



NIH Intramural Program Curriculum Vitae



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Name: Skand Shekhar

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Place of Birth: New Delhi, India

Education and Postdoctoral Training:

- 2008-2014 M.B.B.S. (Doctor of Medicine)- University College of Medical Sciences, University of Delhi, New Delhi, India
- 2015-2018 Internal Medicine Residency- Rutgers Robert Wood Johnson Medical School, Saint Peter's University Hospital, New Brunswick, NJ
- 2018-2020 Clinical & Research Fellowship, Endocrinology and Metabolism, NICHD and NIEHS, National Institutes of Health (NIH), Bethesda, MD
- 2021-2023 Master of Health Sciences (Clinical Research)- Duke University, Durham, North Carolina, United States

Faculty Academic Appointments:

- 2020- Faculty Member, NIH Endocrinology Training Program (IETP)
- 2020- Staff Clinician, NIEHS, NIH
- 2020- Assistant Research Physician, Intramural Program, NIH
- 2024- Principal Investigator, OBSERVE Study, NIH Intramural Program

Appointments at Hospitals/Affiliated Institutions:

- 2020- Attending Physician, NIH Clinical Center Endocrinology & Blood Glucose Management Consultation Service
- 2020- Attending Physician, NIH Mobile Suburban Endocrine Clinic

Other Professional Positions:

- 2023- Medical Director (Interim), Clinical Research Unit, NIEHS, NIH

A. Positions and Honors

Major Administrative Leadership Positions:

Local

2017-2018 Chief Resident- Internal Medicine Residency, Rutgers Robert Wood Johnson Medical School, Saint Peter's University Hospital, New Brunswick, NJ

National

2023- Medical Director (Interim), Clinical Research Unit, National Institute of Environmental Health Sciences, National Institutes of Health (NIH)

Committee Service:

Local

2017-2018 Internal Medicine Faculty Committee. Rutgers Robert Wood Johnson Medical School, Saint Peter's University Hospital, New Brunswick, NJ

2017-2018 Graduate Medical Education Committee. Rutgers Robert Wood Johnson Medical School, Saint Peter's University Hospital, New Brunswick, NJ

2018-2020 Clinical Fellows Committee. National Institutes of Health, Bethesda, MD

2021 Summer Internship Program Judging Committee, NIEHS, NIH

2021 Staff Scientist Search Committee. NIEHS, National Institutes of Health, Durham, NC

2021-current Fellowship Recruitment Committee. Inter-Institute Endocrinology Fellowship, NIEHS, NIH

2021-current Clinical Competency Committee, Inter-Institute Endocrinology Fellowship, NIEHS, NIH

2022-current Program Evaluation Committee, Inter-Institute Endocrinology Fellowship, NIEHS, NIH

2022-2023 NIEHS Electronic Laboratory Notebook Committee, NIH

2022-2023 Research and Career Development Committee Dr. Sanjay Jumani, NICHD, IETP, NIH

2022-2023 Research and Career Development Committee Dr. Rachael Klein, NIDDK, IETP, NIH

2023-2024 Research and Career Development Committee Dr. Sanjay Jumani, NICHD, IETP, NIH

2023-2024 Research and Career Development Committee Dr. Khulood Bukhari, NIDDK, IETP, NIH

Regional

2022 American College of Physicians, North Carolina Chapter Scientific Poster Judging Committee

International

2022-2025 Endocrine Society- Member, Special Programs Committee

2024 Endocrine Society, Annual Meeting 2024 Abstract Review Committee

2024 Endocrine Society, In-Training Examination Steering Committee

2024-2026 American Association of Clinical Endocrinologists (AACE), Clinical Practice Guidelines Oversight Committee

- Chair, Empanelment Group, AACE Postmenopausal Osteoporosis Guidelines

Professional Societies:

- American College of Physicians (ACP)*
- American Association of Clinical Endocrinologists (AACE)*
- The Endocrine Society
- Erdheim Chester disease Global Alliance (ECDGA) (recognized by ECDGA as being among the 3 endocrinologists in the world with expertise in ECD)
- Royal College of Physicians (Edinburgh, United Kingdom)*

* *Elected Fellow*

Grant Review Activities:

1. Ad hoc grant review for Department of Biotechnology (India) & Wellcome Trust (India Alliance). Local thyroid hormonal state and early life epigenetic programming of pathological aggressive behavior across generations. Dr Arpita Konar. November 2023.

Editorial Activities:

1. **Associate Editor:** [Endocrine Research](#)
2. **Review Editor (Editorial Board):** [Frontiers in Endocrinology](#) (Reproduction)
3. **Ad hoc Reviewer**

- British Medical Journal Case Reports
- Canadian Medical Association Journal Open
- Canadian Medical Association Journal
- Genes
- BioMed Central Research Notes
- Endocrine and Metabolic Science
- Preventive Medicine Reports
- World Journal of Surgical Oncology
- World Journal of Pediatrics
- Theriogenology
- Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy
- Medicina
- International Medical Case Reports Journal
- Journal of Inflammation Research
- Brain Communications
- Case Reports in Endocrinology
- Current Oncology
- Communications Biology
- Journal of Clinical and Diagnostic Research
- Tobacco Induced Diseases
- Journal of Clinical Endocrinology and Metabolism
- European Journal of Pediatrics
- Scientific Reports

Honors and Prizes:

