

Minati Singh

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Summary: A senior scientist specialized in molecular neuroscience and mouse behavior. Expertise includes from molecular biology, stem cell regenerative medicine, to generating genetically modified mouse. Consistently uses *in vitro* and *in vivo* model systems to test proof of concept experiments. Progress-driven research Scientist with superior understanding of molecular biology and its application in disease states. Published author, experienced presenter with outstanding interpersonal communication skills. Demonstrate high level of initiative and problem-solving skills in complex research environments. My goal is to use my scientific skills and managerial expertise in a broader operational leadership role.

WORK EXPERIENCE

Associate (Research track Faculty): January 2018-present, University of Iowa, Iowa City, IA.

- Currently leading several projects to establish the central role of klotho in inflammaging and senescence-inflammation of the aging brain and in cellular senescence during Chronic and Acute Kidney Injury and anticancer therapy.
- 2019, Obtained \$5,000 grant from Fraternal Orders of Eagle entitled "Secret niche of aging: klotho unlocks"
- 2018, Obtained \$5,000 grant from Fraternal Orders of Eagle entitled "Klotho-fountain of youth"
- 2019, published manuscript entitled "Absence of BBSome function leads to astrocyte reactivity in the brain" in the Journal of Molecular Brain.
- Established CRISPR Cas9 ADAR knockout pancreatic cell lines using Synthego V2 Platform.
- AAV2-Cre-lox mediated klotho deletion by using stereotaxic brain injection in floxed klotho mice.
- Molecular neuroscience and behavioral assays to assess learning and memory in disease mice models of aging, chronic, and acute Kidney Injury.
- Supervise lab personnel, write grants, and manage research projects.
- Applied US NAM Catalyst Award and Fraternal Orders of Eagle grants.

Associate Research Scientist. June 2012-2017, University of Iowa, Iowa City, IA.

- Project and Budget management.
- 2017, Obtained faculty innovation grant \$2500 to study therapeutic effect of mesenchymal stem cells.
- Led a team of 4 scientists and first-time established astrocyte reactivity due to absence of BBSome function in brains of Bardet Biedl Syndrome mice models.
- Led and established *in vitro* differentiation of mouse iPSCs to hypothalamic-like cells.
- Successful stereotaxic injection of iPSCs hypothalamic neural precursor cells and differentiation into neuronal and glial cells in brains of Bardet Biedl Syndrome mice models.
- Successful stereotaxic injection of mesenchymal cells and differentiation into glial and neuronal cells in brains of Bardet Biedl Syndrome mice models showing reduced astrocyte reactivity in these mice.
- Successful live cell imaging of differentiated iPSC-hypothalamic neuronal cells.
- Wrote NIH grants (4 RO1 and 3 R21).
- Developed new research projects.
- Established CRISPR Cas9 ADAR knockout IMCD and HEK cell lines
- Supervised undergraduate and graduate students on their research projects.
- Serves as a scientific expert reviewer.
- Invited expertise for lecture presentations, review articles, and book chapters.

Research Assistant Professor. May 2010-2012, University of Iowa, Iowa City, IA.

- Established my own lab, Managed Projects, departmental funds, Equipment purchase, and Budgets.
- Obtained NIH R21 (\$275,000) to study the role of serotonin 2C receptor RNA editing in affective disorder of ADAR2 transgenic mice.
- Led team of 6 scientists and collaborated with cross-functional scientific researchers and university core facilities from various departments, to design, coordinate, develop, and implement standard procedures for research protocols and data analysis.

