECTURE AT PRIOR MEETINGS

2024   **Professor Jad Abumrad,** Distinguished Professor of Research at Vanderbilt University
How to Talk to a Human

2023   **Keith S. Heller, MD,** Retired, Professor of Surgery at NYU Langone Medical Center
Listening to our Artists

2022   **Thomas J. Giordano, MD, PhD,** University of Michigan
What Have We Learned From the Genomic Investigation of Endocrine Tumors?

2021   **André Lacroix, M.D., FCAHS, MD,** Centre hospitalier de l'Université de Montréal (CHUM)
Aberrant regulation of cortisol and aldosterone secretion in adrenal tumors and hyperplasias

2019   **Selwyn M. Vickers, MD, FACS,** University of Alabama School of Medicine
Relationships and Resilience: Lessons Learned from Mentors and Heroes

2018   **Julie Freischlag, MD FRCS,** Wake Forest University
Breakthrough to Brave

2017   **Jack A. Gilbert, PhD,** University of Chicago
Thyroid Cancer and the Microbiome

2016   **Steven A. Rosenberg, MD, PhD,** National Cancer Institute and George Washington University
The Curative Potential of T-cell Transfer Immunotherapy for Patients with Metastatic Cancer

2015   **Gary Hammer, MD, PhD,** University of Michigan
Translating Adrenal Stem Cells: Implications for Adrenal Disease

2014   **Yuri E. Nikiforov, MD, PhD,** University of Pittsburgh School of Medicine
Progress in Genomic Markers for Thyroid Cancer: How Does if Affect Patient Management?

2013   **Anders O.J. Bergenfelz, MD, PhD,** Lund University Hospital
Quality Control in Clinical Practice and Postgraduate Education in Endocrine Surgery

2012   **Atul A. Gawande, MD, MPH,** Brigham and Women's Hospital
Strategies for Improving Surgical Performance

2011   **Allan H. (Bud) Selig,** 9th Commissioner of Major League Baseball
Major League Baseball – 2011 Economic and Health Related Issues

2010   **Alexander J.B. McEwan, MB,** University of Alberta
The State of the Art of Radionucleotide Imaging and Therapy in Patients with Neuroendocrine Tumors

2009   **Jeffrey M. Trent, PhD,** Translation Genomics Research Institute
Genomics, and Biology Towards a More Personalized Medicine

2008   **F. John Service, MD, PhD,** Mayo Clinic
Hypoglycemia in Adults – 80th Anniversary of Hyperinsulinism

2007   **Virginia A. LiVolsi, MD,** University of Pennsylvania
Thyroid Nodule FNA and Frozen Section: Partners or Adversaries

2006   **Michael Bliss, PhD,** University of Toronto
Harvey Cushing and Endo- Criminology

2005   **David Duick, MD,** Phoenix, Arizona
Thyroid Nodules and Mild Primary Hyperparathyroidism: Examples of Clinical Perplexities or Unresolvable Conundrums

2004   **Edward R. Laws Jr, MD**, University of Virginia
The Diagnosis and Management of Cushing's Disease

2003   **Sissy M. Jhiang, MD**, The Ohio State University
Lessons From Thyroid Cancer: Genetics and Gene Therapy

2002   **William F. Young Jr., MD**, Mayo Clinic
Adrenal-Dependent Hypertension: Diagnostic Testing Insights

2001   **Andrew F. Stewart, MD**, University of Pittsburg
Parathyroid Hormone-Related Protein: From Hypercalcemia of Malignancy to Gene Therapy from Diabetes

2000   **James Shapiro, MD**, University of Alberta
Pancreatic Islet Cell Transplantation

1999   **James Hurley, MD**, Cornell University
Post-Operative Management of Differentiated Thyroid Cancer

1998   **Susan Leeman, PhD**, Boston University
The NeuroPeptides: Substance P and Neurotensin

1997   **Bertil Hamberger, MD, PhD**, Karolinska Institute
The Nobel Prize

1996   **Victor E. Gould, MD**, Rush-Presbyterian-Medical Center
The Diffuse Neuroendocrine System: Evolution of the Concept and Impact on Surgery

1995   **Ivor M.D. Jackson, MD**, Providence, Rhode Island
Regulation of TSH Secretion: Implications for Disorders of the Thyroid Function

1994   **Gordon J. Strewler, MD**, San Francisco, California
The Parathyroid Hormone Related Protein: Clinical and Basic Studies of a Polyfunctional Protein

1993   **John L. Doppman, MD**, National Institutes of Health
Recent Advances in Endocrinologic Imaging

1992   **Donald Coffey, PhD**, Bethesda, Maryland
New Concepts Concerning Cancer

1991   **Gregory B. Bulkley, MD**, Johns Hopkins University
Endothelial Xanthine Oxidase: A Radical Transducer of Signals and Injury

MEDICAL COLLEGE OF WISCONSIN-STUART D. WILSON, M.D. HISTORICAL LECTURE

Jason Pinchot, MD
Associate Professor (CHS) of Radiology
University of Wisconsin School of Medicine
and Public Health

Sunday, May 18, 2025, 8:45 AM

Dr. Jason Pinchot is an Associate Professor (CHS) of Radiology in the Interventional Imaging Section. He received his medical degree from the Medical College of Wisconsin in 2004. During his internship at St. Joseph's Regional Medical Center in Milwaukee, Wisconsin he received the Distinguished First Year Resident Award. He went on to complete residency training in Diagnostic Radiology at the Indiana University School of Medicine and was board certified by the American Board of Radiology in 2009. He joined the faculty at the University of Wisconsin–Madison in 2010 after completing a vascular and interventional radiology fellowship at the Medical College of Wisconsin in Milwaukee, Wisconsin.

Dr. Pinchot's clinical and research interests include minimally invasive oncologic interventions (including Y-90 radioembolization and transarterial chemoembolization), image-guided tumor ablation, uterine fibroid embolization, and biliary interventions. He is an expert in both Adrenal Venous Sampling and Parathyroid Venous Sampling and has trained providers from around the country in these techniques. He has been an important clinical partner for the endocrine surgery team at the University of Wisconsin and serves as an adjunct faculty member for the endocrine surgery fellowship training program. Outside of work, he enjoys running, gourmet cooking, and international travel. Having grown up in Chicago, he is an avid Cubs, Bears, Bulls, and Blackhawks fan.

MEDICAL COLLEGE OF WISCONSIN-STUART D. WILSON, M.D. HISTORICAL LECTURE AT PRIOR MEETINGS

2024   **Janice Pasieka, MD FRCSC FACS,** University of Calgary
Pancreatic Neuroendocrine Tumours and the Surgical Endocrinologist: Learning the History to Preserve the Legacy

2023   **William R. Rainey, PhD,** University of Michigan
Historic and Cellular Origins of Primary Aldosteronism

2022   **Christopher McHenry, MD,** MetroHealth
A Historical Look at Cleveland: Its Healthcare Institutions and Contributions to Endocrine Surgery

2021   **Clifford Ko, MD, MS, MSHS, FACS, FASCRS,** American College of Surgeons
Evaluating and Achieving Surgical Quality in 2021

2019   **James McClintock, MD,** University of Alabama at Birmingham
From Penguins to Plankton - the Dramatic Impacts of Climate Change on the Antarctic Peninsula

2018   **John L. Cameron, MD,** John Hopkins Hospital
William Stewart Halsted; Our Surgical Heritage (Also an Endocrine Surgeon!)

2017   **David L. Nahrwold, MD,** Northwestern University
Surgery, Surgeons and their College

2016   **Samuel A. Wells, Jr., MD,** National Cancer Institute
The Diagnosis and Treatment of Thyroid Cancer: A Historical Perspective

2015   **Robert Beazley, MD,** Boston University School of Medicine
The Glands of Owen...Who Was Owen?

2014   **Patricia J. Numann, MD,** SUNY Upstate Medical University
Ode to an Indian Rhinoceros

2013   **Orlo H. Clark, MD,** University of California, San Francisco
Recognition of Endocrine Glands and Abnormalities by Artists and Surgeons

       Wen T. Shen, MD, MA, University of California, San Francisco
From 'Kindred Spirits' to the Social Network

2012   **Murray F. Brennan, MD,** Memorial Sloan-Kettering Cancer Center
Re-Operative Parathyroid Surgery Circa 1975

2011   **Jon A. van Heerden, MD,** Medical University of South Carolina
Pheochromocytoma Resection: Now and Then

2010   **Norman W. Thompson, MD,** University of Michigan
The Time Was Right

2009   **Edwin L. Kaplan, MD,** University of Chicago
Radiation Induced Thyroid Cancer – A Chicago Experience

ANNUAL MEETING INFORMATION

ACCREDITATION

PROGRAM OBJECTIVES

This activity is designed for all endocrine surgeons seeking the latest developments in endocrine surgical technique and related research. The intent of the program is to improve the quality of patient care and improve overall patient safety. Audience participation and interaction will be encouraged. The content and format of the program have been determined based on evaluations and suggestions of attendees of previous programs.

At the completion of this activity, attendees will be able to:

1. Recognize the impact of social determinants of health in the diagnosis and management of endocrine diseases.

2. Describe the feasibility and outcomes of newly developed protocols, techniques, and guidelines in the management of thyroid, parathyroid, adrenal, and GI neuroendocrine diseases

3. Compare and contrast protocols for the management of thyroid, parathyroid and adrenal diseases.

Award of CME credits by ACS is based on compliance of the program with the ACCME accreditation requirements and does not imply endorsement by ACS of the content, the faculty, or the sponsor of the program.

Successful completion of this CME activity, which includes participation in the evaluation component, enables the learner to earn credit toward the CME and Self-Assessment requirements of the American Board of Surgery's Continuous Certification program.

CONTINUING MEDICAL EDUCATION CREDIT INFORMATION

Accreditation

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of American College of Surgeons and American Association of Endocrine Surgeons. The American College of Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

AMA PRA Category 1 Credits™

The American College of Surgeons designates this live activity for a maximum of 21.75 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Of the *AMA PRA Category 1 Credits*™ listed above, a maximum of **6.50** credits meet the requirements for Self-Assessment.

CME CERTIFICATES AND EVALUATIONS

You may complete your attendance verification, meeting evaluation and self-assessment posttest online. You will receive your electronic CME certificate after completing the evaluation and posttests. Your final CME hours will be submitted to the ACS. Members of the ACS will have their credits posted to the ACS website around 30 days post-activity if your ACS number is provided.

The website to claim your CME credits will be emailed to all Meeting attendees.

Credit Summary	CME	Self-Assessment
May 16, 2025		
Advanced Course: Mastery of Thyroid and Parathyroid Surgery	4.50	
May 17, 2025		
Opening Session	0.75	
Scientific Session 1 with Distinguished Moderator	1.50	1.50
Lunch Session: Management of Advanced Thyroid Cancer in the Era of Targeted Agents	1.00	
UCSF Carol & Orlo H. Clark Distinguished Lecture	0.75	
Scientific Session 2	1.00	1.00
Presidential Address	1.00	
May 18, 2025		
Breakfast Session: Using EHR to Optimize Surgical Care	1.00	
Scientific Session 3 with Distinguished Moderator	0.75	0.75
MCW Stuart D. Wilson, M.D. Historical Lecture	0.75	
Panel Session: The Challenges of Re-operative Parathyroid Surgery	1.00	
Scientific Session 4	1.00	1.00
Panel Session: Collaborative Efforts to Improve Quality	1.00	
Scientific Session 5 with Distinguished Moderator	1.00	1.00
Interesting Cases Session	1.50	
May 19, 2025		
Scientific Session 6	0.75	0.75
Poster Spotlight Session	0.75	
Scientific Session 7	0.50	0.50
Panel Session: Streamlining Perioperative Care in Endocrine Surgery: Real-World Implementation Strategies for Success	1.25	

DISCLOSURE INFORMATION

In accordance with the ACCME Accreditation Criteria, the American College of Surgeons must ensure that anyone in a position to control the content of the educational activity (planners and speakers/authors/discussants/moderators) has disclosed all financial relationships with any commercial interest (termed by the ACCME as "ineligible companies", defined below) held in the last 24 months (see below for definitions). Please note that first authors were required to collect and submit disclosure information on behalf all other authors/contributors, if applicable.

Ineligible Company: The ACCME defines a "commercial interest" as any entity producing, marketing, re-selling, or distributing health care goods or services used on or consumed by patients. Providers of clinical services directly to patients are NOT included in this definition.

Financial Relationships: Relationships in which the individual benefits by receiving a salary, royalty, intellectual property rights, consulting fee, honoraria, ownership interest (e.g., stocks, stock options or other ownership interest, excluding diversified mutual funds), or other financial benefit. Financial benefits are usually associated with roles such as employment, management position, independent contractor (including contracted research), consulting, speaking and teaching, membership on advisory committees or review panels, board membership, and other activities from which remuneration is received, or expected. ACCME considers relationships of the person involved in the CME activity to include financial relationships of a spouse or partner.

Conflict of Interest: Circumstances create a conflict of interest when an individual has an opportunity to affect CME content about products or services of a commercial interest with which he/she has a financial relationship.

The ACCME also requires that ACS manage any reported conflict and eliminate the potential for bias during the educational activity. Any conflicts noted below have been managed to our satisfaction. The disclosure information is intended to identify any commercial relationships and allow learners to form their own judgments. However, if you perceive a bias during the educational activity, please report it on the evaluation.

Program Committee	Nothing to Disclose	Disclosure		
		Company	Role	Received
Abbey Fingeret	X			
Aditya Shirali	X			
Barbra S. Miller	X			
Brendan Finnerty	X			
Colleen Kiernan	X			
Erin Felger	X			
James Broome		Corcept Therapeutics	Thought Leader/ Liaison/ Advisor	Honorarium
Mahsa Javid	X			
Paxton Dickson	X			
Peter Abraham	X			
Philip I. Haigh	X			
Rachel Kelz	X			
Rebecca Sippel	X			
Sarah Oltmann	X			
Toni Beninato	X			

Speakers/ Moderators/ Discussants	Disclosure		
	Company	Role	Received
Anat BenShlomo	1. AstraZenica	1. Other	1. Research Funding
Michael Campbell	1. Pfizer 2. Pfizer 3. Exelixis 4. Exelixis 5. Eisai 6. AstraZenica 7. MJH Life Sciences 8. Curio Sciences 9. Dava Oncology	1. Research Partner 2. Consultant 3. Consultant 4. Other 5. Consultant 6. Other 7. Speaker 8. Speaker 9. Speaker	1. Research Funding 2. Honoraria 3. Consulting Fee 4. Research Funding 5. Honoraria 6. Research Funding 7. Honoraria 8. Honoraria 9. Honoraria
Mark S. Cohen	1. WideAwakeVR, Inc 2. HylaPharm, Inc 3. Innovative Consulting, LLC 4. GigXR, Inc 5. Pathware, Inc 6. REGENDO Corporation 7. Ferroximend, LLC	1. Consultant 2. Owner 3. Owner 4. Consultant 5. Consultant 6. Owner 7. Owner	1. Owner equity 2. Owner equity 3. Owner equity 4. Owner equity 5. Owner equity 6. Owner equity 7. Owner equity

SPEAKERS/ MODERATORS/ DISCUSSANTS	DISCLOSURE		
	COMPANY	ROLE	RECEIVED
Carrie Cunningham	3M	Consultant	Consulting Fee
Dawn Elfenbein	2nd MD	Consultant	Consulting Fee
Thomas J. Fahey III	1. Veracyte 2. Interpace	1. Speaker 2. Consultant	1. Honoraria 2. Consulting Fee
Pouneh Fazel	1. Regeneron 2. Camurus 3. Crinetics 4. Crinetics 5. Chiesi 6. Quest 7. Corcept Therapeutics	1. Consultant 2. Consultant 3. Consultant 4. Research Partner 5. Consultant 6. Research Partner 7. Research Parter	1. Consulting Fees 2. Consulting Fees 3. Consulting Fees 4. Research Funding 5. Consulting Fees 6. Research Funding 7. Research Funding
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Shih-hao Lee	Intuitive Surgical	Other	Other
Chih-Yi Liao	1. AstraZeneca 2. Incyte 3. Taiho 4. Exelixis 5. Boston Scientific	1. Consultant 2. Speaker 3. Consultant 4. Consultant 5. Speaker	1. Honoraria 2. Honoraria 3. Honoraria 4. Honoraria 5. Honoraria
Amin Madani	J&J	Consultant	Consulting Fees
C. Daniel Mullins	1. Bayer 2. Rocket 3. Takeda	1. Consultant 2. Consultant 3. Consultant	1. Consulting Fees 2. Consulting Fees 3. Consulting Fees
Naoyoshi Onoda	1. Eisai 2. Novartis 3. Bayer 4. Lilly	1. Speaker 2. Speaker 3. Speaker 4. Speaker	1. Honoraria 2. Honoraria 3. Honoraria 4. Honoraria
Jason Presott	Johnson and Johnson	Consultant	Consulting Fees
Marco Raffaelli	1. Medtronic 2. Ab Medica/Intuitive	1. Consultant 2. Consultant	1. Consulting Fees 2. Consulting Fees
Julie A Sosa	1. Exelixis and Eli Lilly 2. Novo Nordisk, Astra-Zeneca	1. Research Partner 2. Other	1. Research Funding 2. Consulting Fees

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	COMPANY	ROLE	RECEIVED
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Ching-Wei D Tzeng	1. PanTher 2. Iota	1. Consultant 2. Consultant	1. Consulting Fees 2. Consulting Fees
Brian Untch	Kura	Owner	Other
Steven Waguespack	Bayer	Consultant	Consulting Fees
Mingzhao Xing	Johns Hopkins University	Other	Other
Mark Zafereo	1. Eli Lilly 2. Merck 3. Exelixis	1. Other 2. Other 3. Other	1. Research Funding 2. Research Funding 3. Research Funding
Catherine Zhang	Recordati	Speaker	Honoraria
Feibi Zheng	Intuitive Surgical	Other	Other

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AGENDA

THURSDAY, MAY 15, 2025

7:45 AM – 5:00 PM	Endocrine Surgery University (Invitation only) *Satellite Symposia – No CME Credit Provided*
6:30 PM – 8:30 PM	Endocrine Surgery University, Fireside Chat Dinner (Invitation only)

FRIDAY, MAY 16, 2025

8:00 AM – 11:30 AM	Endocrine Surgery University, continued (Invitation only) *Satellite Symposia – No CME Credit Provided*
1:00 PM – 5:00 PM	AAES Fellows' Ultrasound Course (Invitation only)
12:30 PM - 5:00 PM	AAES Advanced Course: Mastery of Thyroid and Parathyroid Surgery (additional fee)
1:00 PM – 5:00 PM	AAES Council Meeting (Invitation only)
6:00 PM – 8:00 PM	AAES Council Dinner (Invitation only)
8:00 PM – 10:00 PM	Welcome Social (The New Fashioned)

SATURDAY, MAY 17, 2025

All program sessions will take place at the Baird Center, Grand Ballroom D unless otherwise noted

7:00 AM – 8:00 PM	New Member Breakfast (Invitation only, Room 201 B)
8:00 AM – 6:00 PM	Registration Open (Grand Ballroom Foyer)
8:00 AM – 9:30 AM	Poster Judging (Rooms 103 A, B, C, D)
10:00 AM – 11:00 AM	AAES Opening Session
11:00 AM – 12:15 PM	Scientific Session I with Distinguished Moderator (Papers 1-2, 4-6)
11:15 AM – 12:15 PM	Special Topic Breakout Session: Starting a Robotic Adrenalectomy Program (Room 103 D)
12:15 PM – 1:45 PM	Lunch Break with Sponsors & Poster Viewing
12:30 PM – 1:30 PM	Lunch Session: Treatment of Thyroid Cancer in the Era of Targeted Agents
1:45 PM – 2:30 PM	UCSF Carol & Orlo H. Clark Distinguished Lecture Jackie Seibel, BS, MFC
2:30 PM – 3:45 PM	Break with Sponsors & Poster Viewing (Grand Ballroom ABC) •2:40 PM – 2:55 PM: Product Theater: Interpace Diagnostics •3:05 PM – 3:20 PM: Product Theater: Veracyte
2:45 PM – 3:45 PM	Special Topic Breakout Session: Should I Invest in Parathyroid Autofluorescence Technology? (Room 103 D)
3:30 PM – 4:45 PM	Scientific Session II (Papers 7-11)
4:45 PM – 5:00 PM	Break
5:00 PM – 6:00 PM	Presidential Address: Rebecca Sippel, MD
6:00 PM – 7:00 PM	President's Reception (Grand Ballroom Foyer)

SUNDAY, MAY 18, 2025

6:30 AM – 4:15 PM	Registration Open
7:00 AM – 8:00 AM	Breakfast with Sponsors & Poster Viewing (Grand Ballroom ABC)

7:00 AM – 8:00AM	Breakfast Session: Using the EHR to Optimize Surgical Care
7:45 AM – 8:45 AM	Special Topic Breakout Session: Integrating an APP Into Your Practice (Room 103 D)
8:00 AM – 8:45 AM	Scientific Session III with Distinguished Moderator (Papers 12-14)
8:45 AM – 9:30 AM	MCW Stuart D. Wilson, M.D. Historical Lecture Jason Pinchot, MD
9:30 AM – 10:30 AM	Panel Session: The Challenges of Reoperative Parathyroid Surgery
10:30 AM – 11:15 AM	Break with Sponsors and Poster Viewing (Grand Ballroom ABC) •10:45 AM – 11:00 AM: Product Theater: Corcept Therapeutics
11:15 AM – 12:15 PM	Scientific Session IV (Papers 15-19)
11:15 AM – 12:15 PM	Special Topic Breakout Session: Lobectomy vs. Total Thyroidectomy – The Debate Goes On (Room 103 D)
12:15 PM – 1:45 PM	Lunch Break with Sponsors & Poster Viewing
12:30 PM – 1:30 PM	AAES Business Meeting (Active, Allied Specialist, Corresponding, and Senior members may attend)
12:30 PM – 1:30 PM	Trainee Meet & Greet (Room 103 C) (For Medical Students, Residents, and Fellows)
1:45 PM – 2:45 PM	Panel Session: Collaborative Efforts to Improve Quality
1:45 PM – 2:45 PM	Special Topic Breakout Session: Making the Most of your RFA Program: Tips and Tricks (Room 103 D)
2:45 PM – 3:50 PM	Scientific Session V with Distinguished Moderator (Papers 20-24)
2:45 PM – 4:15 PM	Special Topic Breakout Session: Securing Funding for Your Research Program (Room 103 D)
3:50 PM – 4:30 PM	Break with Sponsors and Poster Viewing (Grand Ballroom ABC) •4:00 PM – 4:15 PM: Product Theater: Pulse Biosciences
4:30 PM – 6:00 PM	Interesting Cases Session AAES Vice President, Wen T. Shen, MD, MA
7:00 PM – 11:00 PM	AAES Gala Celebration (Grand Ballroom AB) Theme: Wisconsin State Fair

MONDAY, MAY 19, 2025

7:00 AM – 10:15 AM	Registration Open
7:00 AM – 8:00 AM	Breakfast in the Exhibit Hall (Grand Ballroom ABC)
8:00 AM – 8:45 AM	Scientific Session VI (Papers 25-27)
8:45 AM – 9:30 AM	Break with Sponsors and Poster Viewing (Grand Ballroom ABC)
9:30 AM – 10:15 PM	Poster Spotlight Session (Posters 1-7)
10:15 AM – 10:45 AM	Break with Sponsors and Poster Viewing (Grand Ballroom ABC)
10:45 AM – 11:20 AM	Scientific Session VII (Papers 28-30)
11:20 AM – 12:30 PM	Panel Session: Streamlining Perioperative Care in Endocrine Surgery: Real-World Implementation Strategies for Success
12:30 PM	Meeting Adjourned

SCIENTIFIC PROGRAM

♦ Denotes Resident/Fellow Research Competition Paper
● Denotes Poster Spotlight Presentation

NOTE: Author listed in **BOLD** is the presenting author

The Scientific Program includes only sessions that are eligible for CME credit. Credit amounts for each session are listed on page 33.

SCIENTIFIC PROGRAM

Saturday, May 17, 2025

10:00 AM – 11:00 AM
AAES OPENING SESSION
- • Welcome to AAES
- • In Memoriam
- • Welcome to Milwaukee
- • AAES Foundation
- • Introduction of 2025 New Members
- • Research Award Presentations

11:00 AM – 12:15 PM
SCIENTIFIC SESSION I WITH DISTINGUISHED MODERATOR (PAPERS 1-2, 4-6)
MODERATORS:
Tracy Wang, MD, MPH, Medical College of Wisconsin
Philip I. Haigh, MD, MSc, Kaiser Permanente Los Angeles Medical Center

01. Highly-selected Sporadic, Apparently Unifocal cN0 MTC May Benefit of Unilateral Surgery. A Proof of Concept in a High-volume Institution

Leonardo Rossi[1], Antonio Matrone[2], Chiara Becucci[1], Gianluca Frustaci[1], Carlo Enrico Ambrosini[1], Benard Gjeloshi[1], Liborio Torregrossa[3], Clara Ugolini[3], Rossella Elisei[2], **Gabriele Materazzi[1]**
[1]Endocrine Surgery, University Hospital of Pisa, [2]Endocrinology, University Hospital of Pisa, [3]Pathology Unit, University Hospital of Pisa

♦**02. Multifocality in Sporadic Medullary Thyroid Carcinoma Is Associated with Low Tumor Grade and No Difference in Somatic Driver Mutations or Disease Outcomes When Compared to Unifocal Tumors**

Aradhya Nigam[1], Bin Xu[1], R Michael Tuttle[1], Richard J Wong[1], Ashok R Shaha[1], Ronald A Ghossein[1], Ian Ganly[1], Brian R Untch[1]
[1]Memorial Sloan Kettering Cancer Center

♦**03. WITHDRAWN**

♦**04. Patient Preferences in PTMC Management Are Driven by Aversion Toward Complications Rather Than Treatment Pathway**

Rebecca Kowalski[1], Kendyl Carlisle[1], Aprill N Park[2], Reuben Don[3], Salome Ricci[4], Carrie Cunningham[5], Julia F Slejko[4], C. Daniel Mullins[4], Yinin Hu[1]
[1]Department of Surgery, University of Maryland School of Medicine, [2]University of Maryland School of Medicine, [3]University of Maryland School of Pharmacy, [4]Department of Practice, Sciences, and Health Outcomes Research (P-SHOR), University of Maryland School of Pharmacy, [5]Department of Surgery, Mass General Brigham

♦**05. RNA Sequencing of Thyroid Tumors From Individuals with PTEN Hamartoma Tumor Syndrome Reveals a Unique Transcriptome with a Predominantly RAS-like Expression Profile**

Gilman Plitt[1], Takae Brewer[1], Lamis Yehia[1], Laura Rabinowitz[1], Christopher C Griffith[1], Gustavo Romero-Velez[1], Allan Siperstein[1], Charis Eng[1]
[1]Cleveland Clinic

06. Sprayable pH-sensitive Near-infrared Fluorophore for Rapid Labeling of Human Papillary Thyroid Cancer in Orthotopic Mouse Models

Sunidhi Jaiswal[1], Sohee Lee[2], Siamak Amirfakhri[1], Jinhui Ser[3], Atsushi Yamashiata[3], Satoshi Kashiwagi[3], Grace Lin[4], Robert M Hoffman[5], Hak Soo Choi[3], **Michael Bouvet[1]**

[1]Surgery, University of California San Diego and VA San Diego Healthcare System, La Jolla, CA, [2]Department of Surgery, VA San Diego Healthcare System, La Jolla, CA, University of California San Diego, La Jolla, CA, Catholic University of Korea, Seoul, Korea, [3]Gordon Center for Medical Imaging, Department of Radiology, Massachusetts General Hospital and Harvard Medical School, Boston, MA, [4]Department of Pathology, University of California, [5]Department of Surgery, University of California San Diego, La Jolla, CA, VA San Diego Healthcare System, La Jolla, CA, AntiCancer, Inc., San Diego, CA

12:30 PM – 1:30 PM
LUNCH SESSION: TREATMENT OF THYROID CANCER IN THE ERA OF TARGETED AGENTS
MODERATOR: David Hughes, MD, University of Michigan
PANELISTS: Gilbert Fareau, MD, Medical College of Wisconsin; Rosemarie Metzger, MD, University of Arizona College of Medicine/Banner University Medical Center Phoenix; Kepal Patel, MD, New York University

1:45 PM – 2:30 PM
UCSF CAROL & ORLO H. CLARK DISTINGUISHED LECTURE
Jackie Seibel, BS, MFC

3:45 PM – 4:45 PM
SCIENTIFIC SESSION II (PAPERS 7-11)
MODERATORS:
Tiffany Sinclair, MD, United Medical Doctors
Courtney Balentine, MD, MPH, University of Wisconsin-Madison

♦**07. Utilization of a Best Practice Advisory to Increase the Detection Rate of Hyperparathyroidism**
Rebecca S Gates[1], Kristin McCoy[1], Jonathan Stewart[2], Andrew J Behnke[3], Adegbenga Bankole[4], Theresa Vallia[5], Michael S Nussbaum[1], Daniel Tershak[1]
[1]General Surgery, Carilion Clinic, [2]Family Medicine, Carilion Clinic, [3]Endocrinology, Carilion Clinic, [4]Rheumatology, Carilion Clinic, [5]Health Analytics and Research Team, Carilion Clinic
♦**08. Parathyroidectomy Is Associated with Lower Mortality and Fewer Cardiac Complications in Patients with Secondary Hyperparathyroidism**
Zhixing Song[1], Sanjana Balachandra[1], Julia Kasmirski[1], Christopher Wu[1], Andrea Gillis[1], Jessica Fazendin[1], Brenessa Lindeman[1], Herbert Chen[1]
[1]University of Alabama at Birmingham
♦**09. Surgery for Normocalcemic Hyperparathyroidism Improves Quality of Life**
C. Corbin Frye[1], Zhixing Song[1], Sanjana Balachandra[1], Andrea Gillis[1], Jessica Fazendin[1], Brenessa Lindeman[1], Herbert Chen[1]
[1]The University of Alabama at Birmingham

♦10. Setting Yourself Up for Re-operative Surgical Success: Lessons Learned From a Ten-year Experience with Selective Venous Sampling for Re-operative Parathyroidectomy

Eileen R Smith[1], Elizabeth Cooper[1], Jason Pinchot[2], Rebecca S Sippel[1]
[1]*Surgery, University of Wisconsin - Madison, *[2]*Radiology, University of Wisconsin - Madison*

♦11. Concomitant Thymectomy with Parathyroidectomy in Multiple Endocrine Neoplasia type 1: Differential Impact on Post-operative Outcomes

Christine Robbie[1], **Yaser Y Bashumeel[2]**, Ahmed Abdelmaksoud[2], Mahmoud Omar[2], Mahmoud A AbdAlnaeem[2], Mohamed Shama[2], Eman Toraih[2], Emad Kandil[2]
[1]*Tulane University School of Medicine, *[2]*Division of Endocrine and Oncologic Surgery, Department of Surgery, Tulane University School of Medicine*

5:00 PM – 6:00 PM
PRESIDENTIAL ADDRESS
Rebecca Sippel, MD

Sunday, May 18, 2025

7:00 AM – 8:00 AM
BREAKFAST SESSION: USING THE EHR TO OPTIMIZE SURGICAL CARE
MODERATOR: David Schneider, MD, MS, University of Wisconsin
PANELISTS: James Suliburk, MD, Baylor College of Medicine; Rachel Kelz, MD, MSCE, MBA, University of Pennsylvania; F. Thurston Drake, MD, MPH, Boston University School of Medicine

8:00 AM – 8:45 AM
SCIENTIFIC SESSION III WITH DISTINGUISHED MODERATOR (PAPERS 12-14)
MODERATORS:
Matthew Nehs, MD, Brigham and Women's Hospital
Maureen Moore, MD, Cooper University Healthcare

♦12. Renal Function Following Adrenalectomy in Patients with Primary Aldosteronism

Kelly A Stahl[1], Kimberly M Ramonell[1], Amoghavarsha Puli[2], Pouneh Fazeli[3], Kelly L McCoy[1], Sally E Carty[1], Linwah Yip[1], Sada Alaa[1]
[1]*Surgery, University of Pittsburgh, *[2]*Nephrology, University of Pittsburgh, *[3]*Endocrinology and Metabolism, University of Pittsburgh*

♦13. A Novel Therapeutic Approach to Adrenocortical Carcinoma Repurposing Fingolimod to Target Sphingolipid Metabolism in Metastatic Disease.

