Olfactory detection thresholds: Are they genetically determined and hormonally modulated?

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Hormones of the hypothalamic-pituitary-adrenal axis are supposed to have neuromodulatory functions beyond those of endocrine regulation. More specifically, the hormones of the adrenal cortex, glucocorticoids and mineralocorticoids, have been shown to modulate sensory perceptual thresholds. The results obtained in studies of patients with a lack of endogenous corticoids (Morbus Addison) and the effects induced in volunteers by the intake of exogenous corticoids suggest that a lack of cortisol should lower the threshold for the perception of sensory stimuli in all modalities. It is not clear, however, whether this also holds for the effects of physiological variations in cortisol production, which are related to circadian rhythm or stress induction.

The present study tested olfactory detection thresholds following a standard laboratory stress situation. We hypothesized that the detection threshold would only rise after stress compared to baseline levels in those persons who actually secreted cortisol in response to the stress induction ("responder"). The variability of olfactory thresholds seems to be more or less genetically determined, perhaps in relation to the biological significance of the respective odorant. We therefore decided to test our hypothesis on twins, and to identify the genetic determinants of the odorants tested as well.

Thirty pairs of twins (15 monozygotic and 15 dizygotic) with a mean age of 29.5 years participated in two sessions each. In the first session the detection of three different odors (citral, isoamylacetate and androstenone) was tested in each person. Detection thresholds were measured in a three-alternative forced-choice staircase procedure. The second session tested both twins in consecutive trials at a baseline, then after stress induction (giving a speech in a spotlight while being videotaped) and at a later point in time. Only one odor was used in this session, mostly androstenone if no specific anosmia existed. At specific time intervals the blood pressure and heart rate were measured and saliva samples for cortisol determination were taken.

Olfactory thresholds for androstenone (a) and isoamylacetate (i), but not for citral, were highly correlated in monozygotic twins (correlation between twins: a 0.63; i 0.82) and to a much lesser degree in dizygotic twins. Nonresponse to the stress induction was more common than a cortisol response. A comparison of the course of olfactory detection across the second (stress) situation did not reveal any significant differences between these two response groups. We would like to interpret this lack of effect as a consequence of other strong influences on olfactory perceptual abilities, such as levels of sex steroids or smoking habits, which overlap with the potential glucocorticoid effects.

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Psychometric versus electrodermal findings in ulcer patients - indication of alexithymia?

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To study the processing of emotionally distressing stimuli in somato-psychosomatic patients 12 patients suffering from ulcer and 24 psychoneurotic patients were compared with 15 healthy controls. Subjects were exposed to cognitive and emotional distress while electrodermal activity (EDA) was registered. Alexithymic features were documented by TAS in somato-psychosomatic and psychoneurotic patients. In contrast to the neurotic patients, the ulcer patients did not differ markedly from the controls in the GT-S and the FPI-R. Concerning EDA no differences were found between ulcer patients and healthy controls under cognitive distress. In any case a significant autonomous arousal was registered. However, only healthy controls and neurotic patients but not the ulcer patients produced a significant increase of EDA as expression of the autonomic activation during presentation of emotionally inductive stimuli. The altered psychophysiological reactivity found in somato-psychosomatic patients in contrast to healthy controls was thus ascertainable specifically for the processing of emotionally qualified stimuli. The findings are discussed with reference to neuro-physiological models and the exception of alexithymia.

Text processing and the Bereitschaftspotential in situation

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The purpose of this study was to investigate whether the Bereitschaftspotential can be applied as an index of mental work situation. Variations of awareness were evaluated during a four-hour task during a particular time schedule (4 working periods of 50 min, interrupted by 10-min breaks). In this study subjects (19 healthy volunteers) between 22 to 36 years were asked to complete a text for missspelled words with the program WordPerfect. They were asked to check for marked words in the text page. In case the marked word was placed by words presented on the text page. In case the marked word was replaced (misspelled word), subjects were asked to check for a left-hand key, otherwise (corrected word) a right-hand key. These key pressers for BP analysis. Analysis was performed separately for the 4 subsequent working periods during analyzing the influence of the 10-min work period was additionally broken into parts of 25 min.

BPs (Fz, Cz, Pz, C3, C4,C3, F3) could be detected at all electrodes pronounced at Cz. For lateral electrodes an almost bilateral symmetric distribution was found for P3, P4, a shift was observed over the right hemisphere independent of whether the decision with the left hand was indicated their decision with the right hand finger (incorrect electrode positions the well-known preponderance of negativity at the frontal part of 25 min.

Furthermore, time-dependent effects were revealed for frontal and parietal electrode positions which indicated that working (10-min breaks) influence BP negativity of the frontal BP was significant in the first part of each work period after work interruption) than in the control situation. For parietal electrode positions no significant effect could be detected: BP amplitude