CURRICULUM VITAE

Sunil Kumar Sukumaran Ph.D.
Assistant Professor (Tenure Track)
Nutrition and Health Sciences
University of Nebraska-Lincoln
316F Ruth Leverton Hall
Lincoln, NE 68583
ssukumaran2@unl.edu
402-472-7613

RESEARCH STATEMENT:

The goal of my research is to uncover how feeding behavior is regulated by taste and other nutrient sensing pathways. I currently focus on identifying the pathways mediating sweet and fat taste signaling and taste cell regeneration. My studies make use of a broad range of techniques including single-cell RNA-Seq, classical molecular genetics, histology, cell physiology and animal behavior.

CURRENT POSITION:

Assistant Professor of Excellence (Tenure Track), Nutrition and Health Sciences, University of Nebraska-Lincoln (Jan 2020- Present)

PREVIOUS POSITIONS:

Research Assistant Professor, Nutrition and Health Sciences, University of Nebraska-Lincoln (Nov 2019-Dec 2019)

Morley R. Kare Research Associate, Monell Chemical Senses Center (Feb 2018-October 2019)

Research Associate, Monell Chemical Senses Center (September 2015 –Jan 2018)

EDUCATION:

Ph.D in Genetics, University of Cologne, Cologne Germany, 2005

M.Sc in Biotechnology, Cochin University of Science and Technology, Cochin, India. 1998.

B.Sc in Zoology, University of Calicut, Calicut, India, 1996

POSTDOCTORAL RESEARCH

Postdoctoral Fellow, Advisor: Robert F Margolskee, M.D, Ph.D., **Monell Chemical Senses Center,** Philadelphia, PA (July 2010 - Aug 2015).

1. Identified an alternate pathway for sweet taste signaling in mice and humans that parallels the mechanism utilized by pancreas to sense sugars, encoded by the brush border glucosidases, glucose transporters and the K_{ATP} channel.

2. Conducted single cell and tissue level transcriptome analysis of taste cells by RNA-Seq:
- Conducted scRNA-Seq of several GFP labeled and physiologically identified taste receptor cells isolated from mouse taste buds.
- Annotated novel isoforms and genes expressed in taste buds using de novo transcriptome assembly.
- Investigated potential salt and sour reception pathways in taste system.

3. Investigated the roles of the transcription factors *Nkx2-2* and *Gli3* in development of taste cells.
4. Investigated the role of the transcription factor *Spib* in mediating innate immune responses in taste cells.

Postdoctoral Fellow, Advisor: Mark A Hoon Ph.D., **National Institute of Dental and Craniofacial Research, NIH** Bethesda MD (Dec 2007 – Feb 2009)
Projects:
1. Identification of candidate touch receptor genes using microarray analysis of touch sensitive neurons innervating the whisker pads of mice.
2. Selective ablation of TRPV1-expressing pain receptor neurons in mice by expression of the diphtheria toxin receptor gene using cre-lox P system.

Postdoctoral Fellow, Advisor: Catherine A Wolkow Ph.D., **National Institute on Aging, NIH,** Baltimore MD (Mar 2006 – Nov 2007)
Investigated the transcriptional and translational regulation of Insulin/IGF like genes in *C.elegans* in during development and upon nutritional stress.

Ph.D., Advisor: Sigrun I Korsching Ph.D., Department of Genetics, **University of Cologne,** Cologne, Germany (Dec 2000- July 2005).
Development of cell type specific neuronal activity markers using the cre-loxP system to study information coding in mouse olfactory system.
- Developed a transgenic mouse model that expressed ratio metric pericam, a calcium sensitive derivative of GFP, in olfactory receptor neurons.
- Developed a BAC transgenic mice model expressing destabilized EYFP under the promoter of the immediate early gene *c-Fos* to study activation of second order neurons (mitral cells) in the in olfactory bulb.

RESEARCH SUPPORT:

Ongoing Research Support:

NHS-Sukumaran Startup Funds (2117365104). Sukumaran (PI)

Past Research Grants:

Morley R. Kare Funds (KAR005), Sukumaran (**PI**) 02/01/2018– 10/31/2019
Monell Institutional Award

Established in 1990, the Morley R. Kare Fellowship Fund honors Dr. Kare's vision to nurture young scientists from diverse disciplines to become scientific leaders in the chemical senses. The fund supports talented junior

scientists as they initiate their research programs at Monell. Kare Fellows are selected by Monell's senior leadership in consultation with Kare family members.

PA State tobacco grant (STA019A01SUKUM) Sukumaran (**PI**) 07/01/2019- 10/31/2019
Title: Single cell RNA-Seq to track taste cell trajectories

R01DC014286, Margolskee, Breslin (**MPIs**), 12/01/2015 – 11/30/2020
NIH/NIDCD
Role of metabolic sensing in human sweet taste
Role: Co-Investigator

NKB002A01MARGO Margolskee (PI), 11/01/2013 – 10/31/2016
Industry Sponsored Project
Na & K Taste Consortium
Role: Investigator.

