Technologies for Detecting and Treating Dementia

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A major challenge of modern medicine

1 billion people

Dementia

Normal brain

Dementia brain

Alzheimer’s disease

obesity

sleep disorders

depression

stroke

addiction

tinnitus

autism

traumatic brain injury

Parkinson’s disease

hearing loss

chronic pain

epilepsy

migraine

Parkinson’s disease

A major challenge of modern medicine
Dementia is a major neurodegenerative brain disease leading to a progressive loss of cognitive functions.


Alzheimer’s disease (AD) is the major cause of dementia (~70%).

Dementia has unprecedented physical, psychological, social, and economic impact on society.

“1 in 3 seniors in US dies with Alzheimer’s or another dementia” (American Alzheimer’s Association, 2021)

“1 in 4 hospital beds in UK are occupied by people with dementia” (UK Alzheimer’s Society, 2009)

“US$ 1.3 trillion annual global costs projected to tripled by 2030“ (World Health Organization, 2019)
Dementia Cause

- **Alzheimer’s disease (AD) is the major cause** of dementia (~70%).

Dementia is **accelerated with age**
(prevalence: age 65y ~1%; 75y, ~10%, 85y ~20%, 90y+ ~50%)

Histology of AD brain

- Amyloid-β plaques (extracellular)
- Neurofibrillary tangles (intracellular)
Dementia Detection

Cognitive Impairment

- Neuropsychological testing

Alzheimer’s Disease Pathology

- Magnetic resonance imaging (MRI) for characteristic anatomical changes.
- Positron emission tomography (PET) for reduced cerebral glucose metabolism or beta-amyloid plaques.
- Electroencephalography (EEG) for change in brain synchronous activity?

PET Beta Amyloid Plaques

Zetterberg et al., Lancet (2006)
There is no effective treatment for dementia including Alzheimer’s disease.