- First time showed the neural circuitry involved in goal-oriented and motivated overeating behaviors in ADAR2 transgenic mice using PET imaging and behavioral assays.
- Supervised and provided scientific support and guidance on issues related to scientific subject matter within and outside the University located domestically and/or abroad. Mentored MSTP, undergraduate, and graduate students on research objectives. Coordinated with research administration for management of research budgets, supervision of laboratory staff, and supplies.
- Guided graduate student on thesis research that led to the student's first authorship publication, Akuburio et al., 2013.
- Managed grants, departmental internal funds, budgets, project supplies, personnel, students, and mice colonies.
- Problem solved experimental problems by modifying procedures and techniques by designing, identifying, and overseeing research methodologies. Further assessed and evaluated specific compounds and processes on mouse behavioral assays.
- Delivered seminars on our research findings to small and large diverse groups of scientists.
- Managed overall design of the project, mouse behavioral assays, molecular experiments, data analysis, and interpretation using various computer soft wares.
- Independently designed, performed experiments and procedures, compiled findings and analyzed data to improve research techniques and methodologies.

Assistant Research Scientist. October 2005-April 2010, University of Iowa, Iowa City, IA

- Project and Budget management.
- Led team member of 5 scientists and first time established that ADAR2 transgenic mice display endogenous behavioral despair and that altered ADAR2 RNA editing plays a role in co-morbidities of depression and anxiety-like behavior in hyperphagia-mediated obesity.
- Obtained Fraternal Orders of Eagle (\$3,000) and Wyeth (\$10,000) drug discovery (WAY163909) grants to study hyperphagia and affective disorder in ADAR2 transgenic mice.
- Used mouse behavioral assay and highly specific serotonin 2C receptor agonist WAY 163909 to show hyperphagia and affective disorder is specific to the serotonin 2C receptor RNA editing in ADAR2 transgenic mice.
- Supervised lab personnel on lab research project.

Instructor and Post-doctoral Fellow, Vanderbilt University, Nashville, TN. Post-doctoral fellow (July 1997- July 2003) and research Instructor (July 2003-Sept 2005).

- Project management.
- Led a team member of 4 scientists and first time generated ADAR2 transgenic mice models and showed that ADAR2 plays an important role in obesity.
- Managed lab personnel, projects, and research design.
- Obtained CNRU internal grant to study hyperphagia-mediated obesity in ADAR2 transgenic mice.
- Collaborated and team lead with scientists and organizations to achieve research objectives of the department and NIH.
- Established stem cell lines at Vanderbilt stem cell core facility
- Supervised high school and undergraduate students to establish protocols and procedures for research analysis.
- Communicated and presented seminars on research findings to small and large diverse groups of scientists.
- Awarded best poster in Gordon Conference.
- Supervised lab personnel on research project of the lab.

Post-doctoral Fellow (September 1995-1997), University of Wisconsin, Madison, WI.

- Project management.
- Led a team member 4 scientists and first time showed that by exposing potato spuds to high humidity for 2 weeks prior to cold storage enhances their quality and longevity.
- Designed cold tolerance experiments to establish optimum cold tolerance in different potato species.
- Analyzed data and presented scientific findings to small and large diverse group of scientific audience.

Senior Research Fellow (July 1986-July 1989) Unit of Plant Cell and Molecular Biology, Delhi University

- Performed plant cell tissue culture and established a protocol for protoplast transformation from leaves of *Vigna radiata* using electroporation.
- Supervised lab personnel on research projects

FUNDED GRANTS

2019	Singh M. (Principal Investigator). Secret niche of aging: Klotho- unlocks. \$5,000 grant from Fraternal Orders of Eagle
2018	Singh M. (Principal Investigator). Klotho- Fountain of youth. \$5,000 grant from Fraternal Orders of Eagle.
2009	Singh M. (Principal Investigator). RNA editing in transgenic mouse model of behavioral despair and anxiety. NIMH grants R21 MH082234-01A1.
2009	Singh M. (Principal Investigator). Drug discovery and alteration of behavioral despair in ADAR2 transgenic mice. Wyeth Inc.
2008	Singh M. (Principal Investigator). Impaired hippocampal function and type II diabetes in ADAR2 transgenic mouse. Fraternal Orders of Eagle Grant, Iowa.
2003	Emeson RB and Singh M (Co-Principal Investigator). CNRU pilot grant: ADAR2 expression and feeding behavior, Vanderbilt University, Nashville, TN.