2011	Indian Council of Medical Research - Short Term Studentship Programme (Award) 2011
2016	Resident Appreciation for Outstanding PGY-2 by Dept. of Medicine, Rutgers Robert Wood Johnson Medical School, Saint Peter's University Hospital, New Brunswick.
2017	Outstanding PGY-2 Annual Award. Dept. of Medicine, Rutgers Robert Wood Johnson Medical School, Saint Peter's University Hospital, New Brunswick.
2017	Best Poster Award, Stanford Society of Bedside Medicine. Palo Alto, CA.
2018	Endocrine Society Outstanding Abstract Award. 2018 Endocrine Society Meeting
2018	Osler Award for Excellence in Clinical Medicine. Dept. of Medicine, Rutgers Robert Wood Johnson Medical School, Saint Peter's University Hospital, New Brunswick.
2018	Clinical Examiner for the Royal College of Physicians (UK), Clinical MRCP examination. New Jersey, USA Center.
2019	Early Careers Forum Travel Award. ENDO 2019 The Endocrine Society, New Orleans, LA.
2019	Outstanding Abstract Award. ENDO 2019. The Endocrine Society, New Orleans, LA.
2019	Presidential Poster Nomination ENDO 2019. The Endocrine Society, New Orleans, LA.
2019	Scientific Judge Post Bac Student Poster Competition for. National Institutes of Health, Bethesda, MD. Apr 2019.
2021	Outstanding Abstract Award. ENDO 2021. The Endocrine Society. Virtual Conference.
2021	International Best Abstract Award. Society for Nuclear Medicine and Molecular Imaging (SNMMI) Annual Meeting 2021. Virtual Conference.
2022	<i>Dr. Uma Shankdhar</i> Memorial Oration. UP Diabetes Association, India.
2023	<i>Dr Phillip Gordon</i> Best Teacher Award, NIH Endocrinology Fellowship Program (IETP), Bethesda, MD. April 2023.
2023	NIEHS Group Merit Award, Electronic Laboratory Notebook Working Group
2023	Fellow, American College of Physicians
2024	Fellow, American Association of Clinical Endocrinology
2024	Fellow, Royal College of Physicians (Edinburgh, UK)

B. Clinical Care and Quality

Report of Clinical Activities and Innovations

Current Licensure and Board Certification:

Licensure

Delhi Medical Council (India)- Active (2014- current)
 New Jersey Medical License- Inactive (2018-2019)
 North Carolina Medical License- Active (2019- current)

Board Certification

2018 Diplomat of the American Board of Internal Medicine (Internal Medicine)
 2020 Diplomat of the American Board of Internal Medicine (Endocrinology, Diabetes & Metabolism)

Practice Activities:

1. Attending Physician, NIH Clinical Center Endocrinology & Blood Glucose Management Consultation Service
2. Attending Physician, Suburban Clinic (Mobile Med) Endocrinology Clinic, Gaithersburg, MD

Clinical Innovations:

2018 Code Physical Diagnosis: A Novel Clinical Teaching Activity for Medical Residents and Students. Rutgers Robert Wood Johnson Medical School, Saint Peter's University Hospital, New Brunswick

C. Educational Activities and Mentoring

Report of Local Teaching and Training

Teaching of Students in Courses:

Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs):

1. Polycystic Ovarian Syndrome, February 2024
2. Male Reproductive System Board Review February 2024
3. Female Reproduction Board Review, October 2023
4. Male Hypogonadism, October 2023
5. Male and Female Reproductive Physiology, August 2023
6. Polycystic Ovarian Syndrome, March 2023
7. Hyperprolactinemia and Acromegaly for Clinical Fellows, Nov 2022
8. Male reproduction board review. September and Oct 2022
9. Endocrinopathies in pregnancy board review. Sep 2022
10. Turner's Syndrome and Transgender Management April 2022
11. Female Reproduction Endocrine Board Review Feb 2022
12. PCOS talk for endocrine fellows Jan 2022
13. Hyperprolactinemia and acromegaly Oct 2021
14. Male Reproductive System Board Review Sep 2021
15. Imaging and function of the pituitary gland Aug 2021
16. Lipid Metabolism July 2021
17. Oral contraceptives July 2021
18. Male Reproduction Endocrine Board Review April 2021

Clinical Supervisory and Training Responsibilities:

1. Preceptor: Endocrine Fellows OP9 Clinic
2. Preceptor: Endocrinology Consultation & Blood Glucose Management Service, NIH Clinical Center
3. Preceptor: Endocrine Fellows Mobil Med Endocrine Clinic
4. Leader: Post clinic conference for the NIH Endocrinology Fellowship program
5. Leader: Inpatient Rounds conference for the NIH Endocrinology Fellowship program

Laboratory and Other Research Supervisory and Training Responsibilities:

1. Overseeing the Clinical Laboratory at the NIEHS Clinical Research Unit as Medical Director
2. CLIA Medical Consultant for NIEHS

Formally Mentored Post-doc IRTAs:

1. Sonal Vaid, MD, Clinical Endocrinology Fellow NIH IETP
2. Rachael Klein, MD, Clinical Endocrinology Fellow NIH IETP
3. Sanjay Jumani, MD, Clinical Endocrinology Fellow NIH IETP
4. Ashna Grover, MD, Clinical Endocrinology Fellow NIH IETP

Other Mentored Trainees and Faculty (include students and Pre-doc IRTAs):

2019-2021 Joselyne Tessa Tonleu, BA
2021-2023 Ethan Brown, BS
2022-2023 Gloria Choi, BS
2022-2023 Lindsay Levine, MD candidate
2023-2024 Maame Amoako, MD candidate
2023-2025 Abhishek Goel, BS

Formal Teaching of Peers (e.g., CME and other continuing education courses):

No presentations below were sponsored by outside entities.

1. *Polycystic Ovarian Syndrome: What Internists Must Know*. St Peter's University Hospital, Rutgers RWJ Medical School. Dept of Medicine. Grand Rounds. Nov 2, 2021.
2. *Endocrine and Metabolic Aspects of Polycystic Ovarian Syndrome*. St Peter's University Hospital, Rutgers RWJ Medical School. Dept of Obstetrics and Gynecology. Grand Rounds. March 18, 2022.
3. *Polycystic Ovarian Syndrome: A Review for Endocrinologists*. Endocrine Society Special Webinar. May 5, 2022. (1000+ registrations from >80 countries worldwide)
4. *Polycystic Ovarian Syndrome: Advances in Diagnosis and Management*. University of Nebraska Medical Center Endocrine Grand Rounds. January 27, 2023.
5. "Hypogonadism in Men: An Evolving Landscape" St Peter's University Hospital, Rutgers RWJ Medical School. Dept of Medicine. Grand Rounds. March 21, 2023.
6. *Hormonal Woes- Finding the Right Balance: Endocrine Disorders in Erdheim-Chester Disease*. Annual Patient and Provider Symposium. ECD Global Alliance. Mayo Clinic, Rochester, MN. April 28, 2023

Local Invited Presentations:

No presentations below were sponsored by outside entities

1. Shekhar S, Pande C, Rana H. Two sides of the same coin: a case series of two cardiac tamponades. Research Day, Rutgers Robert Wood Johnson Medical School, Saint Peter's University Hospital, New Brunswick April 2016. Best Poster Award.

