Spatial Ability In Androgen-Deficient Men

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Context

- Main paper is about the effect of androgens not only early in development but also during adolescence/puberty which among several things help in organization of behavior.
  - "Adolescence part of a single protracted postnatal sensitive period."
- One specific claim:

".....Sex differences in spatial cognition in humans may be organized by pubertal hormones. Evidence for this comes from a study in which spatial cognition was compared in men with idiopathic hypogonadotropic hypogonadism (IHH) that began before puberty and men with acquired IHH in adulthood.....**Spatial cognition was impared in men not exposed to pubertal steroids, both in comparison to healthy control subjects and to men with acquired IHH in adulthood."** (Talking about cognition)

Closer Look at IHH

<u>Idiopathic Hypogonadotropic Hypogonadism:</u>

- Normal 46 XY Karyotype.
- Normal masculinization in utero.
- Reared as normal boys.
- During puberty, pubescence fails to occur due to defiency in gonadotropin-releasing factor.
- No major cerebral malformations, no other hypothalamic deficiencies.

Spatial Ability Experiment/Article

Purpose: To prove that androgens exert a permanent organizing effect on the brain during adolescence. More specifically, that lack of proper androgen reception during puberty will lead to impaired spatial ability.

Experimental Method:

- Subjects: 43 male subjects; 19 Healthy, 19 with IHH and 5 with Acquired IHH.
- Men with IHH criteria: 46 XY karyotype, history of no puberty by age 18, eunuchoid habitus, normal roentgenogram of sella turcica, small testes.

Spatial Ability cont.

- Experimental Method: Psychometric testing in a single test session lasting 90 minutes.
  - 3 Tests of verbal ability and 3 tests of spatial ability.
  - If hypothesis is correct-men with IHH will differ significantly from the other two groups only in the spatial ability tasks.
- Results: There was no significant difference between the performance of the 3 groups in the verbal ability tasks, but on each of the 3 spatial ability tasks the IHH group's ability differed significantly (underperformed) that of the other two groups.
  - There was no significant difference in the results for the spatial task between the Acquired IHH group and the healthy group.
  - In the Block Design and Embedded Figure tests larger testicular size had a positive correlation with better test performance for IHH subjects.

My Thoughts

- Article is well supported and compelling but
  - The sample size is small (Especially the Acquired IHH group with only 5 instead of 19 subjects).
  - Measurement of testicular size only in IHH subjects.
  - Only one test session, what could have changed with more than one?
- However the article with its limitations does prove its hypothesis and does show that androgen levels in puberty affect organizing effects in the brain.

Significance to Target Article

- This article featured results that supported the hypothesis of the target article
  - Proved that androgen deficiency during puberty due to something like IHH would result in lack of development of certain behaviors that would otherwise be normally observed.
- However there is no talk of these tests and their results in hamsters or any other animals in the article to show a direct correlation between human and animal results.

Take Home Message

- Results show that puberty is an important postnatal sensitive period for Androgens.
- These androgens are necessary for several things such and development into adulthood, behavioral development etc.
- They also show that when androgens are not properly administered by the body during this critical period, males with this deficiency are very limited in spatial tasks and recognition.

Citations

- Hier , D.B.,Crowley Jr.,W.F., 1982. “Spatial Ability in Androgen-Deficient Men”. N. Engl. J. Med. 306, 1202-1205.
- Schulz, K.M., et al. 2009. “Back to the future: The organizational-activational hypothesis adapted to puberty and adolescence.”Horm. Behav. 55, 597-604.