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Week 10 – Social behaviors and sociability. Sexual behaviors.

1) Which experimental approaches can be used to prove that social interactions are appetitive and social isolation is aversive? Describe a circuit mechanism of how oxytocin contributes to positive valence of social contacts in mice.

2) Explain the genetic/molecular mechanisms underlying sexual dimorphism of neural circuits. Provide examples of sexually dimorphic brain nuclei and note how they differ between males and females.

3) Describe the differences between vomeronasal and main olfactory systems including details of anatomy, of molecular signal transduction pathways and neuronal connectivity within the brain.

4) What are the roles of the vomeronasal and main olfactory systems in conducting sexual behaviors? Provide examples of possible experiments used to show these roles and corresponding experimental outcomes.

5) Briefly describe a neural pathway underlying sexual behavior (receptiveness) in female mice. Which cell types mainly play role in this pathway - inhibitory or excitatory?

6) Name several brain nuclei that are directly involved in mediating sexual behaviors in male mice. Which of these nuclei are known to be sexually dimorphic?

7) How does behavior of a male mouse differ in response to a presentation of female versus male conspecific? Which hypothalamic nucleus upon its activation was shown to select for a sexual behavioral pattern? How does it happen mechanistically at the circuit level?

8) Read and discuss the following paper:

Ferrero, D.M., Moeller, L.M., Osakada, T., Horio, N., Li, Q., Roy, D.S., Cichy, A., Spehr, M., Touhara, K., Liberles, S.D., 2013. A juvenile mouse pheromone inhibits sexual behaviour through the vomeronasal system. *Nature* 502, 368–71. https://doi.org/10.1038/nature12579; https://www.nature.com/articles/nature12579