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Neuro 430

Do Not Let Cocaine Tie You Down!

Purpose: To demonstrate the effects of cocaine on dopamine transmission within the brain using a simple two-neuron (pre and post synaptic) system.

Materials: Tennis balls (one per group), coffee cans (one per group), string or thin rope (two long pieces per group), pens, paper, timer, sickness coupons, candy.

Procedure: Our modeling demonstration will consist of a pre-game discussion, a game, and a wrap-up discussion. We will use the pre-game discussion to familiarize the kids with the concept of dopamine fostered nerve-communication in the brain. We will use posters with cartoon diagrams to clarify the main points of the discussion, and will make it interactive and short to hold attention.

For the game portion, we will divide the kids into groups of three. Kid 1 will be the pre-synaptic cell, kid 2 will be the post-synaptic cell, and kid 3 will be the score keeper (each kid will wear a sign stating his/her position). Each game will consist of two runs, the first illustrating normal dopamine transmission and the second, dopamine transmission in the presence of cocaine. Each run will last 1.5 minutes and will be timed by a neuroscience student.

In the first run, kid 1 will throw the ball labeled “Dopamine” (using his/her dominant hand) to kid 2, who will catch it in the coffee can. Kid 2 will then dump the ball out of the can, and kid 1 will retrieve it (using his/her non-dominant hand) and return to the starting position to throw again. Kid 3 will keep track of the number of successful transmissions, and, for each one, each member of the group will get candy.

The second run will proceed exactly as the first, except that the retrieving hand of kid 1 will be bound to his/her side with string (e.g. inhibited by cocaine) so that the dopamine transport process will be significantly slowed. For each transmission UNDER that of the first run, the kids will receive coupons for negative physiological consequences of cocaine use (e.g. headache, vomiting, etc.)

After the game, we will close with a discussion to compare the first and second runs, and help the kids form conclusions about how cocaine affects brain function and, in turn, what it does to other (more observable) bodily functions. In addition, we will explain the consequences of long term cocaine use.

Issues: For the sake of comprehension, the detailed cellular processes of neurotransmitter release and reuptake, and the fact that neurotransmitter release involves more than one molecule of neurotransmitter, will be ignored. In addition, the alternative modes of neurotransmitter reuptake will not be addressed.