Alzheimer's Educator Guide

A resource for using QUEST video, audio, blogs and maps in the classroom

QUEST SUBJECTS

Life Science	**Biology** **Health** Environment
Earth Science	Geology Weather Astronomy
Physical Science	Physics Chemistry Engineering

CA SCIENCE STANDARDS

Grade 7

Cell Biology (Focus on Life Sciences)

1. All living organisms are composed of cells, from just one to many trillions, whose details usually are visible only through a microscope. (a, f)

Genetics (Focus on Life Sciences)

2. A typical cell of any organism contains genetic instructions that specify its traits. These traits may be modified by environmental influences. (c)

Grade 8

Chemistry of Living Systems (Life Sciences)

6. Principles of chemistry underlie the functioning of biological systems. (b, c)

Grades 9-12

Physiology

9. As a result of the coordinated structures and functions of organ systems, the internal environment of the human body remains relatively stable (homeostatic) despite changes in the outside environment. (b, e)

QUEST MEDIA FOR TEACHING ABOUT ALZHEIMER S

Read and comment on the blogs for these stories by clicking on the story link and clicking on the blog post link below the video/audio.

Watch **Alzheimer's: Is the Cure in the Genes?**
http://www.kqed.org/quest/television/alzheimers-is-the-cure-in-the-genes

- An estimated 15 million Americans will suffer from Alzheimer's by 2050. **QUEST** visits with researchers at San Francisco's Gladstone Institutes who have found that a gene may hold the key to a cure for this debilitating affliction.

Listen to **Beyond Alzheimer's** http://www.kqed.org/quest/radio/beyond-alzheimers

- There are many other degenerative brain diseases that are even harder to diagnose and treat than Alzheimer's. Amy Standen reports on frontotemporal dementia, a brain disease that commonly affects people in their 40s and 50s and is often misdiagnosed as a psychiatric problem.

Read **Producer's Notes - Alzheimer's: Is the Cure in the Genes?**
http://www.kqed.org/quest/blog/2008/04/08/producers-notes-alzheimers-is-the-cure-in-the-genes/

- Producer Gabriela Quirós shares other sources on Alzheimer's research and treatment.

TOPIC BACKGROUND

The brain is the central command station for the human body. It regulates the functions of many organ systems and controls our thoughts, memories, speech and movements. In a normal, healthy brain, this work is done quickly and automatically. Roughly one in five Americans suffer from neurological disorders, including brain tumors, cerebral palsy and other developmental disorders, and degenerative diseases, such as Alzheimer's, frontotemporal dementia and Parkinson's disease.

Alzheimer's disease is the leading cause of dementia in people over the age of 60. It was named for Dr. Alois Alzheimer, a German doctor who in 1906 found abnormal clumps and tangled fibrous bundles in the brain of a woman who had died of an unusual mental illness. Today, we now know these clumps (amyloid plaques) and bundles (neurofibrillary tangles) as two of the three hallmarks of Alzheimer's. The third characteristic of the disease is a slow loss of connections between the neurons in the brain. Recent research has found that certain proteins found in a person's cerebrospinal fluid may actually be able to identify who is most likely to develop Alzheimer's disease. While early detection may help develop Alzheimer's treatments in the future, as of now there's no cure.

Additional Resources:

Inside the Brain: Unraveling the Mystery of Alzheimer's disease
http://www.nia.nih.gov/Alzheimers/ADVideo/

Discovering Psychology: The Human Brain
http://www.learner.org/discoveringpsychology/brain/index.html

Alzheimer's Disease http://www.alz.org/alzheimers_disease_alzheimers_disease.asp

VOCABULARY

Dementia
significant loss of such intellectual abilities as memory capacity severe enough to interfere with social or occupational functioning

Enzyme
any of several complex proteins that are produced by cells and act as catalysts in specific biochemical reactions

Gene
the basic biological unit of heredity

Mitochondria
spherical or rod-shaped organelles found within the cytoplasm of eukaryotic cells

Mutation
a permanent change or structural alteration in DNA or RNA

Neuron
a nerve cell that sends and receives electrical signals over long distances in the body

Synapse
the junction between two nerve cells

Symptom
a characteristic sign or subjective evidence of disease or physical disturbance

INTRO QUESTIONS

- What do you know about Alzheimer's?
- Do you know of any other brain diseases?
- What do you think would be the hardest thing about losing your memory?

