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

G. Fehm-Wolfsdorf, B. Pause, S. Ehlert, & R. Ferstl
Institute of Psychology,
Christian-Albrechts-University, Kiel, Germany

Hormones of the hypothalamo-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 spot-light 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?

M. Franz¹, B. Croissant², & W. Krafft²
¹Clinical Institute of Psychosomatic Medicine and Psychotherapy, Heinrich-Heine-University, Düsseldorf, ²Central Institute for Mental Health, Mannheim, Germany

To study the processing of emotionally distressing stimuli in somato-psychosomatic patients 12 patients suffering from ulcer and 24 psychoneurotic patients were compared with 18 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-