POSTER

Central nervous processing of chemosensory anxiety signals in humans.

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Socially relevant emotions like anxiety are chemosensorily communicated in many vertebrates. In humans, it has been shown that the startle reflex amplitude is increased in the context of chemosensory anxiety signals, indicating that those signals may pre-attentively prime defensive behavior. Moreover, chemosensory anxiety signals are able to reduce positive emotional priming of facial affect perception, indicating that chemosensory signals have a processing advantage in socially relevant ambiguous perceptual conditions.

The current study investigates whether chemical substances taken from subjects experiencing a situation of high state anxiety elicit different central nervous processing patterns than chemical substances taken during an equally arousing, but emotionally neutral situation. Using cotton pads, axillary sweat was collected from a sample of 49 (28 male) participants both over the course of one hour before an important oral examination at the university (anxiety condition) as well as during ergometer training (control condition). The EEG of 28 (16 male) participants low in social anxiety and 16 (8 male) participants high in social anxiety was recorded from 60 scalp locations. Using a constant-flow olfactometer, the chemosensory stimuli were presented during an oddball paradigm and chemosensory event-related potentials (CSERPs) in response to standard stimuli were analyzed.

Female subjects low in social anxiety showed larger P3 amplitudes when processing chemosensory anxiety signals than when processing control stimuli ($p = 0.019$). In subjects high in social anxiety, the N1 component exhibited a shorter latency in response to anxiety stimuli as compared to control stimuli ($p = 0.007$). This effect was especially pronounced in male subjects ($p = 0.021$). Additionally, female subjects high in social anxiety showed larger amplitudes of the N1 component above posterior scalp regions when processing chemosensory anxiety stimuli compared to control stimuli ($p = 0.009$).

Results indicate that chemosensory anxiety signals may have a higher subjective significance value as compared to control stimuli in subjects low in social anxiety (P3 effect). In subjects high in social anxiety, chemosensory anxiety signals have a processing advantage on an early, pre-attentive level of stimulus-encoding (N1 effects). Taken together, these results suggest that the level of social anxiety as well as sex effects influence the central nervous processing of human chemosensory anxiety signals.

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