

Neurobiological Factors in Aggressive Juveniles (EFCAP)

The Role of Serotonin in Aggressive Behaviour

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Decreased central nervous system activity by the neurotransmitter serotonin plays a significant role in the etiology of impulsive and aggressive behaviour. Several approaches have been developed for non-invasive study of CNS serotonergic activity.

In study 1, we used rapid tryptophan depletion (RTD) to decrease central serotonergic activity in 12 healthy volunteers (6 males, 6 females, 24-31 years). The tryptophan-free amino acid mixture caused a marked depletion of plasma tryptophan, with lowest levels occurring between 3 to 5 hours after mixture application. Maximum changes in mood occurred about 10 hours after RTD, but only in three women with higher levels of aggressive traits, who scored significantly higher in arousal, anger and depressed mood. By contrast, low-aggressive women and men with varying levels of aggression did not show any effect from RTD. Our results are in line with data from previous studies.

Study 2, we investigated serotonergic activity in the platelets of 9-14 year old children, which are accepted as a model for the serotonin nerve terminal. Maximum numbers of platelet tritiated paroxetine binding sites (Bmax) and affinity (1/Kd), as well as 5HT transporter promoter polymorphisms, were measured in 15 aggressive and 15 control subjects. Data collection has been successfully completed and statistical analyses will be presented.

Neurobiological Factors in Aggressive and Antisocial Juveniles

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Objectives: In this longitudinal study various biological markers are being studied, to observe biological characteristics of antisocial and aggressive behaviour in juveniles.

Methods: A total of 300 male 12-13 year old first offenders, who participate in a diversion-project, and 50 controls will be included in the study. Demographic, psychological and psychiatric data will be obtained from the boys, parents and teachers by standard questionnaires and interviews. During one test session the boys will perform a perseverance task, a passive avoidance task, as well as a frustration task. During this session heart rate and skin conductance are registered. Spread over the day and during the session cortisol and testosterone will be sampled from saliva. Developmental characteristics will be studied again after 2 years, especially focusing on aggressive, antisocial behaviour and recidivism.

Results: The initial results of the pilot study will be presented. It is hypothesized that the most aggressive boys and the recidivistic boys will have, for example, lower resting heart rates, lower skin conductance levels, lower resting cortisol levels, less increase (or even decrease) of cortisol due to stress, and higher testosterone.

Salivary Cortisol and Aggression in a Population Based Sample of Early Adolescent Males

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Objective: Studies of the relationship between antisocial behaviour and cortisol levels in children and adolescents have led to conflicting results. We examined the association of various measures of antisocial behaviour with cortisol levels in a population-based sample of 13 year old males.

Methods: Saliva cortisol was collected in 194 boys, and behavioural data on aggression were obtained from various informants: the boys themselves, their mothers, teachers and same-aged, but unfamiliar, peers.

Results: Generally, boys who showed higher levels of aggression had also higher levels of cortisol than non- or low-aggression boys. Moreover, boys with high levels of reactive aggression had higher levels of cortisol.

Conclusions: Contrary to findings from clinical samples, these results suggest a positive relationship between high physical aggression and high cortisol levels in a population-based sample of early adolescent boys.

Biological Determinants of Reactive and Proactive Aggression in Children

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An important issue that has been neglected in research on childhood aggression is the distinction between two major forms of aggression. Aggression in animals and adult psychiatric patients has been distinguished into an offensive, non-impulsive form which is associated with a low level of physiological arousal, and a defensive, impulsive form which is associated with high physiological arousal i.e. cortisol, heartbeat, skin conductance. Child psychologists have made a related distinction, i.e. between pro-active (offensive) aggression, which is associated with positive evaluations of the likely consequences of aggressive behaviour, and reactive aggression, which is associated with attributing hostile intentions to others.

In the present study, the behaviour of dyads consisting of an aggressive child playing with a normal peer, will be compared with dyads of a normal control child and the same normal peer as in the first dyad. Escalation and neutralization of incipient conflicts will be investigated in relation to physiological and psychological measures.

Data will be presented on cortisol measures, basal heartbeat and skin conductance measures and their relation to the two types of aggression. Hypothesis (a) is that proactive aggression is related to low levels of physiological arousal. Hypothesis (b) is that reactive aggression is related to high levels of physiological arousal.