

Application for Young Scientist Award _Dr. Deeksha Sharma_NDRI, Karnal

Application/ Nomination Form for *Young Scientist Award*

1. Name and Title of the Nominee: **Dr. Deeksha Sharma**
2. Category: **Academician/ Research Scholar**
3. Designation: **Researcher**
4. Name of the Award: **Young Scientist Award**
5. Institution/organization: **ICAR- National Dairy Research Institute, Karnal, Haryana 132001, India**
6. Current Affiliation: **University of Michigan, Ann Arbor, MI, USA**
7. Year: **2022**
8. Complete postal address: **Deeksha Sharma, Molecular, Endocrinology and System biology lab, Animal Biochemistry Division, ICAR-National Dairy Research Institute, Karnal, Haryana-132001, India**
9. Mobile No. **917404378557 (Permanent) /+1 734-883-9975 (Current)**
10. Email: amaraiberis@gmail.com/deekshas@umich.edu
11. Domain: **Agricultural and Biological Science**
12. Subdomain: **Molecular reproductive toxicology**
13. Award category: **Best Researcher Award**

Title of the paper: Organochlorine pesticide dieldrin upregulate proximal promoter (PII) driven CYP19A1 gene expression and increases estrogen production in granulosa cells

Abstract

Organochlorine pesticides are highly persistent environmental pollutants, generally shown to act through estrogen receptor alpha and alter estrogen biosynthesis. However, the molecular mechanism of regulation of estrogen biosynthesis by these pesticides is not clear. Estrogen is main female fertility hormone regulated by rate-limiting enzyme aromatase. It is encoded by the CYP19A1 gene, which is expressed using specific promoters. In the present study, the attempt has been made to elucidate the effect of dieldrin on the promoter-specific CYP19A1 gene expression and estrogen hormone production in buffalo granulosa cells. The buffalo granulosa cells were cultured and treated with dieldrin in a dose (100,150 and 200 ng/mL) and time (6, 12, and 24 h) dependent manner, followed by analysis of CYP19A1, promoter-specific CYP19A1 transcript expression, and estrogen production. Results showed that dieldrin significantly increased the expression of the CYP19A1 gene after 6 and 12 h while its expression was decreased after 24 h. To understand the upregulation of CYP19A1 gene, promoters' specific CYP19A1 transcript analysis was done. The finding showed that dieldrin significantly increased the proximal promoter specific CYP19A1 transcript while there was no effect on distal promoter specific CYP19A1 transcripts. This specific-promoter activity was quantified by chromatin immunoprecipitation assay (ChIP). Results confirmed the involvement of the proximal promoter in the overexpression of CYP19A1 gene. Furthermore, a significant increase in estradiol-17 β level was also observed. Overall, the present study demonstrated the stimulatory effect of dieldrin on the CYP19A1 gene and will help to understand the toxicological role of dieldrin on the reproductive system.

Reference: Sharma, Deeksha, Suman Kumari, Payal Rani, Suneel Kumar Onteru, Partha Roy, Rakesh Kumar Tyagi, Surya Pratap Singh, and Dheer Singh. "Organochlorine pesticide dieldrin upregulate proximal promoter (PII) driven CYP19A1 gene expression and increases estrogen production in granulosa cells." *Reproductive Toxicology* 106 (2021): 103-108.

<https://doi.org/10.1016/j.reprotox.2021.10.009>

Resume

Deeksha Sharma

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Personal Profile

I am a post-doctoral Fellow in the Department of Internal Medicine at the University of Michigan, Ann Arbor, Michigan, USA. My research interest lies in Molecular biology, Cancer Biology, Cell signaling, Cell biology, Bioinformatics, and studying the toxicological effects of environmental contaminants on human health.

Education

Postdoctoral Fellow, Internal Medicine University of Michigan, Ann Arbor, MI, USA	Oct 2021- continuation
Doctor of Philosophy (Ph.D.), Animal Biochemistry National Dairy Research Institute, Karnal, India Advisor(s): Dr. Dheer Singh and Dr. Suneel Kumar Onteru	Aug 2017 -Sept 2021
Postgraduate diploma course in Environmental and Occupational Health (Continuation) The Indira Gandhi National Open University, Delhi during 2020-2021	
Master of Science (M.Sc.), Animal Biochemistry National Dairy Research Institute, Karnal, India Advisor(s): Dr. Rajeev Kapila	Aug 2014-June 2017
Bachelor of Science (B.Sc.), Biotechnology Chaudhary Charan Singh University, Meerut, UP, India	Aug 2010-Oct 2013

Research Experience

Postdoctoral Fellow, University of Michigan, Ann Arbor, USA -Oct 2021- Continuation
Research Focus of my lab: Here my research focus is on the development of therapies to target cancer stem cells, specifically ways to alter DNA repair mechanisms and inflammation in cancer stem cells to treat breast cancer.