Report of Regional, National and International Invited Teaching and Presentations

No presentations below were sponsored by outside entities -

Regional

1. Shekhar S. Immunopathophysiology of Severe COVID-19 in Metabolic Disorders webinar for clinical and basic science researchers at the National Institute of Environmental Health Sciences (NIEHS), NIH. Held via Zoom® on July 23, 2020
2. Skand Shekhar. The Impact of Energy Restriction on Thyroid Hormone Dynamics. Oral presentation. National Institutes of Environmental Health Sciences. Science Day 2020. November 20, 2020. Virtual Meeting Zoom.

3. Skand Shekhar. Gonadotropin secretion before and after surgical cure in men with ACTH-dependent Cushing syndrome. Triangle Consortium for Reproductive Biology 2021. Virtual Meeting.
4. Shekhar S. The Effect of Hypercortisolemia on the Male Reproductive Endocrine Axis: Insights from a Human Disease Model. UNC-Chapel Hill Endocrinology Research Conference. March 23, 2023. Virtual Zoom Meeting.

National

1. Shekhar S. Combining Artificial Intelligence & Machine Learning with Medical Records to Diagnose Polycystic Ovarian Syndrome (PCOS). PCOS Challenge: The National Polycystic Ovary Syndrome Association United States Congressional Briefing. Congressional Co-Hosts: Bipartisan Congressional PCOS Caucus, Congresswoman Wasserman Schultz, & Congressman Scott. US Congress Canon House Building, Washington DC. September 26, 2023
2. Invited Speaker for American College of Physicians- American Association of Medical Colleges, Forum for Medical Students (Virtual). March 28, 2024.

International

1. Shekhar S. *Dr. Uma Shankdhar Oration*. Uttar Pradesh Diabetes (Madhumeah) Association, India. Review of Pharmacotherapy of Type 2 Diabetes. Held via Zoom on May 11, 2022.
2. Shekhar S. COVID-19 Therapeutics and Molecular Biology. Webinar for Biochemistry Researchers in Lucknow, India. Held via Google Meet® on June 6, 2020.
3. Shekhar S. By invitation of the National Academy of Medical Sciences-India. COVID-19 and Metabolic Disorders. Presented as a continuing medical education event (CME) to educate physicians about the pathophysiology and treatment of COVID-19 in patients with metabolic disorders. Attended by 100 physicians engaged in practice and research. Held via Cisco Webex® on October 8, 2020.
4. Shekhar S, Shmouni FH, Gahl W, Estrada-Veras JI, O'Brien K. Hypothyroidism in Erdheim-Chester Disease: Experience from the National Institutes of Health. Oral Presentation. ECD Symposium. Orlando FL. 2018.
5. Joselyne Tessa Tonleu, Skand Shekhar, Chinelo Okigbo, Helen Leka, Anne Kim, Bona Purse, Katie Hirsch, Bin Wei, Brian Stolze, John McGrath, Abbie E Smith-Ryan, Steven J Soldin, Hall E Janet. The Effects of Energy Restriction on Thyroid Hormone Dynamics. The Endocrine Society Meeting 2021. Virtual Meeting. (Oral presentation)
6. Shekhar S, Patel N, Van Hoven AM. Thyrotoxicosis: A decade of inpatient trends in the United States. ENDO-2017: Orlando, FL. April 2017. (Oral Presentation)
7. Skand Shekhar, Jorge A. Irizarry-Caro, Ninet Sinaii, William A Gahl, Juvianee I. Estrada-Veras, Rahul Dave, Bernadette R. Gochuico, Georgios Z. Papadakis, Nicholas Patronas, Constantine A. Stratakis, Fady Hannah-Shmouni*, Kevin O'Brien*. Abnormalities of Pituitary Imaging and Associated Endocrine Disorders in Erdheim-Chester Disease. Annual International Medical Symposium, ECD Global Alliance. Mayo Clinic, Rochester, MN. April 27, 2023

Report of Education of Patients and Service to the Community

(No presentations below were sponsored by outside entities)

Attending physician at the NIH Mobil Med Suburban charity clinic

Recognition for Educational Activities and Mentoring

2023- Dr Phillip Gordon Best Teacher Award, NIH Endocrinology Fellowship Program (IETP), Bethesda, MD. April 2023.

D. Research and Scholarly Activities

Report of Funded and Unfunded Projects (investigator-initiated studies could be included here)

Funding Information: N/A

Past N/A

Current

Principal Investigator for the following NIH intramural study

1. **E-001617** Observational Study of Environment and Reproductive Endocrine Effects. NIEHS, NIH: <https://www.niehs.nih.gov/research/atniehs/labs/crb/studies/reproductive-endocrine>

Associate investigator for the following NIH intramural protocols

1. 12-E-0049 -The Molecular Basis of Inherited Reproductive Disorders
2. 12-E-0050 -The Role of Gonadotropin Pulsations in the Regulation of Puberty and Fertility
3. 04-E-0053- Environmental Polymorphisms Registry
4. 20-E-0143- Serological Surveillance for COVID-19 in North Carolina
5. 16-CH-0125- Evaluation of Adults with Endocrine-Related Conditions
6. 16-E-0157- CaREFREE Study (Calorie Restriction, Environment and Fitness: Reproductive Effects Evaluation Study)

Projects Submitted for Funding

Training Grants and Mentored Trainee Grants N/A

Unfunded Current Projects

- Endocrine Dysfunction in Erdheim-Chester disease

E. Report of Scholarship

Peer reviewed scholarship in print or other media:

Original Peer Reviewed Publications

1. **Shekhar S**, Shah D. Validation of Mid-upper-arm Circumference Cut-off to Predict Severe Wasting in Indian Children. *Indian Pediatr.* 2012 Jun 8;49(6):496-7.
2. Kumar A, Dewan R, Suri J, Kohli S, **Shekhar S**, Dhole B, Chaturvedi PK. Abolition of endocrine dimorphism in hyperthyroid males? An argument for the positive feedback effect of hyperoestrogenaemia on LH secretion. *Andrologia.* 2012;44(4):217–225. doi:10.1111/j.1439-0272.2011.01270.x

3. Srivastava S, **Shekhar S**, Bhatia MS, Dwivedi S. Quality of life in patients of coronary artery disease and panic disorder: a comparative study. *Oman Med J*. 2017 Jan; 32(1): 20–26. doi: [10.5001/omj.2017.04](https://doi.org/10.5001/omj.2017.04)
4. Dhole B, Gupta S, **Shekhar S**, Kumar A. A Novel Antigonadotropic Role of Thyroid Stimulating Hormone on Leydig Cell-Derived Mouse Leydig Tumor Cells-1 Line. *Ann Natl Acad Med Sci*. 2020;56(1):30-37. doi:10.1055/s-0040-1709091
5. **Shekhar S**, Sinaii N, Irizarry-Caro J, Gahl WA, Estrada-Veras JI, Dave R, Papadakis GZ, Tirosh A, Abel BS, Klubo-Gwiedzinska J, Skarulis MC, Gochuico BR, O'Brien K, Hannah-Shmouni F. Prevalence of Hypothyroidism in Patients With Erdheim-Chester Disease. *JAMA Netw Open*. 2020;3(10):e2019169.
6. **Shekhar S**, Wurth R, Kamilaris CDC, Eisenhofer G, Barrera FJ, Hajdenberg M, Tessa Tonleu J, Hall JE, Schiffrin EL, Porter F, Stratakis CA, Hannah-Shmouni F. Endocrine Conditions and COVID-19. *Horm Metab Res*. 2020;52(7):471-484. doi:10.1055/a-1172-1352
7. Barrera FJ*, **Shekhar S***, (*Co-first authors) Wurth R, Moreno-Pena PJ, Ponce OJ, Hajdenberg M, Alvarez-Villalobos NA, Hall JE, Schiffrin EL, Eisenhofer G, Porter F, Brito JP, Bornstein SR, Stratakis CA, González-González JG, Rodríguez-Gutiérrez R, Hannah-Shmouni F. Prevalence of Diabetes and Hypertension and their Associated Risks for Poor Outcomes in Covid-19 Patients. *Journal of the Endocrine Society*, bvaa102, <https://doi.org/10.1210/jendso/bvaa102> (Among the top 10 percent of articles published in the journal in 2019-2020 and in 2020-2021 as assessed by rate of citation)
8. **Shekhar S**, McGlotten R, Auh S, Rother KI, Nieman LK. *Hypothalamic Pituitary Thyroid Axis in Cushing Syndrome*. *The Journal of Clinical Endocrinology & Metabolism*, dgaa858. Available from <https://doi.org/10.1210/clinem/dgaa858>
9. Wurth R, Hajdenberg M, Barrera FJ, **Shekhar S**, Copacino C, Moreno-Pena PJ, Gharib OA, Porter F, Hiremath S, Hall JE, Schiffrin E, Eisenhofer G, Bornstein SR, Brito JP, González-González JG, Stratakis CA, Rodríguez-Gutiérrez R, Hannah-Shmouni F. A Scoping Review of Covid-19 Related Systematic Reviews and Meta-analyses: Can We Really Have Confidence in Their Results? *Postgraduate Medical Journal*. Published Online First: 26 February 2021. doi: 10.1136/postgradmedj-2020-139392
10. **Shekhar S**, Irizarry-Caro JA, Sinaii N, Gahl WA, Estrada-Veras JI, Dave RH, Gochuico BR, Papadakis GZ, Patronas N, Stratakis CA, O'Brien K, Hannah-Shmouni F. Pituitary Imaging Abnormalities and Related Endocrine Disorders in Erdheim–Chester Disease. *Cancers*. 2021; 13(16):4126. <https://doi.org/10.3390/cancers13164126>
11. Barrera FJ, Brown EDL, Rojo A, Obeso J, Plata H, Lincango EP, Terry N, Rodriguez-Gutierrez R, Hall JE, **Shekhar S** (2023) Application of machine learning and artificial intelligence in the diagnosis and classification of polycystic ovarian syndrome: a systematic review. *Front. Endocrinol*. 2023(14) online ahead of print <https://doi.org/10.3389/fendo.2023.1106625>
12. **Skand Shekhar**, Raven N McGlotten, Gordon B Cutler, Matthew J Crowley, Carl F Pieper, Lynnette K Nieman, Janet E Hall. Longitudinal Evaluation of Reproductive Endocrine Function in Men With ACTH-Dependent Cushing Syndrome. *The Journal of Clinical Endocrinology & Metabolism*, 2024;dgae497, <https://doi.org/10.1210/clinem/dgae497>

Submitted Manuscripts

1. Sonal Vaid, Juvianee Estrada-Veras, William A. Gahl, Patronas Nicholas, MD, Rahul H. Dave, Fady Hannah-Shmouni, Kevin O'Brien, **Skand Shekhar**. Clinical, Laboratory and Imaging Features Associated with Central Diabetes Insipidus (Arginine Vasopressin Deficiency) in Erdheim-Chester disease (ECD). Under review. *Pituitary*.
2. Aryan Zahergivar, Fatemeh Dehghani Firouzabadi, Fatemeh Homayounieh, Mahshid Golagha, Fahimul Huda, Nadia Biassou, Ritu Shah, Moozhan Nikpanah, Mojdeh Mirmomen, Faraz Farhadi, Rahul H. Dave, **Skand Shekhar**, William Gahl, Juvianee Estrada-Veras, Ashkan Malayeri, Kevin O'Brien. Central Nervous System Involvement in Erdheim-Chester Disease: A Magnetic Resonance Imaging Study. Under review. *Clinical Imaging*.

