Anand Kumar Sharma

Senior Scientist/Postdoc
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Personal Information

- **Date of birth:** July 1, 1990
- **Nationality:** Indian
- **Current residence:** Switzerland
- **Current position:** Postdoc/Senior Scientist
- **Institution:** ETH Zurich, Switzerland
- **Research areas:** Metabolic adaptation, Physiology, adipose tissue homeostasis, biochemistry, futile cycles

Education

- **Ph.D.** in Cellular and Molecular Biology, CSIR-CCMB Hyderabad, India (2019)
- **M.Sc.** in Biotechnology, BBAU, Lucknow, India (2012)
- **B.Sc.** in Biotechnology and Chemistry, DAV College, Kanpur, India (2010)

Research Experience

- **Postdoctoral Researcher**, ETH Zurich, May 2019-Present (Mentor: Prof. Christian Wolfrum)
  Research focus: Major research focused on deciphering the biological utility of futile lipid cycling with a particular emphasis on its thermogenic activity using a pharmaco-genetic approach and complex animal models.
  Supervision: Bachelor's and master's students and partly mentored PhD candidates.
  Collaboration: Nicola Zamboni (ETH Zurich), Alaa Othman (ETH Zurich), Christoph Thiele (Bonn University, Germany), Robert Farese and Tobias Walther lab (Harvard/SKI, USA).

- **Ph.D. scholar**, CSIR-CCMB, India, Aug 2012-April 2019 (Mentor: Prof. Yogendra Sharma)
  Thesis: Role of Secretagogin, a Calcium Sensor, in Insulin Signaling: Interaction, Regulation, and Implications
  Research focus: Interaction and properties of calcium sensor proteins, emphasizing a pancreatic β-cell enriched protein called Secretagogin as an insulin-binding protein.
  Supervision: Project assistants, summer trainees, master's students, and two PhD candidates (at a later stage).
  Collaboration: Mahesh Kumar, N Sai Ram, and T Avinash Raj (CCMB)

Peer Recognition

- Outstanding poster presentation award (runner-up), CPH-BAT2024: The multidimensional functions of adipose tissue, Comwell Portside, Copenhagen (Denmark) 2024.
- Voted best teacher by D-HEST (ETH Zurich) Students at MolBio course 2019.
- NIH-NIDDK Scholarship from Keystone Symposia meeting "*New Therapeutics for Diabetes and Obesity (G1)",* held at Estancia La Jolla Hotel & Spa, La Jolla, California (USA) 2016.
- Best Poster/Oral presentation Travel Award at "*Neuronal Calcium Sensors in Health and Disease*", Delmenhorst, Germany, 2016.
- CSID fellowship from Gordon Research Conference (GRC) to attend the "GRC-*Calcium Signaling Conference"* at Newry, ME (USA), 2015.
- Travel grant from organizers of CaBP19 to attend the "*CaBP19 meeting"* at Vanderbilt University (USA), 2015.
- CSIR-UGC NET Junior/Senior Research Fellowship (2011) to pursue Ph.D.
- National engineering aptitude test GATE-2011 (Biotech) with 98.47 percentile.
- DST International Travel Award 2015 to attend GRC-*Calcium Signaling Conference* at Newry, ME (USA) 2015.
- CSIR International Travel Award 2017 to attend *5th Helmholtz-Nature Medicine Diabetes Conference*, Lenbach Palais, Munich, Germany, 17-19 September 2017.
- "*Regional Child Scientist*-2006" title by the National Children's Science Congress, India.

Invited Talks and Presentations

- TRR BATenergy benchmark lecture "Thermogenic dimension of (f)utile lipid cycle: energetic aberration or physiological adaption?" on 27th January 2025.Organized by TRR BATenergy German consortium.
- Adipose Biology Seminar Series (ABSS) talk "(F)utile cycle of making & breaking lipids and the role played by DGATs" online on 27th June 2023. Organized by ABSS Canada chapter.
- SLA Seminar Series talk titled "Re-esterification modulates mitochondrial fatty acid utilization" in ETZ Zurich, Switzerland, on 04 May 2022.
- Research Presentation at the Institute of Food Nutrition and Health at the ETH Zurich "*Metabolic regulation by SCGN in vitro and in vivo*" in Zurich, Switzerland, on 20 September 2018.
- Chalk the talk presentation titled "*The Secret of Secretagogin Secretion: What We Know and What We Need to!*" in the CCMB lecture hall, on 20 April 2018.
- 18th annual research awards of Dr. KV Rao Scientific Society titled "*SCGN Administration prevents Insulin Resistance and Diabetic Complications in High-Fat Diet-Fed Animals*" in Hyderabad, India, on 24 March 2018.
- 30th CCMB Foundation Day student symposia titled "*SCGN Downregulation in Diabetes: Cause or Consequence?*" in the IICT auditorium on 26 November 2017.

