

# Sandeep K. Rajput, Ph.D.

## *Curriculum Vitae*

Fertility Labs of Colorado,  
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### EMPLOYMENT HISTORY

**October 2017- Present:** Research Scientist, Fertility Labs of Colorado, Colorado Center for Reproductive Medicine, Lone Tree, Colorado, USA

*Area of Research:* Understanding the molecular pathways regulating stage specific nutritional requirement during oocyte maturation and early embryo development.

**Feb 2016 – October 2017:** Assistant Professor, Animal Science Department, Michigan State University, USA

*Area of Research:* Investigating the molecular factors and their signaling mechanism involved in determining the oocyte competence and follicular development in cattle.

**Feb 2013 – Feb 2016:** Postdoctoral Research Associate, Animal Science Department, Michigan State University, USA

**Oct 2011 to Jan 2013:** Team Leader in Research and Development Department of Chromous Biotech Pvt. Ltd., Bangalore, India

**May 2008 to October 2011:** Research Associate, Animal Biotechnology Centre, National Dairy Research Institute, Karnal, India.

**April 2007 to April 2008:** Senior Research Officer, Research and Development, Merck, Bangalore, India.

**Aug 2006 to Mar 2007:** Senior Research Fellow, Animal Biotechnology Centre (ABTC), National Dairy Research Institute, Karnal, India

**Aug 2005 to Aug 2006:** Technical Assistance in Wildlife Forensic Cell, Wildlife Institute of India, Dehradun Uttaranchal, India

### EDUCATION

**Ph.D in Biochemistry** from Banaras Hindu University, National Dairy Research Institute, India, 2012

**MS in Biotechnology** from H.N.B.Garhwal, University, Srinagar, Uttaranchal, India, 2005

**Bachelors in Science (B.Sc.)** from M.J.P Rohilkhand University, Bareilly, Uttar Pradesh, India, 2002

## Peer-Reviewed Publications (28)

1. Daigneault BW, **Rajput S**, Smith GW, Ross PJ. Embryonic POU5F1 is required for expanded bovine blastocyst formation. **Scientific reports** 8 (1), 7753.
2. Ashry M, Lee KB, Folger JK, **Rajput SK**, Smith GW. Follistatin supplementation during in vitro embryo culture improves developmental competence of bovine embryos produced using sex-sorted semen. **Reproductive biology** 18 (3), 267-273
3. Daigneault BW, Vilarino M, **Rajput SK**, Frum T, Smith GW, Ross PJ. CRISPR editing validation, immunostaining and DNA sequencing of individual fixed bovine embryos. **BioTechniques** 65 (5), 281-283
4. Camsari C, Folger JK, **Rajput SK**, McGee D, Latham KE, Smith GW. Transgenerational Effects of Periconception Heavy Metal Administration on Adipose Weight and Glucose Homeostasis in Mice at Maturity. *Toxicol Sci.* 2019 Jan 10
5. **Zhenhua G\***, **Rajput SK\***, Folger JK, Di L, Knott JG, Smith GW. Pre- and Peri-/Post-Compaction Follistatin Treatment Increases In Vitro Production of Cattle Embryos. **PLoS One.** 2017 Jan 25;12(1):e0170808.
6. **Datta TK\***, **Rajput SK\***, Wee G, Lee K, Folger JK, Smith GW. Requirement of the transcription factor USF1 in bovine oocyte and early embryonic development. **Reproduction.** 2015 Feb;149(2):203-12
7. **Rajput SK**, Lee K, Zhenhua G, Di L, Folger JK, Smith GW. Embryotropic actions of follistatin: paracrine and autocrine mediators of oocyte competence and embryo developmental progression. **Reprod Fertil Dev.** 2013;26 (1):37-47.
8. **Rajput SK**, Kumar P, Roy B, Verma A, Pandey HP, Singh D, De S and Datta TK. Identification of some unknown transcripts from SSH cDNA library of buffalo follicular oocytes . **Animal.** 2013; 7(3):446-54.
9. **Rajput SK**, Dave VP, Rajput A, Pandey HP, Datta TK, Singh RK. A Column based rapid method for the simultaneous isolation of DNA, RNA, miRNA and proteins. **Cell Biol. Int.** 2012; 36:779–783.
10. **Rajput SK**, Kumar S, Dave VP, Rajput A, Pandey HP, Datta TK. An improved method of bisulfite treatment and purification to study precise DNA methylation from as little as 10pg DNA. **Appl Biochem Biotechnol.** 2012; 168(4):797-804.
11. **Roy B\***, **Rajput SK\***, Raghav S, Kumar P, Verma A, Jain A, Jain T, Singh D, De S, Goswami SL, Datta TK. Characterization of oocyte-expressed GDF9 gene in buffalo and mapping of its TSS and putative regulatory elements. **Zygote.** 2012; 10: 1-10.