FOCUS QUESTIONS

- What are the symptoms of Alzheimer's?
- How does a brain with Alzheimer's disease differ from a healthy brain?
- Describe the work being done at the Gladstone Institutes. Why are researchers there so interested in the Apo E gene?
- What are some steps a person can take to reduce the risk of Alzheimer's?
- Compare Alzheimer's and frontotemporal dementia. How are the diseases alike? How are they different?

For all media see:

- Segment Summary Student Sheet
  http://www.kqed.org/quest/downloads/QUEST_SegSum_StudentSheet.pdf
- Personal Response Student Sheet
  http://www.kqed.org/quest/downloads/QUEST_PersResp_StudentSheet.pdf

LESSON PLANS and RESOURCES from PBS, TEACHERS DOMAIN and NPR

NOTE: Resources from the Teachers' Domain collection require a fast and free registration.

Alzheimer's Disease Teachers' Domain
http://www.teachersdomain.org/resource/tdc02.sci.life.gen.alzheimers/
This video segment adapted from the **Secret of Life** school video "Genetic Medicine: Tinkering with Our Genes" examines the dilemmas associated with genetic testing for diseases and the potential of gene therapy to one day cure Alzheimer's.

Finding Disease Genes Teachers' Domain
http://www.teachersdomain.org/resource/tdc02.sci.life.gen.findingdisease/
This video segment adapted from **NOVA: Cracking the Code of Life** looks at how researchers find and isolate the genes that cause disease.

An Alzheimer's Vaccine? PBS
http://www.pbs.org/newshour/bb/health/july-dec99/alzheimers_7-8.html
In this video from **Online NewsHour** (July 8, 1999), Margaret Warner talks with Dr. Steven DeKosky from the Alzheimer's Disease Research Center at the University of Pittsburgh about a vaccine that could be used to treat and possibly even prevent Alzheimer's.

The Forgetting: Short Films About Alzheimer's PBS
http://www.pbs.org/theforgetting/watch/pocket.html
These four film shorts highlight the basic facts known about Alzheimer's and information about the latest research into possible cures. They offer a message of hope for newly diagnosed patients and their families.

Second Opinion: Alzheimer's Disease PBS
http://www.pbs.org/secondopinion/episodes/alzheimersdisease/
This episode of **Second Opinion** discusses the three known types of Alzheimer's and shares information on how the disease is diagnosed.

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The Bay Institute
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California Academy of Sciences
www.calacademy.org

Chabot Space and Science Center
www.chabotspace.org

East Bay Regional Park District
www.ebparks.org

Exploratorium
www.exploratorium.edu

Girl Scouts of Northern California
www.girlscoutsnorcal.org

Golden Gate National Parks Conservancy
www.parksconservancy.org

The J. David Gladstone Institutes
www.gladstone.ucsf.edu

Lawrence Berkeley National Laboratory
www.lbl.gov

Lawrence Hall of Science
www.lawrencehallofscience.org

Monterey Bay Aquarium
www.mbayaq.org

Monterey Bay Aquarium Research Institute
www.mbari.org

Oakland Zoo
www.oaklandzoo.org

The Tech Museum of Innovation
www.thetech.org

UC Berkeley Natural History Museums
http://bnhm.berkeley.edu/

U.S. Geological Survey
www.usgs.gov

MORE EDUCATIONAL RESOURCES FOR USING QUEST MULTIMEDIA TO ENHANCE 21st CENTURY SKILLS IN TEACHING AND LEARNING

Why Use Multimedia in Science Education?
http://www.kqed.org/quest/downloads/QUESTWhyMedia.pdf
- Read about the importance of using multimedia in the 21st century science classroom.

How to Use Science Media for Teaching and Learning
http://www.kqed.org/quest/downloads/QUESTMediaTips.pdf
- A collection of tips, activities and handouts to actively engage students with multimedia.

Science Multimedia Analysis
http://www.kqed.org/quest/downloads/QUESTMediaAnalysis.pdf
- Give your students the tools to recognize the purposes and messages of science multimedia.

Create Online Science Hikes with Google Maps
http://www.kqed.org/quest/files/download/52/QUEST_ExplorationCreation.pdf
- Do you like the science hike Explorations on the QUEST site? Use this place-based educational guide to create similar science-based maps with youth.

OTHER WAYS TO PARTICIPATE IN QUEST

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KQED 88.5 FM San Francisco &
89.3 FM Sacramento
Mondays at 6:30am and 8:30am

WATCH

KQED Channel 9
Tuesdays at 7:30pm

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BEYOND ALZHEIMERS — QUEST RADIO TRANSCRIPT

NOTES & QUESTIONS

When we think about what happens to our brains as we age, one disease tends to dominate our thoughts and fears: Alzheimer's. But in fact, Alzheimer's only accounts for about half of degenerative brain diseases. Many others are far tougher to diagnose and treat. Amy Standen reports on one under-diagnosed brain disease and its often baffling effects.