Under Review/Revision Manuscript (=equal first author/*co-corresponding author)

1. **Kinetic analysis reveals universal features of adipocyte triglyceride cycling.**
   Sharma AK=, Zurkovic J=, Khandelwal R, Kuerschner L, Wolfrum C, Thiele C (2024). Under revision in *Nature Communications*.

2. **MEDAG binding moderates PKA activity and respiration in human and mouse adipocytes.**
   Long F, Ghosh A, Xu T, Ding L, Balaz M…. Sharma AK*, Christian Wolfrum* (2024). Revised for *Molecular Cell*.

3. **Beta-2-adrenergic stimulation increases energy expenditure without activating human brown adipose tissue.** Laila FM, Senn JR, Baumann CS, Isenrich AL, Schläfli R, Sharma AK, Horvath C, Maushart CI, Ghosh A, Virtanen K, Fromme T, Wild D, Wolfrum C, Betz MJ (2025) Revised for *Cell Metabolism*.

Published/accepted Research/Review articles

1. **DGAT-driven futile lipid cycling has a pronounced, yet concealed, thermogenic function.**
   Sharma AK*, Khandelwal R, Zurkovic J, Ghosh A, Wang T, Dewal RS, Wu C, Balaz M, Othman A, Manuel K, Thiele C, Wolfrum C* (2024). Accepted, in principle, in *Cell Metabolism*.

2. **MTCH2 modulates CPT1 activity to regulate lipid metabolism of adipocytes.**
   Wu et al., (2025) Accepted in *Nature Communications*.

3. **Glucagon controls obesity-specific energy expenditure via persistent cAMP/PKA signaling.**
   Long F, Challa TD, Ding L, Sharma AK, Wu C, Ghosh A, Noé F, Horvath C, Liebisch G, Höring M, Wang T, Klug M, Zimmermann T, Pereira MMA, Rist W, Strobel B, Pekcec A, Neubauer H, Wolfrum C (2024) *Journal of Hepatology*. https://doi.org/10.1016/j.jhep.2025.06.011.

4. **Intricacies and obscurities of non-shivering thermogenesis.**
   Sharma AK* (2024) *Nat Rev Endocrinol*. *https://doi.org/10.1038/s41574-024-01060-1*.

5. **Single-cell transcriptomics identifies separate classes of UCP1 and futile cycle (FC) beige cells.**
   Wang T, Sharma AK, Wu C, Maushart CI, Ghosh A, Yang W, Stefanicka P, Kovanicova Z, Ukropec J, Zhang J, Arnold M, Klug M, De Bock K, Schneider U, Popescu C, Zheng B, Ding L, Long F, Dewal RS, Moser C, Sun W, Dong H, Takes M, Suelberg D, Mameghani A, Nocito A, Zech CJ, Chirindel A, Wild D, Burger IA, Schön MR, Dietrich A, Gao M, Heine M, Vargas-Castillo A, Sun Y, Søberg S, Scheele C, Balaz M, Blüher M, Betz MJ, Spiegelman B, Wolfrum C (2024) *Cell Metabolism*, https://doi.org/10.1016/j.cmet.2024.07.005.

6. **Development of a functional beige fat cell line: evidence for independent subclasses of cells expressing UCP1 and the futile creatine cycle.**
   Vargas-Castillo A, Sun Y, Smythers AL, Grauvogel L, Dumesic PA, Emont MP, Tsai LT, Rosen ED, Zammit NW, Shaffer S, Ordonez M, Chouchani ET, Gygi SP, Wang T, Sharma AK**,** Balaz M, Wolfrum C, Spiegelman B (2024) *Cell Metabolism*, https://doi.org/10.1016/j.cmet.2024.07.002.

7. **Futile cycles: emerging utility from apparent futility.**
   Sharma AK*, Khandelwal R, Wolfrum C* (2024). *Cell Metabolism*. https://doi.org/10.1016/j.cmet.2024.03.008.

8. **Futile lipid cycling: from biochemistry to physiology.**
   Sharma AK*, Khandelwal R, Wolfrum C* (2024). *Nature Metabolism. https://doi.org/10.1038/s42255-024-01003-0.*

9. **DGAT inhibition at post-absorptive phase reduces plasma fatty acids by increasing fatty acid oxidation.**
   Sharma AK*, Wolfrum C* (2023) *EMBO Molecular Medicine*, e18209.

