

NAME(S): \_\_\_\_\_

## **PSYC4481: RESEARCH PRACTICUM IN BEHAVIORAL NEUROSCIENCE**

### **In-Class Activity: Psychopharmacological Manipulations**

You have a hypothesis that a newly discovered neurotransmitter called PSYC4481 is important for operant reward learning and motivation. You want to use a behavioral paradigm where rats are placed into conditioning chambers and press a lever to receive food pellets. Food pellets are rewarded on a progressive ratio; as the experiment progresses rats must push the lever an increasing number of times to receive a food pellet. You are interested in the “breakpoint”; the point where rats will give up and stop trying to obtain the reward. A higher breakpoint is interpreted as increased motivation for the reward.

Here is what is known about PSYC4481:

- Cell bodies are localized to the tegmentum. The three strongest projections are to the: basolateral amygdala (BLA), ventral hippocampus (vHipp), and nucleus accumbens (ACB).
- PSYC4481 has 3 known receptors:
  - PSYC4481R1: Located on postsynaptic membranes in the forebrain & throughout the periphery.
  - PSYC4481R2: Located on both pre- and post-synaptic membranes in forebrain.
  - PSYC4481R3: Located on presynaptic membranes in the tegmentum (i.e. dendrites).
- The precursor of PSYC4481 is PSYC2285; this conversion process relies on the enzyme OGREN.

**Part A:** Draw a schematic illustrating what’s known about the circuitry of the PSYC4481 system (e.g. source, targets, receptor locations).

**Part B:** You and your research partner(s) have decided that a series of experiments using psychopharmacological manipulations will be the best way to start elucidating the role of PSYC4481 in motivational reward learning. You and your research partner(s) are also superior biochemists, and possess the ability to synthesize any drug you can imagine. To be thorough you decide to plan out 5 different experiments. Each experimental description must include:

1. Route of administration
2. Site and mechanism of action
3. Hypothesized result
4. Why did you choose this experiment/what conclusion you can now make about PS481 action/function?

Exp1: Oral administration of a PSYC4481R direct antagonist decreases breakpoint. Stimulation of PS481R must be important for motivation.

Exp2: ICV administration of PSYC4481R direct antagonist has no effect on breakpoint. Stimulation of PS481R in periphery must be important for motivation, while release of PS481 onto postsynaptic cells in the forebrain is not.