3. Anne E. Kim*, Skand Shekhar*, Katie R. Hirsch, Bona P. Purse, John A. McGrath, Theodore T. Zava, Abbie E. Smith-Ryan, Janet E. Hall. Caloric Restriction in the Early Follicular Phase in Normal-Weight Women Exacerbates the Effect of the Menstrual Cycle on Sleep. Co-first author. Under Review. *The Journal of Clinical Endocrinology & Metabolism*. *co-first authors.
4. **S Shekhar**, JT Tonleu, C Okigbo, H Leka, A Kim, B Purse, K Hirsch, B Wei, B Stolze, J McGrath, AE Smith-Ryan, SJ Soldin, JE Hall. Thyroid Axis Adaptations to Moderate Short-term Energy Restriction in Healthy, Young Women. First author. Under Review. *European Journal of Endocrinology*.

In preparation/revision

1. Changes in metabolic hormones are inversely related to changes in LH pulse frequency after five days of moderate energy restriction in eumenorrheic young women without obesity. First author.
2. The Effect of Energy Deprivation on the Responses of Metabolic and Stress Hormones to Meals. First author.
3. Deep phenotyping of patients with isolated hypogonadotropic hypogonadism. First author.
4. Enrichment of Rare Sequence Variants in Genes that Communicate Metabolic Signals to the GnRH System in Hypothalamic Amenorrhea. Second author.
5. A Metabolomics Analysis of Moderate Energy Restriction in Healthy Lean Women. Middle co-author.

Non-peer reviewed scientific or medical publications/materials in print or other media:

News Media Coverage of Research (first or senior author)

1. Cleaner Data Confirm COVID-19 Link to Diabetes, Hypertension. Medscape
<https://www.medscape.com/viewarticle/934685#:~:text=Further%20refinement%20of%20data%20from,17%25%20prevalence%20rate%20for%20hypertension>.
2. Cleaner data confirm severe COVID-19 link to diabetes, hypertension. MDedge
<https://www.mdedge.com/cardiology/article/226081/diabetes/cleaner-data-confirm-severe-covid-19-link-diabetes-hypertension>
3. Prevalence of diabetes, hypertension among COVID-19 patients likely lower than reported. Endocrine Today (Healio)
<https://www.healio.com/news/endocrinology/20200730/prevalence-of-diabetes-hypertension-among-covid19-patients-likely-lower-than-reported>
4. Higher prevalence of hypothyroidism found in patients with Erdheim-Chester disease. Endocrine Today (Healio)
<https://www.healio.com/news/endocrinology/20201117/higher-prevalence-of-hypothyroidism-found-in-patients-with-erdheimchester-disease>
5. Thyroid dysfunction highly prevalent in Cushing's syndrome. Endocrine Today (Healio)
<https://www.healio.com/news/endocrinology/20210208/thyroid-dysfunction-highly-prevalent-in-cushings-syndrome>
6. AI, machine learning may aid in PCOS detection, reducing undiagnosed burden. Women's Health (Healio)
<https://www.healio.com/news/womens-health-ob-gyn/20230504/ai-machine-learning-may-aid-in-pcos-detection-reducing-undiagnosed-burden>
7. AI and machine learning can successfully diagnose polycystic ovary syndrome. NIH Press Release
<https://www.nih.gov/news-events/news-releases/ai-machine-learning-can-successfully-diagnose-polycystic-ovary-syndrome>
8. AI and Machine Learning Can Successfully Diagnose Polycystic Ovary Syndrome, New Study Confirms. NIEHS News Release

- <https://tools.niehs.nih.gov/newsreleases/index.cfm/detail/961672/ai-and-machine-learning-can-successfully-diagnose-polycystic-ovary-syndrome-new-study-confirms>
9. Turning Data into Diagnosis: AI and ML to Transform PCOS Detection. [MedIndia](https://www.medindia.net/amp/news/healthwatch/turning-data-into-diagnosis-ai-and-ml-to-transform-pcos-detection-213570-1.htm)
<https://www.medindia.net/amp/news/healthwatch/turning-data-into-diagnosis-ai-and-ml-to-transform-pcos-detection-213570-1.htm>
 10. Application of machine learning and artificial intelligence in the diagnosis and classification of polycystic ovarian syndrome: a systematic review
[Altmetric page of news coverage](https://www.altmetric.com/details/154299128/news)
<https://www.altmetric.com/details/154299128/news>
 11. AI, machine learning can help diagnose polycystic ovary syndrome. eFactor (NIEHS), November 2023: <https://factor.niehs.nih.gov/2023/11/papers/AI-diagnose-polycystic-ovary-syndrome>
 12. AI And Machine Learning Can Successfully Diagnose Polycystic Ovary Syndrome. NIH Catalyst November 2023: NIEHS, ORS: <https://irp.nih.gov/catalyst/31/6/research-briefs>
 13. **Thyroid Stimulating Podcast: Sleep and Thyroid Function:** Addressing One Improves Both. Desai K, **Shekhar S**. In partnership with Medscape and ATA. Available from: https://www.medscape.com/viewarticle/1001179?icd=login_success_gg_mismatch_norm