Research Scholar, National Dairy Research Institute (NDRI), Karnal, India Aug, 2017-Sept, 2021

Research topic: Development of LAMP assay to screen milk xenobiotics responsive to estrogen and aryl hydrocarbon receptors using buffalo Granulosa cells **Brief description:** This project involves: (1) Analysis of dose and time-dependent effect of environmental contaminant TCDD and dieldrin on granulosa cells based on expression profiling of aryl hydrocarbon receptor and estrogen receptor alpha downstream genes by q-PCR, Western blot, Immunofluorescence and ChIP assay, (2) Selection of candidate genes using databases and bioinformatics analysis for target identification and pathway analysis, validation of candidate gene by real-time PCR, (3) Development of reverse transcriptase loop-mediated isothermal amplification (RT-LAMP) assay for highly upregulated gene, (4) Validation of RT-LAMP assay in milk

Teaching assistant, National Dairy Research Institute (NDRI), Karnal, India- 2019

Six months teaching assistance for conducting molecular biology practical's for the course AB-622 in Dept. Animal Biochemistry, NDRI, Karnal

Master of Science, National Dairy Research Institute (NDRI), Karnal, India 2014 – 2017

Research topic: Relative expression of genes associated with probiotic attributes of lactobacilli

Brief description: This project aims to study (1) The temporal expression of probiotic related genes of lactobacilli during simulated gastric digestion conditions by real-time PCR and (2) *In vivo* evaluation of bacterial and host genes expression associated with probiotic survivability in albino mice

Skills

- **Molecular biology techniques:** Experience with different techniques for (1) Total RNA, DNA, and plasmid isolation (2) cDNA synthesis, (3) PCR and quantitative real-time PCR, (4) Immunostaining, (5) RT-LAMP assay, (6) Protein isolation and western blotting (Western blotting is not perfect)
- **Mammalian Cell culture, Cell line, and Bacterial cell culture:** Experience in different cell cultures such as primary cell culture as well as cell lines i.e., Granulosa cells and liver cells 2D and 3D and HepG2 cells. Experience in the bacterial culture of *Lactobacillus rhamnosus*, *Lactobacillus fermentum*, and *E. coli*.
- **In-Vivo:** Experience in handling mice (1) Feeding (2) Dissection
- **Bioinformatics software:** Experience in using different bioinformatics tools for mRNA analysis. (1) mRNA pathway identification using tools such as KEGG, GATHER, Panther, and Webgestalt (2) The network of differentially expressed genes and cluster identification using String and Cytoscape software. (3) Experience in handling data of computational toxicological database (COMP-TOX) and comparative toxicogenomics database for analysis of the toxicity of pesticides, dioxins, and heavy metals. Primer designing using different software's such as BLAST and Primer-3 Plus, In Silico-PCR.
- **Toxicology experience:** Experience in handling environmental toxicants such as TCDD, Pesticides & heavy metals. Isolation of these contaminants from the milk.
- **Biochemical techniques:** Experience in the Estimation of hormones using ELISA, MTT assay, and BCA protein assay
- **Bacterial Techniques:** Experience in basic bacterial culture techniques such as (1) Gram staining, (2) Bacterial microscopic examination, (3) Growth analysis by plate count method
- **Hands-on experience** – High-performance liquid chromatography

Research Publications

1. **Deeksha Sharma**, Suman Kumari, Payal Rani, Suneel Kumar Onteru, Partha Roy, Rakesh Kumar Tyagi, Surya Pratap Singh, and Dheer Singh* (2021). Organochlorine pesticide dieldrin upregulate proximal promoter (PII) driven CYP19A1 gene expression and increases estrogen production in granulosa cells. **Reproductive Toxicology**. 2021 Oct; 106:103-108 <https://doi.org/10.1016/j.reprotox.2021.10.009>.