NIH R21 DC013177 Huang (PI) 1/1/2014-12/31/ 2015
Single cell transcriptome analysis of salt taste
Role: Investigator

IND075A01MARGO Margolskee (Co-PI), Breslin (Co-PI) 08/15/2012 – 08/14/2013
Industry Sponsored Project
Functional characterization of roles of GLUTs, SGLT1 and KATP in sugar sensing in T1r3+ taste cells
Role: Investigator.

Submitted NIH grants:

Single cell RNA-Seq to track taste cell trajectories
NIH 1 R21 DC017612-01A1
Role: Principal Investigator.
Impact score: 43
Percentile: 37

Do Tas1r3-expressing taste cells sense fat by a metabolic pathway?
NIH 1 R21 DC016756-01
Role: Principal Investigator.
Impact score and percentile: 49

AWARDS AND FELLOWSHIPS:

2014: Travel award
University of Pennsylvania Biomedical postdoctoral program
Awarded for participation in Association for Chemoreception Sciences 36th Annual meeting, (2014), Bonita Springs, FL, USA

1998: Junior Research Fellowship for PhD studies.
Awarded by the Council of Scientific and Industrial Research, India.

OTHER POSITIONS:

Junior Research fellow, CCMB, Hyderabad (1999-2000, discontinued)

TEACHING EXPERIENCE:

1. Guest lecturer, Taste and Smell course, University of Pennsylvania (2017).

2. Assistant Professor, SRM University, Chennai, India (July 2009 - June 2010)
- Taught graduate and undergraduate level courses in Genetics and Molecular Biology.

MENTORING EXPERIENCE

Monell Chemical Senses Center:

Postdoctoral Fellow: Yumei Qin (2012-2016)

Monell Summer Apprentice Program: Oresta Borodevyc (2012), Stacey Lytle (2013)

Research assistants: Ramana Kotha (2010-16), John Lees (2017- 2018), Tiffany Aleman (2018- present)

SRM University, Chennai, India:

Master's Theses: Jayashree Jeyaraj (2010), Padmapriya Muralidharan (2010).

Bachelors Theses: Mohammed Faiz (2010), Rohit Singh (2010).

INVITED TALKS AND WORKSHOPS:

- **Sunil K. Sukumaran** (2017 April). Lead the RNA-Seq workshop and interest group at Association for Chemoreception Sciences 39th Annual meeting, Bonita Springs, FL, USA.

- **Sunil K. Sukumaran** (2013 October). Potential roles of glucose transporters and intestinal brush border glucosidases in taste system. (2013) 11th Starch Digestion Consortium workshop, Chicago, IL, USA.

PROFESSIONAL SOCIETIES:

Member, American Association for the Advancement of Science (2015- present)
Member, Association for Chemoreception Sciences, USA (2010- present)
Member, European Chemoreception Organization (2015- present)
Member, American Society for Nutrition (2018- present)

JOURNAL REVIEW:

PLOS One
International Journal of Obesity
International Journal of Environmental Research and Public Health
Journal of Neurophysiology

Nutrients
Journal of Agricultural and Food Chemistry
Physiology and Behavior

PUBLICATIONS:

Research papers:

1. Yumei Qin*, **Sunil K. Sukumaran*,** Masafumi Jyotaki, Kevin Redding, Peihua Jiang, Robert F. Margolskee (2018). *Gli3* is a negative regulator of *Tas1r3*-expressing taste cells. PLoS Genet 14(2): e1007058

2. **Sunil K. Sukumaran***, Brian C. Lewandowski*, Alexander A. Bachmanov, Robert F. Margolskee. Whole transcriptome analysis of taste bud cells. Sci Rep. 2017 Aug 8;7(1):7595.

3. **Sunil K. Sukumaran*,** Karen K. Yee*, Shusuke Iwata, Ramana Kotha, Roberto Quezada-Calvillo, Buford L. Nichols, Sankar Mohan, B. Mario Pinto, Noriatsu Shigemura, Yuzo Ninomiya and Robert F. Margolskee (2016). Taste cell-expressed α-glucosidase enzymes contribute to gustatory responses to disaccharides. Proc Natl Acad Sci U S A. 2016 May 24;113(21):6035-40.

4. Brian C. Lewandowski, **Sunil K. Sukumaran,** Robert F. Margolskee and Alexander A. Bachmanov (2016). Amiloride-Insensitive Salt Taste Is Mediated by Two Populations of Type III Taste Cells with Distinct Transduction Mechanisms. J Neurosci. 2016 Feb 10;36(6):1942-53.

