

THE GENETICS OF LEARNING AND MEMORY

Build Your Own Biotech

You have formed a new biotech company, and your first goal is to develop a product that enhances memory. You know that scientists have discovered a lot about what happens inside cells when memories are made and you have a feeling that you can use this information to develop a new product.

Assemble an R & D (Research and Development) team of at least 3 people to plan the work.

1. Your first task is to review what is already known about the genes, molecules and nerve cells involved in memory. Consult scientific references, class notes and the material located in this unit to gather information. You may want to divide the task among the members of your R & D team, and then combine your knowledge to answer key questions and discuss your ideas for enhancing memory.

Make sure you find out:

- A general scheme for how nerve impulses are sent
 - The molecular differences between long-term and short-term memory
 - Scientific evidence that supports this information
 - How mutants have been used to study learning and memory
2. Answer the following questions, to help guide you through the R & D process.
 1. Describe the general role of neurotransmitters in transmitting a nerve impulse. Include a description of a synapse.
 2. What is the molecular difference between long-term and short-term memory?
 3. What is CREB? What does it do?
 4. Is CREB the only protein important for memory?
 5. What happens when an event is repeated at intervals over a period of time?
 6. How do the studies of molecular events and mutants relate to the studies of learning behavior in fruit flies?
 7. What effect would increasing the amount of a protein or activating a protein have on memory? Would it effect both long-term and short-term memory?
 8. Are the molecules involved in memory different in all animals?
 3. Describe your plan for enhancing memory. Make sure that you describe the molecules or cells that you plan to use. Most importantly, be sure to explain how you think modification of these will enhance memory. If other scientists have found similar ways to enhance memory, make sure you describe them.