Chitra Subramanian[1], Kelli McNamara[1], **Daniel Hess[1]**, Seth Wyatt Croslow[2], Yanqi Tan[2], Katja Kiseljak-Vassiliades[3], Margaret E Wierman[3], Jonathan V Sweedler[2], Mark S Cohen[1]
[1]*Carle Illinois College of Medicine, *[2]*University of Illinois Urbana Champaign, *[3]*UCHealth Diabetes and Endocrinology Clinic - Anschutz Medical Campus*

14. Adrenal Imaging Features Predictive of Histopathology: A Contemporary, Longitudinal Analysis

Kelly A Stahl[1], Sada Alaa[1], Yusuf Baytar[2], Anil Dasyam[2], Jodi

Maranchie[3], Pouneh Fazel[4], Raja Seethala[5], Kelly L McCoy[1], Linwah Yip[1], **Kimberly Ramonell[1]**

[1]*Surgery, University of Pittsburgh,* [2]*Radiology, University of Pittsburgh,* [3]*Urology, University of Pittsburgh,* [4]*Endocrinology and Metabolism, University of Pittsburgh,* [5]*Pathology, University of Pittsburgh*

8:45 AM – 9:30 AM
MCW STUART D. WILSON, M.D. HISTORICAL LECTURE
Jason Pinchot, MD

9:30 AM – 10:30 AM
PANEL SESSION: THE CHALLENGES OF REOPERATIVE PARATHYROID SURGERY
MODERATOR: Rebbeca Sippel, MD, University of Wisconsin
PANELISTS: Joyce Shin, MD, Cleveland Clinic; Carmen Solórzano, MD, Vanderbilt University Medical Center; Doug Fraker, MD, University of Pennsylvania; Jason Pinchot, MD, University of Wisconsin-Madison

11:15 AM – 12:15 PM
SCIENTIFIC SESSION IV (PAPERS 15-19)
MODERATORS:
Brian Saunders, MD, Penn State Health Milton S. Hershey Medical Center
Claire Graves, MD, University of California, Davis

♦**15. Enhancing Surgical Proficiency in Endocrine Surgery: A Proposal for the Integration of Augmented Reality and Surgical Simulation Into Resident Training**
Lauren Haskins[1], Shawn Moore[1], Kevin Anderson[2], Rui Wu[2], Walter Pofahl[1]
[1]*Surgery, East Carolina University,* [2]*Computer Science, East Carolina University*

♦**16. Easing the Burden: AI-generated Draft Responses to In-basket Messages Streamline Perioperative Endocrine Surgical Care**
Katherine R Whitehouse[1], Ryan T Heslin[1], Alexis Desir[1], Rajam Raghunathan[2], Ana K Islam[1], Sarah Lallky[1], Priscilla Philip[1], Nicole Reedy[1], Ankeeta Mehta[1], Megan Parmer[1], Marlen V Piersall[1], Sarah C Oltmann[1], Alan PB Dackiw[1], Naim M Maalouf[1], Vivek Sant[1]
[1]*University of Texas Southwestern,* [2]*McGill University*

♦**17. The Association of Community-level Social Vulnerability with Access to High-volume Endocrine Surgeons**
Marin Kheng[1], Alexander Manzella[1], Grigor Simitian[1], Amanda M Laird[2], Toni Beninato[2]
[1]*General Surgery, Rutgers Robert Wood Johnson Medical School,* [2]*Endocrine Surgery, Rutgers Cancer Institute of New Jersey*

♦**18. What PCP's Need to Improve Workup and Referral of Patients with Primary Hyperparathyroidism**
Elizabeth Huffman Cooper[1], Diana Gutierrez-Meza[2], Esra Alagoz[2], John O'Connor[1], Anjali Sanghvi[1], Rebecca Sippel[2], Alexander Chiu[2]
[1]*University of Wisconsin - Madison,* [2]*Surgery, University of Wisconsin - Madison*

♦19. Expenses and Expectations for Endocrine Surgeries: A National Analysis of Price Transparency and Cost of Care

Anthony T Saxton[1], Sabran Masoud[1], Alberto J Monreal[1], Hadiza S Kazaure[1], Michael T Stang[1], Sean Johnson[1], Marcelo Cerullo[1], Randall P Scheri[1]

[1]Duke University

1:45 PM – 2:45 PM
PANEL SESSION: COLLABORATIVE EFFORTS TO IMPROVE QUALITY
MODERATORS: Aarti Mathur, MD, PhD, Johns Hopkins University School of Medicine and Gustavo Romero-Velez, MD, Cleveland Clinic
PANELISTS: Aarti Mathur, MD, PhD, Johns Hopkins University School of Medicine; Judy Jin, MD, Cleveland Clinic; Rebecca Sippel, MD, University of Wisconsin

2:45 PM – 3:50 PM
SCIENTIFIC SESSION V WITH DISTINGUISHED MODERATOR (PAPERS 20-24)
MODERATORS:
Megan Applewhite, MD, MA, University of Chicago
Taylor Brown, MD, MHS, Washington University in St. Louis and John Cochran VA

20. Long-term Result of Phonation Status After Recurrent Laryngeal Nerve Reconstruction

Akihide Matsunaga[1], Akira Miyauchi[2], Akihiro Miya[2], Naoyoshi Onoda[2], Yasuhiro Ito[2], Minoru Kihara[2], Takuya Higashiyama[2], Hiroo Masuoka[2], Makoto Fujishima[2], Takahiro Sasaki[1], Masasi Yamamoto[1], Shiori Kawano[2], Shiori Adachi[1]

[1]Department of Head and Neck Surgery, Kuma Hospital, [2]Department of Surgery Kuma Hospital

21. Is It Possible to Predict Functional Recovery of Vocal Folds Palsy? Role of Intraoperative Neuromonitoring and Laryngostroboscopy Finding

Pierpaolo Gallucci[1], Luca Revelli[1], Francesco Pennestrì[1], Annamaria D'Amore[1], Annamaria Martullo[1], Marincola Giuseppe[1], Procopio Priscilla Francesca[1], Raffaella Marchese[1], D'Alatri Lucia[1], Carmela De Crea[1], Marco Raffaelli[1]

[1]Fondazione Policlinico Universitario Agostino Gemelli, IRCCS

♦22. A Prospective Comparison of Laryngeal Ultrasound-guided Adhesive Transcutaneous Electrodes Versus Conventional Endotracheal Electrodes for Intra-operative Neuromonitoring During Thyroid and Neck Surgery

Matrix Man Him Fung[1], Chun Chung Cheng[1], **Yan Luk**[1], Brian Lang[1]

[1]Surgery, University of Hong Kong

♦23. The Shifting Landscape of Germline RET Pathogenic Variants: A Cross-sectional Analysis of Nearly One Million Patients

Amblessed Onuma[1], Catherine B Skefos[1], Sarah Pasyar[1], Roland L Bassett[1], Brianna Bucknor[2], Mimi I Hu[1], Nancy D Perrier[1], Anastasios Maniakas[1], Mark Zafereo[1], Steven G Waguespack[1], Julie A Sosa[3], Elizabeth G Grubbs[1]

[1]MD Anderson Cancer Center, [2]Invitae Corporation, [3]University of California San Francisco

♦24. Utility of Genomics Resource for Intelligent Discovery (GRID) Molecular Profiling to Predict Aggressive Pathologic Features in Differentiated Thyroid Cancer

Justin Bauzon[1], Joyce Shin[1], Gilman Plitt[1], Rafael Perez-Soto[1], Michael S Lui[1], Jee-Hye Choi[1], Judy Jin[1], Vikram Krishnamurthy[1], Eren Berber[1], Katherine B Heiden[1], Allan Siperstein[1], Gustavo Romero-Velez[1]

[1]Endocrine Surgery, Cleveland Clinic Foundation

4:30 PM – 6:00 PM
INTERESTING CASES SESSION
MODERATOR: Wen T. Shen, MD, MA – University of California, San Francisco

Monday, May 19, 2025

8:00 AM – 8:45 AM
SCIENTIFIC SESSION VI (PAPERS 25-27)
MODERATORS:
Lawrence Kim, MD, University of North Carolina
Azadeh Carr, MD, University of Southern California

2024 ThyCa: Thyroid Cancer Survivors' Association Award for Thyroid Cancer Research Presentation
Tammy Holm, MD, PhD, University of Cincinnati College of Medicine

25. Surgical Management of Adrenocortical Carcinoma: Is There a Role for Multivisceral Resection?

Omair A Shariq[1], Benjamin Kensing[1], Jace P Landry[1], Ching-Wei D Tzeng[1], Mouhammed A Habra[2], Matthew T Campbell[3], Sarah B Fisher[1], Nancy D Perrier[1], Jeffrey E Lee[1], Paul H Graham[1]

[1]Department of Surgical Oncology, MD Anderson Cancer Center, [2]Department of Endocrine Neoplasia and Hormonal Disorders, MD Anderson Cancer Center, [3]Department of Genitourinary Medical Oncology, MD Anderson Cancer Center

26. Objective Assessment of Vascular Dysfunction in Pheochromocytoma and Paraganglioma Patients, and Their Reversal Following Curative Surgery: Results of a Prospective Cohort Study

Samprati Dariya[1], Gaurav Agarwal[1], Raviraj Ahada[2], Roopali Khanna[2], Aditya Kapoor[2], K.M.M.Vishvak Chanthar[3], Sabaretnam Mayilvaganan[1], Gyan Chand[1], Anjali Mishra[1]

[1]Endocrine and breast surgery, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India, [2]cardiology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India, [3]Breast Surgical Oncology, Rajiv Gandhi Cancer Institute, Delhi, India

27. Evaluating the Role of Postoperative Long-acting Somatostatin Analogue Therapy in Metastatic Neuroendocrine Tumors Undergoing Surgical Debulking

Theodoros Michelakos[1], Joseph Tobias[1], Sara Abou Azar[1], Blase Polite[2], J. Michael Millis[1], Chih-Yi Liao[2], Xavier M Keutgen[1]

[1]Surgery, University of Chicago, [2]Oncology, University of Chicago

9:30 AM – 10:15 AM
POSTER SPOTLIGHT SESSION (POSTERS 1-7)

MODERATORS:
Jesse Pasternak, MD, MPH, University of Toronto
Mark Sneider, MD, Allina Health

●♦01. "I Have No Idea Why I Am Here": A Mixed Methods Analysis to Characterize Barriers to Referral and Surgical Treatment in Disadvantaged Patients with Primary Hyperparathyroidism

Eileen R Smith[1], Courtney Balentine[1], Kristin Long[1], Dawn M Elfenbein[1], David Schneider[1], Rebecca S Sippel[1], Alexander Chiu[1]

[1]University of Wisconsin – Madison

●02. Uncovering Patterns in Primary Aldosteronism: Clinicopathologic Findings Based on HISTALDO Subtypes

Sharon Wu[1], Wyleen Kniola[1], Matthew Leong[1], Anat BenShlomo[1], Xuemo Fan[1], Yufei Chen[1]

[1]Cedars-Sinai Medical Center

●♦03. PET Imaging of Urokinase-type Plasminogen Activator Receptor (uPAR) in Aggressive Thyroid Cancers

Pratheek Reddy[1], Grayson R Gimblet[1], Jason D Whitt[2], Hailey A Houson[1], Herbert Chen[2], Diana M Lin[3], Suzanne E Lapi[1], Renata Jaskula-Sztul[2]

[1]Department of Radiology, University of Alabama at Birmingham, [2]Department of Surgery, University of Alabama at Birmingham, [3]Department of Pathology, University of Alabama at Birmingham

●♦04. Prevalence and Outcomes of Primary Hyperparathyroidism in Sarcoidosis Patients: A Large-scale Retrospective Cohort Study

David May[1], Ahmed Abdelmaksoud[2], Yaser Bashumeel[1], Mahmoud Abdalnaeem[1], Abdulrahman Ghaleb[1], Emad Kandil[1]

[1]Tulane School of Medicine, [2]UC Riverside School of Medicine

●♦05. Sonographic and Pathologic Features of Malignant Nodules Within Hyperfunctioning Thyroid Tissue: A Multi-institutional Study

Timothy Kravchenko[1], Lauren Krumeich[1], **Ekaterina Koelliker[2]**, Allison Letica-Kriegel[2], Isabel Hsu[1], Matthew Blanco[2], Rajshri Gartland[2]

[1]University of Michigan, [2]Massachusetts General Hospital

●♦06. Immune Cell-to-Cell Interactions in the Cortisol-Producing Adrenocortical Carcinoma Tumor Microenvironment

Nicholas Michael[1], Bhavishya Ramamoorthy[1], Maggie Cam[2], Richard Finney[2], Naris Nilubol[1]

[1]Endocrine Surgery Section, Surgical Oncology Program, National Cancer Institute, National Institutes of Health, [2]Collaborative Bioinformatics Resource, Center for Cancer Research, National Cancer Institute, National Institutes of Health

●♦07. Can Virtual Non-contrast CT Improve the Diagnostic Uncertainty of Adrenal Incidentalomas?

Likolani Arthurs[1], Max Schumm[1], Zoran Gajic[2], Robert Petrocelli[3], Myles Taffel[3], Rajam Raghunathan[4], Paige Curcio[2], Olivia McAllister-Nevins[5], Cadence Chan[6], Kepal Patel[1], Rachel Liou[1], Jason Prescott[1], John Allendorf[1], Insoo Suh[1]

[1]Surgery, NYU Grossman School of Medicine, [2]NYU Grossman School of Medicine, [3]Radiology, NYU Grossman School of Medicine, [4]Surgery, McGill University, [5]Northwestern University, [6]University of Rochester

10:45 AM – 11:20 AM
SCIENTIFIC SESSION VII (PAPERS 28-30)
MODERATORS:
Sareh Parangi, MD, Massachusetts General Hospital
Hadiza Kazaure, MD, Duke University Medical Center

28. A Prospective Comparison of Sequential Versus Interval Retreatment with Radiofrequency Ablation for Predominantly Solid, Large-volume Benign Thyroid Nodules
Matrix Man Him Fung[1], Yan Luk[1], Brian Lang[1]
[1]Department of Surgery, University of Hong Kong
29. Over-screening of Patients on GLP-1 Receptor Agonists: a Second "Epidemic" of Thyroid Cancer Over-diagnosis?
Rajam Raghunathan[1], Anna R Jacobs[2], Sofia Castiglioni[3], Nardeen Dawood[4], Likolani Arthurs[4], Suedeh Ranjbar[2], Gary D Rothberger[5], Carolyn D Seib[6], Jason Prescott[7], John D Allendorf[2], Rachel Liou[2], Insoo Suh[8], Kepal N Patel[8]
[1]Department of Surgery, McGill University, [2]Department of Surgery, NYU Grossman Long Island School of Medicine, [3]NYU Grossman School of Medicine, [4]Department of Surgery, NYU Grossman School of Medicine, [5]Department of Endocrinology and Metabolism, NYU Grossman Long Island School of Medicine, [6]Department of Surgery, Stanford University School of Medicine, [7]Department of Surgery, NYU Langone Brooklyn, Grossman School of Medicine, [8]Section of Endocrine Surgery, New York University Grossman School of Medicine, NYU Langone Health
30. Deviating From TI-RADS Guidelines in Surgical Planning for Parathyroid Patients: What Is the Clinical Impact?
Shaleen V Sathe[1], **Abigail Chmiel**[1], Caroline Jones[1], William E Gillanders[1], John A Olson[1], Taylor C Brown[1]
[1]Washington University School of Medicine

11:20 AM – 12:30 PM
PANEL SESSION: STREAMLINING THE PERIOPERATIVE CARE OF ENDOCRINE SURGICAL PATIENTS
MODERATOR: Lilah Morris-Wiseman, MD, Johns Hopkins University School of Medicine
SPEAKERS: David Velazquez-Fernandez, MD, MS, PhD, Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán; Reese Randle, MD, Atrium Health Wake Forest Baptist; Heather Wachtel, MD, University of Pennsylvania; James Wu, MD, University of California, Los Angeles

12:30 PM
MEETING ADJOURN

ABSTRACTS

♦ Denotes Resident/Fellow Competition Paper

NOTE: Author listed in BOLD is the presenting author

01. Highly-selected Sporadic, Apparently Unifocal cN0 MTC May Benefit of Unilateral Surgery. A Proof of Concept in a High-volume Institution

Leonardo Rossi[1], Antonio Matrone[2], Chiara Becucci[1], Gianluca Frustaci[1], Carlo Enrico Ambrosini[1], Benard Gjeloshi[1], Liborio Torregrossa[3], Clara Ugolini[3], Rossella Elisei[2], **Gabriele Materazzi[1]**

[1]Endocrine Surgery, University Hospital of Pisa, [2]Endocrinology, University Hospital of Pisa, [3]Pathology Unit, University Hospital of Pisa

Background: The gold standard treatment for sporadic medullary thyroid carcinoma (sMTC) is a bilateral surgery, consisting of total thyroidectomy with central compartment neck dissection (CCND). This study aimed to evaluate the incidence of multifocality, bilaterality, and central compartment lymph node involvement (both ipsilateral and contralateral) in a selected group of patients with apparently unifocal sMTC without evidence of lymph node (cN0) or distant metastases at preoperative assessment.

Methods: Patients with sMTC cN0 were prospectively enrolled between February 2022 and September 2024. All patients underwent total thyroidectomy with CCND. Ipsilateral and contralateral central compartment lymph nodes (LNs) were harvested separately for histopathological examination.

Results: A total of 48 patients were included in the study. The median age was 60 years, with a female predominance of 58.3%. Pre-operative median calcitonin levels were 117.5 µg/L. Median tumor size was 1.2 cm, with vascular invasion observed in 7 cases (14.6%) and no cases with tumor necrosis. Three patients (6.3%) had high-grade MTC. One patient (2.1%) presented with multifocal sMTC, but bilateral sMTC was not observed. A median of 9 central compartment LNs were removed. The median number of ipsilateral and contralateral central compartment LNs removed was 4 for both sides. Twelve patients (25%) had lymph node metastasis (pN1), including 2 patients (4.2%) with lymph node metastases in both the ipsilateral- and contralateral-central compartments.

Seven out of 12 (58.3%) pN1 patients were micrometastatic (<2mm), and all lymph node metastases were <10 mm in size. Desmoplastic stromal reaction was observed in 33 cases (68.8%). No significant difference in pN1 rate was found between patients with desmoplastic stromal reaction ≤ 20% and those with >20% (p=0.255). Both patients with contralateral central compartment lymph node metastases exhibited desmoplastic stromal reactions >20% (40% and 60%, respectively).

Conclusions: Sporadic cN0 MTC harbors a unilateral disease in 96% of cases. Contralateral lymph node involvement in extremely rare in highly selected cases and often microscopic, although ipsilateral central compartment lymph node metastasis occur in 25% of cases. In this cohort of patients, unilateral surgery (hemithyroidectomy with ipsilateral CCND) may be the treatment of choice.

♦02. Multifocality in Sporadic Medullary Thyroid Carcinoma Is Associated with Low Tumor Grade and No Difference in Somatic Driver Mutations or Disease Outcomes When Compared to Unifocal Tumors

Aradhya Nigam[1], Bin Xu[1], R Michael Tuttle[1], Richard J Wong[1], Ashok R Shaha[1], Ronald A Ghossein[1], Ian Ganly[1], Brian R Untch[1]

[1]*Memorial Sloan Kettering Cancer Center*

Background: Total thyroidectomy for patients with medullary thyroid carcinoma (MTC) is often recommended due to multifocality. The International Medullary Thyroid Carcinoma Grading System (IMTCGS) is established as a predictor of disease-specific outcomes. We aimed to study multifocality and its association with tumor grade and somatic mutations.

Methods: A retrospective cohort analysis was performed at a referral cancer center between 1/1/1986-1/1/2018. Specimens underwent formal pathology review to assess multifocality and c-cell hyperplasia. Patients were graded according to variables set in the IMTCGS: Ki67, mitosis, necrosis. Molecular profiling was assessed with a 400-gene sequencing assay using paired tumor/germline DNA. Somatic driver mutations were defined as RET, RAS, and non-RET/RAS. Outcomes included local recurrence (LR), distant recurrence (DR), and overall survival (OS). Patients with germline mutations were excluded from analysis (n=23).

Results: Amongst 107 sporadic MTC patients, 30 (28%) were multifocal and 77 (72%) unifocal. Preoperative imaging identified multifocality in 10 (9%) patients. A greater proportion of multifocal patients were low-grade (95%) compared to unifocal patients (77%; p<0.05). C-cell hyperplasia was identified in a greater proportion of multifocal patients (52% vs 8%, p<0.05). Molecular profiling of the index tumor demonstrated no difference among driver mutations (RET, RAS, and non-RET/RAS) (p=NS). In multifocal patients, median size of additional foci was 0.5cm (IQR 0.2-1.0cm) with 53% of patients harboring two or more foci. Multifocality was present in the ipsilateral lobe in 7 (23%), contralateral lobe in 19 (63%), and bilateral lobes in 4 (13%) patients. Lymph node burden was evaluated in patients who underwent central and lateral neck dissections. Ipsilateral neck dissection was performed in 36% of multifocal and 48% of unifocal tumors (p=0.23). The ratio of positive lymph nodes in compartments was similar (multifocal:0.13,IQR 0-0.15 vs unifocal:0.17,IQR 0-0.38;p=0.54). Disease-specific outcomes comparing multifocal and unifocal cohorts were not different and included LR (17% vs 19%), DR (7% vs 12%), and OS at 5 years (93% vs 94%).

Conclusions: Subcentimeter multifocality is common in sporadic MTC and associated with low-grade tumors. No differences were observed in lymph node burden, disease outcomes, or somatic driver mutations compared to unifocal tumors. Multifocality is not an indicator of adverse outcomes in sporadic MTC.

♦03. WITHDRAWN

♦04. Patient Preferences in PTMC Management Are Driven by Aversion Toward Complications Rather Than Treatment Pathway

Rebecca Kowalski[1], Kendyl Carlisle[1], Aprill N Park[2], Reuben Don[3], Salome Ricci[4], Carrie Cunningham[5], Julia F Slejko[4], C. Daniel Mullins[4], Yinin Hu[1]

[1]Department of Surgery, University of Maryland School of Medicine, [2]University of Maryland School of Medicine, [3]University of Maryland School of Pharmacy, [4]Department of Practice, Sciences, and Health Outcomes Research (P-SHOR), University of Maryland School of Pharmacy, [5]Department of Surgery, Mass General Brigham

Background: Papillary thyroid microcarcinomas (PTMCs) carry an excellent prognosis. As such, patient preferences and cost-effectiveness are important determinants of treatment selection. Cost-effectiveness models incorporate quality-adjusted life-years (QALYs) as a common unit of effectiveness. Any PTMC treatment may be linked to a QALY weight (0=death, 1=perfect health) that incorporates quality of life to adjust the true value of a year of survival. The objective of this study is to estimate the QALY weights of common PTMC treatment scenarios, in order to inform cost- and comparative-effectiveness research. We hypothesized that, because most PTMC treatments are well-tolerated, QALY weights would be comparable across treatment strategies in the absence of major complications.

Methods: An advisory board of thyroid cancer survivors, cancer survivor caregivers, and physicians codeveloped 10 PTMC clinical vignettes describing active surveillance, radiofrequency ablation (RFA), partial thyroidectomy, and total thyroidectomy, along with potential complications (progression, vocal cord palsy, hypocalcemia). Thyroid cancer survivors were recruited to complete a time trade-off instrument, in which participants compare a PTMC vignette against a reference vignette describing perfect health. They are then asked how much survival time they would be willing to "give up" to trade the PTMC vignette for perfect health. This process derives a QALY weight for each PTMC vignette. QALY weights across vignettes were compared using within-subjects repeated measures ANOVA and paired Wilcoxon rank sum tests. Per published standards, the cohort was powered to detect a minimal important difference with an effect size of 0.5 (i.e., 0.04 QALY).

Results: Data from 101 thyroid cancer survivors were collected. Median QALY weights for uncomplicated treatment scenarios ranged from 0.975 – 0.992 and were not significantly different between treatments (Table 1, p=0.15). Treatment complications resulted in significantly lower QALY weights across all treatment strategies (p<0.01) except active surveillance (p=0.72).

Conclusions: This is the first study to derive QALY weights for PTMC using a gold-standard time trade-off approach. QALY weights between treatments were comparable, suggesting that patient preferences in PTMC treatment are heavily driven by aversion toward complications, rather than the treatment pathways themselves. These results may be readily incorporated into value assessments for PTMC treatments.

♦05. RNA Sequencing of Thyroid Tumors From Individuals with PTEN Hamartoma Tumor Syndrome Reveals a Unique Transcriptome with a Predominantly RAS-like Expression Profile

Gilman Plitt[1], Takae Brewer[1], Lamis Yehia[1], Laura Rabinowitz[1], Christopher C Griffith[1], Gustavo Romero-Velez[1], Allan Siperstein[1], Charis Eng[1]
[1]Cleveland Clinic

Background: Differentiated thyroid cancer is typically caused by a single oncogenic driver alteration. In *PTEN* hamartoma tumor syndrome (PHTS), a pathogenic germline *PTEN* mutation results in a predisposition to thyroid cancer and adenomatous thyroid nodules, as well as other benign and malignant tumors. This provides a unique model to study thyroid carcinogenesis in the setting of a baseline "hit" to the PI3K/AKT/mTOR pathway, implicated in *RAS*-like thyroid tumors. We recently performed exome sequencing of PHTS-associated thyroid tumors, demonstrating a unique mutational landscape with frequent *PTEN* biallelic inactivation. Here, we investigated the transcriptome of 53 PHTS-associated thyroid tumors.