10. **Lipid cycling isn't all futile.**
    Sharma AK*, Wolfrum C* (2023) *Nature Metabolism*, 1-2. https://doi.org/10.1038/s42255-023-00779-x.

11. **Basal re-esterification finetunes mitochondrial fatty acid utilization.**
    Sharma AK, Wang T, Othman A, Khandelwal R, Balaz M, Modica S, Zamboni N, Wolfrum C (2023) *Molecular Metabolism,* 71, 101701.

12. **Secretagogin is a Ca2+-dependent stress-responsive chaperone that may also play a role in aggregation-based proteinopathies.**
    Chidananda AH, Khandelwal R, Jamkhindikar A, Pawar AD, Sharma AK*, Sharma Y* (2022) *Journal of Biological Chemistry*. https://doi.org/10.1016/j.jbc.2022.102285.

13. **Nutritional biology of chestnuts: A perspective review.**
    Li R, Sharma AK, Zhu J, Zheng B, Xiao G, Chen L (2022) *Food Chemistry*, https://doi.org/10.1016/j.foodchem.2022.133575.

14. **Extracellular Secretagogin is internalized into the cells through endocytosis.**
    Khandelwal R=, Sharma AK=, Biswa BB, Sharma Y (2022) *FEBS J*. https://doi.org/10.1111/febs.16338.

15. **Novel insights into adipose tissue heterogeneity.**
    Wang T, Sharma AK, Wolfrum C (2022) *Reviews in Endocrine and Metabolic Disorders*. https://doi.org/10.1007/s11154-021-09703-8.

16. **Challenges in tackling energy expenditure as obesity therapy - from preclinical models to clinical application.**
    Neubauer H, Löffler M, Betz M, Blondin D, Augustin R, Sharma AK, Tseng YH, Scheele C, Zimdahl H, Mark M, Hennige AM, Wolfrum C, Langhans W, Hamilton BS (2021) *Molecular Metabolsim*. DOI: 10.1016/j.molmet.2021.101237.

17. **Secretagogin regulates insulin signaling by direct insulin binding.**
    Sharma AK, Khandelwal R, Chadalawada S, Ram NS, Raj A, Kumar JM, Sharma Y (2019) *iScience*. https://doi.org/10.1016/j.isci.2019.10.066.

18. **Secretagogin binding prevents α-synoclien fibrillation.**
    Chidananda AH=, Sharma AK=**,** Khandelwal R, Sharma Y (2019) *Biochemistry*. https://doi.org/10.1021/acs.biochem.9b00656.

19. **Veiled potential of secretagogin in diabetes: correlation or coincidence?**
    Sharma AK*, Khandelwal R, Sharma Y* (2018) *Trends in Endocrinology and Metabolism*. DOI: https://doi.org/10.1016/j.tem.2019.01.007.

20. **Secretagogin: purification for biophysical & cell biological studies.**
    Sharma AK*, Khandelwal R, Sharma Y (2018) *Methods in Molecular Biology; Calcium-Binding Proteins of the EF-Hand Superfamily*. 551-566.

21. **Secretagogin is a redox-responsive Ca^{2+} sensor.**
Khandelwal R[=], Sharma AK[=], Chadalawada S, Sharma Y (2017) *Biochemistry, 56 (2), 411–420.*

22. **Optimization of purification method and characterization of recombinant human Centrin-1.**
Phanindranath R, Sudhakar DV, Sharma AK, Thangaraj K, Sharma Y. (2016) *Protein Expr. Purif.,* 124:48-54.

23. **Secretagogin, a Hexa EF-hand CaBP: High Level, One-Step Bacterial Purification, and Properties.**
Sharma AK*, Khandelwal R, Sharma Y, Vangipurapu R (2015) *Protein Expr. Purif.,* 109, 113-119.

24. **Liaison Between Myristoylation and Cryptic EF-hand Motif Confers Ca^{2+} Sensitivity to Neuronal Calcium Sensor-1.**
Vangipurapu R[=], Sharma AK[=], Rajyalakshmi M, Chandra K, Chary KVR, Sharma Y (2015) *Biochemistry*, 54, 1111-1122.

