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The aim of this fMRI study was two-fold 1) to elucidate the cerebral processing of salt and umami taste and 2)to investigate the laterality of the gustatory system. A total of 24 right handed subjects participated in this study. The salt and umami taste stimuli were presented at suprathreshold concentrations on the lateral ridges of the subjects tongue through a gustometer. The sequence was presented in a session of 6 repetitions on/off -block per stimulus and per side. The BOLD signal (blood oxygenation level dependent) was detected by means of a 1.5 T scanner. fMRI data analysis was implemented in SPM5 ($p<0.005$ cluster level= 5). The main effect of the tastants was activation in the primary and secondary gustatory cortex. However, different coordinates of the activated areas were found for the two tastants inside the same brain, suggesting a segregation of the brain areas involved with the tastants. Comparing the two stimuli we found that the positive effect of MSG on NaCl was evidently highlighted in the limbic lobe. On the contrary the positive effect of NaCl on MSG elicited activations in areas more common to taste perception. The conjunction analysis revealed common activated areas for the two tastants in the primary (SI) and secondary (SII) somatosensory cortex, premotor cortex, but also in the secondary taste areas. With regard to lateralization within the gustatory system, the BOLD contrast for the MSG stimulus was significantly bigger on the right side of the brain when the stimulus was presented to the left side as compared to the right side presentation of the stimulus. Moreover the opposite contrast for MSG highlighted only few brain areas including the left orbitofrontal cortex. The contrary appeared when the stimulus was NaCl. This result suggests a contralaterality of the brain response to the MSG stimuli but an ipsilaterality for the NaCl stimuli with a strong and general right sided lateralization of the brain for salt taste perception.

Predicting odorant perception and neural activity from odorant structure

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Using common methods for dimensionality reduction, we generated a perceptual olfactory space, a physicochemical olfactory space, and a neural olfactory space. We then uncovered rules that allowed us to predict perception and neural activity from structure alone.

Riech-O-Mat: A small and simple olfactometer for fMRI studies

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Stress-reducing effects from orange odor exposure in humans in an experimental setting

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While exposure to the essential oil of orange has demonstrated anxiolytic and sedative effects in mice and rats, evidence in humans has so far been less convincing (Toet, Smeets et al., 2010). To investigate the cause-and-effects relation between orange odor and mental stress we conducted a laboratory experiment in which, after an initial relaxation phase, stress was induced in females (N = 68) using the Trier Social Stress Task. The experimental group (n = 34) received exposure to the odor of Brazilian essential oil at low intensity, while the control group received (n = 34) exposure to room air. Subjective (feelings of stress, mood, positive and negative affect) and physiological responses (cortisol level, heart rate, skin conductance, respiratory rate) were registered during a 1.5 hour session. Results showed significant blunting of subjective reports of stress ($p = .001$) during the stress task in the orange group. This was, however, not reflected in the physiological endpoints, as group differences failed to reach statistical significance. This pattern of results supports a psychological explanation for stress-reducing effects of orange odor in humans rather than a pharmacological explanation.

Reference: Toet, A., Smeets, M.A.M., van Dijk, E., Dijkstra, D., & van den Reijen, L. (2010). Effects of Pleasant Ambient Fragrances on Dental Fear: Comparing Apples and Oranges. Chemosensory Perception, 3, 182-189.

Acknowledgements: Supported by TNO and NWO MAGW-VIDI grant 452-03-334 to M.A.M.S. Orange oil provided by Creative Flavour & Fragrances.