Methods: Patients with PHTS and thyroid cancer were included. Thyroid cancer, adenomatous nodules, and background thyroid tissue underwent RNA extraction and mRNAseq using an Illumina NovaSeq platform. STAR was used for read alignment and transcript quantification. Clustering and differential expression were performed using edgeR. $BRAF^{V600E}$-*RAS* scores (BRS), developed by The Cancer Genome Atlas program, were calculated for each sample (-1 to +1), with negative BRS being *BRAF*-like and positive BRS being *RAS*-like.

Results: RNAseq was performed on 26 cancers [9 (34.6%) classical papillary thyroid cancer (c-PTC), 14 (53.8%) follicular variant of PTC (FV-PTC), 3 (11.5%) follicular thyroid cancer (FTC)], 27 adenomatous nodules, and 15 background thyroid samples from 20 patients with PHTS. Principal component analysis demonstrated three clusters: 1) c-PTC, 2) FV-PTC, FTC, and benign adenomatous nodules, 3) background thyroid tissue. The majority (17, 65.4%) of cancers were *RAS*-like. All strongly *RAS*-like cancers were encapsulated FV-PTC and FTC, while all strongly *BRAF*-like cancers were c-PTC and infiltrative FV-PTC. Adenomatous nodules were *RAS*-like (median BRS +0.66), and were indistinguishable from follicular architecture cancers using clustering and BRS.

Conclusions: PHTS-associated thyroid tumors most frequently have *RAS*-like expression profiles. This appears to be caused by dysregulation of the PI3K/AKT/mTOR pathway due to *PTEN* biallelic inactivation, promoting follicular adenomatous growth and explaining the over-representation of FV-PTC and FTC seen in PHTS. $BRAF^{V600E}$ mutations occur less commonly, but drive MAPK pathway activation and a c-PTC morphology. Better understanding malignant potential and tumor progression in PHTS thyroid tissue is essential for optimizing diagnosis, enhanced-surveillance, and treatment in this population.

♦06. Sprayable pH-sensitive Near-infrared Fluorophore for Rapid Labeling of Human Papillary Thyroid Cancer in Orthotopic Mouse Models

Sunidhi Jaiswal[1], Sohee Lee[2], Siamak Amirfakhri[1], Jinhui Ser[3], Atsushi Yamashiata[3], Satoshi Kashiwagi[3], Grace Lin[4], Robert M Hoffman[5], Hak Soo Choi[3], **Michael Bouvet[1]**

[1]Surgery, University of California San Diego and VA San Diego Healthcare System, La Jolla, CA, [2]Department of Surgery, VA San Diego Healthcare System, La Jolla, CA, University of California San Diego, La Jolla, CA, Catholic University of Korea, Seoul, Korea, [3]Gordon Center for Medical Imaging, Department of Radiology, Massachusetts General Hospital and Harvard Medical School, Boston, MA, [4]Department of Pathology, University of California, [5]Department of Surgery, University of California San Diego, La Jolla, CA, VA San Diego Healthcare System, La Jolla, CA, AntiCancer, Inc., San Diego, CA

Background: Papillary thyroid carcinoma (PTC) is the most common type of thyroid cancer, and the primary treatment approach is surgical resection. Fluorescence-guided surgery (FGS) with tumor-specific probes has been effective in delineating tumor margins and detecting metastatic disease across various cancers. Conventional tumor-specific probes often involve antibodies conjugated to fluorescent dyes administered intravenously, which require time to target tumors. We hypothesized that a topically applied, pH-sensitive near-infrared (NIR) fluorophore in spray form could offer rapid, intraoperative labeling of thyroid tumors, enabling application at the onset of surgery. This study investigates this approach in orthotopic and subcutaneous mouse models of human PTC.

Methods: Subcutaneous and orthotopic tumors were established by injecting 1×10^7 TPC-1 (human PTC-cell line) cells in the flank or into one side of the thyroid gland of 6-8 weeks-old nude mice. After 3 weeks, pH-sensitive NIR fluorophore PH10 (500 µM, 200 µL) was sprayed on the subcutaneous tumor (after removing the skin) and on the orthotopic tumor (opened neck) of euthanized mice. NIR fluorescence images were taken 1 minute post-administration, followed by PBS washing, using the 800 nm channel of the LI-COR Pearl Imaging System. Tumor-to-background ratios (TBR) were calculated as the mean fluorescence intensity of the tumor divided by the intensity of PH10-exposed surrounding tissue. Tumors were collected and stained with H&E for histopathological evaluation.

Results: Both subcutaneous and orthotopic tumors displayed strong NIR signals upon spraying PH10 on the tumoral sites, contrasting with surrounding tissues (Figure 1). The average TBRs were 5.5 (± 1.47) for subcutaneous tumors (n=5) and 9.4 (± 2.59) for orthotopic tumors (n=5). H&E staining confirmed the tumor characteristics (Figure 1).

Conclusions: The pH-sensitive NIR fluorophore PH10 effectively and specifically labels TPC-1 tumors in mouse models, demonstrating promise as a rapid, spray-applied agent for fluorescence-guided surgery in thyroid cancer.

♦07. Utilization of a Best Practice Advisory to Increase the Detection Rate of Hyperparathyroidism

Rebecca S Gates[1], Kristin McCoy[1], Jonathan Stewart[2], Andrew J Behnke[3], Adegbenga Bankole[4], Theresa Vallia[5], Michael S Nussbaum[1], Daniel Tershak[1]

[1]General Surgery, Carilion Clinic, [2]Family Medicine, Carilion Clinic, [3]Endocrinology, Carilion Clinic, [4]Rheumatology, Carilion Clinic, [5]Health Analytics and Research Team, Carilion Clinic

Background: Primary hyperparathyroidism (PHPT) is often initially asymptomatic, but when left untreated, may contribute to renal disease, osteoporosis, decreased quality of life, and metabolic syndrome. Timely diagnosis requires a high index of suspicion and collaboration across specialties, after which the disease can be cured with parathyroidectomy. Screening algorithms are likely to increase diagnosis and treatment rates.

Methods: In November 2022, an Electronic Health Record (EHR) Best Practice Advisory (BPA) was launched to increase practitioner awareness of hypercalcemia and encourage parathyroid hormone (PTH) testing for patients with serum calcium $\geq$ 11. Rates of hypercalcemia, PTH testing, endocrinology and surgery referrals, and parathyroidectomy were compared pre- and post-intervention (January 2021 – July 2021 and January 2023 – July 2023, respectively) with a washout period between groups. Trends in PTH testing, referrals, and parathyroidectomy based on demographic and clinical factors were evaluated in the post-intervention group. A p-value of 0.05 was held as statistically significant.

Results: There were 902 hypercalcemic (Ca $\geq$ 11.0) patients in the pre-intervention group and 893 patients in the post-intervention group. There was an increase in PTH testing after the BPA was implemented (38.75% vs. 24.61% in the post- and pre-intervention groups, respectively, $p < 0.01$). However, referrals for endocrine/surgical specialists and rates of parathyroidectomy were unchanged between the pre- and post-intervention groups (referrals in 41.44% vs. 41.04% of those with PTH testing, $p = 0.93$; parathyroidectomy in 27.17% vs. 26.76% of those referred, $p = 1.00$). In the post-intervention group, PTH testing was performed more commonly in older patients (69.63 vs. 59.01 years, $p < 0.01$), but patients referred to a specialist were younger (67.59 vs. 71.05 years, $p = 0.04$). Patients with any PHPT-associated comorbidities were more likely to undergo PTH testing, but there were no differences in specialist referrals ($p = 0.01$) or parathyroidectomy ($p = 0.60$) based on number of comorbidities.

Conclusions: An EHR BPA was effective in increasing hyperparathyroidism screening, but did not result in more specialist referrals or parathyroidectomies. Reflex PTH testing as well as increased education about hyperparathyroidism may further improve screening, referrals, and treatment.

♦08. Parathyroidectomy Is Associated with Lower Mortality and Fewer Cardiac Complications in Patients with Secondary Hyperparathyroidism

Zhixing Song[1], Sanjana Balachandra[1], Julia Kasmirski[1], Christopher Wu[1], Andrea Gillis[1], Jessica Fazendin[1], Brenessa Lindeman[1], Herbert Chen[1]
[1]University of Alabama at Birmingham

Background: Secondary hyperparathyroidism can be managed medically or with parathyroidectomy. The use of cinacalcet has led to fewer patients requiring parathyroidectomy. We aim to investigate the long-term effects of parathyroidectomy versus cinacalcet.

Methods: We conducted a retrospective analysis of electronic medical records from a multi-institutional database in the United States, spanning 2005 to 2023. The study included patients with a diagnosis code of renal-origin secondary hyperparathyroidism who were on vitamin D supplements or phosphate binders, excluding those with prior kidney transplants. Patients were categorized into groups managed with either cinacalcet for a minimum of six months or parathyroidectomy without cinacalcet. Cox regression analysis with 1:1 propensity score matching (PSM) for age, sex, race, and comorbidities was used to determine hazard ratios (HR) and 95% confidence intervals (CI) for death and cardiac complications (arrhythmia, heart failure or ischemic disease).

Results: Of the 12429 patients included in the study, 1295 (10.4%) underwent parathyroidectomy, and 11134 (89.6%) received cinacalcet. Following PSM, both the parathyroidectomy and cinacalcet group had 1036 patients each. The majority were white (51.8%) and female (61.2%), with a mean age of 58 ± 12 years. Over a median follow-up duration of 9.6 years, death and cardiac complications occurred in 573 (27.7%) and 1295 (62.5%) of patients, with the parathyroidectomy showing significantly lower risks of mortality (HR 0.81, 95% CI 0.68 – 0.96) (Figure1) and cardiac events (HR 0.76, 95% CI 0.68 – 0.85). Additionally, the parathyroidectomy patients had a reduced risk of developing ischemic heart disease (HR 0.74, 95% CI 0.65 – 0.84), atrial fibrillation (HR 0.73, 95% CI 0.61 – 0.86), ventricular arrhythmia (HR 0.56, 95% CI 0.40 – 0.77) and heart failure (HR 0.63, 95% CI 0.55 – 0.72). Subgroup analysis revealed that even in patients whose PTH levels were below 585 pg/mL (9 times the upper normal limit), those who underwent parathyroidectomy still exhibited a decreased risk of both mortality (HR 0.76, 95% CI 0.61 – 0.93) and cardiac complications (HR 0.74, 95% CI 0.64 – 0.85).

Conclusions: In patients with secondary hyperparathyroidism, parathyroidectomy is associated with greater long-term benefit in reducing mortality and cardiac complication risks when compared to cinacalcet.

♦09. Surgery for Normocalcemic Hyperparathyroidism Improves Quality of Life

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Background: Normocalcemic primary hyperparathyroidism (NC-PHPT) is diagnosed by a high or non-suppressed parathyroid hormone (PTH) level and calcium levels within the normal range, after secondary causes have been excluded. The ideal management of NC-PHPT is controversial and is not discussed in recent guidelines due to limited published data. To help fill this knowledge gap, we aimed to report the outcomes of a large case series of patients with NC-PHPT who underwent parathyroidectomy.

Methods: A retrospective review of a multi-institutional database was conducted to identify patients with NC-PHPT who underwent parathyroidectomy from 2000 to 2024. A subset of patients participated in a prospective quality of life (QOL) study using a validated questionnaire, in which lower scores represent better QOL.

Results: Of 554 patients with NC-PHPT who underwent parathyroidectomy, the average age was 58±15 years and 78.7% were female. Mean pre and post-operative calcium levels were 9.9±0.4 and 9.3±0.7 mg/dL, while median pre and post-operative PTH levels were 93.0 (IQR 59.1) and 41.4 (IQR 38.0) pg/mL, respectively. A majority (58.1%) of patients had multi-gland disease. Normal PTH levels were achieved in 82.2% of patients at two weeks and 80.6% at six months. Asymptomatic patients were more likely to be male (p<0.05), to be younger (p<0.01), and to have single gland disease (p<0.01). Patients ≥50 years were more likely to experience postoperative transient hypoparathyroidism (p<0.01). Otherwise, sex, age, symptomatology, and adenoma vs. hyperplasia etiology did not influence cure, recurrence, or complication rates. The median overall QOL scores were 28.8 (IQR 22.0) pre-operatively and 2.4 (IQR 17.1) post-operatively (p<0.001). Each of the individual QOL subsections including the pain, activities of daily living, occupation, mobility, leisure, general health, and mental function domains all improved significantly after parathyroidectomy (p<0.05).

Conclusions: We have herein reported one of the largest case series of NC-PHPT patients undergoing parathyroidectomy with QOL outcomes. The majority of patients had multi-gland disease, although asymptomatic patients were more likely to have a single adenoma. Patients had a dramatic improvement in QOL at just two weeks post-operatively, suggesting that parathyroidectomy may play an important role in the management of NC-PHPT.

♦10. Setting Yourself Up for Re-operative Surgical Success: Lessons Learned From a Ten-year Experience with Selective Venous Sampling for Re-operative Parathyroidectomy

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Background: Accurate pre-operative localization is a critical step in preparing a patient for re-operative parathyroid surgery. Given the limitations of non-invasive imaging modalities, we sought to understand how parathyroid selective venous sampling (SVS), an invasive interventional radiology study, aided in the identification of hyperactive parathyroid tissue and facilitated operative cure in the most challenging parathyroidectomy cases.

Methods: We performed a retrospective review of all patients at our institution who underwent SVS prior to re-operative parathyroidectomy between 2014-2024. Operative reports, imaging studies, and SVS results were analyzed to evaluate the benefit of utilizing venous sampling for re-operative parathyroid surgery.

Results: We identified 83 patients who underwent SVS prior to re-operative parathyroidectomy. Prior to SVS, patients had undergone on average 1.4 (SEM 0.06) parathyroid explorations. Before undergoing SVS, all patients underwent a Neck US and a 4D CT and 49% (N=41) also underwent Tc-99m sestamibi scan. Imaging was negative, discordant, or unclear in all patients. SVS results showed lateralization to one side of the neck in 77% (N=64), clear mediastinal location facilitating thoracic approach in 6% (N=5), inferior location without lateralization in 11% (N=9), multi-gland disease in 2% (N=2), and equivocal results in 4% (N=3). After reviewing the SVS results, potential targets were identified on non-invasive imaging in 62% (N=51) of cases. Overall, 92% (N=76) were able to proceed with further surgical exploration based upon the SVS. In 20 patients the only localization was the SVS. At time of re-operative surgery, an abnormal parathyroid gland concordant with SVS localization was found in 81% (N=62) of patients. Discordant operative results (19% of patients, N=14) included 2 multi-gland disease, 3 subsequent successful intervention after re-review of SVS due to altered anatomy, 3 mediastinal location inaccessible from the neck, 1 no parathyroid found with cure, and 5 no parathyroid found with persistent disease.

Conclusions: SVS can be a very useful adjunct in the setting of re-operative parathyroidectomy when less invasive imaging modalities are negative or inconclusive. SVS requires significant expertise to do well and interpretation of SVS is nuanced and should be done in the context of additional imaging and a thorough understanding of patients' prior operations.

♦11. Concomitant Thymectomy with Parathyroidectomy in Multiple Endocrine Neoplasia Type 1: Differential Impact on Post-operative Outcomes

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Background: Thymectomy is commonly performed during parathyroidectomy (PTX) for primary hyperparathyroidism (pHPT) in multiple endocrine neoplasia (MEN). Recently, many individual institutional reports question the impact of thymectomy on post-operative outcomes and concluded unnecessary need for routine thymectomy. We aimed to evaluate the impact of concomitant thymectomy with PTX on cure rate, reoperation rate, and post-operative hypoparathyroidism (hypoPT) rate in patients with MEN1.

Methods: This retrospective study used the TriNetX research platform, Global collaborative network representing over 130 million patients globally. We identified 434 patients with MEN type 1 who underwent PTX. The outcomes assessed were reoperation, cure rate, persistent and recurrent disease, and transient and permanent hypoparathyroidism (hypoPT). Outcomes were compared between 129 thymectomy cases and 305 controls without thymectomy.

Results: The thymectomy group was younger (mean age 44 ± 18) compared to 52 ± 17 without thymectomy and had more male patients (44%) compared to (34%) in the control group. Adding thymectomy to PTX was associated with significantly higher cure rates 97.7% (126) compared to 88.6% (269), $p=0.0008$ with 10% increase in cure rate (RR: 1.1; 95%CI: 1.04 – 1.16). In addition, 74% reduction in persistent disease risk (RR=0.26, 95%CI:0.10-0.72) compared to PTX alone. While transient hypoparathyroidism rates rose with thymectomy (38% vs 24.3%, $p=0.011$), no difference existed in permanent complications (3.1% with thymectomy vs 1.6% for controls, $p=0.09$).

Conclusions: Combining thymectomy with PTX was associated with higher cure rates, less persistent disease, and no increase in permanent hypoparathyroidism, despite more transient hypoPT. Given the benefits on cure rate and persistent disease, thymectomy should be considered a standard component of care for MEN1 patients undergoing PTX.

♦12. Renal Function Following Adrenalectomy in Patients with Primary Aldosteronism

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Background: Adrenalectomy can be curative for patients with unilateral primary aldosteronism (PA). However, the postoperative effects on renal function remain poorly understood. Therefore, we aimed to evaluate changes in renal function following unilateral adrenalectomy and identify risk factors for renal function decline.

Methods: A single institution retrospective study included adults undergoing adrenalectomy with a unilateral adrenal source (2011-2024), with a diagnosis of PA confirmed per societal guidelines. Unilaterality was determined based on cosyntropin-stimulated adrenal venous sampling (AVS) in patients >35 years of age. Post-operative estimated glomerular filtration rate (eGFR)% change was defined as [(baseline eGFR - postoperative eGFR)/baseline eGFR]x100. Univariate logistic regression assessed eGFR decline <60 at one year.

Results: Of the 75 patients, the median (IQR) age was 53.8 (40,63.9) years, 45% were female, and 64 (88%) had baseline eGFR ≥60 mL/min before surgery. eGFR levels were available for 65 patients on POD1, 45 at one month, 28 at 6 months and 36 at one year; eGFR declined from baseline in 43%, 71%, 100% and 75%, respectively (p=0.01). Median (IQR) eGFR% decline was 11.7% (5.2,20.5) on POD1, 16.7% (9.2, 32.2) at one month, 20.5% (9.6, 32.4) at 6 months and 22.5% (8.5, 35.3) at one year. One of 9 patients with a baseline eGFR<60, required new-onset dialysis 3 months post-operatively.

Among 64 patients with baseline eGFR≥60, eGFR dropped below 60 in 29% at one month and 35% at one year. After an eGFR decline <60 at one month, only one patient experienced recovery, and the rest continued to have eGFR<60 at one year. Variables associated with eGFR decline <60 at one year were older age, AVS lateralization index (LI)>30, and one-month eGFR decline <60 (Table).

Conclusions: Following adrenalectomy for unilateral PA, a decline in eGFR was observed in ~75% of patients at one year. PA patients should be counseled on the high likelihood of unmasked renal impairment after adrenalectomy and although higher LI and early post-operative eGFR decline identified patients particularly at risk for long-term renal function deterioration, eGFR monitoring is recommended for all and any potentially nephrotoxic medications should be avoided perioperatively.

♦13. A Novel Therapeutic Approach to Adrenocortical Carcinoma Repurposing Fingolimod to Target Sphingolipid Metabolism in Metastatic Disease.

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Background: In addition to having a poor survival, patients with advanced adrenocortical carcinoma (ACC) often exhibit elevated steroid production and a suppressed immune response. We have reported from lipid metabolic profiling of ACCs that upregulation of sphingolipid metabolism (regulates steroid synthesis) is associated with worse overall survival. We hypothesize that an FDA approved drug targeting sphingolipid metabolism like fingolimod may effectively target ACC and metastatic spread as a novel repurposed therapeutic option for ACC patients.

Methods: Validated ACC cell lines, including ACC1, ACC2, and NCI-H295R, were cultured in an appropriate medium. Cell-TiterGlo assay assessed cell viability. Western-blot and RNA-sequencing examined the target pathways. Trans-well migration and invasion using decellularized extracellular matrices(ECM) prepared from rat liver and lung were employed to evaluate invasion in metastatic niches. Reverse transcription PCR(RT-PCR) determined expression levels of steroidogenic genes. Mass spectrometry analyzed alterations in sphingolipid metabolism.

Results: Fingolimod treatment for 72 hours resulted in IC_{50} values of 6.906±0.665 μM, 5.304±0.486 μM, and 7.917±0.531 μM for the ACC1, ACC2,and NCI-H295R cell lines, respectively(>100fold more-sensitive than normal cells). All ACC cell lines treated with fingolimod exhibited dose-dependent cleavage of PARP, upregulation of LC3-II, and downregulation of p-Akt, p-ERK, and p-P65, with no significant change in total Akt, ERK, and P65 ($p < 0.01$each). Cell cycle proteins MCM2 and MCM7, linked to decreased ACC survival, were downregulated on RT-PCR after fingolimod treatment in NCI-H295R(56.1% and 46.9%), ACC1(46.4% and 39%), and ACC2(86.2% and 85.1%;$p < 0.001$ for each). Evaluating steroidogenic enzymes revealed a downregulation of StAR,HSD3B2,CYP11A1,CYP11B1, CYP11B2, and CYP21A2 ($p < 0.001$ each). ACC cells in the presence of liver and lung ECM had equivalent sensitivity to fingolimod(IC_{50} levels) as cells in normal culture. These liver and lung niche ACC cells showed a two-fold increase in migration and invasion over ACC cells without liver/lung ECM, which was blocked by > 90% after fingolimod treatment($p < 0.001$). Lipid profiling indicated significantly altered lipids: FA,ceramides,SM,PC,PE,PI, and LPC($p < 0.01$ each).

Conclusions: Fingolimod induces apoptosis in ACC cells by targeting sphingolipid metabolism and prevents liver and lung metastatic invasion in vitro. Further in vivo validation studies will help support its clinical translation as a novel repurposed therapy in ACC.

14. Adrenal Imaging Features Predictive of Histopathology: A Contemporary, Longitudinal Analysis

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Background: Imaging features are essential in the preoperative risk assessment of adrenal nodules. However, recommendations arise from low quality evidence due to a paucity of literature comparing imaging features to the gold standard, histopathology. The aim of this study was to ascertain the performance of CT and MR imaging features with adrenal histopathology.

Methods: We retrospectively reviewed all adult patients who had adrenalectomy within a large healthcare system (2015-2023) and ≥1 pre-operative cross-sectional images, excluding pheochromocytoma and incidental adrenalectomy for non-adrenal malignancies. Benign imaging features were defined as: size ≤4.0cm, Hounsfield (HU) ≤10, or HU≤20 on unenhanced CT, absolute contrast washout (ACW) ≥60% or relative contrast washout (RCW) ≥40% on adrenal protocol CT, and loss of signal (LOS) or homogeneity on T1-weighted MRI. Performance parameters for each imaging features to be associated with benign histopathology were analyzed.

Results: Overall, 250 surgically resected adrenals were included; 21% malignant (52/250), with 23 adrenal cortical carcinomas (ACC) (9.1%) and 29 non-ACC malignant lesions (NAML) (11.6%). The remaining 79% (199/250) were benign including 160 adenomas and 38 non-adenomatous lesions. Malignant lesions were larger than benign (median size, 6.8cm vs. 4.4cm, p=0.002). As seen in Table 1, no malignant lesions had HU ≤20 (or HU≤10) on unenhanced CT or LOS on MRI. However, 2 metastatic lesions (4%) were misinterpreted as benign lesions on adrenal protocol CT scans. These were metastatic hepatocellular carcinoma and an ACC. Further, 17% (4/23) of ACC and 62% (18/29) of NAML were ≤4 cm. Accuracy was best (65%) using an unenhanced HU cutoff of ≤20, and 48% of benign adrenal lesions were accurately identified as being benign while the malignancy rate for those >20 HU was 31%.

Conclusions: In one of the largest cross-sectional imaging to adrenal histopathology correlative studies to date, we demonstrate the low specificity of using size >4cm alone (57%) as a risk factor for malignancy. In addition, washout features on adrenal protocol CT can miss secondary malignancies. However, a threshold of HU ≤20 on unenhanced CT can reliably be used to exclude malignancy, avoid adrenalectomy in 48% of patients, and provided the highest test accuracy.

♦15. Enhancing Surgical Proficiency in Endocrine Surgery: A Proposal for the Integration of Augmented Reality and Surgical Simulation Into Resident Training

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Background: Endocrine surgery addresses thyroid, parathyroid, and adrenal gland conditions. Many general surgeons, especially those in rural areas, lack confidence in performing endocrine procedures, partly due to limited exposure during training. This study proposes using video-based education (VBE) and surgical simulation to improve residents' preparedness for practice. Research indicates that 93% of residents utilize VBE in their studies compared to 89% who rely on surgical textbooks. VBE has been shown to enhance knowledge (100%), operative performance (81.3%), and satisfaction (100%). Additionally, integrated into many residency programs, surgical simulators improve proficiency and reduce complications. We aim to combine augmented reality tutorials with mid-level fidelity surgical simulators, known as SURGE-INS (Synchronized Understanding of Real-time Guided Education with Interactive Navigated Simulation), to enhance surgical training and bolster confidence in performing endocrine surgeries.

Methods: Phase 1 focused on developing Augmented Reality (AR) software that integrated voice-controlled training videos, allowing surgical trainees to freely use their hands during simulations. It also included a post-case assessment and an additional case study. Phase 2 piloted the SURGE-INS platform for usability, video accuracy, and simulator fidelity. In Phase 3, select residents used the platform to complete a total thyroidectomy. Post-case survey data was collected, and performance was compared to intraoperative evaluations and entrustment using available EPAs.

Results: The participating residents completed post-satisfaction surveys after engaging with the SURGE-INS platform for the total thyroidectomy case. 25% reported being "very satisfied" with the anatomical accuracy, while 75% were "satisfied." Half of the residents believed the platform "significantly improved the quality of their performance in the procedure," whereas the other half indicated that it "improved the quality of their performance in the procedure to some extent." Additionally, 75% would recommend this platform over others they experienced.

Conclusions: By integrating AR video-based learning and surgical simulators, we can significantly enhance the education of general surgery residents in endocrine procedures. This approach increases the residents' knowledge and autonomy and can bridge the confidence gap, particularly for procedures with limited practice opportunities. Ultimately, this method can equip future surgeons with the necessary skills to address the unique healthcare needs of rural populations more effectively.

♦16. Easing the Burden: AI-generated Draft Responses to In-basket Messages Streamline Perioperative Endocrine Surgical Care

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Background: Artificial intelligence (AI) can generate accurate and empathetic responses to patient questions about thyroid disease and other conditions. However, its ability to decrease burden on the endocrine healthcare provider (HCP) remains unmeasured. We sought to evaluate how AI-generated draft messages impacted HCP burden in answering common perioperative endocrine questions.

Methods: HCPs who provide endocrine surgical care at an academic center were administered a timed survey where they responded to common perioperative endocrine patient in-basket messages. The survey included 20 randomized questions, 10 with blank draft responses and 10 with AI-generated draft responses. AI-generated draft responses were created using GPT-4. Participants could use some, all, or none of the provided draft. Response times were recorded. To assess how much editing the draft responses required, AI-generated drafts and corresponding HCP-edited responses were compared with a text similarity ratio (1.0 = identical). Cognitive load was assessed with the raw NASA Task Load Index (TLX) consisting of 6 validated domains scored 1-10 (10 = highest load). Mean TLX scores were compared for responses with and without use of AI-generated drafts. Provider satisfaction and feedback were elicited.

Results: 11 HCPs completed the survey. HCPs spent an average of 49 ± 67 seconds per question when starting with an AI-generated draft, and 137 ± 115 seconds when starting with a blank draft ($p<0.001$). The mean similarity ratio between AI-generated drafts and HCP-edited responses was 0.88 ± 0.24. Mean TLX was 3.2 ± 1.5 when using AI-generated drafts, compared to 4.4 ± 1.3 without ($p<0.001$), with significant differences within the mental demand ($p=0.02$) and temporal demand ($p<0.01$) domains. Frustration levels were similar ($p=0.49$). 60% of respondents were satisfied or extremely satisfied with the AI-generated drafts, and 80% of respondents wished to use this tool in clinical practice. Common feedback included desire for further personalization, and recommended use for questions with expected routine responses.

Conclusions: AI-generated draft responses to common perioperative endocrine surgical patient messages were associated with enhanced HCP satisfaction and minimal frustration, reduced response time and cognitive load, required minimal edits, and were sought for continued use.

♦17. The Association of Community-level Social Vulnerability with Access to High-volume Endocrine Surgeons

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Background: Community-level composite social vulnerability scores have been associated with disparities in access to healthcare. However, it is unknown which individual components of these scores are most strongly associated with access to high-volume care. We examined the relationship between specific community-level social determinants of health and thyroidectomy by high-volume thyroid surgeons.

