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Corticosteroids curiously change current and coming conflicts

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A crucial question in aggression research is why sudden stressors readily precipitate violence. An equally important question is why stressful conflicts have long-lasting effects on future violent behavior. There are several reasons to suspect that stress hormones from the adrenal cortex are involved in both effects. First of all, adrenocortical stress hormones, the glucocorticoids, such as cortisol in humans and corticosterone in rodents, rise rapidly and early in anticipation of social conflict. Secondly, this early adrenocortical response is somehow disturbed in many patients with an inadequate style of conflict resolution. Thirdly, we showed that the adrenocortical stress response rapidly facilitates aggression within the timeframe of a single conflict. Finally corticosteroid receptors are transcription factors that regulate gene expression in the brain. They are therefore capable to produce lasting effects on aggressiveness by changing gene expression in the central controlling mechanism. Interestingly, failure to generate an adrenocortical stress response produces responses maladjusted to social conflict.

We demonstrated a rapid and positive mutual feedback between a brain mechanism controlling aggression and a brain mechanism controlling the adrenocortical stress response demonstrated. Our data show that the adrenocortical stress response modulates aggressive behavior by tipping the balance between fight and flight towards aggression. In addition, we show that corticosteroids produced during a first serious conflict cause a long lasting increase in the propensity for violence in subsequent conflicts. Blocking a corticosteroid receptor in the brain, just once, and only during the very first conflict, permanently prevented this long lasting facilitation. Also, taking out the adrenal and thereby abolishing the adrenocortical stress response, produced a major, lasting decrease in the sensitivity of the aggression controlling mechanism in the brain of animals that were initially naive to serious conflict.

Apparently an adrenocortical stress response during the first serious conflict is essential to the development of the full aggressive potential of an individual. We propose that corticosteroid-induced changes in gene expression in the aggression-controlling system in the brain, prepare the individual for future conflicts. These findings suggest a mechanism explaining why early violent conflict under stressful conditions is such a potent predictor for future antisocial behavior and aggression in humans.