SUPERVISORY AND MENTORSHIP

2018-present.	Gabriel Baccam, Ph.D. student. Klotho-mediated regulation of TRPC6 channel activation.
2015-2016	Sunny Huang, MSTP student. Differentiation of mesenchymal stem cells to brown adipose tissue to reduce body weight in BBS mice.
2014-2017	Matthew Cring, Ph.D. student--CRISPR cell lines of ADARs
2012-2013	Danielle Wilkinson, BSc student Ph.D. student. Fear and anxiety in ADAR2 transgenic mice. Lisa Hamey, Ph.D. student. Hyperphagia and morbid obesity in Prader-Willi-like phenotype of ADAR2 mice.
2011-2013	Ashley Akubuiro. M.Sc. Graduate-student. Motivated overeating in ADAR2 transgenic mice.
2007-2009	Elisa Na. Graduate-student. Molecular biology of salt appetite in rats.
2007-2008	Nicholas Sanders. Senior BSc. student. PCR methods of genotyping in transgenic mice.
2003-2005	Kari Yakubisini. Junior BSc. student. Feeding disorder in ADAR2 transgenic mice.
2003-2004	Jason Mauk. Senior BSc. student. The effect of different diets on body weight in ADAR2 transgenic mice.
2002-2003	Cristina Martinez. Senior BSc. student. Feeding disorder in ADAR2 transgenic mice.
1999-2002	Amy Butner, High school Senior at Hume Fogg. The effect of different diets on body weight in ADAR2 transgenic mice.
2001	Chelsea Collins. Summer undergraduate student. Isolation of different cDNA isoforms of mouse ADAR2 from brain RNA
2001	Ragsdale Lamar. IGP student. The expression differences of UCP proteins in hypothalamus, brown fat and skeletal muscles of ADAR2 transgenic mice.

EDUCATION

Date awarded 11-3-1995	Ph.D.	University of Alberta, Edmonton, Canada	GPA: 8/9 <u>Major:</u> Plant Molecular Biology.
11-29-1986	M.Sc.	GB Pant University of Ag & Tech, India	GPA: 4.1/5 <u>Major:</u> Plant Physiology and <u>Minor:</u> microbiology
03-3-1984	B.Sc.	University of Delhi. India	<u>Major:</u> Botany, Zoology and Chemistry.

TEACHING EXPERIENCE

2017	ESL teacher at Iowa city compassion center.
1990-1995	University of Alberta, Canada. PI.Sci. 600, 610, and 620 (Graduate level courses). Instructed students on seminar presentation skills. Lab experience: Molecular plant gene expression analysis
1983-1986	G.B. Pant Univ. of Ag. & Tech., India. Elements of Plant Physiology (Graduate level lab course). Plant Biochemistry (Graduate level lab course). Lab experience: Bacterial culture and microscopical identification, soil microbiology, and plant physiology.