Methods: The Vizient Clinical Database was queried to identify patients who underwent thyroidectomy from 2013 to 2021. Surgeon annual operative volumes were classified as low (1-24 operations), medium (25-49 operations), and high (50+ operations). Ordinal logistic regression was used to estimate the probability of operation with a high-volume surgeon based on patients' zip code-level social vulnerability index scores across nine domains: economic status, education level, healthcare access, neighborhood resources, housing, clean environment, social environment, transportation, and public safety. Patient demographics were also included in the model.

Results: Of 375,663 cases analyzed, 36.8% were performed by low-volume surgeons, 21.7% by medium-volume surgeons, and 41.5% by high-volume surgeons. The majority of thyroid surgeons (96.3%) were considered low-volume, followed by medium- (2.1%) and high-volume (1.6%). Post-operative complication rates decreased with higher surgeon volume: 3.9% among low-volume surgeons, 1.5% in medium-volume surgeons, and 0.9% in high-volume surgeons (p<0.01). Odds of operation with a high-volume surgeon were lower among patients residing in communities that were vulnerable in the domains of healthcare access (OR=0.83 [0.82-0.84]), education (OR=0.88 [0.87-0.89]), environmental pollution (OR=0.91 [0.90-0.93]), and public safety ([OR=0.95 [0.94-0.95]). Conversely, vulnerabilities in neighborhood resources ([OR=1.15 [1.13-1.16]) and transportation ([OR=1.07 [1.06-10.7]) were associated with increased access to high-volume surgeons. Neighborhood urbanization/rurality had minimal association with access to high-volume surgeons (OR=0.96-1.02).

Male patients and those without private insurance were less likely to undergo operation with a high-volume surgeon (OR=0.76 [0.75-0.77] and OR=0.65-0.80 [0.58-0.81], respectively). Patients with malignancy (vs. benign disease) were slightly more likely to see a high-volume surgeon (OR=1.05 [1.04-1.06]). Age had no meaningful association with high-volume surgeons.

Conclusions: Patients residing in communities vulnerable to lower levels of healthcare access and education were significantly less likely to undergo thyroidectomy with a high-volume surgeon. Policies targeting these domains may yield the greatest community-level impact on patients' access to high-volume surgeons.

♦18. What PCP's Need to Improve Workup and Referral of Patients with Primary Hyperparathyroidism

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Background: Patients with primary hyperparathyroidism (PHPT) are underdiagnosed and undertreated. We sought to examine the barriers primary care providers (PCPs) encounter when diagnosing and referring patients with PHPT.

Methods: We conducted semi-structured interviews with 18 PCPs (16 MDs, 1 PA, 1 NP). Virtual interviews were audio-recorded, transcribed verbatim, de-identified, and managed in NVivo. Utilizing deductive thematic analysis, we developed a codebook based on our new conceptual model of barriers to treatment of PHPT and created new codes to capture emergent themes. A multidisciplinary team with backgrounds in surgery, health services research, and qualitative methodology coded and analyzed all transcripts.

Results: PCPs were overall comfortable with the diagnostic workup of PHPT but relied heavily on UpToDate algorithms and endocrine e-consults when available. They frequently described challenges in explaining PHPT given its complexity and their other time constraints. PCPs expressed difficulty in motivating patients to complete the workup process, lack of resources to help coordinate the workup, the volume of results to communicate, and other comorbidities requiring attention. Other barriers included a lack of access to specialists, and not knowing when, how, and to whom to refer their patients (Figure). Targets for improvement included creating resources to help busy PCPs educate patients on the importance of working up their PHPT, clearer referral algorithms (including which results are needed prior to referral and when to refer directly to surgery), and creating an endocrine surgery e-consult (pre-consultation chart review by specialist).

Conclusions: PCPs are generally knowledgeable of PHPT and its diagnostic pathway; however, they face major barriers in communicating the necessity of an often cumbersome and costly workup to patients in a time limited setting. This presents opportunities for action. At the national level, organizations such as the AAES can create patient-centered and culturally competent education materials, made available through commonly used resources such as UpToDate, to help guide patients to treatment. At the local level, our data suggests that endocrine surgeons can work to make their expertise more available to local PCPs via e-consults and clear referral pathways and guidelines. Ultimately, eliminating barriers to workup and referral will improve the care of patients with PHPT.

♦19. Expenses and Expectations for Endocrine Surgeries: A National Analysis of Price Transparency and Cost of Care

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Background: The Centers for Medicare and Medicaid Services (CMS) price transparency rule aims to facilitate cost-conscious decision making. For surgical services like endocrine surgery, factors mediating transparency and real-world prices are not well described.

Methods: Financial and operational data were obtained from Turquoise Health and CMS cost reports. The American Association of Endocrine Surgeons (AAES) "Find A Surgeon" tool identified endocrine surgeons. Chi-square, Kruskal-Wallis, and Wilcoxon Rank-Sum tests evaluated associations with price disclosure. Multivariable linear regression models assessed marginal effects of factors on reimbursements.

Results: There were 439 AAES surgeons identified from 307 unique practice locations, of which 251 (81.8%) published endocrine surgery prices. Locations with an AAES surgeon that disclosed prices were more likely to be teaching hospitals, non-profit, large size (200+ beds), with a higher share of Medicare patients than locations without an AAES surgeon (all p<0.05).

Median procedure reimbursements were $5,061 (interquartile range [IQR] $2,488-7,818) for thyroid surgeries, $4,909 ($1,824-7,129) for parathyroid surgeries, and $3,200 ($1,436-8,833) for adrenal surgeries. Median hospital stay reimbursements were $12,661 ($9,019-20,270) for patients without comorbidities. Hospitalization payments increased by $2,279 ($1,781-5,288) for standard comorbidities, and $12,746 ($10,649-22,571) for major comorbidities.

Hospitals with an AAES surgeon received $3,621 (95% confidence interval [CI] $3,467-3,775) higher average hospital stay reimbursements than those without one, but $378 ($352-405) lower procedure reimbursements (both p<0.001). Commercial insurance payments were higher than government insurance by $10,203 ($10,101-10,305) for hospital stay and $3,505 ($3,487-3,523) for procedures (both p<0.001). Self-pay rates were higher by $14,964 ($14,548-15,380) for hospital stay and $4,448 ($4,378-4,518) for procedures (both p<0.001). Compared to for-profit hospitals, non-profit hospital reimbursements were higher by $4,660 ($4,807-4,513) for hospital stay and $1,553 ($1,517-1,589) per surgery (both p<0.001).

Conclusions: Hospitals with an AAES surgeon demonstrated excellent price disclosure for endocrine surgeries and exceeded transparency reported in many other specialties. Factors associated with higher payments included commercial insurance or self-pay, non-profit health system, and decreased market concentration. Although hospitals with an AAES surgeon received higher hospital stay reimbursements, the corresponding procedure reimbursements were lower. Further studies are needed to investigate alignment of reimbursement with quality of care to translate price transparency into increased value for patients.

20. Long-term Result of Phonation Status After Recurrent Laryngeal Nerve Reconstruction.

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Background: We reported that reconstruction of the injured recurrent laryngeal nerve (RLN) restored phonatory function to nearly normal levels one year postoperatively. Other voice treatments, such as injection laryngoplasty, have been reported to cause voice deterioration after 3 years postoperatively. Our clinical impression is that once phonatory function is restored after RLN reconstruction, it does not decline over time. However, there are no reports on long-term outcomes. The purpose of this study was to evaluate the long-term outcomes of phonation status after RLN reconstruction.

Methods: From January 2005 to December 2023, 484 patients underwent RLN reconstruction at our Hospital. Before and after surgery, their laryngeal functions were evaluated periodically with laryngoscopy and a phonation analyzer at the discretion of the attending physicians. Patients seen during the recent one-year period underwent these tests and asked to complete Voice Handicap Index-10 (VHI-10) questionnaire. To date, 212 patients (165 females and 47 males) including 100 with vocal fold paralysis preoperatively were enrolled. We compared their phonatory functions before surgery (Preop), 6 months to 2 years postop (Period I), 2 to 10 years postop (Period II) and more than 10 years (Period III). VHI-10 at these periods were also compared. Because of gender differences, analyses were conducted separately for females and males.

Results: In female patients, maximum phonation time (MPT) and mean flow rate (MFR) in Period I reached close to preoperative values. These values were significantly better in Period II than in Period I (14.3 sec vs. 12.7 sec, $p<0.01$, and 150 mL/s vs. 195 mL/s, $p<0.01$, respectively, Table). Those values in Period III were slightly poorer than those in Period II (not significant). In male patients, MPT and MFR in the four time periods showed very similar pattern to those in female patients (Table). Data from VHI-10 showed a similar pattern, but less clear (Table).

Conclusions: Following reconstruction of RLN, phonatory function recovers 1 year postoperatively, and further improves by 10 years postoperatively. Furthermore, even after more than 10 years, phonatory function remained well maintained despite the possible adverse effects of aging.

21. Is It Possible to Predict Functional Recovery of Vocal Folds Palsy? Role of Intraoperative Neuromonitoring and Laryngostroboscopy Finding

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Background: Vocal fold palsy (VFP) is the most common reason for claim following thyroidectomy, with no established predictive factors for recovery. We evaluated the prognostic role of intraoperative neuromonitoring (IONM) and postoperative (PO) flexible fiberoptic laryngostroboscopy (FFL) findings.

Methods: During 4526 IONM-assisted thyroid procedures (April 2021-April 2024), 5799 nerves at risk (NAR) were evaluated. All losses of signal (LOS) (Type 1 and Type 2) were prospectively registered. After LOS findings, FFL was performed in 1st,15th,45th and 180th postoperative day (POD). Patients were categorized into two groups basing on vocal fold motility (VFM) at POD180: recovery group (RG) and non-recovery group (NRG).

Results: Among 104 included patients (2.3% of all the patients, 1.8% of NARs), 87 recovered VFM within POD180, while 17 (0.4% of all the patients, 0.3% of NARs) did not. At POD15 type I LOS and arytenoid inward rotation (AInR) were significantly more frequent in the NRG Vs RG (88.2 % Vs 39.1%; RR=5.2, CI 1.4–19.2; p=0.001 and 82.3% Vs 11.5%; RR=4.9, CI 1.8–13.9; p=0.001, respectively). Conversely, arytenoid motility (AM) at POD15 was significantly more frequent in RG (74.7% Vs 11.7%; RR=0.3, CI 0.2–0.4; p=0.001). Type I LOS, arytenoid fixation and AInR at POD15 recovered in only one case (RR=2.7, CI 1.5–5.3; p=0.001), while in POD15 Type II LOS with AM and no AInR showed recovery of VFM in all cases (RR=0.5, CI 0.4–0.6; p=0.001).

Conclusions: Type of LOS and arytenoid characteristics at POD15 significantly influenced VFM recovery. AInR was a strong predictor of non-recovery, while type II LOS and POD15 AM predicted recovery. This information should be included in follow-up protocols for clinical and medico-legal purposes. Additional prospective studies with larger sample sizes are warranted to validate these preliminary results and to further elucidate the prognostic factors affecting VFM recovery.

♦22. A Prospective Comparison of Laryngeal Ultrasound-guided Adhesive Transcutaneous Electrodes Versus Conventional Endotracheal Electrodes for Intra-operative Neuromonitoring During Thyroid and Neck Surgery

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Background: Conventional intra-operative neuromonitoring (IONM) during thyroid surgery commonly uses electromyography (EMG) electrodes embedded in endotracheal tubes (ETTE). Adhesive transcutaneous electrodes (ATE) may be a novel, non-invasive and low-cost alternative, but its accuracy and limitations remain less known. This prospective study compared the accuracy of ATE placed under laryngeal ultrasound (LUSG) guidance to that of conventional ETTE, and assessed the factors associated with success in ATE IONM.

Methods: Consecutive patients undergoing open thyroid and neck surgery in a tertiary endocrine surgery unit were prospectively recruited. Before skin incision, the position of vocal cords relative to the thyroid cartilage was marked with LUSG, and a pair of ATE was placed on the overlying skin. ETTE was used simultaneously. Standardized pre- and post-dissection vagus (VN) and recurrent laryngeal nerve (RLN) stimulation protocol was followed. Upon each stimulation, EMG signals were simultaneously recorded by ATE and ETTE, and later verified by post-operative flexible laryngoscopy.

Results: From 2023 to 2024, 300 nerves-at-risk from 216 patients were analyzed. Median age 59 (50 – 70), 72.7% female. ATE EMG had lower amplitudes for both RLN and VN (p<0.001). All 4 vocal cord palsies (VCP) (1.33%, transient and unilateral) were detected by ATE and ETTE i.e. 100% sensitivity and negative predictive value for VCP. ATE had slightly lower specificity (91.6% vs 96.5%) and accuracy (91.8% vs 96.6%), and lower positive predictive value (14.3% vs 28.6%). Signal interference leading to malfunction of ATE occurred in 6 (2.8%) patients. Higher body mass index (BMI) was the only factor associated with ATE malfunction or false results (p=0.002, OR 1.145 (95% CI 1.049 – 1.250)). Accuracy of ATE (94.6%) became comparable to ETTE in patients with BMI <25kg/m^2. ATE costs less than ETTE (USD 32 vs USD 427) for each surgery. Two patients with misplaced ETTE (false ETTE signal loss) had normal RLN function correctly predicted by ATE.

Conclusions: LUSG guided ATE IONM has comparable sensitivity and negative predictive value to ETTE and may resolve false ETTE signal loss. Lower BMI was associated with improved and comparable accuracy to ETTE. ATE may be a reliable, low-cost replacement to ETTE in patients with BMI<25.

◆23. The Shifting Landscape of Germline RET Pathogenic Variants: A Cross-sectional Analysis of Nearly One Million Patients

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Background: The mode of discovery and distribution of germline RET pathogenic variants is changing. Per 2015 ATA guidelines, testing is recommended for all patients with sporadic medullary thyroid cancer (MTC) or RET-positive family members. More recently, RET mutations have been identified as an incidental finding in panel testing for non-MTC indications. We sought to clarify the current landscape of RET variants over the last decade.

Methods: This retrospective, cross-sectional study used data from three major genetic testing laboratories (Ambry, Invitae Corporation, and Myriad) to describe patients who underwent RET testing after January 2015. Outcomes included type of testing [single gene (SGT), targeted panel (TPT), or broad panel (BPT)] and incidence of positivity for RET pathogenic/likely pathogenic (P/LP) variants. SGT included both predictive testing for a known familial variant and RET testing for individuals with apparently sporadic MTC. TPT included panels of genes specifically related to a suspected RET phenotype, including MTC, pheochromocytoma, and/or hyperparathyroidism. BPT encompassed panels of genes related to multiple cancer types.

Results: We identified a total of 802,682 patients, of whom 20,264 (2.5%) were tested through SGT, 15,229 (1.9%) through TPT, and 767,189 (95.6%) through BPT. Out of 1,793 RET P/LP variants, 960 (53.5%) were identified via SGT, 74 (4.1%) via TPT, and 759 (42.3%) via BPT. The most common pathogenic variants identified through SGT were V804M (27.7%), C609Y (19.3%), and K666N (8.1%); through TPT, C634R (21.2%) and V804M (11.1%); and through BPT, V804M (38.3%), K666N (18.8%), and C609Y (9.1%). 209 individuals harbored RET P/LP mutations not listed in the 2015 ATA MTC guidelines risk stratification table, including K666N, M918V and C618G/Y.

Conclusions: Over the last decade, RET pathogenic V804M, K666N and C609Y variants were the most identified across three large testing laboratories. Many RET alterations were identified via BPT, suggesting that MEN2 is being more incidentally diagnosed, something which providers must be prepared to manage. Identification of P/LP variants not currently described in the ATA guidelines highlights the need for appropriate variant curation to better understand the risk of developing MTC and an opportunity to consider a dynamic process for guideline change implementation to allow prompt integration of current information.

♦24. Utility of Genomics Resource for Intelligent Discovery (GRID) Molecular Profiling to Predict Aggressive Pathologic Features in Differentiated Thyroid Cancer

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Background: The 2015 American Thyroid Association (ATA) guidelines stratify recurrence risk of differentiated thyroid cancer (DTC) based on pathologic findings. "Low-risk" tumors permit the option of thyroid lobectomy, but postoperative pathologic features (e.g. angioinvasion) may reclassify tumor risk as "Intermediate" or "High", warranting completion thyroidectomy or radioiodine therapy. Thirty mRNA expression-based profiles ("signatures") were developed via Afirma Genomics Resource for Intelligent Discovery (GRID) to analyze clinically relevant factors of DTC. These include the novel sodium iodide symporter (NIS) pathway expression, tumor invasion, lymph node metastases and twenty-seven others. Using thyroid nodules sampled with Afirma Genomic Sequencing Classifier (GSC), we aimed to determine whether GRID signatures could preoperatively distinguish ATA risk categories for DTC.

Methods: A retrospective analysis of patients at our institution with DTC who underwent surgery for GSC-suspicious thyroid nodules from January 2018 to September 2024 were identified. Patients had indeterminate, suspicious for malignancy, or malignant thyroid cytopathologies (Bethesda III-VI) and underwent lobectomy or total thyroidectomy. Using pathology report features from the index operation, patients were classified as ATA guideline-specific "Low-risk" or "Intermediate/High-risk". Comparison of GRID signatures among cohorts was performed using Student's and Welch's t-tests. Logistic regression was used for multivariate analysis.

Results: Of 436 patients analyzed, 312 were Low-risk and 124 were Intermediate/High-risk. Thirty distinct patterns of mRNA expression signatures were analyzed and grouped into Thyroid Cancer Predictors, Pan Cancer Hallmarks and Tumor Microenvironment based on molecular pathway features (Table 1). Within each group, GRID signatures demonstrated a clear dichotomy of highly significant (p<.001) and nonsignificant (p>.05) differences among study cohorts. In multivariate analysis of Thyroid Cancer Predictors, "Invasion Score" predicted higher ATA risk (OR 1.16, 95% CI 1.05-1.28, p<.01) while "NIS Expression" showed a protective effect (OR 0.83, 95% CI 0.72-0.93, p<.01). Age, sex and race were not significant predictors.

Conclusions: Multiple GRID signature profiles showed marked variation among ATA risk classes. While "Invasion Score" mirrors higher risk pathologic features, "NIS Expression" likely reflects a downregulation of the glycoprotein in more aggressive tumors. GRID signatures may enhance preoperative recurrence risk stratification and help guide extent-of-surgery discussions with patients. Further analysis on other GRID signatures is warranted.

25. Surgical Management of Adrenocortical Carcinoma: Is There a Role for Multivisceral Resection?

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Background: Recent data suggest that primary tumor cytoreductive surgery in stage IV (metastatic) adrenocortical carcinoma (mACC) may improve survival. However, successful removal of locally invasive primary tumors in such patients may require complex en bloc multivisceral resection for which the survival benefits remain unclear. We sought to compare survival outcomes across treatment approaches for mACC, including multivisceral resection, adrenalectomy alone, and non-operative management.

Methods: We conducted a retrospective analysis of patients with mACC at presentation, treated at our institution from 1998-2024. Overall survival (OS) was compared between those who underwent multivisceral resection, adrenalectomy alone, or non-operative management, using Kaplan-Meier analysis and log-rank tests. Multivariable Cox proportional hazards models evaluated the association between treatment approach and OS, adjusting for age, sex, tumor functionality, and performance of complete metastatectomy (R0 resection).

Results: We identified 153 patients (52% female) with mACC diagnosed at a median age of 49 years (IQR 36–59 years), who had a mean follow-up of 19±27 months. Overall, 67% had functioning tumors (63% cortisol-secreting and 22% mixed cortisol/androgen secreting). The most frequent metastatic sites were lung (71%), liver (66%), and bone (21%). Thirty-six patients (24%) underwent multivisceral resection, 28 (18%) had adrenalectomy alone, and 89 (58%) were managed non-operatively. Among multivisceral resection patients, 31% had curative-intent surgery (R0 resection of all distant metastases), while 69% had palliative debulking with known unresectable distant disease. The most frequent en bloc procedures included radical nephrectomy (64%) and partial hepatectomy (47%). Median OS was 33 months for multivisceral resection, 22 months for adrenalectomy alone, and 7 months for non-operative management (P<0.0001). On Cox analysis, multivisceral resection (HR 0.29, 95% CI: 0.17–0.48) and adrenalectomy alone (HR 0.35, 95% CI: 0.22–0.55) were independently associated with improved OS compared to non-operative management.

Conclusions: In this cohort, cytoreductive surgery (including multivisceral resection) for mACC was associated with prolonged survival compared with non-surgical management. Despite the possibility of selection bias, surgical intervention can facilitate extended systemic therapy by mitigating complications from local progression and hormone-related morbidity. However, given the potential risks of these complex operations, they should be performed judiciously in carefully selected patients by experienced multidisciplinary teams to balance benefits and risks.

26. Objective Assessment of Vascular Dysfunction in Pheochromocytoma and Paraganglioma Patients, and Their Reversal Following Curative Surgery: Results of a Prospective Cohort Study

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Background: Hypercatecholaminism and hypertension in pheochromocytomas-paragangliomas (PPGL) lead to higher cardiovascular morbidity and mortality. Arterial wall stiffness and impaired endothelium-dependent and endothelium-independent vasodilatory responses are linked to cardiovascular and all-cause mortality, though they have not been studied in PPGL.

Aim: To study nature and extent of vascular changes and impaired vasodilatory response in PPGL patients, and their reversal following curative surgery.

Methods: This prospective cohort study enrolled PPGL patients (study group) and matched controls: 20 healthy normotensive volunteers (Control-1) and 10 essential hypertensives (Control-2). Patients underwent adrenalectomy or paraganglioma excision, with cure documented by normal post-op metanephrines. Patients underwent vascular evaluation- Endothelial dependent: Flow-mediated Vasodilatory response (FMD) and Endothelium independent: Nitro-glycerine-induced vasodilatory response (NMD)—at diagnosis, 7-10 days after α-blockade, 7 days, and 3 months post-adrenalectomy/ Paraganglioma excision. Controls underwent vascular assessment at baseline.

Basal brachial artery diameter (B.A.D.) was measured 3cm above cubital fold. FMD was evaluated by inflating blood-pressure cuff on forearm to 50mmHg above systolic BP for 5 minutes, then released to induce hyperaemia, and B.A.D. measured 30 seconds after cuff deflation.

FMD(%)= {(B.A.D. at peak hyperemia – basal B.A.D.)/ basal B.A.D.}X100%

NMD was evaluated by measuring B.A.D. 30 seconds after Tab. Isosorbide dinitrate 5 mg.

NMD(%)= {(post-ISDN B.A.D. – basal B.A.D.) / basal B.A.D.}X100%.

Values were normalized for confounding factors affecting vasodilatory response. Significance of change in vascular indices over time was tested using repeated measures ANOVA, $p < 0.05$ considered significant.

Results: Mean age of 33 PPGL patients (7 normotensive, 5 Paraganglioma, 20 males) was 34.0±14.7 years; none had persistent hypercatecholanism, 45.5% remained hypertensive after surgery.

FMD and NMD values and trend are provided in table. Endothelium-dependent vasodilatory response (FMD) and Endothelium-independent vasodilatory response (NMD) were stunted or exhibited lesser vasodilation in hyper-catecholaminic hypertensives (PPGL), compared to normotensive controls, and hypertensive(but normo-catecholaminic) controls, which reversed partially following α-blockade and progressively improved 7-10 days and 3 months post-surgery.

Conclusions: In this first-of-its-kind study performed using objective non-invasive vascular assessment methodology, high circulating catecholamines in PPGL patients were found to impair endothelium-dependent and independent vasodilatory responses. The stunted vasodilatory responses are reversed and normalised following curative resection of catecholamine-secreting tumours.

27. Evaluating the Role of Postoperative Long-acting Somatostatin Analogue Therapy in Metastatic Neuroendocrine Tumors Undergoing Surgical Debulking

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Background: The benefit of long-acting somatostatin analogues (SSA) as first-line systemic therapy for metastatic gastro-entero-pancreatic (GEP) neuroendocrine tumors (NETs) prior to surgical debulking has been established. However, the timing of postoperative SSA resumption remains controversial and varies widely between institutions. Herein, we hypothesized that SSA resumption can be safely deferred in select patients.

Methods: We performed a retrospective study of consecutive patients with well-differentiated GEP-NETs with liver metastases who underwent liver debulking, synchronously or metachronously to primary tumor resection, at an academic referral center (2019-2023). Clinicopathologic characteristics and progression-free survival (PFS) were compared between patients who resumed SSA within 90 days of surgery and those who did not. PFS1 was defined as time to progression from the initial operation regardless of SSA resumption. PFS2 was defined as time from SSA resumption (only in the group that did not initially resume SSA) to further progression.

Results: Of the 83 included patients, 56 (68%) had small bowel NETs, while 27 (32%) had pancreatic NETs. Twenty-seven patients (33%) were resumed on SSA within 90 days of debulking. SSA resumption was associated with worse PFS (median 13 [IQR 8-27] vs 21 months [IQR 12-60], p=0.048) after a median follow-up of 28 months (IQR 22-42). The SSA resumption group had higher frequency of pancreatic NETs (52% vs 23%, p=0.01) and extrahepatic metastases at the time of operation (74% vs 39%, p<0.001), and higher Ki-67 index (median 4% vs 2%, p=0.03). Among patients who did not resume SSA, small bowel NETs had longer PFS compared to pancreatic NETs (median 33 [IQR 13-60] vs 16 months [10-18], p=0.02). On multivariable analyses, independent predictors of decreased PFS were pancreatic location (β=0.81, p=0.003) and osseous metastases (β=0.68, p=0.04) for the whole cohort, and only osseous metastases (β=1.14, p=0.03) for the small bowel subgroup. PFS2 was longer in the delayed SSA group compared to PFS1 in the SSA-resumption group (median 21 vs 13 months, p=0.27).

Conclusions: Patients with small bowel NETs without osseous metastasis undergoing surgical debulking experience an extended PFS and might therefore not benefit from restarting SSA after surgical debulking. Our findings provide foundational data for a prospective trial.

28. A Prospective Comparison of Sequential Versus Interval Retreatment with Radiofrequency Ablation for Predominantly Solid, Large-volume Benign Thyroid Nodules

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Background: Radiofrequency ablation (RFA) is an effective treatment for benign thyroid nodules. For large nodules ≥20ml, retreatment within 6 month would lead to higher volume reduction rate (VRR) at 12-month than single treatment. However, the optimal timing of retreatment within the 6-month period has not been determined. This prospective study compared sequential versus interval retreatment with RFA for predominantly solid, large benign thyroid nodules ≥20ml, and identified factors associated with better VRR.

Methods: Consecutive patients with predominantly (>80%) solid, cytologically benign large thyroid nodules (≥20ml) that were undergoing RFA at a tertiary endocrine surgery center were recruited for a planned, two-session RFA treatment. Group I received sequential retreatment in <1 month, Group II received interval retreatment in 4 – 6 months. For each session, the entire nodule was ablated until it was fully covered with echogenic bubbles. Primary outcome was 18-month VRR = (baseline volume – 18-month volume)/baseline volume x 100%. Complications, compressive and cosmetic symptoms were compared.

Results: From 2022 to 2023, 31 nodules (Group I: 15, Group II: 16) from 30 patients were recruited for totally 62 ablation sessions. Baseline characteristics including nodule volumes (33.5 (25-40) vs 37.2 (23.9 – 56.1)) and symptoms where comparable (p<0.05). The overall 12-month and 18-month VRR were 76.1% (64.3-80.8) and 84.1% (68.1-88.3). No significant difference in 18-month VRR was observed between groups (Group I, 84.1%(68.1 – 88.3) vs Group II, 79.4%(64.7 – 87.6), p=0.608). Both groups had significant further nodule shrinkage from 12-months to 18-months (p<0.05), at comparable rates (p<0.05); and significant improvement in cosmetic and compressive symptoms (p<0.001). Higher energy per unit volume delivered at the second ablation was the only factor associated with 18-month VRR ≥80% (p=0.038, OR 88.3(1.47 – 532). No vocal cord palsy or hematoma occurred, and all patients were discharged on the same day after each treatment session.

Conclusions: Continued shrinkage beyond 12-months was observed in large, predominantly solid benign thyroid nodules that received two-session RFA within 6 months. Varying the time interval between the two ablation sessions within 6 months did not affect efficacy. Delivering higher energy per unit volume at the second ablation led to better nodule shrinkage.

29. Over-screening of Patients on GLP-1 Receptor Agonists: a Second "Epidemic" of Thyroid Cancer Over-diagnosis?

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Background: No current guidelines recommend screening for thyroid nodules when beginning a glucagon-like peptide-1 receptor agonist (GLP-1RA). Increasingly, however, patients are presenting with thyroid nodules discovered incidentally on imaging ordered at GLP-1RA initiation.

