Neural mechanisms of social cognition in zebrafish

ABSTRACT:

The recognition of living organisms in the environment is an elementary social cognitive ability, critical for survival. It is well known that the human visual system can detect the presence of an individual when looking at dozen of point lights placed on the main joints of a walking person. This early evidence has stimulated researchers over the years to investigate the perceptual mechanisms underlying biological motion detection. Even simple visual displays (e.g. moving geometric shapes) can originate high-level percepts of animacy, and this ability is conserved across species (e.g. chicken, medaka fish) and critical for filial attachment, detection of predators, and perception of social dominance.
We aimed to explore the mechanisms and neuromodulators that regulate biological motion perception.
We used zebrafish (*Danio rerio*) as a model organism since, like humans, they rely on sensory cues, mainly visual cues, to recognize their conspecifics, in order to approach and interact with them. We used a video playback system to allow zebrafish to choose between different visual stimuli, differing in biological motion, conspecific shape or both, and quantified the time fish spent close to each stimulus as a measure of preference. Furthermore, we have used a zebrafish mutant line that exhibits oxytocin signalling impairment, to assess whether oxytocin contributes to the perception of these visual cues.
Our results demonstrated that both conspecific form and biological motion cues, either alone or together, promoted social attraction in zebrafish. Furthermore, we demonstrated an involvement of oxytocin in regulating biological motion detection.
In conclusion, our results suggest that oxytocin plays a role in basic perceptual mechanisms underlying the recognition of conspecifics.

Keywords

Oxytocin, Perception, Biological motion, Social cognition

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