12. Roy B\*, **Rajput SK\***, Raghav S, Kumar P, Verma A, Kumar S, De S, Goswami SL, Datta TK. A reporter promoter assay confirms the role of a distal promoter NOBOX Binding Element in influencing promoter activity of GDF9 gene in buffalo oocytes. **Anim Reprod Sci.** **2012**; 135:1-4)
13. Zhang K, **Rajput SK**, Wang S, Folger JK, Knott JG, Smith GW. CHD1 Regulates Deposition of Histone Variant H3.3 During Bovine Early Embryonic Development. **Biol Reprod.** **2016** Jun;94(6):140
14. Zhang K, **Rajput SK**, Lee KB, Wang D, Huang J, Folger JK, Knott JG, Zhang J, Smith GW. Evidence Supporting a Role for SMAD2/3 in Bovine Early Embryonic Development: Potential Implications for Embryotropic Actions of Follistatin. **Biol Reprod.** **2015** Oct;93(4):86.
15. Kumar P, **Rajput S**, Verma A, De S, Datta TK. Expression pattern of glucose metabolism genes in relation to development rate of buffalo (*Bubalus bubalis*) oocytes and in vitro-produced embryos. **Theriogenology.** **2013** Nov;80(8):914-22.
16. Singh.S, **Rajput SK**, Singh M, Misra PK, Mohan G, Kumar M, Singh RK and Gambhir IS. p53 gene: mutation and immunohistochemical analysis in patients with invasive ductal carcinoma of breast. **American Journal of Biochemistry and Biotechnology.** **2013.** 9 (4): 395-403.
17. Verma A, **Rajput S**, Kumar S, De S, Chakravarty AK, Kumar R, Datta TK. Differential histone modification status of spermatozoa in relation to fertility of buffalo bulls. **J Cell Biochem.** **2015** May;116(5):743-53.
18. Verma A, **Rajput SK**, De S, Kumar R, Chakravarty AK, Datta TK. Genome-wide profiling of sperm DNA methylation in relation to buffalo (*Bubalus bubalis*) bull fertility. **Theriogenology.** **2014** Sep 15;82(5):750-9.
19. Handa JM, Zhang K, Wang , Kogantia PP, Mastrantonio K, **Rajput SK**, Ashry M, Smith GW, Yao, J. Discovery of a novel oocyte-specific Krüppel-associated box domain-containing zinc finger protein required for early embryogenesis in cattle. **Mechanism of Development.** **2017** (<http://dx.doi.org/10.1016/j.mod.2017.02.003>)
20. Dholpuria S, Kumar M, Kumar S, Sarwalia P, **Rajput S**, Kumar R, De S, Datta TK. Differential Expression of Newly Identified Long Intergenic Non-Coding RNAs in Buffalo Oocytes Indicating Their Possible Role in Maturation and Embryonic Development. **J Cell Biochem.** **2016** Dec 9. doi: 10.1002/jcb.25828.
21. Ashry M, Lee K, Mondal M, Datta TK, Folger JK, **Rajput SK**, Zhang K, Hemeida NA, Smith GW. Expression of TGF $\beta$  superfamily components and other markers of oocyte quality in oocytes selected by brilliant cresyl blue staining: relevance to early embryonic development. **Mol Reprod Dev.** **2015** Mar;82(3):251-64.
22. Jena SC, Kumar S, **Rajput SK**, Roy B, Verma A, Kumaresan A, Mohanty TK, De S, Kumar R, Datta TK. Differential methylation status of IGF2-H19 locus does not affect the fertility of