Methods: This retrospective case-control study looked at patients from 6 October 2019 (Epic launch) to 1 November 2024 at a single academic health system who underwent thyroid ultrasound, fine-needle aspiration biopsy (FNAB), molecular testing and/or surgery in tandem with GLP-1RA initiation. Data including patient characteristics, prescription details, interventions and outcomes was collected and analyzed with case-control matching for age, gender and BMI.

Results: From 2019 to 2024, 437 patients underwent thyroid ultrasound with GLP-1RA initiation. The majority (66%) of studies were ordered for "thyroid nodules" by an endocrinologist, who also prescribed the GLP-1RA, and performed an average of 29 days after the prescription start date. FNAB was performed on 20% (89/437) of patients, a total of 116 nodules. Cytology showed 4% Bethesda I (5/116), 76% Bethesda II (88/116), 14% Bethesda III (16/116), 0.8% Bethesda IV (1/116), 1.7% Bethesda V (2/116) and 3.4% Bethesda VI (4/116). Of 19 indeterminate (Bethesda III-V) nodules, 10 were sent for molecular testing and 6 were positive or suspicious, including fusions, alterations, RAS and BRAF mutations. Of 437 patients, 16 had thyroid surgery after starting a GLP-1RA (7 total thyroidectomies, 8 hemithyroidectomies, and 1 completion thyroidectomy). On final pathology, 5 were benign disease, 1 was NIFTP and 10 were malignant. The rate of malignancy diagnoses in the GLP-1RA cohort was 2.3% (10/437). Case-control matching demonstrated GLP-1RA patients were 0.32 years younger (p=0.03) and had 0.24 higher BMI than non-GLP-1RA patients (p=0.0003). In 2020, 0.17% of patients investigated with thyroid ultrasound were on a GLP-1RA, but this increased to 0.48% by 2023, a 183% relative increase.

Conclusions: The malignancy rate among patients starting a GLP-1RA remains low, but the incidence of thyroid nodule detection and intervention has increased, highlighting a growing problem of over-screening and over-diagnosis. Strong clinical suspicion should govern screening for thyroid disease and guidelines should reflect that patients using GLP-1RA should not be treated any differently than the general population.

30. Deviating From TI-RADS Guidelines in Surgical Planning for Parathyroid Patients: What Is the Clinical Impact?

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Background: The American College of Radiology (ACR) Thyroid Imaging Reporting and Data Systems (TI-RADS) standardizes the classification of thyroid nodules to assess malignancy risk. Preoperative ultrasound before parathyroidectomy often detects incidental thyroid pathology, prompting concomitant thyroid surgery to minimize re-operative surgery. This study aimed to evaluate whether endocrine surgeons follow TI-RADS guidelines for patients scheduled for parathyroidectomy and to examine the outcomes of these clinical decisions.

Methods: Patients who underwent parathyroidectomy for any cause of hyperparathyroidism were included in the study (n=828). A retrospective chart review assessed the use of routine ultrasound in preoperative planning and the incidental discovery of thyroid nodules. Clinical and pathologic characteristics were recorded. Descriptive and univariate statistical analyses were performed.

Results: Between 2019 and 2024, 797 patients underwent formal preoperative neck or thyroid ultrasound (Figure 1). Of these, 340 patients (42.7%) had at least one thyroid nodule identified on ultrasound with TI-RADS classification reported by a radiologist. Among those with a nodule, 131 patients (38.5%) underwent fine needle aspiration (FNA), and 44 patients (12.9%) underwent thyroid lobectomy or total thyroidectomy for the nodule. Thirty-nine of the 131 patients who underwent FNA (29.8%) did not meet TI-RADS criteria, including 11 TR5 nodules < 1cm, 18 TR4 nodules < 1.5cm, 7 TR3 nodules < 2.5cm and 3 TR2 nodules. There was a significant difference in the proportion of patients who underwent thyroid surgery between those with guideline-discordant versus guideline-concordant FNA (12.8% vs. 29.4%, p=0.044). Patients who underwent guideline-discordant FNA were less likely to be diagnosed with thyroid cancer compared to those who underwent guideline-concordant FNA on final surgical pathology, although this finding was not statistically significant (5.1% vs. 14.1%, p=0.139). A majority of the patients diagnosed with malignancy were classified as low risk per ATA guidelines (n=14, 77.8%).

Conclusions: Although many patients undergoing parathyroidectomy receive additional interventions for incidental thyroid pathology, most nodules are evaluated according to TI-RADS guidelines. FNA for nodules that do not meet these criteria infrequently leads to concurrent thyroid surgery. While some patients are incidentally diagnosed with malignancies, most cases involve the resection of low-risk thyroid cancer. The long-term benefits for these patients remain uncertain.

POSTERS

♦ Denotes Resident/Fellow Competition Poster

● Denotes Poster Spotlight Presentation

NOTE: Author listed in **BOLD** is the presenting author

●♦01. "I Have No Idea Why I Am Here": A Mixed Methods Analysis to Characterize Barriers to Referral and Surgical Treatment in Disadvantaged Patients with Primary Hyperparathyroidism

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Background: Primary hyperparathyroidism (PHPT) remains under diagnosed and under treated especially in disadvantaged patient populations. We aimed to (1) quantify rates of referral and treatment of hyperparathyroidism for patients living in socioeconomically disadvantaged neighborhoods compared to more advantaged neighborhoods, and (2) identify barriers to diagnosis and treatment for these patients to begin developing interventions that address this critical disparity.

Methods: We performed a convergent mixed methods analysis of adults (age ≥ 18 years) without a history of ESRD, transplant, or prior diagnosis of hyperparathyroidism who had ≥2 episodes of hypercalcemia (Ca >10.2 mg/dL) between 2021-2022 in our health system. We used the Area Deprivation Index (ADI) to classify patients as "advantaged" (ADI<33), "neutral" (ADI 33-66), and "disadvantaged" (ADI >66). We compared rates of parathyroid hormone (PTH) evaluation, consultation with a specialist (endocrinology or endocrine surgery), and parathyroidectomy within 2 years across ADI levels. We additionally evaluated charts of 40 patients from disadvantaged neighborhoods who had "likely PHPT" (two abnormal calcium values and a PTH >65) to identify common reasons for nonreferral or lack of surgical treatment.

Results: We identified 1,524 patients with repeated hypercalcemia, and rates of PTH evaluation were similar for advantaged (60.9%) and disadvantaged (58.6%) patients (p=0.11). However, advantaged patients with "likely PHPT" were significantly more likely than disadvantaged patients to be referred to a specialist (72.7% vs. 53.1%, p=0.02) or undergo parathyroidectomy (47.1% vs. 30.6%, p=0.03). The most common barrier to referral and treatment was patient preference to avoid surgery, followed by providers not understanding indications for intervention, and social determinant related barriers to obtaining care (e.g., housing, work, family support).

Conclusions: Referral rates for PHPT are particularly low for patients in disadvantaged neighborhoods. Preferences to avoid surgery in this population raises concerns that the disease process and benefits of surgical treatment may not be communicated effectively by providers. Addressing this disparity will require a multi-component intervention of education for providers on indications for referral, culturally competent and educationally appropriate patient directed efforts to better communicate the safety and efficacy of surgery, and support for patients to navigate social barriers to specialist care.

●02. Uncovering Patterns in Primary Aldosteronism: Clinicopathologic Findings Based on HISTALDO Subtypes

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Background: The histology of primary aldosteronism (HISTALDO) consensus classification was established in 2021 to standardize nomenclature used to describe patterns of aldosterone production, as identified by CYP11B2 (aldosterone synthase) staining in adrenal tissues. Classical subtypes include aldosterone-producing adenomas (APA) and aldosterone-producing nodules (APN). Non-classical subtypes include aldosterone-producing micronodules (APM), multiple aldosterone-producing micronodules (MAPM) and multiple aldosterone-producing nodules (MAPN). This study aims to compare clinicopathologic characteristics and outcomes following adrenalectomy based on HISTALDO type.

Methods: Consecutive adrenalectomies performed between 2014-2024 for primary aldosteronism at a single academic center were included. Histology, including both H&E and CYP11B2 immunohistochemistry staining, was reviewed by expert pathologists, and cases were classified according to the HISTALDO scheme. Data on patient demographics, clinical history, biochemical findings, adrenal vein sampling (AVS) results, and clinical outcomes were collected and analyzed.

Results: Among 67 patients, 64 had histopathology slides available for review. Most patients (73.5%) were male, with a median age of 56 years at surgery. Of the 46 patients who underwent AVS, 41 showed lateralization, 1 was bilateral, and 4 were unsuccessful. All patients underwent minimally invasive unilateral total adrenalectomy, except for 2 patients who underwent unilateral subtotal adrenalectomy. On HISTALDO review, 42 were classified as APA, 11 APN, 2 APM, 6 MAPM, and 3 MAPN. Patients with APA had significantly higher lateralization index on AVS compared with other subtypes (Figure 1). At six months post-surgery, complete clinical response was observed in 21.2% of patients, partial response in 63.5%, and no response in 15.4%, with no significant differences in clinical response between HISTALDO subtypes (p=0.77). Additionally, clinical response rates were similar between classic (87.2%) and non-classic (80%) subtypes (p=0.62). Nodule size did not correlate with clinical response, as demonstrated by comparable measurements in patients with complete (10.2±1.4mm), partial (10.9±1.4mm), or absent (9.1±2.0mm) responses (p=0.96).

Conclusions: Routine application of the HISTALDO classification provides valuable insights into the spectrum of primary aldosteronism and its underlying pathophysiology. Although patients with classic APAs exhibited a higher lateralization index, this did not translate to differences in clinical outcomes. Nodule size showed no association with clinical response, suggesting that its role in predictive models may be limited.

●♦03. PET Imaging of Urokinase-type Plasminogen Activator Receptor (uPAR) in Aggressive Thyroid Cancers

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Background: Aggressive thyroid cancers, including poorly differentiated thyroid cancer (PDTC) and anaplastic thyroid cancer (ATC), represent more than half of annual morality despite accounting for less than 5% of annual cases. The purpose of this study was to assess urokinase-type plasminogen activator receptor (uPAR) as a target for aggressive thyroid cancers. uPAR is a cell membrane receptor which facilities cell invasion and migration during wound healing and embryogenesis, but becomes overexpressed in many cancers.

Methods: Cancer specimens from 39 patients with PDTC (21 patients) and ATC (18 patients) were immunostained for uPAR. Western blot identified PDTC and ATC cell lines with endogenous uPAR-expression. uPAR-positive cell lines were used to conduct *in vitro* cell uptake studies and *in vivo* PET imaging in a subcutaneous xenograft model with uPAR-targeted radiopharmaceutical [^{68}Ga]Ga-NOTA-AE105.

Results: Immunohistochemical analysis revealed one quarter of PDTC (4 primary) and ATC (3 primary, 2 metastatic) patients were uPAR-positive. Western blot identified one PDTC and two ATC cell lines with strong endogenous uPAR expression: THJ529T (PDTC), THJ560 (ATC), and JEM493 (ATC). *In vitro* cell uptake in THJ529T cells with 10 nM [^{68}Ga]Ga-NOTA-AE105 showed 6-fold higher uptake in unblocked cells compared to THJ529T cells blocked with excess AE105. PET imaging 20-minutes postinjection showed that the mean standardized uptake value (SUV$_{mean}$) in THJ529T (PDTC) xenografts was 1.3 ± 0.1, 2-fold higher than background organs, and 1.2 ± 0.3 in JEM493 (ATC) xenografts, 3-fold higher than background organs.

Conclusions: *In vitro* uptake and *in vivo* PET imaging suggest uPAR is promising target for diagnosis and therapy in aggressive thyroid cancers that are uPAR-positive.

●♦04. Prevalence and Outcomes of Primary Hyperparathyroidism in Sarcoidosis Patients: A Large-scale Retrospective Cohort Study

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Background: Hypercalcemia affects 7%-18% of patients with sarcoidosis. Primary hyperparathyroidism (PHPT) and malignancies account for most hypercalcemia cases. We aim to determine rates of primary hyperparathyroidism in patients with Sarcoidosis and survival benefits of controlling it.

Methods: We conducted a retrospective cohort study using the TriNetX platform, representing data from 120+ million patients across the US collaborative network. Our study aimed to investigate the coexistence of PHPT in patients with sarcoidosis. We analyzed data from 117,395 patients with sarcoidosis, categorizing them by calcium levels (normal or high) and PTH levels (normal or high). The study assessed several key outcomes: the rate of proper hypercalcemia workup, PHPT prevalence, parathyroidectomy frequency, and mortality rates across different patient groups. For each outcome, we calculated hazard ratios with 95% confidence intervals to compare risks between groups and subgroups. This analysis allowed us to evaluate the rates of PHPT in patients with sarcoidosis and impact of hypercalcemia and PHPT on mortality, as well as the effects of parathyroidectomy (PTX).

Results: The study cohort of 117,395 patients had a mean age of 56.4 ± 14 years, with 57.6% females. Hypercalcemia was observed in 31.3% (36,790) of patients, but only 30.5% (11,217) of these patients with hypercalcemia received PTH assessment. Among those with both hypercalcemia and PTH assessment, 50% (5,615) were diagnosed with PHPT. However, only 6.5% (362) of PHPT patients underwent PTX. Over a median 3-year follow-up, hypercalcemia is associated with increased mortality risk by 33% compared to normal calcium levels (HR: 1.33; 95% CI: 1.29 – 1.38). PHPT was associated with 50% higher mortality compared to patients without PHPT (HR: 1.5; 95% CI: 1.4 – 1.6). Notably, patients with PHPT who did not undergo PTX had a 4-fold increase in mortality compared to those who received PTX (HR: 4.2; 95% CI: 2.7 – 6.4).

Conclusions: Our study reveals significant under-evaluation and under-treatment of hypercalcemia in patients with sarcoidosis. This leads to missed PHPT diagnoses and significant increases in mortality. We recommend thorough hypercalcemia workup, including PTH assessment, for all patients with sarcoidosis with elevated calcium levels. Timely referral for parathyroidectomy in confirmed PHPT cases could significantly improve survival outcomes.

●♦05. Sonographic and Pathologic Features of Malignant Nodules Within Hyperfunctioning Thyroid Tissue: A Multi-institutional Study

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Background: Prior studies indicate that approximately 5% of hyperfunctioning thyroid nodules harbor malignancy. Hyperfunctioning nodules often exhibit suspicious sonographic features despite their typical benign pathology. We sought to explore the incidence, sonographic characteristics, and surgical pathology of malignant nodules among patients with different etiologies of hyperfunctioning nodules to inform management of these nodules and guide pre-procedure workup for ablative therapies.

Methods: We identified patients at five tertiary centers with a diagnosis of solitary toxic nodule or toxic multinodular goiter who underwent partial or total thyroidectomy 2017-2024. Thyroid uptake scan and ultrasound were used to match hot nodules with their sonographic characteristics. Patients were excluded if either imaging modality was missing. Nodules on imaging or pathology <1cm in all dimensions were excluded. Thyroid Imaging Reporting and Data System (TI-RADS) was used to evaluate sonographic features and indication for fine needle aspiration (FNA). Tests of proportions were utilized.

Results: 204 patients with 324 hyperfunctioning nodules were included: 125 solitary toxic nodules and 199 nodules within toxic multinodular goiters. Median age was 53 (IQR:36-64); 171 (84%) were female. 13 hyperfunctioning nodules (4.0%) contained thyroid cancer >1cm, 10 (8.0%) solitary toxic nodules and 3 (1.5%) within toxic multinodular goiters (p=0.004). Malignant compared to benign nodules were more often solid or almost completely solid (91.7% vs. 51.1%, p=0.006) and isoechoic/hyperechoic (83.3% vs. 49.8%, p=0.03, Table 1). Malignant nodules were more often biopsied (69.2% vs. 41.8%, p=0.05) and more often resulted as Bethesda V or VI (50% vs. 0%, p<0.0001). Molecular testing was seldomly performed. Pathology revealed papillary and follicular cancers averaging 1.3 cm in longest dimension. There were significant rates of BRAF positivity (30.8%), lymphovascular invasion (38.5%), multifocality (23.1%), and tall cell features (23.1%). Three patients underwent completion thyroidectomy and received postoperative radioactive iodine.

Conclusions: Solitary toxic nodules harbor a higher risk of malignancy than toxic multinodular goiter and these malignancies can exhibit poor prognostic pathologic features. Providers biopsied a higher percentage of malignant nodules, suggesting they can discern high-risk sonographic features despite these malignant nodules often being isoechoic or hyperechoic. The 8% malignancy rate in solitary toxic nodules supports existing recommendations for biopsy prior to thermal ablation.

●♦06. Immune Cell-to-Cell Interactions in the Cortisol-Producing Adrenocortical Carcinoma Tumor Microenvironment

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Background: In adrenocortical cancer (ACC), cortisol-producing (CP) tumors are known to carry a worse prognosis compared with non-producing (NP) tumors. This is likely due, at least in part, to cortisol-induced immunosuppression in the tumor microenvironment. The exact mechanisms that govern this immunosuppressive state are unknown. In this study, we used transcriptomics data from The Cancer Genome Atlas (TCGA) database to perform an *in silico* analysis of cell signaling interactions and their underlying pathways within the tumor microenvironment.

Methods: Using the TCGA ACC cohort, we compared immune cell expression using CIBERSORTx and the "LM22" signature matrix between CP and NP samples. The CIBERSORTx HiRes mode was used to impute gene expression values within each cell population, then this was merged with the sample and cell type information. This merged matrix was used for CellChat analysis to infer differential signaling between groups. We repeated this on the dataset with scrambled labels to ensure the robustness of the results.

Results: Of 69 ACC samples with sufficient clinical and transcriptomics data, there were 31 CP and 38 NP. We found that between CP and NP cells, CP had a significantly decreased presence of CD8 cells, while NP tumors had an increased presence of activated dendritic cells (aDC). Despite the increased presence of aDCs in NP cells, in the CP group there were significantly more interactions between neutrophils and aDCs found in the CellChat analysis. Angiopoietin-like protein (ANGPTL) interactions were significantly over-expressed in the CP group, suggesting this is driving the aDC-neutrophil interactions. We found downregulation of incoming CD80 (inducible co-stimulatory molecule of antigen-presenting cells) signal from aDC to neutrophils and downregulation of outgoing CD276 signal from aDC to neutrophils. Further, CP ACCs had several differentially downregulated immunomodulatory pathways, such as Poliovirus receptor, PD-L1, and NODAL (secreted ligand of TGF-β) and upregulation of IL-1, fibronectin, and TNF-related apoptosis apoptosis-inducing ligand (TRAIL).

Conclusions: These results suggest that the interactions between aDCs and neutrophils and associated differentially expressed immunomodulatory signaling above may be responsible for the immunosuppressive TME in CP ACCs. This finding and the underlying pathways that govern the interactions provide new potential targets for manipulation of the ACC TME.

●♦07. Can Virtual Non-contrast CT Improve the Diagnostic Uncertainty of Adrenal Incidentalomas?

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Background: Although most adrenal incidentalomas are benign, many are identified by single-phase contrast-enhanced CT which is typically unreliable for confidently excluding malignancy. Virtual non-contrast (VNC) is a newer modality of dual-energy CT using reconstructed image data with the potential to better characterize adrenal nodules.

Methods: VNC imaging demonstrating adrenal nodules with an available reference standard of chest/abdominal true non-contrast (TNC) CT images were abstracted from an institutional radiology database (2016-present). Three authors reviewed images and evaluated nodule characteristics, and measured Hounsfield unit (HU) attenuation and variability. Nodules were classified as benign (HU<10) or indeterminate/suspicious (HU>10) based on TNC. HU attenuation values were compared and correlated between VNC and TNC. Variability in attenuation measurements was compared by evaluating HU differences one slice up and down from the chosen mid-depth image. ROC analysis was used to define clinically optimal thresholds for VNC accuracy.

Results: Sixty-seven adrenal nodules (median size 1.6 cm, IQR 1.4-2.1 cm) were identified after excluding 5 nodules due to suboptimal VNC technique or beam artifact that hindered accurate HU measurement (59.7% female, average age 70.6 years, 59.7% with malignancy history). Based on TNC HU, 23 nodules (34.3%) were benign and 44 (65.7%) were indeterminate/suspicious. HU measurements for each nodule exhibited wide variability by both VNC and TNC (HU standard deviation range 5.44-9.57 for VNC vs 7.49-8.98 for TNC). VNC and TNC were significantly correlated with moderate effect size (Pearson coefficient 0.69, p-value<0.001). Conflicting impressions occurred for 6 nodules (9.0%), with 2 under-estimated and 4 over-estimated by VNC. Overall, VNC exhibited outstanding discrimination between benign and indeterminate/suspicious nodules (area under ROC curve 0.93). Maintaining a threshold of <10 HU resulted in a sensitivity of 95%, specificity of 74% and negative predictive value (NPV) of 89%, while a HU threshold of 7 achieved 100% NPV.

Conclusions: Despite wide variability in HU measurements, adrenal nodules are well defined by both VNC and TNC. Well-reconstructed VNC images can accurately rule out malignancy in selected patients, and may avoid the additional imaging currently required to characterize adrenal incidentalomas discovered by single-phase contrast-enhanced CT.

08. Calcitonin Doubling Rate in Patients with Medullary Thyroid Carcinoma as an Excellent Prognostic Predictor and a Possible Indicator of Change in the Tumor Growth Dynamics Over Time

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Background: Serum tumor marker doubling time (DT) is an excellent prognostic predictor of a cancer that secretes a tumor marker. However, it has a limitation of discontinuity among those with positive values and those with negative values. Doubling rate (DR), inverse of DT, resolves this problem. Here, we studied the prognostic value of calcitonin DR (Ct-DR) calculated within 3 years postoperatively in patients underwent surgery for medullary thyroid carcinoma (MTC). Tumor growth rate might change over long time. We also studied on this issue using Ct-DR.

Methods: Since 1997, 278 patients with MTC underwent surgery at our hospital. Postoperatively, 92 of them were diagnosed with biochemical persistent disease. From these, excluding 32 patients with insufficient calcitonin measurements and 5 patients who had recurrence or died within 3 years postoperatively, 55 patients were included in the present study. The median observation period for the 55 patients was 12.4 years (range 3-24.7years). Ct-DR were calculated in these patients and compared with their prognosis. We also compared Ct-DR in the first 3 years postoperatively and those in the last 3 years of postoperative follow-up in patients with longer than 10 years follow-up.

Results: The recurrence-free survival rate at 10 years was 88.3%. There was a significant difference in recurrence-free survival rate between those with Ct-DR ≥ 0.3 /year and those with Ct-DR < 0.3 /year (64.9% and 94.0% at 10 years, respectively, $p < 0.01$). Of the 28 patients with Ct-DR ≥ 0.1/year during the first 3 years postoperatively, 9 patients were followed for more than 10 years and had significantly lower Ct-DR during the last 3 years compared with those in the first 3 years (0.18 /year vs. 0.01 /year, $p < 0.01$).

Conclusions: Ct-DR measured within 3 years postoperatively strongly predicted MTC recurrence. A decrease in Ct-DR was observed in all patients with long-term follow-up. This may suggest that spontaneous deceleration and regression of MTC growth may not be a rare phenomenon.

09. The Normo-aldosteronemic Variant as the Norm for Hyperaldosteronism: Use of a Modified Aldosterone-to-renin Ratio to Enhance Primary Aldosteronism Detection

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Background: Primary aldosteronism (PA) is classically defined by elevated aldosterone production with compensatory renin downregulation. Since 1981, aldosterone-renin ratio (ARR) has been used with an aldosterone-to-plasma-renin activity of >30 ng/dL/ng/mL/h (5.7 ng/dL/ng/L with the modern direct renin assay). We evaluated the diagnostic characteristics of a modern series of patients with PA and compared them to non-secretory tumors.

Methods: Patients diagnosed with PA were reviewed at our center from January 2016 through December 2023 and compared to non-secretory tumors. An ARR of 5.7 ng/dL/ng/L was used based on clinical practice guidelines. Plasma aldosterone (PAC) and direct renin concentration (DRC) were plotted to determine optimal differentiation between groups. Receiver-operating characteristic (ROC) curve with Youden Index was used to determine the ideal sensitivity and specificity.

Results: 169 patients were identified: 100 with PA (70 unilateral, 30 bilateral) compared to 69 non-secreting tumors. Of patients with PA, 67% had a PAC level below our institution's upper limit of 30 ng/dL (45% with a more conservative limit of 20 ng/dL). Among the PA cohort, only 4 (4%) required withdrawal of mineralocorticoid receptor antagonist to confirm the diagnosis. After plotting DRC vs PAC, comparison of PA and non-PA cohorts demonstrated two distinct zones (Figure 1). For the diagnosis of PA, classic ARR of 5.7 yielded a sensitivity of 73.5% and specificity of 100% (AUC: 0.984, 95% CI: 0.972-0.995). Using a modified ARR formula (adding 1.8 to the PAC value, adjusting the ARR slope to 4.0) yielded an improved sensitivity of 93.5% with specificity of 93.0% (AUC: 0.981, CI: 0.968-0.994). Although PAC levels were higher in patients with unilateral compared to bilateral disease [mean: 32.8 (SD: 19.6) vs 19.4 (SD: 10.0) ng/dL, $p<.01$], the optimal ARR formulas were similar.

Conclusions: To our knowledge, this is the largest single-center study evaluating the diagnosis of PA with comparison to non-secretory tumors. As elevated aldosterone levels were seen in a minority of patients, suppressed renin was key in diagnosing PA. Modification of the classic ARR formula led to increased diagnostic sensitivity without significantly compromising specificity. This increased understanding can help with the diagnosis of non-classic PA presentations.

♦10. Should Osteopenia Be an Indication for Parathyroidectomy? A Systematic Review and Meta-analysis of Bone Mineral Density Outcomes After Parathyroidectomy in Primary Hyperparathyroidism

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Background: According to AAES guidelines, parathyroidectomy is indicated in patients with primary hyperparathyroidism (pHPT) and osteoporosis (T-score <-2.5). Whether surgery also benefits patients with osteopenia (-2.5 > T-score < -1) remains contested.

Methods: A systematic search of Ovid MEDLINE, CENTRAL and clinicaltrials.gov was carried out, including cohort studies and randomized controlled trials (RCTs) of patients with pHPT who underwent parathyroidectomy, had pre- and post-operative bone mineral density (BMD) measurements by dual X-ray absorptiometry (DXA) and specified the proportion of patients in their sample with osteoporosis and/or osteopenia. Studies that included secondary and tertiary hyperparathyroidism and hereditary diseases were excluded. Data extraction followed Preferred Reporting Items for Systematic Reviews and Meta-analysis guidelines. Single-arm random-effects meta-analysis was performed on mean difference BMD data at the lumbar spine, femoral neck, distal radius and total hip. Meta-regression assessed the associations of osteoporosis versus osteopenia on effect size.

Results: Of 642 studies screened by two independent reviewers, 20 were included for systematic review and 13 for meta-analysis: 2 RCTs and 18 cohort studies, of which 7 were prospective in design, published from 1995 to 2024, with 1,098 patients (mean age 61.5±11.9, 83% female) and mean time to post-operative DXA 1.7±1.1 years. Forty-four percent of patients had osteopenia. After parathyroidectomy, BMD improved overall by 0.039 g/cm^2 (95% CI 0.023, 0.055) at the lumbar spine, 0.020 g/cm^2 (95% CI 0.008, 0.032) at the femoral neck and 0.022 g/cm^2 (95% CI 0.002, 0.042) at the total hip, while no difference was seen at the distal radius. For the weighted average patient in the pooled sample, this represents clinically meaningful percent changes in BMD of 4.6%, 4.4% and 2.3%. On sensitivity analysis, osteopenic patients were as likely to experience improvement in BMD as osteoporotic patients. There was low heterogeneity detected across studies and quality of evidence was also low.

Conclusions: There are positive pooled effects of parathyroidectomy on BMD at the spine, femur and hip for patients with primary hyperparathyroidism and osteopenia. Since improving bone density decreases fracture risk, parathyroidectomy may be beneficial for patients with osteopenia and consideration should be given to the inclusion of osteopenia in future guidelines.

♦11. Associations Between Lymphocytic Thyroiditis and Outcomes in Papillary Thyroid Cancer

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Background: The relationship between lymphocytic thyroiditis (LT) and outcomes in papillary thyroid cancer (PTC) remains controversial. Our primary objective was to assess the impact of LT on BRAF and TERT mutations and outcomes in PTC.

Methods: We leveraged a retrospective single-institution cohort study of patients with PTC from 1990-2016. Univariate analyses assessed associations between mutational status (BRAF and TERT) and the presence of LT. Multivariable logistic regression adjusting for age, sex, race, ethnicity, mutational status, and aggressive PTC variants (tall cell, columnar cell, sclerosing, or cribriform) was then used to assess the impact of LT by BRAF or TERT mutational status on clinical and pathologic outcomes. Primary outcomes included PTC-related mortality and recurrence. Secondary outcomes included tumor characteristics such as size, aggressive variants, disease stage, and invasion.

