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Testosterone does not induce aggression

New scientific evidence refutes the preconception that testosterone causes aggressive, egocentric, and risky behavior. A study at the Universities of Zurich and Royal Holloway London with more than 120 experimental subjects has shown that the sexual hormone with the poor reputation can encourage fair behaviors if this serves to ensure one's own status.

Popular scientific literature, art, and the media have been attributing the roll of aggression to the arguably best known sexual hormone for decades. Research appeared to confirm this – the castration of male rodents evidently led to a reduction in combativeness among the animals. The prejudice thus grew over decades that testosterone causes aggressive, risky, and egocentric behavior. The inference from these experiments with animals that testosterone produces the same effects in humans has proven to be false, however, as a combined study by neuroscientist Christoph Eisenegger and economist Ernst Fehr, both of the University of Zurich, and economist Michael Naef of Royal Holloway in London demonstrates. “We wanted to verify how the hormone affects social behavior,” Dr. Christoph Eisenegger explains, adding, “we were interested in the question: what is truth, and what is myth?”

For the study, published in the renowned journal *Nature*, some 120 test subjects took part in a behavioral experiment where the distribution of a real amount of money was decided. The rules allowed both fair and unfair offers. The negotiating partner could subsequently accept or decline the offer. The fairer the offer, the less probable a refusal by the negotiating partner. If no agreement was reached, neither party earned anything.

Before the game the test subjects were administered either a dose of 0.5 mg testosterone or a corresponding placebo. “If one were to believe the common opinion, we would expect subjects who received testosterone to adopt aggressive, egocentric, and risky strategies – regardless of the possibly negative consequences on the negotiation process,” Eisenegger elucidates.

Fairer with testosterone

The study's results, however, contradict this view sharply. Test subjects with an artificially enhanced testosterone level generally made better, fairer offers than those who received placebos, thus reducing the risk of a rejection of their offer to a minimum. “The preconception that



testosterone only causes aggressive or egoistic behavior in humans is thus clearly refuted,” sums up Eisenegger. Instead, the findings suggest that the hormone increases the sensitivity for status. For animal species with relatively simple social systems, an increased awareness for status may express itself in aggressiveness. “In the socially complex human environment, pro-social behavior secures status, and not aggression,” surmises study co-author Michael Naef from Royal Holloway London. “The interplay between testosterone and the socially differentiated environment of humans, and not testosterone itself, probably causes fair or aggressive behavior”.

Moreover the study shows that the popular wisdom that the hormone causes aggression is apparently deeply entrenched: those test subjects who believed they had received the testosterone compound and not the placebo stood out with their conspicuously unfair offers. It is possible that these persons exploited the popular wisdom to legitimate their unfair actions. Economist Michael Naef states: “It appears that it is not testosterone itself that induces aggressiveness, but rather the myth surrounding the hormone. In a society where qualities and manners of behavior are increasingly traced to biological causes and thereby partly legitimated, this should make us sit up and take notice.” The study clearly demonstrates the influence of both social as well as biological factors on human behavior.

Original article:

Christoph Eisenegger, Michael Naef, Romana Snozzi, Markus Heinrichs, Ernst Fehr: Prejudice and truth about the effect of testosterone on human bargaining behaviour, *Nature*, doi:10.1038/nature08711

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