Reviews, chapters, monographs and editorials

1. **Shekhar S**, Goel A. Euthanasia: India's position in the Global scenario. *Am J Hosp Palliat Care*. 2013 Nov;30(7):628-31.
2. Kumar A, **Shekhar S**, Dhole B. Thyroid and male reproduction. *Indian J Endocrinol Metab*. 2014;18(1):23–31. doi:10.4103/2230-8210.126523
3. **Shekhar S**, Hall JE, Klubo-Gwiedzinska J. The Hypothalamic Pituitary Thyroid Axis and Sleep. *Curr Opin Endocr Metab Res*. 2020. (online ahead of print)
<https://doi.org/10.1016/j.coemr.2020.10.002>
4. **Shekhar S**, Copacino CE, Barrera FJ, Hall JE, Hannah-Shmouni F. Insights into the Immunopathophysiology of Severe COVID-19 in Metabolic Disorders. *Ann Natl Acad Med Sci*. 2020 Apr;56(2):112-115. doi: 10.1055/s-0040-1713346.
5. **Shekhar S**, Martini A, De Cherney A. Genetic, Lifestyle and Environmental Factors in Male Infertility. In: Indian Society for Assisted Reproduction. March 2019. Publisher: IASR. Mumbai, IN
6. **Shekhar S**, Dhole B, Kumar A (2017) Thyroid. In: Kumar A., Sharma M. (eds) Basics of Human Andrology. Publisher: Springer, Singapore. https://doi.org/10.1007/978-981-10-3695-8_22
7. Brown EDL, Obeng-Gyasi B, Hall JE, **Shekhar S**. The Thyroid Hormone Axis and Female Reproduction. *International Journal of Molecular Sciences*. 2023; 24(12):9815.
<https://doi.org/10.3390/ijms24129815>
8. Tonleu, J.T., Wurth, R., **Shekhar, S**. (2023). Familial Endocrine Cancer Syndromes with Pediatric and Adolescent Presentation. In: Hannah-Shmouni, F. (eds) Familial Endocrine Cancer Syndromes. Springer, Cham. https://doi.org/10.1007/978-3-031-37275-9_4
9. Brown EDL, Hannah-Shmouni F, **Shekhar S**. Chapter 21 - Artificial intelligence in endocrinology. In: Krittanawong C, editor. Artificial Intelligence in Clinical Practice: Academic Press; 2024. p. 187-93.

Case reports

1. **Shekhar S**, Singh S, Gupta S. Postcolonoscopy pancreatitis. *Endoscopy* 2014; 46: E515–E516
2. **Shekhar S**, Rushabh Vakharia, and Anne Marie Van Hoven (2018) Retroperitoneal Ganglioneuroma Presenting As Symptomatic Nephrolithiasis In A Young Adult: A Zebra Among

Horses. *AACE Clinical Case Reports*: March/April 2018, Vol. 4, No. 2, pp. e140-e142.

<https://doi.org/10.4158/EP171936.CR>

3. **Shekhar S**, Dharmashaktu P. On the palm of his hands: ACTH induced hyperpigmentation. *Am J Med*. 2018 Feb;131(2):144-145. Epub 2017 Nov 7.
4. **Shekhar S**, Gubbi S, Papadakis GZ, Nilubol N, Hannah-Shmouni F. Adrenocortical carcinoma and pulmonary embolism from tumoral extension [published online ahead of print, 2019 Nov 25]. *Endocrinol Diabetes Metab Case Rep*. 2019;2019:19-0095. doi:10.1530/EDM-19-0095
5. **Shekhar S**, Chen J, Desai K. Doege-Potter syndrome presenting as 'end-stage renal disease-associated hypoglycaemia': a primary presentation of retroperitoneal sarcoma. *BMJ Case Reports* CP 2020;13:e235549. 10.1136/bcr-2020-235549
6. **Shekhar S**, Haykal R, Kamilaris C, Stratakis CA, Hannah-Shmouni F. Curative resection of an aldosteronoma causing primary aldosteronism in the second trimester of pregnancy [published online ahead of print, 2020 Aug 4]. *Endocrinol Diabetes Metab Case Rep*. 2020;2020:20-0043. doi:10.1530/EDM-20-0043

Letters to the Editor

1. **Shekhar S**, Hannah-Shmouni F. Hookah smoking and COVID-19: Call for Action. [Letter to the editor] *CMAJ*. April 6, 2020 DOI: <https://doi.org/10.1503/cmaj.1095855>. Available from: <https://www.cmaj.ca/content/hookah-smoking-and-covid-19-call-action>

Professional educational materials or reports, in print or other media:

Clinical Guidelines and Reports:

1. O'Brien K, Dave R*, **Shekhar S***, Hannah-Shmouni F, Comis LE, Solomon BI, Chen M, Gahl WA, FitzGibbon E, Gochuico BR, Estrada-Veras JI. Survivorship Issues in Adult Patients With Histiocytic Neoplasms. *J Natl Compr Canc Netw*. 2021 Nov;19(11):1312-1318. doi: 10.6004/jnccn.2021.7096. PMID: 34781266. **Equal Contribution*

Thesis: Longitudinal Evaluation of Reproductive Endocrine Function in Men with Cushing Syndrome (Submitted on April 3, 2023). Masters in Health Sciences. Duke University.

Abstracts, Poster Presentations and Exhibits Presented at Professional Meetings:

1. Lindsay Levine, Kirsten Overdahl, Samantha Molsberry, **Skand Shekhar**, Alan Jarmusch, Janet E. Hall. A Metabolomics Analysis of Moderate Energy Restriction in Healthy, Lean Women. Endocrine Society Meeting 2023. Chicago, Illinois. <https://doi.org/10.1210/jendso/bvad114.1585>
2. Gloria Choi, Chinelo Okigbo, Joselyne Tessa Tonleu, **Skand Shekhar**, Helen F. Leka, Anne E. Kim, Bona P. Purse, Katie R. Hirsch, Abbie E. Smith-Ryan, Janet E. Hall. Appetite Response to Short-Term Energy Restriction in Young Healthy Women. Endocrine Society Meeting 2023. Chicago, Illinois.
3. **Skand Shekhar**, Joselyne Tessa Tonleu, Ethan Brown, Chinelo C Okigbo, Helen Leka, Anne E Kim, Bona Purse, Daniel Zaccaro, Steven J Soldin, Katie R Hirsch, Abbie E Smith-Ryan, Janet E. Hall. Metabolic Hormone- and Energy-Related-Factors are Associated with the Pulsatile LH Secretion Response to Short-term Energy Restriction in Healthy Women. Endocrine Society Meeting 2023. Chicago, Illinois.
4. Mariana Velasquez, **Skand Shekhar**, Rachna Manju, Lynnette K Nieman, THU527 Metastatic Adenocarcinoma Of The Colon Concealing An ACTH Secreting Neuroendocrine Differentiated Cluster: A Lethal Zebra Within A Trojan Horse. Endocrine Society Meeting 2023. Chicago,