Results: We included 1,061 PTC patients, of whom 299 (28%) had LT, 362 (34%) had BRAF mutations, and 135 (13%) had TERT mutations. Among those with LT, 26% had BRAF mutations and 11% had TERT mutations. LT was associated with a 41% decreased risk of having a BRAF mutation (OR = 0.594; 95% CI: 0.441-0.799), while there was no association between LT and TERT mutation. BRAF and TERT mutations were associated with a 3.322-fold (95% CI: 2.403-4.593) and 2.423-fold (95% CI:1.572-3.735) increased odds of PTC-related mortality and recurrence, respectively. LT was associated with 2.184-fold higher odds of having an aggressive PTC variant (95% CI: 1.021-4.672) and 1.478-fold increased odds of lymph node metastases (LNM) (95% CI: 1.115-1.959). However, LT was also associated with a 55% decreased risk of PTC-related mortality (aOR 0.445; 95% CI: 0.292-0.678) and recurrence (aOR 0.445; 95% CI: 0.292-0.678), a 44% decreased risk of having a tumor >4 cm (aOR 0.557; 95% CI: 0.320-0.971), and a 57% decreased risk of extrathyroidal extension (aOR 0.433, 95% CI: 0.274-0.685), irrespective of mutational status.

Conclusions: Despite its association with aggressive tumor variants and LNM, LT appeared to confer a protective effect against PTC-related mortality, recurrence, and certain aggressive disease features irrespective of mutational status. Our findings highlight LT's complex role in PTC biology and underscore the need for further research into its protective mechanisms and clinical implications.

♦12. A Dangerous Inheritance? Characterizing the Malignancy Risk and Management Implications of Dicer1 Mutations in Indeterminate Thyroid Nodules

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Background: The DICER1 mutation is associated with an increased risk of multi-organ malignancies, including thyroid neoplasms. Thyroseq v3 reports DICER1 mutations in indeterminate thyroid nodules, however its associated malignancy risk and germline mutational status remain ill-defined.

Methods: A prospectively maintained institutional database was retrospectively queried to identify patients with DICER1 mutations on FNAB of indeterminate thyroid nodules between July 2017 and February 2022. Patient demographics, personal and family history of cancer, surgical intervention, pathology, and genetic testing were collected and analyzed.

Results: Of 2900 patients with indeterminate thyroid nodules, 40 were identified with DICER1 mutations. Average patient age was 40.7 years, and 34 patients (85%) were female. Of the 40 patients, 32 had Bethesda III and 8 had Bethesda IV nodules. Thirty patients underwent surgery, 18 of whom had lobectomy and 12 had total thyroidectomy. All patients who underwent surgery were found to have a neoplasm on final pathology: 13 (43.5%) had follicular adenoma, 7 (23.5%) had follicular variant papillary thyroid carcinoma, 6 (20%) had follicular carcinoma, and 4 (13%) had non-invasive follicular thyroid neoplasm with papillary-like nuclear features.

Of the 17 malignant/NIFTP cases, 6 (35.3%) were associated with copy number alterations. DICER1 with high copy number alterations were also considered ATA high risk. Mutations of CTNB1 (3.3%) and TSHR (6.6%) were associated with benign pathology. Thyroseq v3 risk stratified all follicular adenomas as "low to intermediate" and all malignant cases as "intermediate to high" risk. In patients with malignancy, no recurrences have been observed over a median follow-up of 33 months. Of the 10 patients with Bethesda III nodules who did not undergo surgery, none have evidence of disease progression since initial consultation. Of 9 patients referred for genetic testing, 3 had a germline DICER1 mutation, and found to have higher allelic frequencies [AF].

Conclusions: DICER1 mutations in thyroid nodules are associated with a significant risk of malignancy and some patients in observation may harbor malignant disease. Copy number alterations may also contribute to malignant potential, amplifying the risk of DICER1 alone. Patients with these nodules and high DICER1 AF also frequently harbor a germline mutation, supporting genetic counseling.

♦13. Size-dependent Predictors of Survival After Surgery: Revisiting the Impact of Tumor Size in Patients with Early-stage Pancreatic Neuroendocrine Tumors

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Background: Current guidelines support resection for nonfunctional pancreatic neuroendocrine tumors (NF-pNETs) >2cm in size, while an individualized approach favoring observation is recommended for tumors <2cm. An increase in both disease incidence and frequency of imaging have contributed to more patients referred to surgeons with early-stage NF-pNETs. Meanwhile, the predictors of survival for patients undergoing surgery remain inconsistent across. This study examines the clinical factors, tumor characteristics, social and treatment center-related factors impacting overall survival in patients NF-pNETs.

Methods: The National Cancer Database (NCDB) 2004-2022 was queried for patients >18yrs with a diagnosis of early-stage I and II, low-grade G1/G2, NF-pNETs who underwent primary tumor resection. Exclusion criteria included G3 pNETs, neuroendocrine carcinoma, functional pNETs, and advanced-stage disease. Multivariable model and Kaplan-Meier survival analysis were performed.

Results: Of 5,587 patients, 67% were stage I and 33% stage II. Median tumor size was 23mm, with 7.9% <1cm, 35% between 1-2cm, and 57% >2cm. Patients with early staged tumors had higher rates of R0-resection (97% vs. 90%, p<0.001) and less lymphovascular invasion (12% vs. 55%, p<0.001) compared to stage II. Predictors of post-surgical mortality included age (HR=2.21; 95%CI=1.88-2.60; p<0.001) and male sex (HR=1.20; 95%CI=1.06-1.36; p=0.005). Multivariable analysis highlighted high Charlson-score (HR=1.48; 95%CI=1.30-1.68; p<0.001), R1/R2-resection (HR=1.32; 95%CI=1.04-1.68; p=0.021), and lymphovascular invasion (HR=1.21; 95%CI=1.04-1.42; p=0.016) as significant mortality predictors.

For tumors <2cm, significant predictors of mortality were age >65 (HR=1.93; 95%CI=1.46-2.55; p<0.001), male sex (HR=1.42; 95%CI=1.14-1.77; p=0.002), Charlson-score >1 (HR=1.57; 95%CI=1.26-1.95; p<0.001), and primary tumor in the head (HR=1.45; 95%CI=1.13-1.86; p=0.004). For tumors >2cm, predictors included age >65 (HR=2.26; 95%CI=1.85-2.77; p<0.001), Charlson-score >1 (HR=1.45; 95%CI=1.23-1.70; p<0.001), lymphovascular invasion (HR=1.24; 95%CI=1.03-1.48; p=0.021), primary tumor in the head (HR=1.38; 95%CI=1.16-1.64; p<0.001), positive lymph nodes (HR=1.37; 95%CI=1.14-1.65; p<0.001). No differences were found for extent of resection, chemotherapy, and distance traveled for both cohorts.

Conclusions: While current guidelines recommend primary tumor resection for low grade early-stage NF-pNETs >2cm, this study reveals >40% of patients undergoing surgery in the US have tumors <2cm. Surgery in patients with small pNETs is not without mortality risk. When examining predictors of survival across conventional tumor size-cutoffs, this study shows that these significantly differ and warrant further study.

♦14. Exhausted and Broke: A Mixed Methods Analysis of Fatigue and Financial Toxicity After Thyroidectomy

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Background: This study evaluated financial toxicity and fatigue following thyroidectomy in patients with benign and malignant disease and explored their lived experience.

Methods: This sequential explanatory, mixed-methods study surveyed adults who underwent thyroidectomy between January 2021 and January 2024 at a tertiary referral center. The Comprehensive Score for Financial Toxicity-Functional Assessment of Chronic Illness Therapy tool (COST-FACIT) measured current financial toxicity. Fatigue and social determinants of health (SDoH) were assessed with validated measures. Logistic regression identified factors associated with moderate-severe financial toxicity (COST-FACIT $\leq$25). Semi-structured interviews using purposive sampling explored the experience, mechanism, and consequences of financial toxicity in relation to fatigue.

Results: Of 623 eligible patients, 180 (28.9%) responded, and 167 were analyzed. Participants were predominantly female (77.8%, n=130), white (83.8%, n=140), and underwent total thyroidectomy (65.3%, n=109). Overall, 31.1% (n=52) experienced moderate-severe financial toxicity with no differences by surgical indication or extent of surgery. Fatigue was reported by 49.1% (n=82) of participants—33.5% experienced moderate (n=41) or severe (n=5) fatigue. Factors that were present prior to surgery and associated with financial toxicity included younger age (OR 0.96 [95%CI 0.92-1.00]), SDoH (OR 12.89 [95%CI 3.45-48.17]), and multiracial identity (OR 23.13 [95%CI 1.61-332.52]; Figure). Fatigue post-thyroidectomy also increased the odds of moderate-severe financial toxicity (OR 1.42 [95%CI 1.15-1.76]).

Semi-structured interviews (n=20; Figure) revealed that participants with financial toxicity and fatigue felt overwhelmingly "*exhausted.*" They had no energy, couldn't move, and felt older. Difficulty or inability to work or attend school due to diminished concentration, sleep disturbance, an absolute need for naps, and increased use of sick days contributed to financial toxicity. Some attributed their fatigue to difficulty regulating TSH levels. Additional consequences of fatigue included the inability to perform day-to-day activities like housework, exercise, or engage socially with friends or family. No participants felt prepared for the magnitude of their fatigue and financial consequences. Most wished their care team had prepared them better.

Conclusions: Nearly 1 in 3 patients suffer moderate-severe financial toxicity following thyroidectomy for benign or malignant disease, which isassociated with experiencing debilitating fatigue post-surgery. This fatigue affects all aspects of patients' lives and requires targeted interventions.

♦15. PROPr Is Noninferior to PAS as a Measurement Tool of Neurocognitive Symptoms in Primary Hyperparathyroidism

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Background: Most patients with primary hyperparathyroidism (PHPT) experience neurocognitive symptoms. However, PHPT-management guidelines do not include neurocognitive symptom burden as an indication for surgery. This may be due to (1) a lack of standardized measurement tools of neurocognitive symptoms and (2) difficulty with data capturing using modern electronic medical records (EMRs). A potential solution to this problem is to use the PROMIS-29+2 Profile (PROPr) as a neurocognitive symptom-PROM, as it is high-quality, comprehensive, easy to administer, and embedded into modern EMR systems. In this study, we hypothesize that PROPr will perform noninferior to the Parathyroid Assessment of Symptoms (PAS, a validated, parathyroid-specific PROM).

Methods: We created a voluntary survey that included PROPr and PAS. Surveys were distributed to patients aged ≥18 years with PHPT scheduled for parathyroidectomy at three timepoints: prior to surgery (baseline), 2-weeks (2wk) post-operatively (post-op), and 6-months (6mo) post-op. Patients with persistent PHPT after surgery were excluded. Data were analyzed using R software.

Results: Sixty-nine patients completed PROPr and PAS at baseline and 2wk post-op, of which 33 also completed a 6mo post-op assessment. At 2wk post-op, both PROPr ($p=0.003$) and PAS ($p<0.001$) scores significantly improved from baseline (interpreted as a significant decline in PAS and significant increase in PROPr). At 6mo post-op, both PROPr ($p=0.045$) and PAS scores ($p=0.013$) remained significantly improved from baseline (**Figure 1**). Improvement in PROPr score was correlated with normalizing serum calcium levels when comparing 2wk post-op to baseline ($r=-0.37$, $p<0.01$). The same was true of PAS scores and serum calcium levels ($r=0.48$, $p<0.001$).

Conclusions: PROPr scores significantly improved from baseline to 2wk post-op. This effect was maintained at 6mo and correlated with improvement in serum calcium levels, similar to PAS. These data suggest that PROPr captures neurocognitive symptom burden in patients with PHPT and is noninferior to PAS. Furthermore, the correlation between improvement in post-op PROPr scores and serum calcium suggests that the degree of neurocognitive symptom burden has a biological correlate. Our results support that PROPr successfully measures neurocognitive symptoms in patients with PHPT. Future studies will evaluate implementation of PROPr for routine neurocognitive symptom quantification in a clinical setting.

♦16. Epidemiology of Hyperparathyroidism in Dialysis Patients in the Post-calcimimetic Era- Insights From the U.S. Cohort DOPPS 2010-2022

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Background: Medical treatments for dialysis patients with secondary hyperparathyroidism (SHPT) have evolved. We aimed to understand recent trends in PTH levels, treatment, and its effectiveness to identify care opportunities.

Methods: We utilized data from the U.S. cohort of the Dialysis Outcomes and Practice Patterns Study (DOPPS) phases 4-7 (spanning 2010-2022) encompassing patient-level data from over 200 dialysis centers in the U.S. Trends in PTH, estimated by using the median from 3 most recent PTH values for each patient, and treatment were calculated using the Mann-Kendall test. Mann-Whitney U test assessed differences in various subgroups.

Results: Among 75,331 participants, the median age was 65 years, 31.5% were Black, and the most common cause of ESKD was type II diabetes (39.4%). The median PTH level increased by 48% from 274 pg/mL (IQR:171-461) in 2010 to 406 pg/mL (IQR:250.5-656.7) in 2022 ($p<0.001$). The proportion of patients with PTH >600pg/mL rose from 19% in 2010 to 30% in 2022 ($p<0.01$). Calcimimetic use increased with 23.3% of patients on calcimimetics in 2010, 28.8% in 2017 and 41.8% in 2022 ($p<0.01$). Among patients with PTH >600pg/mL calcimimetic use rose by 29.9% between 2017 to 2022. Vitamin D supplementation increased by 16.4% (74.2% in 2010 to 86.4% in 2022) ($p=0.04$). Parathyroidectomy was performed in <2% of this cohort. In subgroup analyses, compared to other races, Black patients had the highest PTH levels (425pg/mL vs 353pg/mL-white and 348pg/mL-other races) which rose 41.4% over the study period ($p<0.001$); 39.4% had PTH levels >600pg/mL. Compared to older (age$\geq$65) patients, younger patients had higher PTH levels (411pg/mL vs 322pg/mL) which increased by 35.6% over the study period ($p<0.001$); 34.8% had PTH >600pg/mL. Compared to patients on dialysis for less than 5 years, those on dialysis for at least 5 years had higher PTH (430pg/mL vs 349pg/mL), an increase of 22.2% over the study period ($p<0.001$), and 39.9% had PTH>600pg/mL.

Conclusions: Among a large cohort of U.S. dialysis patients, despite increasing utilization of calcimimetics and vitamin D supplementation, median PTH levels rose from 2010 to 2022. Those most at risk (Black, young, dialysis>5 years) should be considered for parathyroidectomy.

♦17. Cardiovascular and Metabolic Outcome in Patients with Mild Autonomous Cortisol Secretion: Adrenalectomy Versus Nonoperative Management

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Background: Mild autonomous cortisol secretion (MACS) is the most common hormonal abnormality in adrenal incidentalomas. However, it is unclear whether adrenalectomy benefits patients with MACS given their mildly elevated cortisol levels.

Methods: We conducted a retrospective analysis of electronic medical records from a multi-institutional database in the United States, covering the years 2011 to 2024. Patients with cortisol levels between 1.8 to 5 µg/dL following a 1 mg dexamethasone overnight challenge were included. Cox regression analysis with propensity score matching (PSM) for age, sex, race, body mass index (BMI), and comorbidities was utilized to compare hazard ratios (HR) and 95% confidence intervals (CI) for cardiovascular and metabolic outcomes between patients who underwent adrenalectomy and those who did not. The median follow-up duration was 2.5 years after the index lab.

Results: Of the 10226 patients included, 343 (3.3%) underwent adrenalectomy, while 9883 (96.7%) received non-surgical management. After propensity score matching (PSM), both the surgical and non-surgical groups comprised 342 patients each. The majority were white (70.2%) and female (64.1%), with a mean age of 57 ± 14 years. The surgical and non-surgical groups were balanced regarding pre-diagnostic hypertension (71.3% vs. 67.5%, p = 0.28), diabetes (34.5% vs. 33.9%, p = 0.871), and BMI (30.4 vs. 29.3 kg/m², p = 0.122). Adrenalectomy was associated with a reduced hazard for developing cerebral infarction (HR 0.44, 95% CI 0.22 – 0.88) (Figure 1), ischemic heart disease (HR 0.62, 95% CI 0.44 – 0.87), and sepsis (HR 0.34, 95% CI 0.20 – 0.58). However, an association with decreased risk of new-onset hypertension (HR 1.07, 95% CI 0.52 – 2.22), diabetes (HR 0.69, 95% CI 0.34 – 1.41), and osteoporosis (HR 0.87, 95% CI 0.52 – 1.47) were not observed during the study period.

Conclusions: Adrenalectomy may help reduce the risk of severe cardiovascular morbidities and infections in patients with MACS.

♦18. Parathyroidectomy for Primary Hyperparathyroidism Is Associated with a Reduction in Acute Coronary Syndrome Compared to Non-operative Management

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Background: Cardiovascular diseases are known comorbidities in patients with primary hyperparathyroidism (PHPT). However, the impact of parathyroidectomy on reducing these risks remains unclear. This study aims to compare the incidence of new-onset cardiovascular disorders in patients with PHPT who underwent parathyroidectomy versus those managed nonoperatively.

Methods: A retrospective cohort study was conducted using an institutional database of patients diagnosed with PHPT. We excluded patients with renal hyperparathyroidism as well as patients with other causes of hypercalcemia. The date of biochemical diagnosis of PHPT served as the index date, and new-onset stroke or acute coronary syndrome (ACS) events were defined as those occurring after this diagnosis. Cox proportional hazards regression was used to evaluate the risk of cardiovascular events over a median follow-up of 3.7 years.

Results: The cohort included 3,736 patients, mostly female (77.9%) and white (63.9%), with a mean age of 62 ± 14 years. Of these, 1,710 (45.8%) underwent parathyroidectomy. Patients who underwent surgery had a hazard ratio (HR) of 0.82 (95% CI: 0.65 – 1.02; p = 0.076) for stroke and 0.42 (95% CI: 0.28 – 0.64; p < 0.001) for ACS. Male sex was an independent risk factor for both stroke (HR: 1.37, p = 0.008) and ACS (HR: 1.67, p = 0.005), while older age increased the risk of stroke (HR: 1.05 per year, p < 0.001) and ACS (HR: 1.03 per year, p = 0.001). Kaplan-Meier analysis showed that at 5 years, stroke-free survival was 87.6% in the nonoperative group compared to 92.3% in the operative group (p<0.0001). 5-year ACS-free survival was 93.5% in the non-operative group and 98.5% in the operative group (p<0.0001).

Conclusions: Parathyroidectomy is associated with a significant reduction in the risk of ACS and may offer benefits in reducing stroke risk in patients with PHPT. These findings suggest that surgical intervention could improve cardiovascular outcomes, particularly for ACS, in this patient population.

♦19. Bespoke Surgeon Specific Chat Bots: Integrating Large Language Models Into Clinical Endocrine Surgery Practice

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Background: Large-language models (LLMs) are capable of providing detailed answers to patient questions about thyroid surgery. The feasibility of integrating LLMs into real-world clinical practice, however, depends on their ability to provide safe, accurate and complete answers individualized to surgeon preference.

Methods: This prospective feasibility study used prompt engineering and surgeon specific data to train four distinct GPT-4o-powered bots on the practice preferences of four high-volume endocrine surgeons practicing across a single quaternary care center. Bots were then asked a series of common patient email / phone call questions about preoperative, operative, and postoperative care. Responses provided by each surgeon's bot were sent to ten healthcare providers familiar with the surgeon's practice along with the four surgeons themselves and graded using 4-point Likert scales based on accuracy, quality and, in some cases, safety. Results were analyzed using a single-factor ANOVA.

Results: Average accuracy, quality, and safety scores were 3.65/4 (SD 0.63), 3.57/4 (SD 0.56), 3.60/4 (SD 0.56) respectively. An accuracy score of 3 was: " mostly true to my practice" and 4: "completely accurate to my practice". A quality score of 3 was: "fully answers the question" and 4 "fully answers with relevant additional information". A safety score of 3 was: "partially safe with appropriate urgency" and 4 "fully safe with appropriate urgency".

For safety related questions, 0% of responses were graded as a 1: containing "dangerous information".

A single-factor ANOVA was also used to compare the consistency of results among the four customized bots. There was no significant difference in accuracy, quality, and safety results between the groups (p = 0.052, p = 0.610, p=0.254). The best trained bot was the first made with the most prompt-engineering to date, with the other subsequently trained bots demonstrating enhanced performance with iterative training.

Conclusions: LLM-powered bots trained on individual surgeon preferences provided detailed and complete information that was highly representative of individual surgeon practices. Bots successfully recognized and escalated unsafe and dangerous situations with appropriate urgency, suggesting that they can be effectively integrated into real-world practice.

♦20. Noncompliance with Thyroid Imaging Reporting and Data Systems(TI-RADS) Guidelines: Reimbursement Analysis and Clinical Impact

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Background: Guidelines based on contemporary scientific data improve patient outcomes while minimizing inappropriate clinical resource expenditure. The ultrasound-based TI-RADS classification scheme is a widely accepted ultrasound-based assessment tool to determine which nodules need fine needle aspiration (FNA) biopsy, the gold standard for assessing the potential for thyroid nodule malignancy. Here, we examine noncompliance with TIRADS-based guidelines for thyroid FNA, including associated clinical and financial impact.

Methods: We conducted a retrospective review of FNAs performed through a large academic medical system, for which TI-RADS is used for thyroid ultrasonographic assessments, between January and June 2024. Exclusion criteria included age <18 years and the presence of risk factors predisposing to thyroid malignancy. Minimum associated cost data were extrapolated from standard reimbursement values published by the Centers for Medicare and Medicaid Services (CMS).

Results: 155 FNAs were identified, of which 50 (32%) did not meet TI-RADS guidelines for biopsy. Fourteen of these (28%) were classified as indeterminate or malignant using the Bethesda categorization system. Of these, eight FNAs (57%) underwent additional ThyroSeq◊ genomic classifier testing, with findings suspicious for malignancy in two FNAs (25%). Nine indeterminate or malignant FNAs were managed with thyroid surgery (64%) and all nine were found to be papillary thyroid cancer (PTC) on final surgical pathology assessment. Eight of these (89%) were <1 cm in maximal diameter. Minimum reimbursement assessment for FNAs not meeting TIRADS criteria were $6,140.18 (50 FNAs, CPT 10005/10006), $28,800.00 (8 ThyroSeq◊ assessments, CPT 0026U) and $57,600 (9 minimum surgical interventions, CPT 60220), for a total of $92,540.18.

Conclusions: Our data demonstrate a minimum expenditure for TI-RADS FNA guideline noncompliance over a 6-month period of $92,540.18. These data represent published CMS reimbursements and are lower than those received for the same services through most private insurers and relative to out-of-pocket expenses for uninsured patients. Our analysis also indicates that none of the 50 TI-RADS-noncompliant FNAs identified would have been incorrectly managed (e.g. serial ultrasound monitoring) had TI-RADS guidelines been applied. Together, these findings strongly support the application of TI-RADS guidelines to guide thyroid FNA decision-making.

♦21. Adrenalectomy Patients with Mixed Primary Aldosteronism and Hypercortisolism(PA/HC): An Analysis of Outcomes Following Surgery at a Single Institution

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Background: Primary aldosteronism (PA) is the most common form of secondary hypertension. A subset of patients with PA present with clinical features and/or biochemical evidence of hypercortisolism, suggesting excess co-secretion of both aldosterone and cortisol (mixed PA/HC). We compared mixed PA/HC patients and their outcomes following adrenalectomy to those of patients with PA only.

Methods: This is a retrospective review of adult patients who underwent unilateral adrenalectomy at a single institution for PA from 8/2014 to 8/2024. Mixed PA/HC patients (1mg dexamethasone suppression test (DST) cortisol >1.8 mcg/dL) were compared to patients who had PA only. Demographics, comorbidities, CT nodule size, adrenal venous sampling (AVS), laterality, and perioperative steroid usage were assessed. The Primary Aldosteronism Surgical Outcome (PASO) criteria were used to assess clinical and biochemical outcomes following adrenalectomy.

Results: Of 130 patients who underwent unilateral adrenalectomy for PA, 28 (21.5%) had mixed PA/HC. PA/HC patients were older than PA only patients (median age 61 vs 49 years; $P<0.001$). There were no differences in demographics, preoperative potassium supplementation, laterality of the operation, or size of the resected adrenal gland. AVS was performed in 88.2% of PA only patients and in 75% of mixed PA/HC patients ($P=0.126$). Of the patients who underwent AVS, the results dictated the laterality of surgery in 100% of the PA only patients and 85.7% of the mixed PA/HC patients ($P=0.006$). Following surgery, mixed PA/HC patients were more likely to have postoperative day 1 cosyntropin stimulation testing (82.1% vs 16.7%) and were more likely to be discharged on glucocorticoid replacement than PA patients (35.7% vs 2.0%, $P<0.001$). On long-term follow up, mixed PA/HC patients were more likely to remain hypertensive and on the same number of antihypertensive medications as prior to surgery (21.4% vs 5.9%, $P=0.042$).

Conclusions: Patients with mixed PA/HC comprised >20% of patients who underwent adrenalectomy for PA. These patients were more likely to need postoperative glucocorticoid replacement and less likely to have a partial or complete clinical response to surgery. This study highlights the importance of DST in all patients with PA prior to adrenalectomy to guide perioperative management and appropriately frame postoperative outcomes.

♦22. Ex-Vivo Parathyroid Aspiration in Parathyroidectomy: Correlation with Histopathology and Biochemical Outcomes in Single- and Multi-glandular Hyperparathyroidism

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Background: Surgical treatment of hyperparathyroidism is often supported by intraoperative adjuncts for parathyroid tissue confirmation. Ex vivo aspiration of excised parathyroid tissue followed by intraoperative parathyroid hormone testing (aIOPTH) is a rapid and sensitive technique that can discriminate between parathyroid and surrounding tissues. There is limited literature regarding specific aIOPTH protocols, correlation with final histopathology, and the impact of its use on patient outcomes. This study aims to describe the implementation and effectiveness of an aIOPTH protocol.

Methods: This observational, retrospective study was conducted at a tertiary care academic hospital. It included patients who underwent parathyroidectomy with aIOPTH testing between June 2023 and August 2024. Quantitative aIOPTH values were converted to qualitative results ('positive' or 'negative') based on absolute cutoffs of 500 and 5,000 pg/mL. These qualitative results were then compared to final histopathology findings from the excised tissue. Performance metrics were calculated from this comparison. Additionally, subgroups of patients with adenomatous versus multiglandular disease were similarly analyzed. Six-month postoperative cure rates were assessed using total calcium levels.

Results: This study included 55 patients undergoing parathyroidectomy, during which 123 unique aIOPTH specimens were analyzed. Using the 500-cutoff, sensitivity was 98% and positive predictive value (PPV) was 96%. With the 5,000-cutoff, sensitivity decreased to 88%, while PPV increased to 99%. Of the 22 patients with multiglandular disease (n=22), 70 unique aIOPTH specimens were analyzed. In this subgroup, sensitivity and PPV were 97% and 95% for the 500-cutoff, and 88% and 100% for the 5,000-cutoff, respectively. At the time of this analysis, 96.6% of patients with who had six-month postoperative calcium testing (n=29) demonstrated durable biochemical cure.

Conclusions: The use of an absolute cutoff in aIOPTH testing protocols shows clinical performance comparable to that reported in current literature. Lower absolute PTH cutoffs enhance sensitivity without a significant decline in PPV. Additionally, aIOPTH performs similarly in patients with intraoperatively identified multiglandular disease. Moreover, aIOPTH was associated with a high rate of biochemical cure. These findings support the use of ex vivo aspiration for intraoperative parathyroid testing as an effective aid for intraoperative decision-making.

23. Learning Curves & Efficiency Metrics in Robotic Adrenalectomy

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Background: Robotic adrenalectomy adoption has steadily increased over the past decade and has become 31% of minimally invasive adrenalectomy in the US. Practice patterns of surgeons performing adrenalectomy are heterogenous, with a small group of surgeons performing adrenalectomy as their nearly singular robotic procedure type, while many surgeons perform robotic adrenalectomy in the context of a more heterogenous case mix. Little is known about the learning curves and efficiency metrics of robotic adrenalectomy in these two groups.

Methods: Data of all surgeons globally performing at least 50 robotic adrenalectomies were extracted from robotic manufacturer system logs. Surgeons were divided into two cohorts: "adrenalectomy only" (where adrenalectomy was >=90% of their case mix) and mixed case surgeons (adrenalectomy <90% of their case mix). Efficiency performance indicators (console time, master clutch rate, camera clutch rate) were compared across the two cohorts for their first 50 cases.

Results: There were 17 surgeons in the "adrenalectomy only" group and 157 surgeons in the mixed case group. Average time to accumulate 50 robotic adrenalectomies in the "adrenalectomy only" group was 989 days and 2116 days in the mixed case group. Console times between the two groups followed the same pattern of slow decline with an overall average of 83 minutes for the "adrenalectomy only" surgeons and 80 minutes for the mixed case surgeons (NS). Master clutching rates were 1.0 clutches/min in the "adrenalectomy only" cohort vs 0.94 clutches/min for mixed case group (p =0.02) and camera clutching rates were consistently lower in the "adrenalectomy only" group: 1.6 clutches/min vs 2.6 clutches/min (p< 0.001).

