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NEURODEVELOPMENTAL DISORDERS

Misreading social smells

Growing evidence suggests that humans, like other mammals, use chemosensory signals to aid social communication. In a study published in *Nature Neuroscience*, Endevelt-Shapira *et al.* provide evidence of alterations in the brain's interpretation of such cues in individuals with autism spectrum disorder (ASD), which may be linked to the social impairments associated with this disorder.

A characteristic feature of ASD is a reduced capacity to correctly 'read' and appropriately respond to emotional cues. One such cue is provided by body odour: studies have shown that both autonomic responses and behaviour can be affected by the subliminal detection of chemosensory cues in the body odour of someone experiencing fear. The authors here exposed a group of male participants with ASD and a group of male control participants to subliminal levels of the odour of 'fear sweat', collected from male skydivers immediately after a dive, or 'control sweat', collected from non-diving individuals. Control individuals demonstrated an increase in electrodermal activity (EDA, an indicator of autonomic arousal) when exposed to the fear odour, but this effect was absent in individuals with ASD. However, individuals with ASD correctly distinguished between and identified the odours when they were presented at levels high enough to elicit conscious perception.

These findings suggest that although fear-related chemosensory signals are detected by individuals with ASD, their subliminal influence differs from that observed in individuals without ASD. To determine how this might affect social behaviour, the authors set up a spatial target detection task in which participants used a cursor to indicate the position of a visually presented target. In each trial, the participants were first provided with a spoken hint about the location of the upcoming target by one of two lifelike manikins, each of which emitted subliminal levels of a fear-related or control odour. The subsequent time taken to click on a target provided a measure of the degree of trust in the manikin, because trust enables the participant to begin to move the cursor before the target is presented. The authors found that control participants exhibited greater trust in the control manikin, whereas participants with ASD exhibited increased trust in the manikin emitting a fear-related odour.

Sweat contains a large number of potential odorants and we currently know little about the specific molecules that convey emotional information in humans. The authors next investigated the influence of exposure to subliminal levels of two putative chemosensory signals, androstadienone and hexadecanal, that are proposed to have opposing effects on arousal. Similar to fear sweat, the two signals had differing effects on individuals with ASD and controls. Androstadienone increased autonomic arousal in controls, but decreased arousal in individuals with ASD. Hexadecanal reduced arousal in controls, but had no effect in individuals with ASD.

These findings boost our understanding of the ways in which subliminal chemosensory signals are processed and influence behaviour and show that these may be dysregulated in males with ASD. The underlying differences in the chemosensory system that may drive these effects, and whether similar effects are observed in females with ASD, remain to be determined.

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