PROFESSIONAL SKILLS

- **Animal studies:** Mouse Colony maintenance, mouse models of obesity; CGRP mouse, ADAR2 transgenic mouse, Bardet Biedl Syndrome mouse. Mouse behavioral assays; learning and memory, fear conditioning, depression-like, anxiety-like, and feeding behavior. CSF, plasma, and serum isolation. Acute kidney injury, brain senescence, Experience in BSL1, and 2, agents and facility, Familiar with federal and state standard operating procedures and regulations regarding animal welfare in research.
- **Molecular Biology:** *E coli* culture and transformation, Molecular microbiology, molecular diagnostics, Plasmid isolation, DNA, RNA, and protein isolation, genotyping, RNA editing, RNAi, Imprinting, RNA-Seq, pyrosequencing, genomic editing, sequencing, cloning, site directed mutagenesis, DNA and RNA methylation, Real-time PCR, PCR, PCR sequencing, genome wide methylation, live cell Ca⁺⁺ imaging, PET Imaging, Immuno-magnetic-activated immunoprecipitation (Dynabeads), RNA CHIP, *in vitro* transcription and translation assay, Pulse chase, lipid raft isolation, Molecular Biomarkers in CSF and plasma exosomes, Western, Northern, and Southern blot analyses, ELISA, protein conjugation, LiCOR Odyssey, vibratome and cryo-sectioning, H&E staining, β Gal staining, immunocytochemistry, immunohistochemistry, immunofluorescence, and confocal imaging. Immuno-magnetic cell separation and FACS sorting.
- **Pharmacodynamics:** drug administration in mice *via* intraperitoneally, subcutaneous and brain infusion for drug delivery in mice *via* osmotic mini pump.
- **Electrophysiology:** LTP.
- **Gene therapy:** Stereotaxic microinjection AAV2 and neural stem cells mediated gene targeting and xenotransplantation neural precursor cells in mice brain.
- **In vitro cell culture:** HEK, NIH 3T3, RPE, Hela, N2A, mHypoA, and C6 cell culture maintenance, human and mouse fibroblast cell culture, cellular transfection, RNAi, cell line engineering with CRISPR\Cas9, and FACs analysis. Plant tissue culture and protoplast transformation.
- **Stem cell therapy:** 2D-3D organoid cell culture, mouse and human iPSCs and mesenchymal stem cell maintenance and differentiation, Teratomas, Regenerative medicine; cellular therapy in mouse models of obesity, Mycoplasma detection, CRISPR\CAS9 gene modification of human and mouse iPSCs, IMCD, pancreatic, and HEK cell lines, iPSCs and mesenchymal neural precursor cells transplantation in brains of mice. Fluorescent diamond nanoparticle delivery in mouse brain.
- **Computer skills:** SnapGene, Image J, Microsoft office, End note, Prism, Adobe illustrator photoshop, and In Design Image.

PUBLICATIONS

1. **Singh M**, Garrison J, Wang K, and Sheffield V. 2019. Absence of BBSome function leads to astrocyte reactivity in BBS mice. Journal of Molecular Brain: May9;12(1):48<https://doi.org/10.1186/s13041-019-0466-z>
1. **Singh M**. 2017. Epigenetics in hyperphagia. In: The handbook of nutrition, diet, and epigenetics. Accepted. (Editors: Patel, Vinood, Preedy, Victor R). Springer International Publishing. eReference ISBN 978-3-319-55530-0.
2. **Singh. M**. 2014. Mood, food, and obesity. Frontier Psychology, Sep 1; 5:925. PMID: 25225489.

