NATIONAL CENTER FOR CASE STUDY TEACHING IN SCIENCE

The Frozen Addicts: Gene-Environment Interactions in Parkinson's Disease

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Day 1

Watch *The Case of the Frozen Addict*, a video produced by PBS NOVA (1986) at:
<**http://openvault.wgbh.org/catalog/V_474CF2C8A20B4173988486AC4C605A3C**>

As you watch the video, take notes on relevant terms and concepts. Use a table like the following "Know/Don't Know/Questions" chart to help you organize your notes. Return to this chart and add to it each time the video is paused.

Know	*Don't Know*	*Questions*

First Pause (~5:52 in Video)

1. Define the problem.

2. Describe the symptoms of Parkinson's disease.

3. How are the symptoms of this type of movement disorder similar or different to the types of problems with movement you've learned about before?

4. Draw a simple diagram or flow chart detailing what you know about the "motor system" from a neuroscience perspective; perhaps focus on "voluntary" movement.

Second Pause (~15:09 in Video)

5. What is L-DOPA and how does it relate to dopamine (DA)?

6. Would taking a pill of L-DOPA increase DA in the substantia nigra (SN) specifically or everywhere in the body? What could be the side effects of such a treatment?

Third Pause (~3:30 in Video)

7. What can you add to your Know/Don't Know/Questions chart about MPTP, L-DOPA side effects, genetic and environmental influences on Parkinson's disease?

Fourth Pause (End of Video)

8. Review your chart and consider your questions and ideas for discussion. What are you curious about?

Homework

1. Check out the active ingredients in pesticides and herbicides you could buy for your home garden or lawn. You may call your parents and ask them to read you the active ingredients in the pesticides or herbicides at your house. What have you been exposed to? Find at least three different products and at least three different active ingredients. Try to find at least one product that is "all natural" or "organic," and be sure to identify the active ingredient in each.

2. Watch *My Father, My Brother, and Me* from PBS Frontline at <**http://www.pbs.org/video/1082086931/**>. In addition to what we learned from a video produced in 1986, we now know PD certainly has genetic factors as well. Check out the sources on the Frontline website when you pull up this video. Bring at least three comments or questions about the video to next class.

Day 2

1. Recall the major discussion points from last class. Recreate your simplified figure of voluntary motor systems.

2. Share the list of pesticide exposures that you compiled for homework. What active ingredients are common among the class? What do they do to kill or repel pests?

3. What are ways that these chemicals could also affect us?

4. What are the health considerations for *not* killing pests?

5. If exposure to pesticides can be harmful and yet is common, why doesn't everyone develop Parkinson's disease or other disorders?

6. Are there genetic forms and influences on PD?

Jigsaw Activity

You will be participating in a "jigsaw" activity. Each student will be assigned to a "working group" in which they develop expertise about a topic that they will later share with members of their "home group." Each working group, composed of students from different home groups, will consider one of the following major treatment strategies discussed in "My Father, My Brother, and Me":

- Pharmacology/drug therapies.
- Exercise.
- Deep brain stimulation.
- Cell based therapies (stem cell, fetal cell).

In each working group, create a shared document for your treatment strategy. Consider at least these issues:

- Basic biological mechanisms of *how* this therapy works.
- Current status of this therapy (research only or clinically available).
- Side effects, risks and benefits.

After you have compiled your research you will return to your home group, now made up of people bringing different information from different working groups. Your home group will be assigned a patient to which you will apply your shared expertise. Which treatment options might be best for your assigned patient? Why? What factors are most important to consider? Each home group will briefly present their patient's story and their group's treatment suggestions to the class.