Editorial/Reviewer Services

- **Associate editor** at bio-protocol: https://en.bio-protocol.org/userhome.aspx?id=1436964
- **Independent reviewer:** Cell Metabolism, Nature Metabolism, Nature Cell Biology, Nature Communications, Molecular Metabolism, J Cellular Biochemistry, bio-protocol
- **Reviewed with PhD mentor:** JBC, Biochemistry, PlosOne
- **Reviewed with postdoc mentor:** Science, Nature, Cell Metabolism, Nature Metabolism, Nature Cell Biology, Cell Reports, EMBO Reports, Molecular Metabolism.

Teaching

- 2019: Instructor and Examiner - Molecular Biology course, ETH Zürich, Switzerland
- 2020: Instructor and Examiner - Precision Medicine, ETH Zurich, Switzerland
- 2021: Instructor and Examiner - Precision Medicine, ETH Zurich, Switzerland
- 2022: Instructor and Examiner – Introduction to Health Sciences, ETH Zurich, Switzerland
- 2022: Instructor and Examiner - Molecular Biology course, ETH Zürich, Switzerland
- 2023: Instructor and Examiner - Precision Medicine, ETH Zurich, Switzerland

Student Supervision

- Amrutha Chidananda (presently postdoc, at the University of Georgia. USA)
- Dinesh Jadhav (presently a PhD scholar, at Ashoka University, India)
- Rashmi Thapa (presently a PhD scholar, at the University of Wyoming, USA)
- Yi Zheng (presently an MD doctor, in Switzerland)
- Hanna Weber (presently an MD student, in Switzerland)
- Stefan Nikolic (presently a Sports therapist, Zürcher RehaZentren, Switzerland)
- Ladina Odermatt (was a HIWI, presently a master's student, in Switzerland)
- Emilia Mende (HIWI)
- Selin Baysal (HIWI)

Conference Presentations

1. **Oral Presentation.** The 6th European Workshop on AMPK, Domaine Lyon Saint Joseph, Lyon, Frace. 29-Sept to 02-Oct 2024.
2. **Poster Presentation:** The multidimensional functions of adipose tissue. Comwell Portside, Copenhagen, Denmark. 27-31 May 2024.
3. **Poster Presentation:** International Conference on Brown and Beige Fat - Organ Crosstalk, Signaling and Energetics. Bucerius Law School, Hamburg, Germany. 22-24 May 2023.
4. **Poster Presentation:** Danish Diabetes Association Postdoc Summit**.** Green Solution House, Strandvejen 79, 3700 Rønne, Bornholm, Denmark, 25-30 September 2022.
5. **Poster Presentation**: 61st ICBL meeting on Emerging Lipid Technologies – from molecular species to health and disease. Utrecht, The Netherlands, 12-15 October 2021.
6. **Oral and Poster Presentation**: *42nd Annual Meeting of the Indian Biophysical Society* IISER Pune, India, 09-11 March 2018.
7. **Poster Presentation in roundtable meet session**: *5th Helmholtz-Nature Medicine Diabetes Conference*" Lenbach Palais Munich, Germany, 17-19 September 2017.

8. **Oral and Poster Presentation**: *Neuronal Calcium Sensors in Health and Disease* Demenhorst, Germany, 04-07 December 2016.
9. **Poster Presentation**: *Annual Meeting of the Indian Biophysical Society,* Indian Institute of Science, Bangalore, India, 08-10 February 2016.
10. **Poster Presentation**: *Keystone Symposia meeting New Therapeutics for Diabetes and Obesity (G1),* Estancia La Jolla Hotel & Spa, La Jolla, California, USA, 17-20 April 2016.
11. **Poster Presentation**: *The XXXIX All India Cell Biology Conference of the Indian Society for Cell Biology, Cellular Organization and Dynamics*, Thiruvananthapuram, Kerala, India, 06-08 December 2015.
12. **Poster Presentation**: *14th FAOMBM Congress and 84th Annual meeting of SBC(I), Current Excitements in Biochemistry and Molecular Biology for Agriculture and Medicine*, Centre for Cellular & Molecular Biology, Hyderabad, India, 27-30 November 2015.
13. **Poster presentation**: *Calcium Signalling- Molecular and Cellular Mechanisms in Health and Disease, Gordon Research Conference*, Sunday River Newry, ME, USA, 07-12 June 2015.
14. **Oral and Poster Presentation**: *19th International Symposium on Calcium Binding Proteins and Calcium Function in Health and Disease*, Vanderbilt University; Nashville, Tennessee, USA, 30 May-03 June 2015.
15. **Oral Presentation:** *Indian Biophysical Society Golden Jubilee Meeting and national symposium*, Jamia Millia Islamia, New Delhi, 14-17 February 2015.