- crossbred bulls but some of the CTCF binding sites could be potentially important. **Mol Reprod Dev.** 2014 Apr;81(4):350-62.
23. Gupta PS, Folger JK, **Rajput SK**, Lv L, Yao J, Ireland JJ, Smith GW. Regulation and Regulatory Role of WNT Signaling in Potentiating FSH Action during Bovine Dominant Follicle Selection. **PLoS One.** 2014 Jun 17;9(6).
  24. Lee KB, Folger JK, **Rajput SK**, Smith GW. Temporal regulation of mRNAs for select bone morphogenetic proteins (BMP), BMP receptors and their associated SMAD proteins during bovine early embryonic development: effects of exogenous BMP2 on embryo developmental progression. **Reprod Biol Endocrinol.** 2014 Jul 15;12(1):67.
  25. Verma A, Kumar P, **Rajput SK**, Roy B, De S, Datta TK. Embryonic genome activation events in buffalo (*Bubalus bubalis*) preimplantation embryos. **Mol Reprod Dev.** 2012; 79(5):321-8
  26. Kumar V, Mishra M, **Rajput SK**, Bajpai S, Singh RK.. Detection and diagnostic applicability of human urinary kininogen in kala-azar patients. **Parasitol Res.** 2012;111(4).
  27. Kumar P, Verma A, Roy B, **Rajput SK**, Ojha S, Anand S, Yadav P, Arora J, De S, Goswami SL, Datta TK. Effect of varying glucose concentrations during in vitro maturation and embryo culture on efficiency of in vitro embryo production in buffalo. (*Reprod Domest Anim.* 2012 Apr;47(2):269-73).
  28. Sharma R, Stuckas H, Bhaskar R, **Rajput SK.**, Khan I, Goyal SP, Tiedemann, R. mtDNA indicates profound population structure in Indian tiger (*Panthera tigris tigris*). **Conservation Genetics.** 10(4): 909-914; 2008.

#### ABSTRACTS AND POSTER PRESENTATION (16)

1. **S Rajput**, J Becker, Y Yuan, W Schoolcraft, R Krisher. Temporal regulation of molecular pathways, metabolic enzymes and growth factor receptors during bovine oocyte maturation in vitro. *Reproduction, Fertility and Development* 31 (1), 189-189.
2. B Daigneault, M Vilarino, **S Rajput**, T Frum, G Smith, P Ross. CRISPR gene editing in bovine zygotes—mutation confirmation by integration of protein expression and DNA sequencing analyses. *Reproduction, Fertility and Development* 31 (1), 165-165
3. JC Becker, R Pasquariello, **SK Rajput**, WB Schoolcraft, RL Krisher, Y Yuan. Growth factors improve mouse oocyte developmental potential via increased MAPK and MTOR signaling activities in cumulus cells during in vitro maturation. *Fertility and Sterility* 110 (4), e313
4. **Sandeep K. Rajput**, Luis J. Montiel-Olguin, Joseph K. Folger, Jason G. Knott and George W. Smith .Role of SMAD1/5 Signaling in Bovine Early Embryonic Development: Impact on Embryotropic Actions of Follistatin. [Abstract 351, Society for the Study of Reproduction **SSR 2016, USA**].

