

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Odorant Transport and Deposition in the Canine Nasal Airways

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Pennsylvania State University — The canine nose functions similar to a chromatograph that imposes odorant-specific deposition patterns upon the thin mucus layer covering the nasal cavity. Here we use an anatomically-correct computational fluid dynamics (CFD) model to study airflow and odorant transport from the external environment through the nasal airways to the olfactory receptor layer beneath the mucus. The results show that deposition patterns are primarily influenced by the intricate olfactory flowfield and the odorant solubility in the mucus layer. Highly-soluble odorants are quickly absorbed near the entrance to the olfactory region, and thus do not reach the periphery with significant concentrations. In contrast, insoluble odorants are deposited more evenly and may even exit the olfactory region without being completely absorbed. Predicted odorant deposition patterns correspond with the anatomical organization of olfactory receptors known to occur in keen-scented (macrosmatic) mammals, providing a mechanism that helps explain the excellent olfactory acuity of the dog.

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Date submitted: 03 Aug 2009

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