



**Invitation to M.Tech. Thesis Defense of Radhika Arora : August 20, 2021 (Friday): 11.30-12.00 IST**

In Partial Fulfilment of the Requirements for the Degree of

**M.Tech. CB**

**Radhika Arora (MT19219)**

Will defend her thesis

Title: **“Elucidating the functional basis of Odorant Receptor genes pseudogenization in humans”**

IIIT-D Faculty and Students are invited

**Date: August 20, 2021 (Friday)**

**Time: 11.30-12.00 IST**

**Online over Google meet (<https://meet.google.com/wex-drcf-tor>)**

<b>Examiner:</b>	<b>Internal:</b>	<b>Jaspreet Kaur Dhanjal</b>
	<b>External/Internal:</b>	<b>Debarka Sengupta</b>
	<b>Advisor:</b>	<b>Gaurav Ahuja</b>

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### **Abstract**

In light of evolution, olfaction, the sense of smell, is one of the oldest senses, allowing the organisms to identify food, potential mating partners and avoid predators. Odorant Receptors are a specialized set of G-Protein Coupled Receptors mainly expressed on the cilia of the olfactory sensory neurons. Of note, comparative genomics studies revealed that during evolution there is a drastic increase in the number of pseudo odorant receptors genes. Of note, pseudogenes are considered non-functional DNA sequences that do not encode for a functional protein; in other words, sequences mutated into an inactive form over the course of evolution. Speculation-based theories suggest that such an increase could be potentially due to either a change in the food habits over the primates evolution or due to parallel advancements in the high brain centers for olfactory information processing, thus obviating the need for a large number of odorant receptors at the periphery. Till date, the theory supported by the functional analysis is largely missing. In this project, we hypothesize that selective pseudogenization of odorant receptor genes could be due to their redundant function. To test this hypothesis, first we performed a pilot study in which we first computationally converted two of the known pseudo odorant receptor genes into their possible functional forms (annotated as pseudopseudoORs) by following the molecular rules of the Genetic Code. Second, for the functional comparative analysis, we constructed the three dimensional structures of the pseudopseudoORs and their functional orthologs. Third, we identified the potential ligands for these odorant receptors (two pseudopseudoORs and their functional orthologs) using the Deep Learning based tools: AdaptiveOdoriFy and EvOlf and compared the predicted ligand profiles. Finally, we further tested these findings by an orthogonal approach using the structure-based docking analysis and follow up comparative analysis with the results from Deep Learning-based prediction. Our preliminary investigation suggest that functional redundancy could be the potential reason for pseudogenization of odorant receptors in humans.