5. **Sandeep K. Rajput**, Joseph K. Folger, Jason G. Knott and George W. Smith. Investigating the molecular mechanisms involved in embryotrophic actions of follistatin on bovine early embryonic development [Society for the Study of Reproduction **SSR 2015, USA**].
6. **Sandeep K. Rajput**, Joseph K. Folger, Jason G. Knott and George W. Smith. Investigating the molecular mechanisms involved in embryotrophic actions of follistatin on bovine early embryonic development [4th Annual MSU Conference on **Women's Health Research 2015, USA**].
7. Luis J. Montiel-Olguin, **Sandeep K. Rajput**, Joseph K. Folger, and George W. Smith. Evidence Supporting a Role for Canonical Wnt Signaling Pathway During Maturation of Bovine Oocytes In Vitro [Abstract 550, Society for the Study of Reproduction **SSR 2016, USA**].
8. Joseph K. Folger, **Sandeep K. Rajput**, Jason G. Knott and George W. Smith. Differences in embryotropic response of in vitro produced bovine embryos to follistatin variants. [Abstract 341, Society for the Study of Reproduction **SSR 2016, USA**].
9. Mohamed Ashry, **Sandeep K Rajput**, Joseph K Folger, Jason G Knott, George W Smith. Potential Link Between Follistatin Mediated Increase in CDX2 Expression and a Loss of Epigenetic Modifications of CDX2 Regulatory Region in Early Bovine Embryos. [Society for the Study of Reproduction SSR 2016, Abstract 532 USA].
10. Mohamed Ashry, **Sandeep K Rajput** · Joseph K Folger · Jason G Knott · Nabil A Hemeida · George W Smith. Regulation and potential regulatory role of AKT in bovine oocyte competence [Society for the Study of Reproduction **SSR 2014, USA, Volume: 47**]
11. George W Smith · Kun Zhang · Kyungbon Lee · Joseph K Folger · **Sandeep Rajput** · Mohamed Ashry · Jason G Knott. Embryotropic actions of Follistatin: Mechanisms and Translational Relevance [Society for the Study of Reproduction **SSR 2014, USA, Volume: 47**]
12. P.S.P. Gupta, Joseph K. Folger, **Sandeep Rajput**, Lihua Lv, Jianbo Yao, James J. Ireland and George W. Smith. Regulation and regulatory role of WNT signaling in potentiating FSH action during bovine dominant follicle selection [2nd Annual MSU Conference on **Women's Health Research 2013, USA**].
13. Roy B, **Rajput S**, Kumar P, Verma A, De S, Goswami SL, Datta TK. A NOBOX binding element (NBE) at 5'UPS of buffalo gdf9 gene has important role for enhancing minimal promoter activity of this gene for its oocyte specific expression [**ISSRF, International conference 2011, INDIA**]
14. Kumar S, **Rajput S**, Roy B, Kumar P, De S, Goswami SL and Datta TK. Aberrant methylation changes at H19 locus in spermatozoa of cross bred bulls in relation to their fertility. [**ISSRF, International conference 2011, INDIA**].
15. Roy B, **Rajput S**, Raghav S, Kumar P, Goswami SL, Datta TK. Mapping of Unique TSS and identification of putative TF binding site in 5'upstream region of oocyte expressed buffalo GDF9 gene. [**ISSRF, International conference 2010, INDIA**].
16. Sahoo AP, **Rajput S**, Kaushik R, Raghav S, Sharma A, Kumar P, Yadav P, De S, Goswami SL, Datta TK. **Methylation changes of GDF9 5'UTR** CpG island region could explain its expression variation during invitro maturation of follicular oocytes in buffalo. [**ISSRF, International conference 2009, INDIA**].

#### GENEBANK ACCESSION NO. (768)

**Rajput SK**, Kumar P, Roy B, De S, Singh D, Pandey HP, Goswami SL, Datta TK. NAIP Grant TKD: NAIP/C4/C1056: Buffalo oocyte SSH cDNA library. **Published at NCBI** [GW811330,

GW813165 - GW813184, HO000096 - HO000114, HO004803 - HO004911, GW840909 - GW840962, HO000325 - HO000362, HO007290 - HO007305, GW841012 - GW841081, GW996674 - GW996846, GW863638 - GW863843, HS514055 - HS514071]

## FELLOWSHIPS AWARDED

**Visiting Research Associate Fellowship** in 2013 from Michigan State University, USA

**Research Associate Fellowship** in 2008 from Indian Council of Agricultural Research (ICAR), New Delhi, India

**Senior Research Fellowship** in 2007 from Indian Council of Agricultural Research (ICAR), New Delhi, India.

**Junior Research Fellowship** in Council of Scientific & Industrial Research, (CSIR-UGC-NET) 2005, 2007.

## MEMBERSHIPS IN PROFESSIONAL SOCIETIES

*2011-2016*

Member of Indian Society for the Study of Reproduction & Fertility, INDIA

*2014-2016*

Member of Society for the Study of Reproduction, USA

2014-2016

Reproductive and Developmental Sciences Program, Michigan State University, USA

## REVIEW EXPERIENCE

➤ Working as active reviewer of research articles for international journals including:

1. Scientific Report (Nature publication)
2. Journal of endocrinology (Bioscientifica)
3. Molecular Reproduction and Development (Wiley)
4. ChemComm (Royal society of chemistry)
5. Integrative Biology (Royal Society of Chemistry)
6. Animal Reproduction Science (Elsevier)
7. Gene (Elsevier)
8. Journal of Cellular Physiology
9. Domestic Animal Endocrinology (Elsevier)
10. Animal (Cambridge)
11. PLoSE ONE
12. Royal Society of Chemistry advance (Royal Society of Chemistry)
13. Molecular Biosystem (Royal Society of Chemistry)
14. Theriogenology

(<https://publons.com/author/1179541/sandeep-k-rajput#profile>)