Conclusions: Surgeons performing robotic adrenalectomy may experience long gaps between adrenalectomy cases, with mixed case surgeons experiencing even longer gaps than "adrenalectomy only surgeons." Despite this, mixed case surgeons maintain similar or sometimes superior efficiency metrics in adrenalectomy suggesting that some robotic efficiency metrics are transferable from procedure type to procedure type while some are procedure specific.

♦24. Total Thyroidectomy for Graves' Disease Among High-volume Surgeons: A CESQIP Analysis

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Background: Total thyroidectomy (TT) is an effective treatment for Graves' disease (GD). Many surgeons consider this operation to be more difficult than TT performed for other indications.

Methods: We obtained data from the Comprehensive Endocrine Surgery Quality Improvement Project (CESQIP) for all patients who underwent TT from 2014-22. CESQIP contains 10 possible diagnosis codes. Patients were considered to have "Graves' disease" if hyperthyroidism was listed without "thyroid nodule" or "multinodular goiter" (MNG) as concomitant diagnoses (indicating solitary toxic nodule or toxic MNG, respectively). After 2018, CESQIP added a "Graves' disease" variable; we checked our definition against this more-specific variable, revealing good concordance (kappa=0.76). Patients with lateral or central neck lymph node dissections were excluded. We compared immediate post-operative complications. We defined a composite complication variable to include vocal cord dysfunction (VCD), hypoparathyroidism, and hematoma. Outcomes between patients with and without GD were compared using chi-square analyses and multivariable logistic regression.

Results: We identified 15,407 patients who underwent TT (median age 52 years; 83% female). Eighteen percent (n=2844) met our definition for likely GD. Compared to non-GD patients, GD patients were younger (41 vs. 54 years), more likely to be Black (16% vs. 11%) or Hispanic (12% vs. 8%), and less likely obese. Among patients with GD, 10.6% experienced at least one post-operative complication versus 6.9% among those without GD (p<0.001); specifically, the incidence of hypoparathyroidism was 8.3% versus 5.2% and of hematoma was 1.4% versus 0.6% (both p<0.001). The rate of VCD was 1.8% among GD patients versus 1.4% for non-GD patients (p=0.3). Adjusted for age, sex, and race, odds of any complication were 1.3-fold (95%CI 1.09-1.47) higher for patients with GD when compared to those without GD. Length of stay (LOS) was longer for patients with GD, and readmissions (2.7% vs. 0.7%, p<0.001) were more common [Table].

Conclusions: Among a group of mostly high-volume thyroid surgeons, TT for GD is independently associated with an increase in post-operative complications, particularly hypoparathyroidism and hematoma. GD patients require more resource-intensive post-operative care, such as longer LOS and more readmissions. TT for GD is safe and effective, but disease-specific outcomes are critical for effective pre-operative counseling.

♦25. Surgical Intervention for Primary Hyperparathyroidism Is Associated with a Reduction in New-onset Neuropsychiatric Disorders

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Background: Primary Hyperparathyroidism (PHPT) has been linked to an increased prevalence of neuropsychiatric disorders. However, there is sparse literature to determine if parathyroidectomy improves the development of new-onset neuropsychiatric disorders when compared to non-operative management. This project aims to assess the impact of parathyroidectomy on developing new-onset neuropsychiatric diseases in PHPT patients.

Methods: Using data from a multi-institutional health network database, a retrospective cohort study was conducted on patients classified with an ICD-10 of PHPT (E21.0) aged 18 or older with at least three years of follow-up after diagnosis. The study compared those with a previous parathyroidectomy (CPT 60500) to those with non-surgical management. Cohorts underwent propensity score matching. A Cox regression analysis was conducted to compare cohorts and calculate the hazard ratio of developing the following neuropsychiatric disorders based on ICD-10 codes: anxiety (F41), depression (F32), suicidal ideation (R45.851), schizophrenia (F20), mild cognitive impairment (G31.84), somnolence (R40.0), bipolar disorder (F31), and mania (F30).

Results: The initial query identified 43,176 patients with PHPT. After matching, 30,984 patients were included, and were predominantly white (73.0%, n=22,679) and female (73.7%, n=22,817). The parathyroidectomy and non-surgical groups both contained 15,492 patients, with an average age of 60 ± 13 years. Patients who underwent parathyroidectomy had significantly lower rates of anxiety (HR 0.71, 95% CI 0.65-0.78), depression (HR 0.74, 95% CI 0.67-0.82), mania or bipolar disorder (HR 0.54, 95% CI 0.36-0.83), mild cognitive decline (HR 0.67, 95% CI 0.52-0.88), and somnolence (HR 0.82, 95% CI 0.69-0.98) when compared to their non-surgical counterparts. There was no difference between the groups regarding new-onset schizophrenia (HR 0.51, 95% CI 0.23-1.13) and suicidal ideation (HR 0.92, 95% CI 0.54-1.59).

Conclusions: Parathyroidectomy was associated with significantly lower rates of new-onset neuropsychiatric disorders in patients suffering from PHPT compared to medical management.

♦26. C[11] Choline-PET/CT Is a Localization Standard for Re-operative Parathyroidectomy in Primary Hyperparathyroidism

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Background: Previous studies have demonstrated that C[11] choline positron emission tomography/computed tomography (Choline-PET/CT) can localize abnormal parathyroid glands in the re-operative setting. This study assesses a large volume of patients with primary hyperparathyroidism (1HPT) who underwent Choline-PET/CT to evaluate its utility in the setting of negative or equivocal conventional imaging.

Methods: All patients who underwent Choline-PET/CT for evaluation of 1HPT from July 2017 to July 2024 at a single institution were reviewed. Inclusion criteria were patients who underwent parathyroidectomy and had lab testing to assess for cure (defined as >50% drop from baseline PTH and into normal range, or resolution of hypercalcemia at follow-up). Sensitivity, positive predictive value (PPV), false negative rate (FNR), and accuracy were compared to conventional imaging (ultrasound, Sestamibi, and 4D-CT). Subgroup analysis was conducted comparing sensitivity of modalities among index operations, and separately in re-operations.

Results: 176 patients were identified. 85 underwent parathyroidectomy, 1 patient was excluded due to lacking data to evaluate for cure. Of 91 patients who did not undergo parathyroidectomy, 45 were non-localizing on all imaging, and 46 had positive Choline-PET/CT findings but opted against surgery due to mild disease or prohibitive re-operative risk. Of the remaining 84 patients, 61 failed to localize on at least one conventional modality, and 15 failed to localize on all three. 67 patients (80%) achieved cure, of whom 53 were re-operations (range of 1-4 prior operations, average 1.5). Choline-PET/CT outperformed conventional modalities across sensitivity, PPV, FNR, and accuracy (Table). Among index operations, Choline-PET/CT had significantly higher sensitivity than conventional modalities (100% vs 27% for ultrasound, 30% for Sestamibi, 29% for 4D-CT; p values ≤0.01). This was also true in re-operations (95% for Choline-PET/CT vs 13% for ultrasound, 30% for Sestamibi, 32% for 4D-CT; p values <0.01).

Conclusions: C[11] choline-PET/CT is a valuable imaging modality in the re-operative setting and demonstrates utility for index operations. It provides localization when other modalities fail and allows for a high surgical cure rate. Further investigation into its utility as a primary imaging modality is warranted.

27. Are LLMs Overconfident in Addressing Controversial Questions in the Management of Thyroid Disease?

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Background: Large language models (LLMs) often quantitatively outperform human experts across scientific disciplines. However, their safety in clinical practice remains undetermined and depends on their ability to recognize, gauge, and communicate uncertainty in their responses. We tested this capacity using controversial questions in the management of thyroid disease.

Methods: A concordance survey study was conducted using thyroid disease-specific questions from online forums (Reddit, ThyCa). Twenty questions on uncertain areas in thyroid disease management, including radioiodine use, extent of surgery, and ethical issues, were selected. Responses were generated using GPT-4o. Nine blinded healthcare professionals with expertise in endocrine disease were randomly assigned to grade six GPT-4o-generated responses each (54 total ratings) using four metrics (accuracy, fit, conciseness, and suitability for real-life use), on 4- or 5-point Likert scales. Grades were compared against those provided by GPT-4o itself, which completed the identical survey as a measure of its confidence in assessing its own responses. A Welch t-test compared human- and GPT-4o-assigned grades.

Results: On average, GPT-4o rated its own response accuracy higher (4.0/4, SD 0.0) than physicians (3.33/4, SD 0.43; $p<0.01$), where 4 = "completely true information" and 3 = ">50% true." Fit was rated significantly higher by GPT-4o (3.40/4, SD 0.50) than physicians (2.62/4, SD 0.47; $p<0.01$), where 4 = "provided information beyond what was asked," 3 = "completely answers the question," and 2 = "partially answers..." For conciseness, GPT-4o averaged 4.0/5 (SD 0.0), compared to 3.50/5 by physicians (SD 0.44; $p<0.01$), where 5 was "strongly agree" and 1 was "strongly disagree" for the statement: "The response is appropriately concise." Suitability for real-life clinical use was rated significantly higher by GPT-4o (4.25/5, SD 0.44) than physicians (3.04/5, SD 0.66; $p<0.01$), according to the statement: "I feel comfortable sending this response, unedited, to the patient."

Conclusions: Particularly in areas of clinical uncertainty, ChatGPT consistently expresses overconfidence in its responses. This underlines the need to train LLMs to recognize limitations in their knowledge and for ongoing physician oversight in the integration of LLMs into clinical practice.

♦28. The Relationship Between Microscopic Margin Positivity and Disease Recurrence in Differentiated Thyroid Cancer

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Background: The significance of microscopic margin positivity after initial resection of differentiated thyroid cancer (DTC) is unclear. This study aimed to assess whether microscopic margin positivity influenced biochemical or structural recurrence rates in low-risk DTC patients who underwent total thyroidectomy.

Methods: We conducted a retrospective cohort study of 1,335 patients with DTC from 1990 to 2021 at a single tertiary referral center. We included patients who underwent total thyroidectomy with (T1 or T2)NxM0 disease (AJCC 8th edition) and a minimum of two years' follow-up. Surgical pathology prior to 2016 did not routinely report margin status; hence these cases underwent blinded re-review. Structural or biochemical evidence of disease detected within one year of surgery was classified as persistent, whereas those detected beyond one year was considered recurrent. A disease-free state was defined as continuously undetectable thyroglobulin levels and negative surveillance imaging from one year after treatment through last follow-up. Multivariate analysis was performed to assess factors associated with disease recurrence.

Results: The study cohort comprised of 516 patients (76% female) with a median age of 44 years (interquartile range [IQR] 35-56). Microscopic margin positivity was present in 68 (13%) patients and was not associated with higher rates of persistent disease compared to the negative margin cohort (35 vs 27%, p=0.17). However, the margin positive cohort had increased rates of structural recurrence (14 vs 4%, p=0.001) and lower likelihood of maintaining a disease-free state (65 vs 78%, p=0.001). In multivariable analysis, margin positivity remained independently associated with structural recurrence (hazard ratio [HR] 2.98, 95% confidence interval [CI] 1.23-7.26, p=0.016) (Table), but had no relationship with maintenance of a disease-free state (odds ratio 0.71, 95% CI 0.39 – 1.29, p=0.26). In a subgroup analysis of patients without microscopic extrathyroidal extension (intrathyroidal tumors), margin positivity remained a predictor of structural recurrence (HR 2.75, 95% CI 1.09 – 6.94, p=0.033).

Conclusions: Microscopic margin positivity after thyroidectomy in patients with low-risk DTC increases the risk of structural recurrence, even among intrathyroidal tumors. Future studies should assess whether patients with microscopic margin positivity may benefit from additional treatment and/or increased surveillance.

♦29. Neurocognitive Function Improvement After Parathyroidectomy for Primary Hyperparathyroidism: Use of a Readily Available Online Tool for Patient Assessment

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Background: Controversy exists as to whether neurocognitive impairment should be considered an indication for parathyroidectomy for primary hyperparathyroidism. The optimal cognitive assessment tool to select patients for surgery is also unknown. Boston Cognitive Assessment™ (BoCA™) is a simple, novel, validated computerized tool suitable for longitudinal, repeated testing in the same patient without practice effect. BoCA™ assesses eight cognitive domains (memory/delayed recall, visuospatial abilities, executive function, language, abstract thinking, attention, arithmetic, and temporal and spatial orientation) in 10 minutes and can be easily done with any smartphone. This prospective study aimed to evaluate changes in neurocognitive function after parathyroidectomy with BoCA™ and to identify patients with the greatest cognitive improvement after surgery.

Methods: Consecutive patients undergoing parathyroidectomy for primary hyperparathyroidism in a tertiary institution were prospectively recruited. Patients underwent BoCA™ pre-operatively and at 2 weeks after surgery. Similar to the Montreal Cognitive Assessment (MoCA), the full marks of BoCA™ is 30. The Patient Health Questionnaire-9 (PHQ-9) and Generalized Anxiety Disorder 7-item scale (GAD-7) were also completed. Patients not cured after surgery were excluded.

Results: During the 10-month study period, 28 patients were analyzed, which 24 (85.7%) were females. The median age was 65 years old (range 36-80). Five (17.9%) had multi-gland disease. 18 patients (64.3%) underwent focused parathyroidectomy and 10 (35.7%) had cervical exploration. Within the entire cohort, there was no significant difference in BoCA™ score (pre-operative median score 26 vs post-operative 25.5, $p=0.125$). Among 5 patients with pre-operative BoCA™ score <20, all showed improvement after surgery and score improvement was significant in this cohort (16 vs 19, $p=0.041$). For psychological symptoms, PHQ-9 score demonstrated significant post-operative improvement (3 vs 2, $p=0.036$). Among 6 patients with pre-operative GAD-7 score >4, significant post-operative improvement was shown (9 vs 5, $p=0.043$).

Conclusions: Parathyroidectomy for primary hyperparathyroidism significantly improved neurocognitive function in patients with neurocognitive impairment as well as psychological symptoms. BoCA™ is a simple and readily available tool that could quantify neurocognitive improvement after surgery. A BoCA™ score of <20 may be an indication for surgery as these patients benefited the most from surgery.

♦30. Multi-species Analysis of T Cell Populations in the Adrenal Gland Immune Microenvironment

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Background: The adrenal glands are a common site of metastasis and are hypothesized to be an immune privileged location, leading to a poor response to immunotherapies. The purpose of this study is to characterize the adrenal microenvironment to better understand the adrenal gland's role in immune homeostasis.

Methods: We collected peripheral blood and remnant adrenal tissue from laparoscopic adrenalectomy patients and adrenal specimens from C57BL/6 and BALB/C mice for cross-species analysis. Fresh samples were processed into single cell suspensions and stained for flow cytometry.

Results: In the 6 laparoscopic adrenalectomy patients, there was an average of $300\pm98 \times 10^3$ live CD45+ (pan-leukocyte marker) cells per gram of adrenal tissue, which was lower than immune rich organs such as lung with an average of $1,470\pm65 \times 10^3$ live CD45+ cells per gram of tissue. Adrenal CD45+ live cells were composed of $15.6\pm11.5\%$ CD3+ T cells and $1.8\pm1.3\%$ CD3-CD56+ natural killer cells. When compared to peripheral blood samples, adrenal tissue had an increased expression of checkpoint marker PD-1 ($42.2\pm22.1\%$ in CD4 T cells, $44.4\pm22.8\%$ in CD8 T cells, $P<0.05$) and tissue activation marker CD69 ($64.7\pm28.2\%$ in CD4 T cells, $72.2\pm25.3\%$ in CD8 T cells, $P<0.05$). Adrenal tissue also had an increase in co-expression of double positive PD-1/CD69 cells ($50.5\pm23.0\%$ in CD4 T cells, $59.2\pm19.0\%$ in CD8 T cells, $P<0.05$). Mouse adrenal glands showed similar results, with approximately 25–35% higher T cell expression of PD-1 compared to spleens.

Conclusions: Our analysis shows that adrenal tissue contains a T cell population with an increased expression of PD-1, CD69, and PD-1/CD69 co-expression compared to peripheral blood. This data suggests that the adrenal gland harbors a distinct population of tissue resident T cells with features of both activation and exhaustion that may contribute to its unique immune microenvironment.

31. What Is the Cost of Selectivity? Selective and Non-selective Alpha Blockade Costs Associated with Adrenalectomy for Pheochromocytoma.

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Background: Alpha blockade is typically utilized in the preoperative preparation of patients with pheochromocytomas. Both selective (SAB) and non-selective alpha blockade (NSAB) are safe with equivalent clinical outcomes; the goal of this study is to evaluate the comparative costs of SAB and NSAB.

Methods: We performed a retrospective cohort study (2004-2022) of patients who underwent adrenalectomy for pheochromocytoma from the OPTUM database who underwent preoperative preparation with alpha-blockade. Patients were identified by CPT codes and ICD9/10 diagnostic codes. Patients were stratified by treatment as SAB (phenoxybenzamine) or NSAB (prazosin, doxazosin, terazosin). Patients receiving both SAB and NSAB were excluded. The primary outcomes were: 1) adjusted standard costs from surgery to discharge; and 2) costs of alpha-blockade in the 30 days prior to surgery. Secondary outcomes included length of hospital stay (LOS), ICU admission, and costs 30 days after discharge.

Results: A total of 418 patients received SAB and 384 patients received NSAB. 65.7% were female and the majority (74.5%) were White. The median age was 58 years (IQR:21). The median Elixhauser comorbidity score was 3 (IQR:4.) The median LOS was 2 days (IQR:3), and 33.7% of patients required ICU stay. The NSAB group was significantly less likely to have private insurance (81.3% vs. 53.7%, p<0.001) and more likely to have a household income of <$40,000 (26.0% vs. 14.6%, p=0.002.) The median cost of alpha-blockade was $313.24 (IQR:$1,231.79), as shown in Table 1. The median adjusted standard cost from surgery to discharge was $30,442.31 (IQR:$23,007.17), which was not significantly different between groups (NSAB:$31,104.47; SAB: $31,471.90). Median costs of alpha-blockade ($19.73 vs. $1,033.70, p<0.001) and rates of ICU admission (50.6% vs. 59.8%, p=0.015) were significantly lower in the NSAB compared to the SAB group. Median LOS (NSAB: 2 days; SAB: 3 days, p=0.296) and costs in the 30 days after discharge were not significantly different between groups (NSAB:$790.78, SAB:$715.10, p=0.074.)

Conclusions: NSAB is associated with lower medication costs and lower rates of ICU admission than SAB, without any increase in hospitalization or post-hospitalization costs. These data suggest that NSAB may be a more cost-effective preoperative regimen for patients undergoing adrenalectomy for pheochromocytoma.

♦32. Total Thyroidectomy Does Not Confer Survival Benefit Compared to Lobectomy for Patients with Poorly Differentiated Thyroid Carcinoma

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Background: Poorly Differentiated Thyroid Carcinoma (PDTC) is a rare form of thyroid cancer with clinicopathologic behavior that lies between differentiated and anaplastic thyroid cancer. Total thyroidectomy is the mainstay of current treatment guidelines, but there is limited literature supporting this recommendation.

Methods: The Surveillance, Epidemiology, and End Results (SEER) Database was queried for patients ≥18 years with PDTC from 2000-2017. Patient demographics, clinicopathologic characteristics, and outcomes were compared based on lobectomy versus total thyroidectomy and radioactive iodine (RAI) administration. Multivariable Cox regression and linear regression were performed to identify predictors of disease specific survival (DSS) and overall survival (OS).

Results: 1861 patients with PDTC were treated with lobectomy (N=152) or total thyroidectomy (N=1709), with a median follow-up of 78 months. There was no significant difference in rates of metastatic disease in patients who underwent lobectomy vs total thyroidectomy (25.7% vs 21.5%, p=0.238). There was also no significant difference in rates of node positive disease (51.0% lobectomy, 57.4% total, p=0.367). Patients with lobectomy had significantly larger tumors, on average, compared to total thyroidectomy (54.1 mm vs 43.2, p=0.002). Non-surgical treatment included RAI (N=972) and external beam radiation (EBRT, N=279). In multivariate linear regression, increased age, larger tumor size, EBRT, node positivity, presence of distant metastases, and presence of positive lymph nodes were associated with worse OS (all $p<0.001$). RAI administration was weakly associated with improved OS (7.8 months, p=0.046). Total thyroidectomy was not significantly associated with improved OS in multivariate regression (p=0.339). In a multivariable Cox proportional hazards model, larger tumor size (by mm; HR = 1.01, $p<0.001$), metastatic disease (HR = 3.11, $p<0.001$), positive lymph nodes (HR = 2.23, $p<0.001$), increased age (in intervals of 5 years; HR = 1.16, $p<0.001$), and EBRT (HR = 1.80, $p<0.001$) were all associated with worse DSS. RAI administration (p=0.274) and total thyroidectomy (p=0.708) were not statistically significant contributors to DSS.

Conclusions: Total thyroidectomy was not associated with improved DSS or OS compared to lobectomy for PDTC. Aggressive clinicopathologic features such as tumor size, increased age, positive lymph nodes, and distant metastatic disease confer worse prognosis independent of extent of treatment.

♦33. Genetic Characteristics and Clinical Outcomes in Patients with Pheochromocytomas and Paragangliomas

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Background: Pheochromocytomas and Paragangliomas (PGL) (PPGL) are rare tumors that can be associated with hereditary syndromes. Understanding the relationship between genetic characteristics and clinical outcomes is limited by the relative rarity of PPGL and many studies include fewer than 100 patients. Our aim was to describe germline genetic characteristics and clinical outcomes in a large cohort of patients with PPGL and associated hereditary syndromes.

Methods: We conducted a retrospective analysis of patients with either a diagnosed PPGL tumor or genetic testing demonstrating an associated hereditary syndrome at our institution between 2008-2024. Genetic testing and pedigree analysis was reviewed for families with hereditary PPGL. Descriptive, univariate, and multivariate analysis were performed with the primary outcome being development of multisite/recurrent or malignant PPGLs.

Results: We analyzed 704 patients, of which 386 patients (54.7%) had a PPGL, with 537 total tumors diagnosed within this cohort. Surgical resection occurred in 325 (73.9%) of tumors. Tumor types included head and neck PGL in 400 patients (74.5%), abdominal PGL in 69 (12.9%), pheochromocytoma in 60 (11.2%), and gastrointestinal stromal tumors in 8 (1.5%). Multiple tumors occurred in 75 patients (21.5%) and tumor behavior was malignant in 46 tumors (8.7%). On multivariate analysis, younger age (mean 45.8 years vs 55.0 years p<0.01), presence of a hereditary PPGL (83.3% vs 28.4%, p=0.04), and abdominal tumors (38.8% vs 29.6%, p=0.04) were associated with multisite/recurrent PPGLs. Abdominal tumors (25.0% vs 5.6%, p<0.01) and symptomatic patients (25.4% vs 4.9%, p<0.01) were associated with malignant disease.

Familial disease was observed in 149 distinct families. A hereditary PPGL variant was present in 443 patients in our cohort (62.9%), of which 136 (30.7%) had a PPGL. Variants in the SDHB gene were the most common. PPGL was diagnosed in 14.4% of our cohort through familial screening and surveillance and 68.5% of our patients were asymptomatic at the time of genetic testing.

Conclusions: This large cohort study describes the genetic and clinical outcomes of PPGL and associated hereditary syndromes. The high rate of asymptomatic patients and PPGLs diagnosed from familial screening and surveillance highlight the importance of germline genetic testing and long-term care for PPGL.

♦34. Thyroid Nodule Screening Before Parathyroidectomy: Is This a Necessary Recommendation in AAES Guidelines?

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Background: Current guidelines by the American Association of Endocrine Surgeons (AAES) recommend that patients undergoing parathyroidectomy should undergo preoperative thyroid evaluation to investigate for concomitant thyroid disease. This presumably minimizes reoperations and associated complications; however, it may lead to additional and potentially unnecessary thyroid procedures. We aimed to determine the incidence and management of concomitant thyroid abnormalities detected on preoperative imaging in patients undergoing parathyroidectomy for treatment of primary hyperparathyroidism (PHPT).

Methods: An institutional database of patients who underwent parathyroidectomy for PHPT from 2016 to 2023 was reviewed to determine which patients received neck imaging preoperatively and identified a concomitant thyroid abnormality. Patients referred for thyroid disease and subsequently diagnosed with PHPT were excluded, along with patients who had a known history of pre-existing thyroid disease, Multiple Endocrine Neoplasia 2, family history of thyroid cancer, and a history of parathyroidectomy or thyroidectomy. Retrospective chart review collected the following data for included patients: initial referral reason, pre-operative neck imaging results, follow-up imaging, fine needle aspiration (FNA) results, and final surgical pathology report.

Results: Between 2016 to 2023, 423 patients with PHPT underwent parathyroidectomy and preoperative cervical ultrasound. Of the patients who received an ultrasound, 22.2% (n=94) identified concomitant thyroid abnormalities. Of the patients with concomitant thyroid abnormalities, 46.8% (n=44) had 1 nodule, 50% (n=47) had more than 1 nodule, 2.1% (n=2) had multiple sub-centimeter cysts, and 1.1% (n=1) had a goiter without nodules. Of the patients with concomitant thyroid abnormalities, 26.6% (n=25) received an FNA. Of the FNAs, 84% (n=21) were Bethesda II, 8% (n=2) were Bethesda III, and 4% (n=1) were Bethesda IV. Of the patients with concomitant thyroid abnormalities, 11.7% (n=11) underwent a thyroid operation, and 18.2% (n=2) of these patients had a nodule size greater than 4 centimeters. All final surgical pathology reports revealed benign thyroid tissue.

Conclusions: Thyroid ultrasound in patients with primary hyperparathyroidism revealed nodules in almost 25% of patients undergoing parathyroidectomy. However, all the nodules were benign and 10% had a concomitant thyroid operation that may have been unnecessary. This calls into question the therapeutic benefit of thyroid nodule screening prior to parathyroidectomy.

♦35. A Prospective Study of Transoral Endocrine Surgery Cases Compared to a Matched Cohort of Traditional Open Surgery in a North American Population

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Background: Transoral endocrine surgery (TES) is a scarless alternative for thyroidectomy and parathyroidectomy. While relatively common in some parts of the world, limited research exists on outcomes in diverse North American populations. To address this gap, we compared transoral total thyroidectomies, lobectomies, and parathyroidectomies to a matched cohort of open surgeries for Operative Time (OT), Estimated Blood Loss (EBL), Inadvertent Parathyroid Removal (IPR), and Complications.

Methods: A prospective database of 183 transoral total thyroidectomies (56), lobectomies (61), and parathyroidectomies (66) from 2021 to 2023 were matched to open cases over the same period performed by the same surgeon. Included open cases were eligible for TES based on criteria accepted in the literature: 50 total thyroidectomies, 47 lobectomies, and 24 parathyroidectomies (121 total). Statistical comparisons were done using t-tests for OT and EBL, Chi-squared tests for IPR, and Fisher's Tests for complications. Complications were permanent RLN injury, permanent hypoparathyroidism and wound infection.

Results: For total thyroidectomy, average OT was longer for transoral surgery compared to open surgery (102 ± 27 vs 46 ± 16 mins, $p<0.001$), while there was no statistically significant difference in EBL (13.8 ± 15.1 vs 12.9 ± 8.1 mL, $p=0.686$), IPR (36% vs 24% $p=0.14$), and Complications (5.4% vs 2.0%, $p=0.620$). Transoral surgery had two permanent RLN injuries and one wound infection, open had one permanent RLN injury. For lobectomy, OT was significantly longer for transoral surgery compared to open (71 ± 16 vs 30 ± 10 mins, $p<0.001$), while there was no significant difference in EBL (9.0 ± 5.6 vs 9.0 ± 6.3 mL, $p=0.982$) and IPR (25% vs 19%, $p=0.66$). There were no complications in either lobectomy group. For parathyroidectomy, there was no significant difference in OT (48 ± 16 vs 40 ± 17 mins, $p=0.05$) or EBL (6.4 ± 3.2 vs 9.0 ± 8.1 mL, $p=0.127$). There was one complication in the transoral group (RLN injury), and zero in the open group.

Conclusions: Our study found that in a North American population TES has a comparable risk profile to traditional open surgery. We also found that operative times are longer with TES but are still reasonable relative to national clinical standards. These findings support TES as a viable, scarless alternative to open surgery with similar safety outcomes, although with longer operative times.

♦36. Decision-making in the Initial Treatment of Papillary Thyroid Cancer: A Qualitative Study

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Background: The American Thyroid Association guidelines encourage incorporation of patient preference into shared decision-making when choosing extent of initial surgery and use of radioactive iodine. We sought to characterize the current state of decision-making in papillary thyroid cancer and patient engagement in decision-making.

Methods: We conducted semi-structured interviews with 15 patients with papillary thyroid cancer who completed initial treatment between 2019 and 2024. Participants were recruited from the Thyroid Cancer Survivors' Association and endocrine service line offices within an academic health center. We used a grounded theory approach, allowing for the development of emergent themes and conceptual frameworks directly rooted in participants' experiences.