3. Akubuiro A, Zimmerman BM, Boles PL, McCormick L, Sunderland J and **Singh M**. 2013. Hyperactive hypothalamus, motivated and non-distractible chronic overeating in ADAR2 transgenic mice. Gene Brain Behavior, 12(3): 311-22. PMID: 23323881.
4. **Singh M**. 2013. Dysregulated RNA editing and non-coding RNAs in Neurodegeneration. Frontier Genetics, Jan 22; 3:326. PMID: 23346095.
5. **Singh M**, Singh MM, Na E, Agassandian K, Zimmerman MB, Johnson AK. 2011. Altered ADAR 2 equilibrium and 5HT(2C) R editing in the prefrontal cortex of ADAR 2 transgenic mice. Gene Brain Behavior, 10(6): 637-472. PMID: 21615684.
6. **Singh M**, Zimmerman BM, Beltz T and Johnson AK. 2009. Affect-related behaviors in mice misexpressing the RNA editing enzyme ADAR2. Physiology & Behavior, 97(3-4): 446-454. PMID: 19361536
7. *Xue, B, ***Singh M**, Guo F, Hay, M and Johnson AK. 2009. Protective actions of estrogen on angiotensin II-induced hypertension: role of central nitric oxide. Am J Physiol Heart Circ Physiol. Nov; 297(5): H1638-46 (*= equal authorship). PMID: 19734362. Commentary: L. Yannes and Jane F. Reckelhoff. 2009. A new piece in the hypertension puzzle: central blood pressure regulation by steroids. Am J Physiol Heart Circ Research. 297: H1584-H1584. PMID: 19801489.
8. Singh, M.V.; Kapoun, A.; Higgins, L.; Kutschke, W.; Thurman, J.M.; **Singh, M***; Yang, J.; Guan, X.; Lowe, J.; Mohler, P.J.; Weiss, R.M.; Zimmerman, K.; Zhang, R.; Yull, F.E.; Blackwell, T.S.; Anderson, M.E. 2009. CaMKII triggers cell membrane injury by inducing complement factor B in cardiomyocytes. Clinical Invest, 119(4): 986-96. PMID: 19273909.
9. Thompson BJ, Washington MK, Kurre U, **Singh M***, Rula EY, and Emeson RB. 2008. Protective roles of alpha-Calcitonin and beta-Calcitonin Gene-Related Peptide in spontaneous and experimentally induced Colitis. Dig Dis Sci, Jan; 53(1): 229-41.
10. **Singh M**, Kesterson R, Jacobs MM, Joers J and Emeson RB. 2007. Hyperphagia-mediated obesity in transgenic mice misexpressing the RNA editing enzyme ADAR2. J. Biol Chem. Aug 3; 282, 31: 22448-59. PMID: 17567573. 2007-Faculty of 1000 Medicine: evaluations for **Singh M** et al J Biol Chem 2007 Aug 3 282 (31): 22448-59. <http://www.f1000medicine.com/article/id/1088265/evaluation>.
11. Feng Yi, Sansam C, **Singh M**, and Emeson RB 2006. Altered RNA Editing in Mice Lacking ADAR2 Autoregulation. MCB, 26(2): 480-8. PMID: 16382140.
12. Emeson RB and **Singh M** 2001. Adenosine to Inosine RNA Editing: Substrates and Consequences. In: RNA Editing: Frontiers in Molecular Biology. (BL Bass, Ed.) Oxford University Press: London, pp. 109-138.
13. **Singh M** and Palta J 1996. Regulation of *des A* and ATPase genes during cold acclimation in *Solanum* species with varying capacity to acclimate. Plant Physiology 111: 581-581.
14. **Singh M** and Flanagan AJ 1996. Co-ordination of gene expression between the chloroplast and nucleus during low temperature acclimation in *Brassica napus* cv. Jet Neuf.leaves. Plant science 135: 171-181.

FELLOWSHIPS AND AWARDS

- 2005- *Best poster award*. Expression of RNA editing enzyme leads to hyperphagia mediated obesity in transgenic mice. Gordon Research Conference on RNA editing.
- 2003- *CNRU Pilot Grant*: Emeson RB and Singh M. ADAR2 expression and feeding behavior.
- 1994- Marie Imirie Louise *Award*, University of Alberta.
- 1992-1994. Graduate Research Assistantship, University of Alberta.
- 1988-1989. University Grant commission, Senior Research Fellow, University of Delhi
- 1986-1988. University Grant commission, Junior Research Fellow, University of Delhi

REVIEWER AND EDITORIAL ROLE

- BMC genomics (Reviewer). 2010-present.
- Frontiers Genetics Editorial member. 2011-present.
- Open Journal of Depression Editorial member. 2012-present.

