

# Two Organizational Effects of Pubertal Testosterone in Male Rats: Transient Social Memory and a Shift Away from Long-Term Potentiation Following a Tetanus in Hippocampal CA1



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# Claim



“Spatial memory is hippocampus-dependent, and synaptic plasticity in the hippocampus appears to be organized by pubertal androgens. Specifically, activation of androgen receptor during puberty results in long term depression in CA1 in response to a tetanizing stimulus in adulthood, whereas if androgen receptor activation is blocked during puberty, long term potentiation occurs in response to a tetanizing stimulus in adulthood”

In other words, activation of androgen receptors during puberty hinders spatial memory learning.

# Method



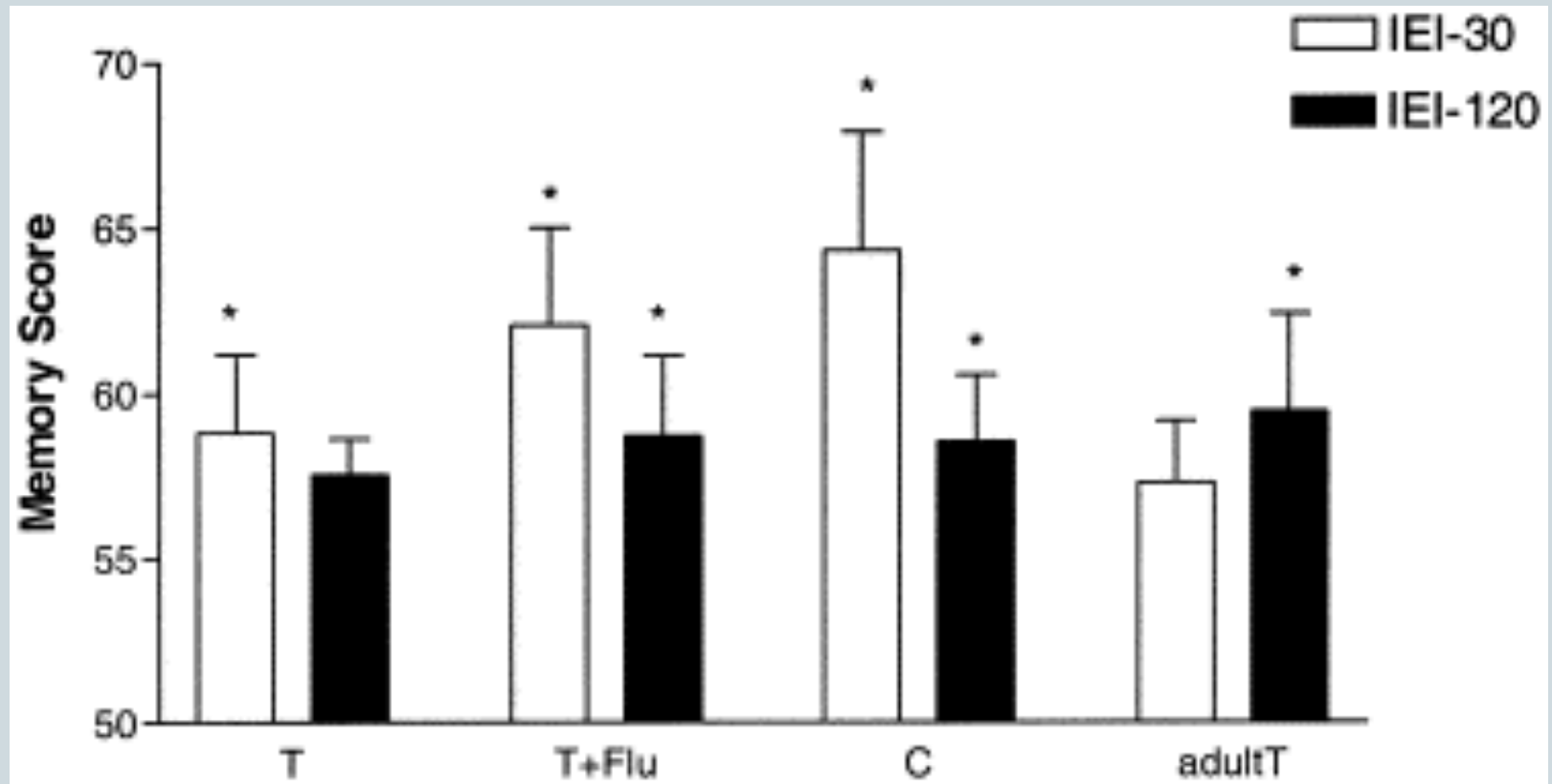
- 36 male rats in study
- All castrated at puberty, given different treatments:
  - Testosterone (Puberty)
  - Testosterone + Flutamide (Puberty)
  - No Testosterone
  - Testosterone (Adulthood)
- Animals on a 12-hour light/dark cycle, but tested during the dark phase – AKA during normal sleeping hours.

