Institutionen för Klinisk Neurovetenskap

Neural Mechanisms of Emotional Regulation and Decision Making

AKADEMISK AVHANDLING
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ABSTRACT

Emotions influence our perception and decision making. It is of great importance to understand the neurophysiology behind these processes as they influence human core functions. Moreover, knowledge within this field is required in order to develop new medical therapies for pathological conditions that involve dysregulation of emotions.

In this thesis the neural mechanisms of emotional regulation and decision making were investigated using different pharmacological manipulations and brain imaging. In Study I, we examined whether a CCK$_{3}$-receptor and a mu-opioid receptor agonist could modulate emotional perception of visual stimuli in opposite directions. In Study II and III, we examined if amygdala, a subcortical structure involved in emotional coding, was involved in social punishment and neural processing of unfairness. The participants played an economic game that examined their proneness to hand out social punishment and their processing of unfairness. Prior to the game, participants had been treated with either an active drug (oxazepam or madopark) or placebo. With this intervention we could manipulate the participants’ behavior and brain activity. Lastly, in Study IV we investigated neural mechanisms of hypothetical bias; that is, the difference between a real decision versus a hypothetical decision.

In summary we found, in Study I, that the CCK-opioid system can modulate emotional visual perception in opposite directions. In Study II we demonstrate that amygdala is involved in social punishment and neural processing of unfairness. The degree to which participants gave out social punishment was suppressed with oxazepam without affecting the participants’ perception of unfairness. In Study III we noted that madopark increased amygdala activity in response to unfairness without detectable changes in behavior. In Study IV, we showed that real decisions, in comparison to hypothetical decisions, involve amygdala processing and amygdala activity co-varies positively with the real cost for the participants.

In conclusion, this thesis demonstrates that specific neuromodulatory systems participate in emotional regulation and decision making. Our findings also prompt an ethical discussion as we show that a commonly used drug influences core functions in the human brain that underlie individual autonomy and decision making.

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