CONFERENCES AND LECTURE PRESENTATIONS

1. **Singh M** and Sheffield V 2016. Global loss of BBS proteins is associated with increased levels of reactive astrocytes and pro-inflammatory cytokines, IL1 α , IL6, IL15, and TNF α in brains of mouse models of Bardet Biedl Syndrome. ASHG, Vancouver, October 18-22.
2. **Singh M**. 2012. A transgenic mouse with hyperactive brain limbic region and hyperphagia-mediated morbid obesity. 2nd international conference on hyperphagia and PWSA scientific conference. Pennington Biomedical Research center Oct 17th-20th.
3. Akubuiro A, Bairs T, Singh MV, McCormick L, and **Singh M** 2012. Epigenetics in chronic hyperphagia and morbid obesity of ADAR2 transgenic mouse. IBANG, Colorado, USA.
4. **Singh M**, Bair T, Tecedor L, Singh MV and Davidson B. 2011. RNA editing and quantifying transcriptomes by RNA-Seq from the prefrontal cortex brain region of ADAR2 transgenic mouse with affective disorder. IBANG, Rome, Italy.
5. **Singh M**, Bair T, Tecedor L, Singh MV and Davidson B. 2011. RNA editing and quantifying transcriptomes by RNA-Seq from the prefrontal cortex brain region of ADAR2 transgenic mouse with affective disorder. Research Day. Internal Medicine, University of Iowa, Iowa City, IA.
6. Singh MM, Zimmerman MB, Johnson AK and **Singh M**. 2010. Dysregulated RNA editing of the 5HT_{2c}R and ERK signal in the prefrontal cortex of ADAR2b transgenic mice. Gordon Research Conference, Hong Kong University of Technology, Hong Kong.
7. **Singh M**, Xue, B, Hay, M and Johnson AK. 2009. Sex differences in neuronal nitric oxide synthase (nNOS) expression in the paraventricular nucleus (PVN) and subfornical organ (SFO) in angiotensin II (ANG II)-induced hypertension. Experimental Biology April 18-22, New Orleans, LA.
8. **Singh M** and Johnson A.K 2007. Depression-and-anxiety related behaviors in transgenic mice overexpressing RNA editing enzyme ADAR2. Society for Neuroscience, San Diego. Nov 3rd
9. **Singh M** and Emeson RB. 2005 Gordon Conference on RNA editing: Expression of ADAR2 leads to hyperphagia mediated obesity in transgenic mice. Best poster award. Jan 24th-29th 2005.
10. **Singh M** and Emeson RB. 2003. Gordon Conference on RNA editing. RNA editing and obesity. January 19th-24th
11. **Singh M** and Emeson RB. 2001. Gordon Conference on RNA editing. Characterization of ADAR2 transgenic mice. January 21-26th 2001.
12. **Singh M** and Emeson RB. 1999. Gordon Conference on RNA editing. Overexpression of rADAR2 in transgenic mice. January 24-29th 1999.
13. **Singh M**, Palta JP. 1996. Regulation of *Des A* and *Atpase* genes during cold acclimation in *Solanum* species with varying capacity to acclimate. Plant Biology Meeting, San Antonio, Texas, July 27-31st.
14. **Singh M** and Flanagan AJ 1994. Differential expression of chloroplast genes amongst two leaf ages during low temperature acclimation in *Brassica napus* cv Jet Neuf. ASPP, July 30-Aug 3rd, Portland, Oregon, USA
15. **Singh M** and Flanagan AJ. 1993. Co-ordination of gene expression between chloroplast and nucleus during low temperature acclimation in *Brassica napus* cv. Jet Neuf. Eighth crucifer genetics workshop, Saskatoon, Saskatchewan. July 24th-28th 1993.

PROFESSIONAL MEMBERSHIP

- Society for Neuroscience, 2007-present
- AHA-2018-present
- IBANG, 2010-present.
- NAASO, 2002-present.
- National Eating Disorder Association, 2004-present.
- Middle Tennessee Chapter for Neuroscience, 2003-present.
- Indus Women Leaders, 2005-present.
- Plant Physiology, 1994-1997.

Extracurricular activities

- Volunteer at Iowa City Compassion Center: ESL teacher
- Volunteer for Democratic Party
- Covid-19 patient Screener