When Cassandra Shafer talks about her husband, Keith Jordan, she's really talking about two people. One is the man she married: A family man, a longtime environmentalist, community activist. Flipping through a photo album, she points out a slim, dark-haired 37-year-old in glasses and a tuxedo.

SHAFER: Here he is... So this was right around the time my daughter was born. He's all dressed up for a wedding; he was the best man. And it's just to see how he looked, you know, fairly well-kempt.

As Shafer flips through the pages, the image of Keith changes. In the final photos, he's gained about 20 pounds, and wears a bushy gray beard.

SHAFER: And I don't know that the whole wild, wooly Jerry Garcia look was directly related to his brain cells dying, but it just sure seems like it.

Shafer didn't know it back then, but her husband was in the early stages of a disease called fronto-temporal dementia, or FTD. Like Alzheimer's, FTD is caused by a protein that makes parts of the brain gradually atrophy. About half of FTD patients have a family history of the disease, the other half, like Keith, do not. FTD tends to hit younger people. In fact it, not Alzheimer's, may be the most common degenerative dementia among those under 60. Keith Jordan was only 42 when his first symptoms appeared, and Shafer had no idea what was happening to him.

SHAFER: He had changed, and people didn't believe me.

Jordan would tell the same joke a dozen times at dinner. He obsessively counted white cars he saw on the freeway. And worst of all, he didn't seem to care about other people.

SHAFER: My daughter was really seven when things got quite dicey and weird. That was the summer when they were swimming at the Russian River and he was playing with her and pulled her out into the deep current and dropped her and swam away. You know, and I saw her going down and rescued her. And it was just, his attention span, very short "Oh! Just done with that game!"

Shafer spent years trying to learn what was wrong with her husband. When doctors and psychiatrists couldn't help, she tried acupuncture, yoga, exorcisms. They removed all Keith's mercury dental fillings. In the end, Shafer figured it out herself, on Google.

MILLER: It's so under-diagnosed. We think only a smattering of the patients with this disease are properly diagnosed.

That's Bruce Miller who directs the Memory and Aging Center at the University of California San Francisco. He's spent much of his career studying FTD. He says the disease often gets misdiagnosed as Alzheimer's or as a psychiatric problem. Still, if you know what to look for, FTD is not generally that hard to diagnose. MRI scans show the deterioration of a part of the brain called the frontal lobe. It's right behind your eyebrows.

MILLER: It's a part of the brain that's very important for social regulation.

That is, for telling us how our behavior will be perceived by others.

MILLER: What sorts of things can I do in the elevator that will be acceptable? How do I talk to someone in a restaurant? These are the sorts of things that we all do easily and automatically. But patients with fronto-temporal dementia can't do these things at all.

Everyone understands the forgetfulness of an Alzheimer's patient. But FTD takes away something even more basic: the ability to be liked. Again, Cassandra Shafer

SHAFER: They do unpredictable things, socially inappropriate things, lewd and disgusting things. The neighbors are pissed, the family is freaked out. The friends drift away.

Keith Jordan died at the age of 52, just five years after his diagnosis. Last year the disease gained national attention when New Mexico Senator Pete Domenici announced he had been diagnosed with it, and was retiring. There is no cure for FTD, although antipsychotic drugs can help with symptoms. But Bruce Miller thinks that some forms of the disease may be curable, possibly as soon as the next decade.

MILLER: One of the types of fronto-temporal dementia that we're extremely focused around is a deficiency in a protein called progranulin. People who carry a mutation in this gene develop with an almost 100% certainty, a fronto-temporal dementia. We think that by replacing this protein, or by figuring out a way of increasing its production in the brain, that this disease could be preventable.

Meanwhile, FTD poses profound questions human nature and free will. Do we get to control who we are, as people? Or is the self just a function of how our brains are designed?

MILLER: What political organization we like, how we dress. These can be drastically changed by subtle loss of function in a very tiny part of the brain.

To Cassandra Shafer this may be the only consolation in what happened to Keith. If kindness and likeability can die in a person, then that means they were there, built into the architecture of the human brain, to begin with.

SHAFER: It actually makes me have more faith in human nature. That people really are good, kind, loving, compassionate, pro-social, as long as their right temporal lobe is working. I actually think innate human nature is probably pretty darn good. With QUEST, I'm Amy Standen, KQED Radio News.