5. Karen K. Yee*, **Sunil K. Sukumaran***, Ramana Kotha, Timothy A. Gilbertson and Robert F. Margolskee (2011). Glucose transporters and ATP-gated K+ (KATP) metabolic sensors are present in type 1 taste receptor 3 (T1r3)-expressing taste cells. Proc Natl Acad Sci U S A. 2011 Mar 29;108(13):5431-6.

*Co-First Authors

Google scholar URL:

https://scholar.google.com/citations?user=cxcU-1UAAAAJ&hl=en

Published abstracts and platform presentations:

1. **Sunil K. Sukumaran.** The ATP-sensitive K+ channel K_{ATP} mediates T1r-independent caloric sugar taste signaling. American Society for Nutrition 1st annual meeting, (2018) Boston, MA, USA. (Poster # P10-116)

2. **Sunil K. Sukumaran** (2018). Multiple pathways mediate caloric sugar taste signaling. In Juyun Lim (Chair) Oral Carbohydrate sensing: Beyond sweet taste. Symposium conducted at the meeting of Association of Chemoreception Sciences,40th Annual meeting, Bonita Springs, FL, USA.

3. **Sunil K. Sukumaran**, Brian C. Lewandowski, Alexander A. Bachmanov, Robert F. Margolskee: *De novo* assembly of the mouse taste transcriptome. Chem. Senses*,* 43 (4), E106-E107 (Abstr).

4. Yumei Qin, **Sunil K. Sukumaran**, Kevin Redding, Robert Margolskee: Type II taste bud cells may function in oral immune surveillance. Chem. Senses*,* 43 (4), E13-E14 (Abstr).

5. **Sunil K. Sukumaran**, Brian C. Lewandowski, Alexander A. Bachmanov, Robert F. Margolskee: Augmented transcriptomics of taste cells by RNA-Seq analysis of single cells and pooled taste buds. Chem. Senses, 41 (9), E272-E273 (Abstr).

6. Brian C. Lewandowski, **Sunil K. Sukumaran**, Robert F. Margolskee, Alexander A. Bachmanov: Analysis of peptidergic signaling-related gene expression in RNA-seq data of individual type II and III mouse taste cells. Chem. Senses, 41 (9), E277-E277 (Abstr).

7. Yumei Qin, **Sunil K. Sukumaran**: *Gli3* acts as negative regulator of taste bud maintenance. 17th International Symposium on Olfaction and taste (2016). Chem. Senses 41 (9), E278-E278 (Abstr.)

8. **Sunil K. Sukumaran** (2015). Taste cell detection of caloric sugars independently of T1rs. Chem. Senses, Volume 41, Issue 4, 1 May 2016, Page 398 (Abstr.)

9. Robert F. Margolskee, **Sunil K. Sukumaran**, Karen K. Yee, Shusuke Iwata, Ramana Kotha, Yuzo Ninomiya (2015) Taste cell-expressed carbohydrate-digesting enzymes contribute to gustatory responses to disaccharides. Chem. Senses 40: 615 (Abstr.)

10. Yumei Qin, **Sunil K. Sukumaran**, Robert F. Margolskee: *Nkx2*.2 is required for the generation of type III taste receptor cells. Chem. Senses 40: 596, 2015 (Abstr.)

11. Brian. C. Lewandowski, **Sunil. K. Sukumaran**, Robert. F. Margolskee, Alexander. A. Bachmanov: Anion effect and osmotic sensitivity of salt-responsive taste bud cells isolated from mouse circumvallate papillae. Society for Neuroscience, Annual meeting (2014), Washington DC, USA (poster # 621.13/BB26).

12. **Sunil K. Sukumaran**, Brian C Lewandowski, Peihua Jiang, Gary Beauchamp, Alexander Bachmanov, Liquan Huang, Robert F Margolskee**:** Mining deep sequencing data from individual taste cells**.** Association for Chemoreception Sciences 36th Annual meeting, (2014), Bonita Springs, FL, USA. (Platform Presentation).

13. **Sunil K. Sukumaran**, Brian C Lewandowski, Yuri Kaulin, Peihua Jiang, Gary Beauchamp, Alexander Bachmanov, Liquan Huang, Robert F Margolskee: (2013) Transcriptome analysis of individual taste receptor cells. Chem. Senses 38: e85 (Abstr.)

14. B. C. Lewandowski, N. Iguchi, L. Huang, **Sunil K. Sukumaran**, R. Margolskee, Y. Kaulin. Identification and characterization of salt-responsive amiloride-insensitive taste receptor cells. 2012 International Symposium on Olfaction and Taste. Stockholm, Sweden. (Poster #324).

15. **Sunil K. Sukumaran**, Karen K. Yee, Ramana Kotha., Timothy A. Gilbertson & Robert F. Margolskee (2011) "Glucose transporters and ATP-gated K+ (KATP) metabolic sensors are present in type 1 taste receptor 3 (T1r3)-expressing taste cells." *Chem. Senses* 36 (9): A122-A123 (Abstr.)