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Great Problems Seminar

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Alzheimer's Disease Screening

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Recommended Citation

ALZHEIMER'S DISEASE SCREENING

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Project Goals

• Develop a plan for the screening of the general public for Alzheimer's Disease

Background

Cause:

• As the body ages, β-amyloid plaques and neurofibrillary tangles may build up in the brain

• These block communication between cells

http://library.med.utah.edu/WebPath/CNSHTML/CN5086.html
http://library.med.utah.edu/WebPath/CNSHTML/CNS090.html
http://www.alz.org/index.asp

Diagnosis:

• Most widely used form of definitive diagnosis is an autopsy

• Patients can be diagnosed with "Alzheimer's Type" pathology based on symptoms such as memory loss and other cognitive tests

• A newly developed, accurate test for AD is a PET scan, administered with radioactive tracers

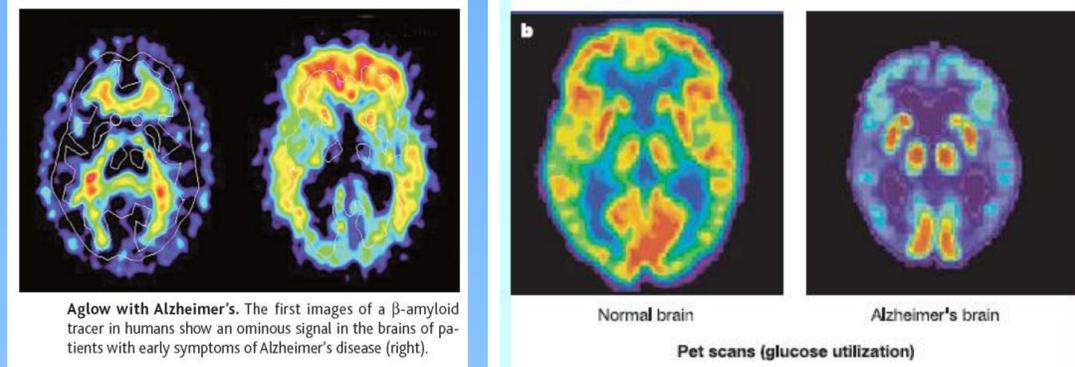• Effective diagnosis of the disease can be achieved through an efficient, widespread system of screening

PET Scans

• Positron emission tomography shows how well cells are working based on the amount of sugar or oxygen the cell consumes

• A radioactive tracer can be given to the patient so that the PET scan will show the targeted cell

http://www.researchmalignantmesothelioma.com/pet-scan.html
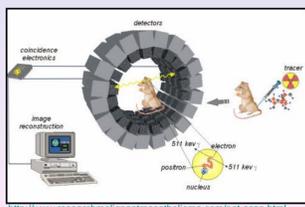
PET Scan Screening For Alzheimer's

• Used to measure the levels of β-amyloid plaques as well as neurofibrillary tangles

• A radioactive tracer, 18F-FDDNP, binds to the plaques and tangles

• An administered PET scan shows where the tracer is greater in concentration

Aglow with Alzheimer's. The first images of a β-amyloid tracer in humans show an ominous signal in the brains of patients with early symptoms of Alzheimer's disease (right).

Helmuth L (2002) *Science* **297**: 752-753.

Normal brain   Alzheimer's brain

Pet scans (glucose utilization)

(2004) Nature 430: 631-639.

• FDG PET scans use the tracer 18 FDG to show brain metabolic activity

• Administration of these two tests is enough to diagnose Alzheimer's Disease
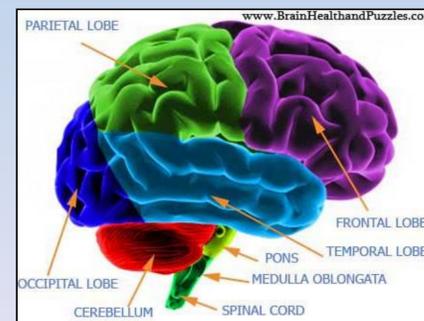
Diagnostic Screening System

• "At-risk" patients will be given a standard cognitive assessment called a Mental Status Examination (MSE) as a part of their yearly physical examination

• If the patient's score declines significantly over the course of one or more years, the physician must refer them to a hospital for plaque screening and a FDG PET scan

• If the results show that the patient has signs of AD, treatment will be carried out

Mental Status Examination (MSE)

• Evaluates:

  • Affect and mood

  • Attitude

  • Appearance

  • Behavior

  • Cognition

  • Insight judgment

  • Speech and language

  • Thought content

  • Thought processes

PARIETAL LOBE   www.BrainHealthandPuzzles.com
FRONTAL LOBE
TEMPORAL LOBE
OCCIPITAL LOBE   PONS   MEDULLA OBLONGATA
CEREBELLUM   SPINAL CORD
http://www.brainhealthandpuzzles.com/diagram_of_brain.html

• The frontal lobe deals with thinking and planning

• Temporal lobe is responsible for memory and learning

• These are the two areas affected most by Alzheimer's

Percentage Changes in Selected Causes of Death, 2000 and 2006			
Cause	2000	2006	Percentage Change
Heart disease	710,760	629,191	-11.5
Breast cancer	41,200	40,970	-0.6
Prostate cancer	31,900	27,350	-14.3
Stroke	167,661	137,265	-18.1
Alzheimer's disease	49,558	72,914	+47.1

http://www.alz.org/national/documents/report_alzfactsfigures2009.pdf

"At Risk Patients"

• Patients already diagnosed with "Alzheimer's type" pathology

• Those with a family history of Alzheimer's over the age of 40

Funding and Cost

• The average cost of a basic PET scan is between $3,000 and $6,000

• Most insurance companies will cover the cost if it has been clinically indicated

• Changes in Medicare would result in the reimbursement of these costs to patients of a certain age

Ethics

• Does the treatment really improve their quality of life?

• Will the screening create more paranoia and harm?

• Will treatment create false hope?

http://www.smh.com.au/news/health/new-hope-in-fight-against-alzheimers/2008/03/15/1205472166682.html

Conclusion

• An organized, widespread screening system for Alzheimer's Disease will result in the earlier treatment of patients and possibly a decrease in the mortality rate due to this degenerative condition.