Illinois. *Journal of the Endocrine Society*, Volume 7, Issue Supplement_1, October-November 2023, bvad114.2155, <https://doi.org/10.1210/jendso/bvad114.2155>

5. Sonal Vaid, Juvianee Estrada-Veras, William Gahl, Patronas Nicholas, Rahul Dave, Bernadette Gochuico, Kevin O'Brien, Fady Hannah-Shmouni, **Skand Shekhar**, SAT614 Clinical, Laboratory And Imaging Features Associated With Central Diabetes Insipidus (Arginine Vasopressin Deficiency) In Erdheim-Chester Disease (ECD). Endocrine Society Meeting 2023. *Journal of the Endocrine Society*, Volume 7, Issue Supplement_1, October-November 2023, bvad114.1347, <https://doi.org/10.1210/jendso/bvad114.1347>
6. **Skand Shekhar, MD**, Francisco J. Barrera, MD, SM, Ethan Brown, BS, Amanda Rojo, MD, Javier Obeso, MD, Hiram Plata, MD3, Eddy P. Lincango Naranjo, MD, Nancy Terry, MLS, René Rodríguez-Gutiérrez, MD, MSc, PhD, Janet E. Hall, MD, MS. Artificial Intelligence and Machine Learning in the Detection of Polycystic Ovarian Syndrome: A Systematic Review and Meta-Analysis. American Association of Clinical Endocrinology Conference. Seattle, WA. May 4, 2023.
7. Georgios Z. Papadakis, Jorge Irizarry-Caro, Vasiliki Giannakaki, **Skand Shekhar**, William Gahl, Juvianee Estrada-Veras, Kevin O'Brien and Fady Hannah-Shmouni. Male Hypogonadism and testicular 18F-FDG activity in Erdheim-Chester Disease. *Journal of Nuclear Medicine* June 2023, 64 (supplement 1) P1557.
8. **Skand Shekhar**, MD, Joselyne Tessa Tonleu, BS, Chinelo C Okigbo, MD, PhD, Helen Leka, BS, Anne E Kim, MD, Bona Purse, MSW, Daniel Zaccaro, MS, Steven J Soldin, PhD, Katie R Hirsch, PhD, Abbie E Smith-Ryan, PhD, Janet E Hall, MD, MS, RF10 | PMON215 Greater changes in metabolic hormones are associated with a smaller decrease in pulsatile LH secretion in response to short term moderate energy restriction in healthy, young women, *Journal of the Endocrine Society*, Volume 6, Issue Supplement_1, November-December 2022, Pages A710–A711, <https://doi.org/10.1210/jendso/bvac150.1464> (*Rapid Fire Oral and Poster presentation*)
9. Ethan Brown, **Skand Shekhar**, Angela Delaney, Adam B Burkholder, Lacey Plummer, Veronica Mericq, Paulina M Merino, Richard Quinton, Katie L Lewis, Natalie D Shaw, Corrine K Welt, Kathryn A Martin, Stephanie B Seminara, Leslie G Biesecker, Alison Motsinger-Reif, John S House, Janet Hall, LBMON114 Enrichment Of Rare Sequence Variants In Genes That Communicate Metabolic Signals To The GnRH System In Hypothalamic Amenorrhea, *Journal of the Endocrine Society*, Volume 6, Issue Supplement_1, November-December 2022, Pages A466–A467, <https://doi.org/10.1210/jendso/bvac150.970>
10. Georgios Z Papadakis, Jorge Irizarry-Caro, **Skand Shekhar**, Rachel Wurth, Amit Tirosh, Sara Haroutunian, Bernadette Gochuico, William Gahl, Juvianee Estrada-Veras, Kevin O'Brien, Fady Hannah-Shmouni. Testosterone replacement therapy (TRT) is associated with significant decline in testicular 18F-FDG activity in hypogonadal male patients with Erdheim-Chester Disease (ECD). *Journal of Nuclear Medicine* June 2022, 63 (supplement 2) 3132;
11. Georgios Papadakis, **Skand Shekhar**, Jorge Irizarry-Caro, Georgios Giannakakis, Apostolos Karantanas, William Gahl, Kevin O'Brien, Juvianee Estrada-Veras and Fady Hannah-Shmouni. Increased metabolic activity of the adrenal glands assessed by 18F-FDG PET/CT in patients with Erdheim-Chester disease associated with the *BRAF V600E* disease causing variant. *Journal of Nuclear Medicine* May 2021, 62 (supplement 1) 1112

