Scientists shed new light on neural processes behind our desire for revenge

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Credit: George Hodan/public domain

New insight on the neural processes that drive a desire for revenge during conflict between groups has been published today in the open-access journal *eLife*.

The study suggests that the 'love hormone' oxytocin is increased during conflict between groups and influences the medial prefrontal cortex, the

section of the brain associated with our decision-making activity. This leads to a greater feeling of love and empathy among a group and the desire to seek revenge when attacked by an outside group. The findings may help explain how a process called 'conflict contagion' can occur, where a conflict that starts between a few individuals ends up spreading among entire groups.

"The desire to seek revenge for an attack during conflict is universal among humans, but the neurobiological processes that drive it are still unclear," says lead author Xiaochun Han, Doctor of Psychology and Neuroscience at the School of Psychological and Cognitive Sciences, PKU-IDG/McGovern Institute for Brain Research, Peking University, China. "Building upon previous studies, we suggest there may be a neurobiological mechanism that links pain within a group, known as the 'ingroup', caused by an outside group, or 'outgroup', with the tendency to seek revenge upon the outgroup."

To explore this possible mechanism further, the team developed a new neural-behavioural experiment that simulates real-life revenge during conflict between groups. As oxytocin is known to play a role in empathy within a group and in regulating intergroup conflict, they wanted to examine the oxytocin and neural responses to ingroup suffering caused by an outgroup, and to see how these responses predicted a desire for revenge.

For the experiment, participants watched an ingroup and an outgroup member receive an electric shock that was caused either mutually (for the 'revenge' group) or respectively by a computer (for the 'control' group). The team then combined a brain imaging technique called functional magnetic resonance imaging with measurements of oxytocin levels in the members of both groups.

They found that the conflict encountered by the revenge group was

associated with an increased level of oxytocin compared to the control group. Additionally, they saw that these increased levels of oxytocin predicted the medial prefrontal activity associated with ingroup pain. This activity in turn predicted the desire to seek revenge upon the outgroup, regardless of whether some of the individuals were directly involved in the conflict.

"Our experiment allowed us to investigate how harm to an ingroup member caused by an outgroup member inspires an uninvolved ingroup member to seek revenge," explains senior author Shihui Han, Professor at the Department of Psychology and Principle Investigator at PKU-IDG/McGovern Institute for Brain Research, Peking University. "The results highlight an important neurobiological process underpinning the desire for revenge, which may be implicated in conflict contagion during conflict among groups."

Han adds that there are various motivations for seeking revenge within a group, such as feeling threatened, feeling empathy towards a harmed group member, and feeling pressure to avenge the individual or group as a whole. "Further studies will be needed to examine these motivations and associated emotions if we are to fully understand the processes that can drive humans to seek revenge," he concludes.

More information: Xiaochun Han et al, A neurobiological association of revenge propensity during intergroup conflict, *eLife* (2020). DOI: 10.7554/eLife.52014

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