National Alzheimer’s Project Act (NAPA)

The information that follows was included as an attachment to an email submitted by the public.

For more information about NAPA, visit the NAPA website at:

http://aspe.hhs.gov/national-alzheimers-project-act
Are dental X-rays causing the Alzheimer’s epidemic?

Unifying hypothesis explains puzzling AD facts
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• Alzheimer’s Association International Conference (AAIC) 2011 Hot Topics Poster Presenter (PA-382)
What is causing Alzheimer's disease?

**HYPOTHESIS at a glance**

- Ionizing radiation from dental X-rays shortens microglia telomeres
- Shortened telomeres reduce microglia lifespan
- Stranded neurons die, causing irreversible dementia
- The microglia neuronal support system collapses

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Simply stated:

Head exposure to ionizing radiation is causing us to outlive the brain cells meant to support our neurons lifelong.
Hypothesis foundation

- **AD prevalence data**
  1. World Health Organization
  2. 10/66 Dementia Research Group

- **Dental health data**
  1. Indian Consumer Usage and Attitudes Survey 2009

- **Scientific studies**
  2. Xue QS, Streit WJ, 2011\(^2\)
  
  *(. . . and many others)*

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Dental visits & dementia: a sampling of countries

INDIA
• 67% have never visited a dentist\(^5\)
• Dementia prevalence estimated at 1/5-1/4 that of Europe’s\(^6\)

CHINA
• 30% to 43% adults have never visited a dentist\(^7\)
• Dementia prevalence about half of Europe’s\(^6\)

UNITED STATES
• 1% have never visited a dentist\(^8\)
• 13% of people 65 and older have AD\(^9\)
Testing the hypothesis

Puzzling AD facts explained
The emergence of AD symptoms is delayed 10 or more years — when it is too late to stop or reverse it.

Microglial telomere shortening would have a delayed effect on neurons because it reduces microglial lifespan, not function.

Images courtesy of the National Institute on Aging / National Institutes of Health
AD mortality increased rapidly after 1979, making it the sixth leading cause of death by 2000.

**FACT:**

- 1940 X-ray machines were in most U.S. dental offices
- 1957 37% visited a dentist within year (18% never visited a dentist)
- 2008 59% visited a dentist within year (1% never visited a dentist)

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FACT:

The hippocampus is one of the first brain regions to suffer AD-related damage.

It contains both microglia and neural progenitor cells that keep dividing, making them more susceptible to radiation-induced damage.
FACT:

Men die sooner than women following an AD diagnosis\textsuperscript{12}

Older men have shorter telomeres than women the same age\textsuperscript{13}

Diagram courtesy of tasciences.com
FACT:

Virtually all people with Down syndrome have AD brain pathology by age 40 – but there is a wide variance in the onset of dementia\textsuperscript{14,15}

People with Down syndrome lose telomere length faster than the general population, but just like others, there is variation in newborn telomere length\textsuperscript{16,13}

Catherine Rodgers
1945-1995
Died of Alzheimer’s at age 49

Caroline Rodgers 2012
FACT:

AD prevalence is higher in urban areas\(^\text{17}\)

City dwellers make more dental visits\(^\text{18}\)

Graphic public domain image from: http://www.clipartpal.com/clipart_pd/buildings/city_10063.html
FACT:

AD is increasing most rapidly in developing countries – especially Latin America.  

Many countries started providing free dental care to all citizens in the last few decades, such as Cuba in 1976, Venezuela in 1999 and Brazil in 2004.

Public domain image from: http://www.clker.com/clipart-planet-earth-1.html
FACT:

AD does not respond to anti-inflammatory or cholesterol-lowering drugs – even though it is associated with brain inflammation and high cholesterol\(^\text{19,20}\)

Neither treatment can help neurons that have lost their support system.
FACT:

Mentally stimulating activities initially delay AD, yet ultimately accelerate it\textsuperscript{21}.

Additional brain growth would eventually overwhelm microglia struggling to support existing neuronal networks.
Questions & Concerns

Could diligent dental care explain the increase in non-familial early-onset AD?

Could head X-rays after sports injuries contribute to early-onset dementia?

What are the long-term risks for orthodontia patients exposed to cone-beam CT scanners that produce 3-D images — at much higher radiation levels?

Could the ratio of dental professionals to population be used to create an algorithm to predict dementia trends?

If dental X-rays pose risks, could brain imaging utilizing ionizing radiation to monitor AD accelerate disease progression?

Do plateaus in declining cognition relate to intervals between X-ray exposures?
REFERENCES


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