2. **Deeksha Sharma**, Payal Rani, Suneel Kumar Onteru, Partha Roy, Rakesh Kumar Tyagi, Surya Pratap Singh, and Dheer Singh* (2021). Reverse transcription-loop mediated isothermal amplification (RT-LAMP) assay for detection of AhR receptor responsive xenobiotics. **Toxicology Mechanisms and Methods**. 2021 Jun; 13;31(5):359-66. <https://doi.org/10.1080/15376516.2021.1884923>
3. **Deeksha Sharma**, Tanu Shri, Ankita Kapri and Vipra Sharma (2021). Effect of endosulfan organochlorine-based insecticide on human mental health at the molecular level using PANTHER. **Analytical Chemistry Letters**. 2021 May; 4;11(3):303-14. <https://doi.org/10.1080/22297928.2021.1919547>
4. Mohd Iqbal Bhat, Vishwajeet Kumar Singh, **Deeksha Sharma**, Suman Kapila, and Rajeev Kapila (2019). "Adherence capability of an indigenous probiotic strain *Lactobacillus rhamnosus* MTCC-5897." **Microbial pathogenesis**. 2019 May 1; 130:120-30. <https://doi.org/10.1016/j.micpath.2019.03.009>
5. Tanu Shiri, Sourabh Jain, Shailendra S. Gaurav, S. K. Singh, and **Deeksha Sharma** (2020). "Biosorption of lead (pb) through eichhorina crassipes biomass". **IJRAR**, Volume 7, Issue 3. E-ISSN 2348-1269, P- ISSN 2349-5138.

Conferences and Workshops Attended

1. **Deeksha Sharma**, Suneel Kumar Onteru, Partha Roy, Rakesh Kumar Tyagi, Surya Pratap Singh, Dheer Singh. "Diendrin Upregulate Proximal Promoter II Driven CYP19A1 Gene Expression and Increased Estrogen Production Through Estrogen Receptor Alpha" 31st Annual Meeting of the Indian Society for the Study of Reproduction and Fertility (ISSRF) (2021). (Best poster award).
2. **Deeksha Sharma**, Suneel Kumar Onteru, Partha Roy, Rakesh Kumar Tyagi, Surya Pratap Singh, Dheer Singh. "Inhibitory effect of environmental pollutant (TCDD) on promoter specific aromatase (CYP19A1) expression in granulosa cells" 2nd International Conference on Environmental, Agricultural, Chemical and Biological Sciences (ICEACBS 2021). (For oral presentation).
3. Suman Kumari, **Deeksha Sharma**, Vaishali Chaurasiya, Suneel Kumar Onteru, Dheer Singh." Follicular Fluid Exosomes Induce Inflammatory Cytokines Production In Buffalo Granulosa Cells Through TLR-4 Receptor". 31st Annual Meeting of the Indian Society for the Study of Reproduction and Fertility (ISSRF) (2021). (Abstract Published).
4. Puja Kumari, **Deeksha Sharma**, Suneel Kumar Onteru, Partha Roy, Rakesh Kumar Tyagi³, Surya Pratap Singh⁴, Dheer Singh **Lead (Pb) Enhances Distal Promoter (P1.1) Mediated Aromatase (CYP19A1) Gene Expression in Buffalo Granulosa Cells". 31st Annual Meeting of the Indian Society for the Study of Reproduction and Fertility (ISSRF) (2021). (Abstract Published)**
5. **Deeksha Sharma**, Payal Rani, Suman Kumari, Suneel Kumar Onteru, and Dheer Singh. "Reverse transcription-loop mediated isothermal amplification assay to screen dioxins in milk using buffalo granulosa cells." 30-the Annual Meeting of the Indian Society for the Study of Reproduction and Fertility (ISSRF) (2020).
6. Suman Kumari, Vaishali Chaurasiya, **Deeksha Sharma**, Monika Vashisht, Suneel Kumar Onteru, and Dheer Singh. "MiR-326 regulates pro-inflammatory cytokines targeting

- TLR-4 in buffalo granulosa cells.” 30-the Annual Meeting of the Indian Society for the Study of Reproduction and Fertility (ISSRF) (2020). (Best Poster Award).**
7. **Deeksha Sharma**, Mohd Iqbal Bhat, Taruna Gupta, Suman Kapila and Rajeev Kapila “**Evaluation of probiotic attributes of *Lactobacillus fermentum* 5898 under invitro and in vivo conditions at the molecular level**” 5th Biennial conference of PAi and International Symposium on Probiotics and immunity: way forward to microbial therapy 19th to 20th November 2020. **(For Poster presentation).**
 8. The **Workshop** on “**Mammalian genome editing by CRISPER technique** Nov-15, 2019 under NAHEP conducted by ICAR-NDRI.
 9. The **Workshop Cum Training program** on “**Metabolomics basic principles and applications**”. Mar 3-5, 2020, under NAHEP conducted by ICAR- NDRI. **Demonstrated hands-on NMR and MS.**
 10. Two Week **certificate course** on **Multiomics box for Linux**, Python programming, transcriptomics, and epigenomics from **Decode Life- Biotech informative**, Rohtak, Haryana, India during 23rd nov-6th Dec 2020.

