

Individual Olfactory Significance is associated with altered patterns of brain connectivity

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Introduction:

There is a large degree of variation in both olfactory abilities and significance of olfactory stimuli in the healthy population. In opposition to other sensory modalities, olfactory input circumvents the thalamus. A higher degree of individual olfactory significance may influence structural connectivity patterns between the olfactory cortical networks.

The present study investigates changes in the underlying brain connectivity of primary and secondary olfactory brain regions in 30 healthy individuals with low and high individual olfactory significance ratings.

Methods:

By combining diffusion data with an anatomical atlas and advanced probabilistic tractography, we analysed differences in structural brain connectivity.

Results:

We found that participants with higher ratings of olfactory significance were associated with increased intra- and inter-hemispheric structural connectivity of the primary olfactory cortex. Our results show that different subscales of olfactory significance are associated to the structural connectivity between the primary olfactory cortex and the hippocampus (consequence), parahippocampus (application and consequence) and amygdala (consequence).

Discussion:

Taken together, these results suggest that the patterns of structural connectivity between the primary olfactory cortex and key secondary olfactory regions may predict the nature of olfactory significance, hence strengthening the theory that individual differences in olfactory behaviour are encoded in the structural network fingerprint of the olfactory cortex.

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