Introduction

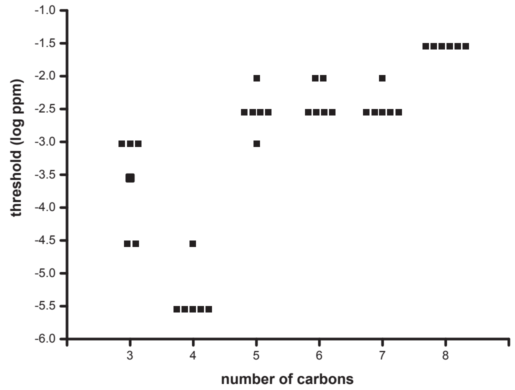
Genetics, physiology and anatomy of olfaction is widely studied in Mus musculus. However very few studies are conducted on organismal level, with regard to olfactory sensitivity.

Basic data on olfactory sensitivity for the choice of adequate stimulus concentrations in electrophysiological or functional imaging studies is very important.

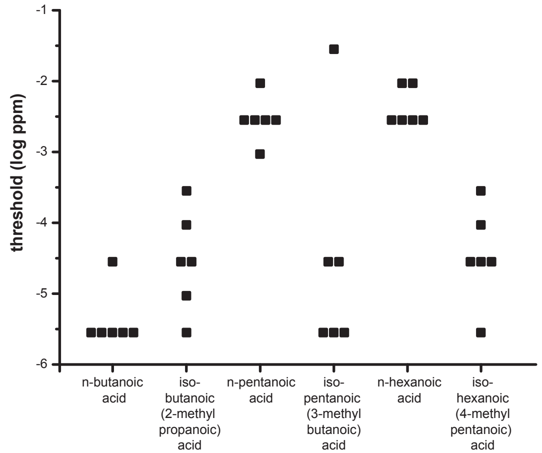
Aim

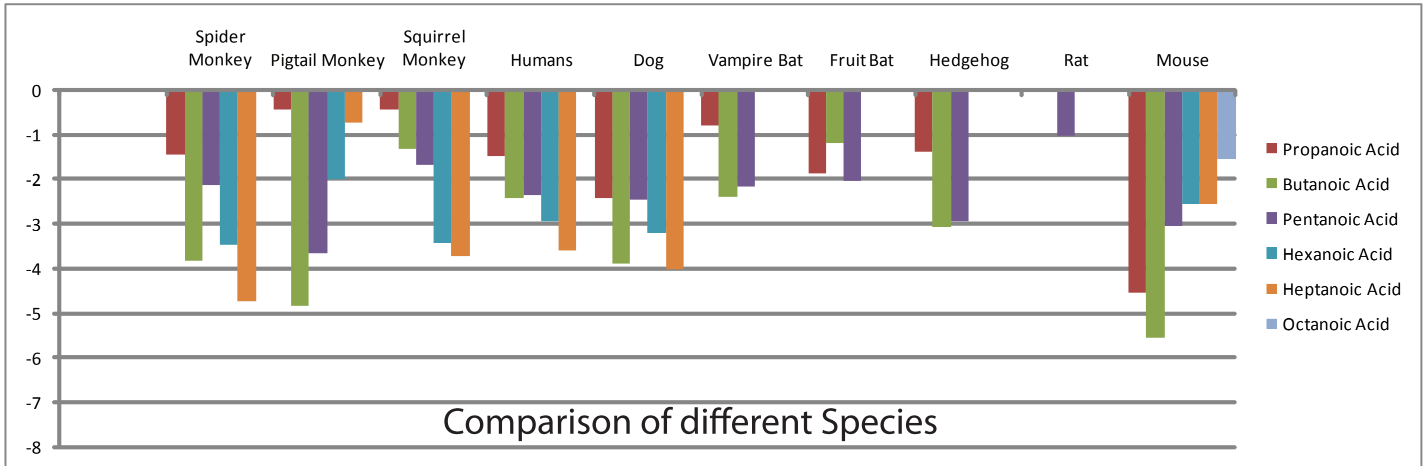
- is to determine olfactory detection thresholds in CD-1 mice for aliphatic carboxylic acids
- is to assess the impact of molecular structural features on detectability of the odorants tested
- is to compare the threshold data obtained here to those of other species tested previously

Comparison of different Carboxylic Acids



Comparison of n- vs iso- form





Conclusions

There is a U-shaped correlation between olfactory detection thresholds and carbon chain length of unbranched carboxylic acids.

Branching of the carbon backbone and the position of the methyl group attached to it has an effect on detectability.

A comparison of the present data with those obtained in other species found no clear correlation between a species' olfactory sensitivity and the size of its olfactory receptor repertoire.

Materials & Methods

Six male CD-1 mice were tested with eleven odorants: n-propanoic acid, n-butanoic acid, n-pentanoic acid, n-hexanoic acid, n-heptanoic acid, n-octanoic acid, 2-methyl propanoic acid, 3-methyl butanoic acid, 2-methyl pentanoic acid, 3-methyl pentanoic acid and 4-methyl pentanoic acid.

Mice were trained using standard operant conditioning procedures. Olfactory detection thresholds were determined using an automated olfactometer.

If you have no idea what all these technical mumbo jumbo mean

In this study, we tried to find out how good mice can detect the smell of carboxylic acids. Carboxylic acids are one of the ingridents of body odors of mice, specifically vaginal secretions.

This is important because mice are social animals that rely heavily on sense of smell, so there can be a behavioral relevance for good recognition of carboxylic acids. Data obtained here will be also beneficial for providing a base point to stimuli concentrations in electro physiological studies, which is basically "how much should we poke the brain before observing it for certain functions."

We found that the molecular structure of the carboxylic acids (the shape of the chemicals) has a systematic effect on how good mice can detect the odors.

Some animals have more genes dedicated to olfaction. Does this mean they can detect smells better?

When we compared the performance of different species for carboxylic acids, we could not find any similarity between number of genes and olfactory sensitivity.

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Olfactory sensitivity in CD-1 mice for aliphatic carboxylic acids

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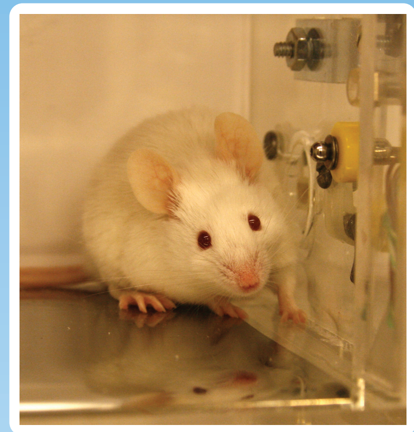

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