12. JT Tonleu, **S Shekhar**, C Okigbo, H Leka, A Kim, B Purse, K Hirsch, B Wei, B Stolze, J McGrath, AE Smith-Ryan, SJ Soldin, JE Hall. The Effects of Energy Restriction on Thyroid Hormone Dynamics. *Journal of the Endocrine Society* 5 (Supplement_1), A978-A979
13. Abstract #998651: Follicular Thyroid Lymphoma: A Rare Differential of Neck Mass Grover, Ashna **Shekhar**, **Skand** Rivadeneira, Ana Pandit, Zuha Gao, Chuanyun et al. *Endocrine Practice*, Volume 27, Issue 6, S148 - S14
14. The Effect of Short-term Energy Restriction on Appetite. Okigbo, Chinelo C. Tessa Tonleu, Joselyne **Shekhar**, **Skand** Leka, Helen F. Kim, Anne E. Purse, Bona P. Hirsch, Katie R. Smith-Ryan, Abbie E. Hall, Janet E. Hall. *Endocrine Practice*, Volume 27, Issue 6, S82 - S83 Abstract #1004271:
15. **Skand Shekhar**, Helen F. Leka, Anne E. Kim, Bona P. Purse, Katie R. Hirsch, Christopher McGee, John A. McGrath, Abbie E. Smith-Ryan, Janet E. Hall. The Effect of Energy Deprivation on Metabolic Hormone Responses to Meals. *Endocrine Society Virtual Meeting 2020*.
16. Okigbo, Chinelo C. Tessa Tonleu, Joselyne **Shekhar**, **Skand** Leka, Helen F. Kim, Anne E. Purse, Bona P. Hirsch, Katie R. Smith-Ryan, Abbie E. Hall, Janet E. Hall. The Effect of Short-term Energy Restriction on Appetite. *Endocrine Practice*, Volume 27, Issue 6, S82 - S83. 2020. Virtual Meeting American Association of Clinical Endocrinologists 2020. Abstract #1004271.
17. **Shekhar S**, Iris H, Meader B, Hall JE, Delaney A. SUN-438 Spontaneous Recovery of the Hypothalamic-Pituitary-Gonadal (HPG) Axis in a Female with Kallmann Syndrome, *Journal of the Endocrine Society*, Volume 3, Issue Supplement_1, April-May 2019, SUN-438, <https://doi.org/10.1210/js.2019-SUN-438>
18. **Shekhar S**, Gubbi S, McGlotten R, Nieman LK. SAT-459 Hypothalamic-Pituitary-Gonadal (HPG) and Hypothalamic-Pituitary-Thyroid (HPT) Axes in Cushing Syndrome (CS): A Retrospective Cohort Study, *Journal of the Endocrine Society*, Volume 3, Issue Supplement_1, April-May 2019, SAT-459, <https://doi.org/10.1210/js.2019-SAT-459>
19. Sirna S, **Shekhar S**, Sharma M. SUN-377 Adrenal Incidentaloma Evaluation in Critical Illness: A Diagnostic Dilemma, *Journal of the Endocrine Society*, Volume 3, Issue Supplement_1, April-May 2019, SUN-377, <https://doi.org/10.1210/js.2019-SUN-377>
20. Baral N, Basyal B, **Shekhar S**, Phillips A, Sharma M, Tumor Induced Osteomalacia: A Challenging Diagnosis. *Endocrine Practice*. 2019;25(78-79). Retrieved from <https://search.proquest.com/docview/2266301808?accountid=87927>
21. **Shekhar S** & Gupta R. Proceedings of 2nd International Congress on Gerontology and Geriatric Medicine, New Delhi: 2012
22. **Shekhar S**, Dhole B. Effect of hyperestrogenism on gonadotropin levels in hyperthyroid males: An argument for positive feedback action of estrogen. Medical Students' International Conference (MEDSICON). August 2012. VMMC, New Delhi

F. Report of Technological and Other Scientific Innovations

G. Narrative Report

I am an endocrinologist, and a clinical investigator in the Reproductive Physiology and Pathophysiology Group, Hall lab within the Clinical Research Branch, DIR, NIEHS, NIH with a special interest in studying the relationship between metabolism and reproductive disorders. I am also the Medical Director (interim) of the NIH-NIEHS Clinical Research Unit in Research Triangle Park, NC. I attended medical school at the University of Delhi, India, followed by residency training in internal medicine and chief medical residency at Saint Peter's University Hospital/Rutgers Robert Wood Johnson Medical School, NJ. Thereafter, I completed my clinical and research training in adult endocrinology at the inter-institute endocrinology training program (IETP) at NIH, focusing on reproductive endocrinology, under Dr Janet Hall's mentorship. Subsequently, I completed an additional master's in health sciences (clinical research) from Duke University.

In the past half a decade, I have authored several original articles in high quality journals that have been widely cited. Some of these studies have been the subject of news articles due to their prominent impact on COVID-19 and other endocrinopathies. I have developed special expertise in the area of reproductive endocrine disorders and am working on several studies and manuscripts elaborating the role of environment, genetics, and metabolism on reproductive endocrine function. Additionally, I am a Principal Investigator for the NIH/NIEHS [OBSERVE study](#) an Associate Investigator on five NIH intramural protocols, including *the Role of Gonadotropin Pulsations in the Regulation of Puberty and Fertility* (12-E-0050), *the Molecular Basis of Inherited Reproductive Disorders* (12-E-0049), *Carefree Study (Calorie Restriction, Environment, and Fitness: Reproductive Effects Evaluation)* (16-E-0157). I investigate and treat a range of conditions such as idiopathic hypogonadotropic hypogonadism (IHH), Kallmann syndrome, puberty disorders, menstrual disorders, and polycystic ovarian syndrome (PCOS). I am an associate editor for *Endocrine Research*, a review editor for *Frontiers in Endocrinology (Reproduction)* and serve as an ad-hoc reviewer for over a dozen internationally reputed scientific journals such as *British Medical Journal Case Reports*, *Cancers* and the *Journal of Clinical Endocrinology & Metabolism*.

I am also an enthusiastic clinician and educator with a core role in the NIH's [Inter-institute Endocrinology Training Program](#) contributing to training the next generation of clinician scientists. I am double board certified in internal medicine, endocrinology, diabetes and metabolism. I am an elected Fellow of the American College of Physicians (FACP), the American Association of Clinical Endocrinologists (FACE), and the Royal College of Physicians (FRCP, Edinburgh) and hold active membership of the Endocrine Society while serving on several international committees. I have also co-authored the first-ever survivorship guidelines on histiocytosis and gained recognition for my expertise. My original work on the impact of Cushing's syndrome on the thyroid axis was included in the Cushing syndrome management guidelines published in 2021. Additionally, I have delivered several invited scientific talks and Medical Grand Round lectures nationally and internationally and was invited to talk about PCOS at a US Congressional Briefing in 2023.

I have received several awards from the Endocrine Society, Rutgers University, Society for Bedside Medicine, and the Indian Council of Medical Research for a range of scientific and clinical contributions within endocrinology and internal medicine. My teaching skills were recognized with receipt of the *Dr. Philip Gordon Best Teacher Award* by NIH Endocrinology. My long-term goals are to excel as a clinician and scientist by contributing new and meaningful insights into the reproductive and endocrine systems.