Book Chapters

1. **Deeksha Sharma**, Suman Kapila and Rajeev Kapila. “Bile salt tolerance and adhesion mechanism of probiotic bacteria”. *Agricultural Science: Research and Reviews (2021) Volume II*, 20.
2. **Deeksha Sharma**, Suman Kapila and Rajeev Kapila. Acid tolerance marker of the probiotic bacteria at molecular level—a review. *Frontiers in Life Science (2021) (Volume III)*, 84.
3. **Deeksha Sharma**, Puja Kumari, Suneel Kumar Onteru, and Dheer Singh. “Review of the prevalence of heavy metals ‘in food matrices at the global level’”. *Frontiers in Life Science (2021) (Volume IV)*, 130.
4. **Deeksha Sharma**, Suman Kumari, Tanu Shri and, Lal krishan Kumar “Bioinformatics analysis of cancer health effects of Endosulfan-an organochlorine pesticide”. *Ecology Research volume (2021)*. 3. ISBN: 978-93-88901-21-5 s
5. **Deeksha Sharma**, Suman Kumari, Tanu Shri and, Saurabh Jain “Toxicological impact of Endosulfan in *Caenorhabditis elegans* at the molecular level: An in silico approach”. *Proceedings of International e-Symposium on Biodiversity (2021)*. (IeSB-2020-SSC).
6. **Deeksha Sharma**, Shubham Kumar, Tanu Shri, and Monish Roy “The range of coronavirus Disease 2019 pandemic socio-economic influence on global impoverishment”. *COVID-19 impact and response, (2020)*. ISBN:978-93-88901-6
7. **Deeksha Sharma**, Shubham Kumar, Tanu Shri, and Monish Roy. “Significance of carbon nanotubes in the early diagnosis of cancer and its treatment-A review”. *Proceedings of online International Conference on advanced materials (2020)*.
8. **Deeksha Sharma**, Tanu Shri, Neha Bisht “Significance of magnetic nanoparticles in the treatment of cancer- A Review. *Proceedings of online International Conference on Zero dimensional materials. (2020)*.
9. Tanu Shri, Shailendra S. Gaurav, S.K Singh, **Deeksha Sharma**, and Sourabh Jain. “Antimicrobial and cytotoxic effects of silver nanoparticles synthesized from waste extract of okra fruit- A review”. *Proceedings of online International Conference on advanced materials (2020)*.

10. Tanu Shri, S.K Singh, Sourabh Jain, **Deeksha Sharma**, Neha Bisht, and Akash Kumar. “Carbon and Graphene Quantum Dots and their applications in Agricultural, Biomedical and biotechnological”. *Proceedings of online International Conference on Zero dimensional materials (2020)*

Honors and Awards

2019 Awarded **Junior Research Fellowship (UGC- CSIR JRF JUNE)** for Ph.D. by Council of Scientific and Industrial Research (CSIR), India.

2018 Qualified **National Eligibility Test (UGC-NET)** conducted by Council of Scientific and Industrial Research (CSIR), India for the position of *Assistant Professor in life sciences*.

2018 Qualified **Graduate Aptitude Test in Engineering in Life Science (GATE-2018)** conducted by The Indian Institute of Technology Guwahati (IIT), India.

2017 Qualified **National Eligibility Test (ICAR-NET)** conducted by Indian Council of Agricultural Research (ICAR), India.

2017 Qualified **All India entrance examination** for admission to Ph. D program (AIEEA-Ph. D) conducted by the National Dairy Research Institute of Indian Council of Agricultural Research (ICAR-NDRI), India.

2014 Qualified **All India entrance examination** for admission to the master program (AIEEA- PG) conducted by the Indian Council of Agricultural Research (ICAR), India.

Membership

- Lifetime membership of Society of Biological Chemist
- Lifetime membership of the Indian Society for the Study of Reproduction and Fertility

Contact List of the Professional References

1. Dr. Dheer Singh

Joint Director Research, NDRI, Principal Research Scientist, Animal Biochemistry Division, NDRI, Karnal, India -132001. Email: drdheer.singh@gmail.com

2. Dr. Suneel Kumar Onteru

Principal Research Scientist, Animal Biochemistry Division, NDRI, Karnal, India - 132001.

Email: suneelvet@gmail.com

3. Dr. Veda Murthy G.V.

Scientist, NDRI-SRS, Bangalore, India – 560058

Email: vedavet747@gmail.com

Personal Details

Father's Name:	Janardan Sharma
Date of Birth:	07-06-1992
Sex:	Female
Marital Status:	Unmarried
Languages Known:	English and Hindi

Declaration

I certify that the particulars furnished above are true to the best of my knowledge and belief.

Deeksha Sharma