Results: The 15 subjects (13 female) had a mean age of 38 years (range 23-56 years). The analysis revealed the following themes in thyroid cancer decision-making: 1) Increased reliance on electronic physician-patient communication increased anxiety and uncertainty, especially when used to share the initial cancer diagnosis; 2) Patients often felt rushed into surgery without having had an adequate opportunity to fully express their values and preferences; 3) Most patients were offered options regarding the extent of surgery; and 4) Patients frequently cited the desire to avoid subsequent operations ("getting it all done at once") and concern that cancer will recur in remaining thyroid tissue as determining factors in their choice of initial surgery. Operative risks, such as hypoparathyroidism and recurrent laryngeal nerve injury, did not influence patients' choice of initial surgery. Most patients did not desire autonomous decision-making, feeling burdened by the final choice of therapy. Rather, several expressed relief when circumstances or the physician made the decision on their behalf.

Conclusions: The emergent theory is that thyroid cancer patients possess different decision-making phenotypes that vary in their desired level of autonomy and weight assigned to clinical risks. Although patients in our cohort were informed of their management options, perception of time pressure to proceed to surgery reduced opportunities to voice their values and preferences.

♦37. Cost Analysis of Post-2015 Practice Patterns for Treatment of Low-risk Differentiated Thyroid Cancer

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Background: The 2015 American Thyroid Association (ATA) guideline update reflects the growing evidence supporting de-escalation of therapy for small, low-risk differentiated thyroid cancer (DTC). Prior cost analyses projected that these changes are cost-effective. We aim to investigate whether the cost savings are realized in real-world practice patterns almost a decade following the update.

Methods: A Markov model estimated treatment costs for patients with small (1-4 cm), low-risk DTC, simulating the healthcare system perspective. We compared real-world practice patterns before and after the 2015 ATA guideline update as well as idealized guideline-concordant care (i.e., lobectomy and no radioactive iodine (RAI) therapy). Primary outcome was cost over 10-years. Model probabilities and cost data were abstracted from comprehensive review of current literature and Medicare physician fee schedule. Sensitivity analyses were performed to account for uncertainty in model assumptions.

Results: The rate of thyroid lobectomy increased from 13.4% to 39.2% and the rate of RAI therapy decreased from 69.3% to 25.3% following the 2015 ATA guideline update. Expected cost per patient was $20,342 under pre-2015 practice patterns, $18,639 under post-2015 practice patterns, and $18,640 under idealized guideline-concordant care. In 10,000 Monte Carlo simulations with fixed costs and random sampling of model probabilities, idealized guideline-concordant care was optimal in 51% of simulations with mean expected cost of $18,658, post-2015 care was optimal in 49% of simulations with mean expected cost of $18,695, and pre-2015 care was never optimal. On one-way sensitivity analysis, costs of total thyroidectomy and lobectomy were the only variables that changed model outcomes, with pre-2015 strategy dominant when the cost of total thyroidectomy fell below $8,222 or the cost of thyroid lobectomy exceeded $18,280. Idealized guideline-concordant care became dominant when at least 77.9% of pathology confirmed low-risk DTC following initial lobectomy.

Conclusions: In this cost analysis, real-world practice pattern changes following the 2015 ATA guideline update resulted in an average savings of $1,703 per patient. While current practices do not yet reflect idealized guideline concordant care, the cost savings since the update have largely been realized. Opportunities for further savings include reducing costs of thyroid operations and improved preoperative risk stratification of disease.

♦38. Re-evaluating Drivers of Change in Intra-operative Parathyroid Hormone Levels Using Latent Growth Models

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Background: Many surgeons analyze post-resection trends in intraoperative parathyroid hormone (ioPTH) levels to guide decision-making, but there is conflicting evidence regarding which patient factors affect the rate at which ioPTH decreases following curative resection. We aimed to determine important predictors of ioPTH levels, including age, renal function, and gland size, using methods that address limitations of prior studies by allowing the effects of predictors to vary by patient and by timing of ioPTH measurement.

Methods: We analyzed 2,731 patients with primary hyperparathyroidism who underwent parathyroidectomy at a single, tertiary center and had a drop in ioPTH. We used latent growth models to predict changes in ioPTH at 5, 10, and 15 minutes post-resection while allowing patient-level variation in time-dependent effects of predictors including age, symptoms, preoperative creatinine, calcium, and parathyroid hormone, gland weight, and disease etiology. We split patients into 80% training and 20% validation datasets and used 1,000 bootstrap samples for model optimization.

Results: The mean age of our cohort was 62 ± 13 years, median preoperative calcium was 10.9 mg/dL (IQR 10.5-11.2), and median creatinine was 0.9 mg/dl (IQR 0.73-1). We found that age was associated with significantly higher ioPTH levels (up to a 64% difference for oldest compared to youngest patients) at 5, 10, and 15 minutes post-resection. Additionally, increased weight of resected glands was associated with higher baseline ioPTH but accelerated decline following resection (up to 2% drop in ioPTH per 1% difference in gland weight). Preoperative renal function was not a significant predictor of ioPTH changes at any time point, but both preoperative calcium and parathyroid hormone did portend slower improvement in post-resection ioPTH.

Conclusions: Intraoperative PTH levels in older patients and those with larger glands may take longer to demonstrate an appropriate drop following curative resection, while differences in renal function appear to make little difference in ioPTH kinetics. These findings demonstrate the importance of considering patient-specific factors when interpreting intraoperative PTH values and suggest potential benefit of measuring ioPTH at time points beyond 15 minutes post-resection for older patients with high probability of adenoma.

♦39. Lessons From Continuous Intraoperative Nerve Monitoring in Thyroidectomies with 761 At-risk Nerves

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Background: Continuous intraoperative nerve monitoring with automatic periodic stimulation (APS) allows for real-time feedback of the recurrent laryngeal nerve (RLN), enabling immediate recognition and correction of surgical maneuvers that may adversely impact the nerve during dissection. We present the results of a single surgeon experience using APS monitoring in thyroidectomies.

Methods: We performed a retrospective analysis of all thyroidectomies from a single surgeon after the implementation of APS monitoring, which occurred over 2019 – 2023. A similar number of thyroidectomies were then investigated pre-implementation (from 2014 – 2019). Intermittent nerve monitoring was also used routinely on all thyroidectomies over the total time period. Any loss of signal (LOS) on either nerve monitoring modality was counted, with post-operative follow-up outcomes determining temporary versus permanent injuries. The rates of LOS (temporary vs permanent), along with any known causes of LOS (tie, traction, thermal, tumor involvement) were compared.

Results: Of 1446 nerves "at-risk" in 973 thyroidectomies, 685 nerves were tested using only intermittent nerve monitoring while 761 nerves were also tested with APS. The LOS rate after implementation of APS was 3.55% (n=27 /761) while the rate was 4.96% prior to implementation (n=34/685), with an overall rate of 4.28% (n=62/1446) (**Fig 1A**). After implementation of APS monitoring, there was a significant decrease in permanent nerve injuries (3 v. 0, X^2=6.7, p=0.035), LOS due to traction (19 v. 11, X^2=10.3, p=0.0057) or dissection (7 v. 1, X^2=41.9, p=7.78x10^{-8}) along with an increased detection of LOS from ties/clips (5 v. 10, X^2=6.5, p=0.378) and thermal injuries (0 v. 2, X^2=5.9, p=0.05) (**Fig 1B**). There were no significant differences rates of clinical hoarseness, time to recovery, gender, indication for thyroidectomy (benign/malignant), estimated blood loss, or operative time with the use of APS.

Conclusions: Intraoperative APS enabled significantly improved detection of untoward maneuvers that risk the RLN, which facilitated a decrease in traction or dissection injuries, along with improved real-time recognition of aberrant clips, ties, or thermal injuries. We believe this type of feedback can be of tremendous benefit in achieving safe dissection of the RLN.

♦40. The Impact of Thyroid Nodule Size on Patient Perception and Treatment Choice: A Discrete Choice Experiment for Hemithyroidectomy, Radiofrequency Ablation, and Active Surveillance

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Background: Papillary thyroid cancer (PTC), the most common thyroid malignancy, has seen an increasing trend toward treatment de-escalation due to its excellent prognosis. Traditionally, PTC was managed with total thyroidectomy, based on the belief that more aggressive treatment led to better outcomes. Current research shows that for selected patients, hemithyroidectomy (HT) and active surveillance (AS), have similar mortality and recurrence rates to more invasive treatments with less morbidity in certain low-risk thyroid cancer groups. Despite lower complication rates, many patients, especially younger individuals, avoid AS due to fears of recurrence and concerns about long-term follow-up. Radiofrequency ablation (RFA) presents an alternative for patients and healthcare teams favoring de-escalation but hesitant about AS. We conducted a Discrete Choice Experiment to explore preferences for treatment options in low-risk thyroid cancer, comparing HT, RFA, and AS.

Methods: We recruited English-speaking participants from the general population through Prolific (prolific.com), utilizing an online Discrete Choice Experiment to assess treatment preferences for HT, RFA, or AS for low-risk PTC with T1a (≤1cm) and T1b (1cm-2cm) sized tumors. Demographic data was collected with univariate and multivariate analyses performed to determine differences in treatment preferences.

Results: Of 989 patients, RFA preference was the significantly preferred treatment option for T1a tumors specifically RFA 62.2% (615) vs AS 23.2% (229) vs HT 14.7% (145) (p<0.001). In T1b scenarios, 58.9% (582) chose RFA vs 15.8% (156) chose AS vs 25.4% (251) chose HT (p<0.001). More women preferred surgery over AS (21.3% vs 18.5%), while more men favored AS over surgery (20.9% vs18.2%). Older patients (>45 years) preferred AS more than those under 45, most notably in the T1b group (20.3% vs 13.8%).

Conclusions: These findings reveal a strong preference for RFA among patients with T1a and T1b low-risk PTC. Increased interest in surgery for larger tumors came at the expense of AS while interest in RFA remained a constant majority. Being female or young were predictors to avoid AS. This study highlights the importance of incorporating patient preferences into treatment decisions, especially when oncologic outcomes are similar. These data can help advocate for innovative, less invasive treatment options for certain low-risk PTC patients.

♦41. A Value-based Health Care Approach to Tertiary Hyperparathyroidism Improves Outcomes and Lowers Costs

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Background: Tertiary hyperparathyroidism (THP) occurs when hyperplastic parathyroid glands function autonomously causing hypercalcemia, most commonly in renal transplant patients. As hypercalcemia has the potential to negatively affect the allograft, parathyroidectomy is generally recommended if THP persists one year post-transplant. Timely surgical referral and treatment presents challenges owing to the fragmented care of THP patients as multiple specialties are involved. Value-based health care (VBHC) focuses on improving patient outcomes while minimizing costs. We hypothesized that applying a VBHC approach to patients with THP would improve, streamline, and lower the costs associated with the patient experience.

Methods: Following stakeholder engagement meetings, a THP care pathway was developed and implemented at a tertiary endocrine surgery referral center. We conducted a retrospective chart review of renal transplant patients undergoing subtotal parathyroidectomy for THP from 2010-2024 and compared outcomes of patients before and after implementation of the VBHC pathway. We focused on time from THP diagnosis to preoperative imaging, surgical referral, and parathyroidectomy. Cost savings were determined using time driven activity-based costing. Patient-reported outcomes were collected. Student's t-test was used to compare continuous variables and Fisher's exact test for categorical variables with a p-value of $<.05$ considered statistically significant.

Results: 31 patients in the prepathway group were compared to 13 patients who followed the VBHC pathway. Implementation of the pathway was associated with decreased time to imaging (-254.9 d, p = 0.05). There was a trend towards decreased time to surgical referral (-211.4 d, p = 0.08), consultation (-226.3 d, p = 0.08), and parathyroidectomy (-182.7 d, p = 0.12) with the VBHC pathway. There was a statistically significant decreased hospital length of stay following pathway implementation (-1.3 d, p < 0.01). Cost savings were $143.02-187.72 per patient at minimum. 88% of patients reported a good understanding of the need for parathyroidectomy which was anecdotally a significant improvement compared to prepathway patients.

Conclusions: We observe decreased time to care, better patient experience, and clear cost savings following implementation of a VBHC pathway for THP treatment. Future analysis of savings from reduced cinacalcet use and shortened length of stay are anticipated to amplify cost savings.

♦42. Comparing the Safety and Efficiency of Outpatient Total Thyroidectomy in Hospital-based and Ambulatory Surgery Center Settings: A Single-site Retrospective Cohort Study

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Background: The standard of care after total thyroidectomy continues to evolve, with some institutions requiring mandatory overnight stays while others mandate 2 to 6-hour observation in the recovery unit. This study evaluates the safety of early discharge after outpatient total thyroidectomy at a high-volume endocrine surgery center. Additionally, it compares the efficiency between the main hospital (main OR) and outpatient surgery center (OSC).

Methods: This retrospective cohort study included patients undergoing outpatient total thyroidectomy from February 2021 to February 2024 in a tertiary academic center's main OR and OSC. Cases with planned admissions or simultaneous parathyroidectomy were excluded. Data were obtained through a scheduling database and chart review. Data collected included demographics, preoperative diagnosis, recovery time, complications, and postoperative portal messages and phone calls. Differences for continuous variables were compared using the t-test or Mann-Whitney U test, and categorical variables were compared using the Chi-square test.

Results: During the three years, 347 patients underwent outpatient total thyroidectomy, with 223 (64%) cases at the main hospital and 124 (36%) at the OSC (**Table 1**). Patient characteristics were similar between the two groups except for sex, preoperative diagnosis, and ASA class. The time in recovery was shorter (median 80.5 minutes) for cases performed at the OSC than for those performed at the main OR (median 146 minutes) ($p<0.001$). Complication rates were overall low and similar between the two groups. There was no difference in the number of postoperative portal messages and phone calls.

Conclusions: The time in recovery after outpatient total thyroidectomy in both the main OR and OSC at a high-volume endocrine center was significantly shorter than previously published recommendations without increasing complication rates. The time in recovery was significantly shorter at the OSC, indicating added efficiency at ambulatory surgical centers. Mandatory observation periods after outpatient thyroidectomy may be appropriately relaxed at high-volume endocrine surgery centers.

♦43. Evaluating Treatment Modality on Cure Rates for Cardiovascular Disease in Graves' Patients: A Retrospective Cohort Study Comparing Antithyroid Medication, Total Thyroidectomy, and I-131 Therapy

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Background: Patients with Graves' disease are at an increased risk for cardiovascular complications. The affect of treatment choice—antithyroid medication, radioiodine therapy, or thyroid surgery—on cardiovascular outcomes and their cure rates are uncertain. This study aimed to assess and compare these factors among Graves' disease patients treated by different modalities.

Methods: This retrospective cohort analysis utilized real-world data from the TriNetX Research network, which is comprised of greater than 155 million patients. Patients ≥18 years of age with Graves' disease and no prior cardiovascular disease were included. The primary outcomes assessed were cardiovascular complications (arrhythmias and hypertension) and cure rates 6 months after treatment

Results: In a cohort of 1,911 patients with atrial fibrillation (Afib), treatment groups included 1,267 patients (66.3%) on antithyroid medication, 275 (14.4%) undergoing surgery, and 369 (19.3%) receiving I-131. Surgery achieved the highest cure rate at 85.09%, followed by radioiodine therapy at 81.03%, and lastly antithyroid medication at 72.93%. In 18,421 patients with hypertension (HTN), 13,685 (74.3%) received antithyroid medication, 2,119 (11.5%) underwent surgery, and 2,617 (14.2%) received I-131. Cure rates for HTN were highest with surgery (64.79%), followed by antithyroid medication (56.00%) and lastly radioiodine therapy (52.43%).

Conclusions: This study demonstrates that surgical intervention for Afib results in significantly higher cure rates (85.09%) compared to antithyroid medication (72.93%) and radioiodine therapy (81.03%). Similarly, surgery for HTN (64.79%) outperformed both medication (56.00%) and radioiodine therapy (52.43%). Relative risk analyses confirm that surgery enhances improvement likelihood for both conditions. These findings suggest prioritizing surgical options in treatment plans for patients with Afib and HTN. Further research is warranted to evaluate sustained cure rates and the long-term effects of treatment modality.

44. Incidence and Rate of Follow-up for Thyroid and Adrenal Incidentalomas Found in Trauma Patients

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Background: Thyroid and adrenal masses are often discovered incidentally on trauma related computed tomography (CT) scans, but the incidence and rate of follow-up is unknown. Here, we examine the frequency of these incidental findings at an academic Level 1 trauma center and associated patient demographics to target efforts of intentional patient-level communication and follow-up.

Methods: A retrospective review of the trauma registry was performed between 2018-2023, including adult trauma patients with thyroid and/or adrenal incidentalomas noted on their CT scans. Data on sociodemographic, clinicopathological characteristics, insurance type, imaging studies, as well as follow-up visits were reviewed. Univariable and multivariable regression and time-to-event models were generated.

Results: A total of 24,551 charts were extracted from the trauma registry, of which 439 (1.8%) had thyroid (80.4%, n=353) or adrenal (19.6%, n=86) incidentalomas and were included for analysis. Median age was 57.0 years (IQR 40.0-71.5) and 48.7% (n=214) were female. Most patients were Black/African American (74.9%, n=329) and non-Hispanic (89.7%, n=394). Insurance coverage included 35.5% Medicare, 31.9% private, 23.5% Medicaid, and 9.1% had no insurance coverage. Documented referral to a PCP or endocrine-related specialist occurred in 25.9% (n=114). Median follow-up was 21 months (IQR 7-36). A total of 9.3% (n=41) had follow-up imaging for their incidentaloma and endocrine organ-specific laboratory tests were carried out in 38.0% (n=167) of patients. Male gender (p=0.008), Black/African American race (p=0.003), no insurance coverage (p<0.001), younger age (p<0.001), and thyroid incidentalomas (p<0.001) were associated with less frequent laboratory and imaging follow-up. On multivariate analysis, male gender (p=0.013) and no insurance coverage (p=0.007) remained significantly associated with less follow-up.

Conclusions: Thyroid and adrenal incidentalomas are found in just under two percent of trauma patients in this review. Given the tremendous volume of trauma patients annually, this amounts to a large number of individuals who would ideally be worked up by an endocrine provider for diagnosis and treatment. Particular attention should be paid to the groups found here that are less likely to receive follow-up care, notably male patients and uninsured patients.

45. Artificial Intelligence-enabled Electrocardiography for Identifying Severe Hypocalcemia Following Parathyroidectomy in Renal Hyperparathyroidism

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Background: Abnormal serum calcium levels can impact cardiac function and alter electrocardiograms (ECG). An artificial intelligence-enabled ECG (AI-ECG) approach has shown promise in the early detection of dyscalcemias. This study aims to evaluate the performance of AI-ECG in identifying hypocalcemia following parathyroidectomy.

Methods: We included patients who underwent parathyroidectomy for renal hyperparathyroidism from September 2021 to October 2024 and had at least one ECG recorded within 4 hours of a serum calcium measurement. AI-ECG calcium predictions were generated using a model developed at our hospital in 2021, which included data from all diagnoses: 86,731 ECGs for model development, 15,611 for tuning, 11,105 for internal validation, and 8,401 for external validation. We analyzed the correlation between AI-ECG calcium predictions and serum calcium levels and assessed the model's accuracy in predicting severe hypocalcemia (defined as serum calcium ≤ 7.5 mg/dL) using ROC curve analysis.

Results: A total of 136 paired ECG-serum calcium recordings from 44 patients were analyzed. AI-ECG predictions showed a strong correlation with serum calcium levels (Pearson correlation coefficient, 0.81). For predicting severe hypocalcemia, the AI-ECG achieved an area under the curve (AUC) of 0.9609, with a sensitivity of 87.7% and specificity of 96.2%. However, predictive accuracy declined for calcium levels between 7.5 and 8.5 mg/dL (AUC 0.6266).

Conclusions: AI-ECG demonstrates excellent performance in detecting severe hypocalcemia, allowing for timely intervention. Implementing this technology post-parathyroidectomy may support optimal calcium supplementation and help prevent life-threatening hypocalcemia.

♦46. Can Molecular Signatures Help Prognosticate and Guide Management of the Novel Entity Differentiated High-grade Thyroid Carcinoma?

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Background: Differentiated high-grade thyroid carcinoma (DHGTC), defined in 2022 by the World Health Organization, differs histologically from poorly differentiated thyroid carcinoma based on retained papillary thyroid cancer-related nuclear atypia or follicular growth pattern. While both represent high-grade non-anaplastic follicular cell-derived carcinomas with intermediate prognostic risk, molecular drivers and clinicopathologic outcomes specific to DHGTC remain relatively unknown.

Methods: Consecutive patients with thyroid cancer who underwent surgery with histopathology showing DHGTC from 2022 to present at an academic healthcare system were retrospectively reviewed. Tumor slides were re-examined by two pathologists to confirm diagnosis. Clinicopathologic outcomes were assessed and correlated to molecular signatures obtained with ThyroSeq v3.

Results: DHGTC occurred in 12 (1.1%) of 1099 patients with thyroid cancer. Median age was 66 years, 58% were female and 73% of nodules cytologically indeterminate (Bethesda III/IV) vs. 27% malignant (Bethesda VI). Hemithyroidectomy was performed in 6 (50%) patients, of which 4 underwent completion thyroidectomy. Surgical pathology demonstrated aggressive features, including median tumor size of 4.9cm, >3 mitoses in 83%, tumor necrosis in 75%, angioinvasion in 58% and gross extrathyroidal extension in 33%. Over median follow-up of 12 months, locoregional recurrence occurred in 4 patients (36%), of which 2 (18%) also experienced distant metastases. RAI-refractory disease was observed in 1 (17%) of 6 patients. In 8 (73%) of 11 patients with available molecular results, ≥2 molecular alterations were present. Specifically, 6 (55%) harbored *TERT*, with either *RAS* (50%), CNA (33%) or *BRAF* (17%) driver alterations. *TERT* late-hit mutations were more common in carcinomas with >5 mitoses and angioinvasion, occurring with 30%-86% allelic frequencies. 3 cases included histopathologic diagnosis of suspected focal DHGTC within oncocytic/follicular adenomas (**Figure**). None of these patients harbored *RAS*/*BRAF* driver mutations, exhibited other aggressive features, received completion thyroidectomy and/or RAI, or recurred.

Conclusions: A diverse mutational landscape was observed among DHGTCs, with common occurrence of late-hit mutations, notably *TERT* with high allelic frequencies. We identified cases of clinical uncertainty resulting from focal histopathologic DHGTC in the background of otherwise benign follicular/papillary architecture; in these scenarios, correlation of molecular signatures and presence of other aggressive clinicopathologic features may guide risk stratification and further management.

♦47. Metabolic Outcomes in Patients with Mild Autonomous Cortisol Secretion (MACS) After Unilateral Adrenalectomy

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Background: Hypercortisolism, both overt and subclinical, can have significant metabolic and cardiovascular consequences. The effects of mild autonomous cortisol secretion (MACS), present in up to 10% of patients with hypertension, diabetes mellitus (DM), and obesity, remain unclear, resulting in conflicting guidelines with respect to adrenalectomy. This study aimed to assess the metabolic outcomes of patients with MACS after unilateral adrenalectomy, compared to patients with nonfunctional adrenal tumors (NFAT).

Methods: This is a retrospective review of patients who underwent unilateral adrenalectomy from 11/30/2011-8/19/2023 at a single institution. The cohort included patients with MACS (defined as an adrenal nodule ≥1 cm and serum cortisol 1.8-5 µg/dL after 1 mg dexamethasone suppression test [DST]) and those with NFAT for comparison. Metabolic outcomes between patients with MACS and NFAT were compared before and after adrenalectomy, including the prevalence of DM, hypertension, dyslipidemia, and overweight/obesity (BMI>25 kg/m^2).

Results: The cohort included 65 patients; 53 with MACS and 12 with NFAT (median age 59 years, IQR [50, 67]); 78% were female). Median follow-up was 28.1 months, IQR [11.1, 55.3]. Patients with MACS were older (60 vs. 49 years, P=0.02) and had a higher prevalence of DM (42% vs. 8%, P=0.03) and preoperative median hemoglobin A1c (5.9% [5.6, 6.7] vs. 5.6% [5.0, 5.8], P=0.03). Over 90% of patients in both groups had a BMI >25 kg/m^2 (P=0.91). Postoperatively, more patients with MACS had improvement in weight (≥5% weight loss *or* reduction in BMI category) than those with NFAT (51% vs. 11%, P=0.03), and more patients with MACS had ≥5% weight loss postoperatively (43%, n=23 vs. 0%). There was no difference in postoperative control of DM, hypertension, or dyslipidemia between the two groups (Table 1).

Conclusions: Patients with MACS had a higher prevalence of DM and higher hemoglobin A1c preoperatively than patients with NFAT. After unilateral adrenalectomy, while there was no difference in DM, dyslipidemia, or hypertension, patients with MACS more often had clinically significant weight loss. These findings may help guide discussions regarding indications for and potential outcomes of adrenalectomy in patients with MACS.

♦48. Post-operative Biochemical and Imaging Surveillance in Monitoring Pheochromocytoma and Paraganglioma Recurrence and Metastasis

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Background: Pheochromocytomas and paragangliomas (PPGL) are neuroendocrine tumors that arise in the chromaffin cells of the adrenal gland and paraganglia respectively. Routine postoperative biochemical and imaging surveillance to monitor for recurrence and metastasis is recommended, yet the optimal surveillance modality for detecting recurrences or metastases is not clearly defined. This study correlated biochemical and imaging surveillance with recurrences and metastases.

Methods: Records of patients who underwent surgery for PPGL at a tertiary-care cancer hospital between 1997-2024 were reviewed. Patients with metastatic disease at presentation were excluded. Surveillance catecholamine levels and imaging were compared between patients with and without locoregional recurrence (LRR)/metastasis.

Results: Two hundred and ninety-four patients with PPGLs met inclusion criteria (paraganglioma n=65, pheo n=229). Median follow-up was 11 months (Range 1-77). Genetic testing was performed in 232 patients (79%), with 117 patients (50%) having a PPGL-susceptibility mutation. Biochemical surveillance at 1- and 2-years post-surgery was performed in 182 (62%) and 122 (41%) patients respectively. Imaging surveillance at 1 and 2 years was performed in 141 (48%) and 78 (27%) patients. The median time to identify LRR/metastasis was 57 months (3-186). Twenty-five patients (8.5%) developed recurrence (local n=16, metastasis n=6; contralateral gland n=3). LRR/metastases were predominately from pheochromocytomas (LRR n= 17, metastasis n= 5). Fifteen patients with LRR/metastasis had an identified PPGL-susceptibility mutation (RET 10, VHL 4, SDHD 1). Patients with LRR/metastasis were younger at presentation than those without LRR/metastasis (33 years vs. 49 years, p<0.0001). No difference in LRR/metastasis was observed based on tumor size or surgical approach (open=12 vs laparoscopic =13). Nineteen (76%) LRR/metastases were identified by a combination of imaging and biochemical surveillance vs. imaging alone (n=5) vs. biochemical surveillance alone (n= 1). The five patients with recurrence detected by imaging alone all had PPGL mutation and developed LRR following cortical sparing adrenalectomy (median time to recurrence of 25 months).

Conclusions: In our cohort, recurrence and/or metastasis was not uncommon which underscores the importance of long-term surveillance for patients with PPGLs. Biochemical surveillance of PPGL identified most but not all LRR/metastasis; and imaging surveillance was important in a subset of patients, especially following cortical sparing adrenalectomy.

IN MEMORIAM

IN MEMORIAM
John B. Hanks, MD
1947 - 2024

Dr. John Bright Hanks was born on January 18th, 1947, in Washington DC. After completing his undergraduate studies at Princeton University, he attended medical school at the University of Rochester where he developed an interest in surgery. He went on to complete his surgical training at Duke University where he met his best friend Dr. Worthington Schenk and the love of his life, Bonnie Hanks, who was the head OR Nurse at Duke.

He was then recruited to UVA in Charlottesville, Virginia. He was a full professor and President of the clinical Staff. In 1993, Dr. Hanks was appointed the Department's first Chief of the new formed Division of General Surgery, which he held as the C. Bruce Morton Chair until his retirement in 2015. During this time, he also served on the American Board of Surgery from 2005 to 2011. Dr. Hanks was also honored to be elected President of the Southern Surgical Association for the 2017-2018 term.

Along the way. he authored over 200 refereed publications, several books, and book chapters. He was also elected as Vice President of the Southern Surgical Association, Vice President of the American Association of Endocrine Surgeons (2006-2007), and President of the Southeastern Surgical where he also received the Lifetime Service Award.

Dr. John Hanks passed away peacefully at his favorite place in the world, his home in North Garden, Virginia which he and Bonnie built together 37 years ago. He was surrounded by Bonnie and his daughters, Laura and Mary Hanks, when he passed. Of all the accomplishments in life, he was always quick to say he was the proudest of his family.

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