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Endocrine processes underlying victory and defeat in the male rat

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CHAPTER VI GENERAL DISCUSSION

The central questions of the present study were:

1. does base line hormonal state determine agonistic behavior in male-male encounters?
2. does agonistic behavior affect hormonal state?

Such an interrelationship between agonistic behavior and hormonal processes might serve as a regulatory system for behavior, in which hormonal changes due to agonistic experiences mediate behavioral changes after these experiences. The above questions were asked in relation to gonadal and adrenal hormones.

With respect to the first aspect of the proposed hormone-behavior interrelationship, the present study gives evidence that base line plasma testosterone (T) concentration is a factor that determines the amount of aggressive behavior in male-male encounters (the castration experiment in Chapter II). Further, also correlational evidence for this behavioral effect of base line T is given (Chapter III). Probably T affects only the aggressive components of agonistic behavior and not the defensive components. No evidence was obtained that base line corticosterone (C) concentration affects aggressive and/or defensive behavior.

With respect to the second question, the present study shows that a single serious defeat decreases base line plasma T concentration,

and it is thinkable that this lowered base line T contributes to the behavioral changes due to defeat (Chapter IV). On the other hand in most rats a single defeat does not lead to altered base line C concentrations. In Chapter V the hypothesis is put forward that the acute, transient C elevations during male-male encounters contribute to behavioral changes. In other words hormones might mediate the effects of agonistic encounters on behavior in different ways:

1. by a more or less chronically altered hormone base line concentration. Probably this way takes at least some hours.
2. by rapid, transient hormonal responses to agonistic encounters.

The effects of these responses on behavior may be acute.

Future experiments have to give the final answer whether these hormonal changes due to agonistic experiences indeed play a role in the realization of changes in agonistic behavior. Techniques that may prevent or exaggerate the above hormonal changes are a good tool for this (see Leshner, 1980).

Interestingly, some defeated rats regained normal levels of aggressive and defensive behavior within one week after defeat, whereas other losers did not so. Also inter-individual differences in the hormonal changes after defeat were observed. For example, part of defeated rats showed hypoglycemia during a lost combat and in some rats chronically elevated C levels were measured one week after defeat. Maybe that these and other hormonal changes due to repeated "psychological" stress might play a role in the etiology of some stress-related diseases in men and animals (see e.g. Henry and Cassel, 1969; Iams et al. 1979; Scklar and Anisman, 1979).