# Method

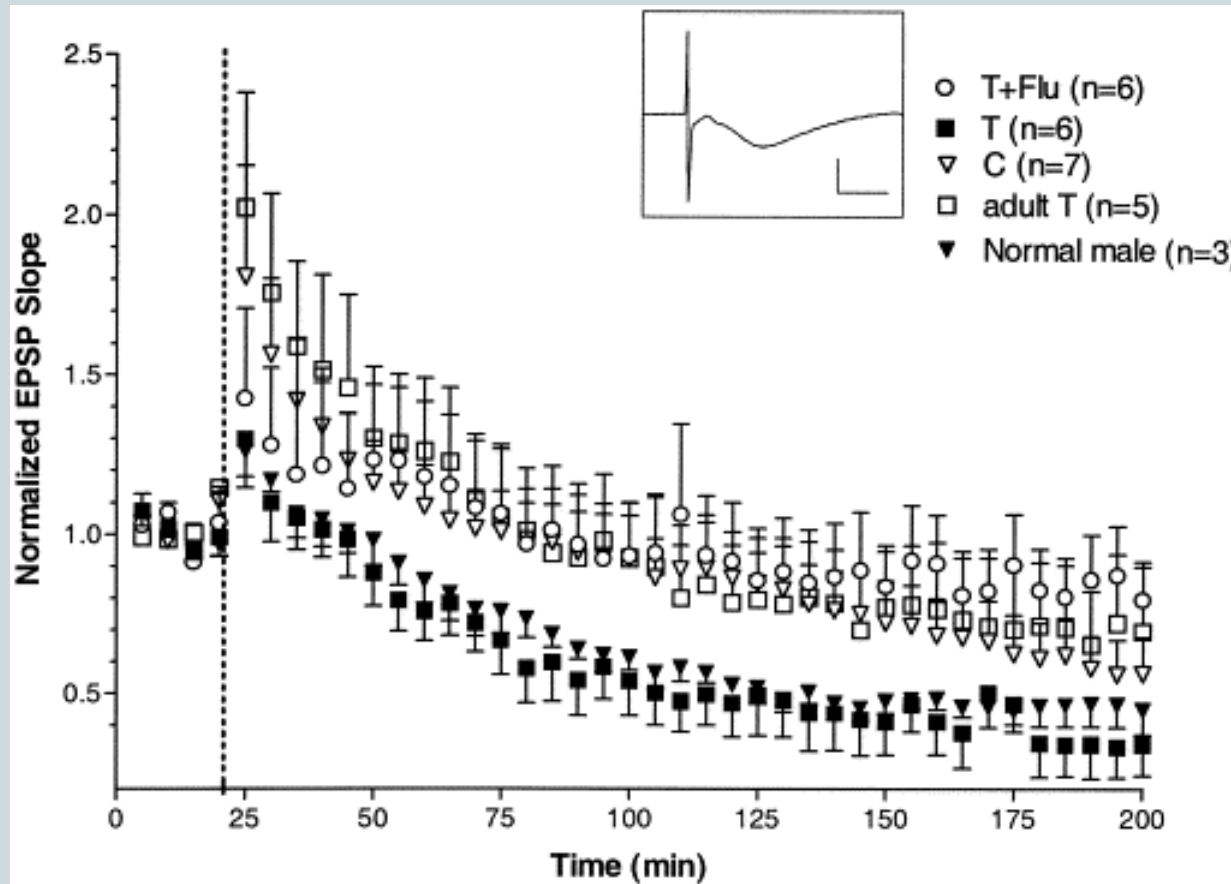


- At the end of puberty, rats were tested for social memory and long term potentiation
  - Social memory was measured using the discrimination procedure – time spent sniffing novel vs. familiar peers
    - ✦ Four groups: Testosterone during puberty, Testosterone + flutamide during puberty, castration only (no testosterone), and Testosterone during adulthood
  - LTP was measured by looking at dendrites of brain area CA1; an LTP stimulus was passed through the synapses, and stimulus strength was measured.
    - ✦ Five groups: Control (Normal Male), Testosterone during puberty, Testosterone + flutamide during puberty, castration only (no testosterone), and Testosterone during adulthood

# Results (Social Memory)



# Results (LTP)



# Implications



- Supportive of original article's claim that pubertal androgens have organizational effect on hippocampal CA1 area
- However, this experiment was conducted during the dark phase of a light/dark cycle; not representative of normal research; probably used to better show contrast between LTD with androgen receptor activation and LTP without.
  - Is, however, strong evidence of synaptic plasticity during puberty playing a major role in development of spatial memory.

# Similar Articles



- **Bluthe & Dantzer, 1992**
  - Adult castrated rats show good social memory at 120-minute delays – basis of social memory study
- **Harley et al., 2000**
  - Exposure to pubertal androgens causes a weaker, earlier LTP while depriving pubertal androgens from rats causes a delayed but larger LTP – done during light phase.