# Dementia in Australia 2010 and Beyond

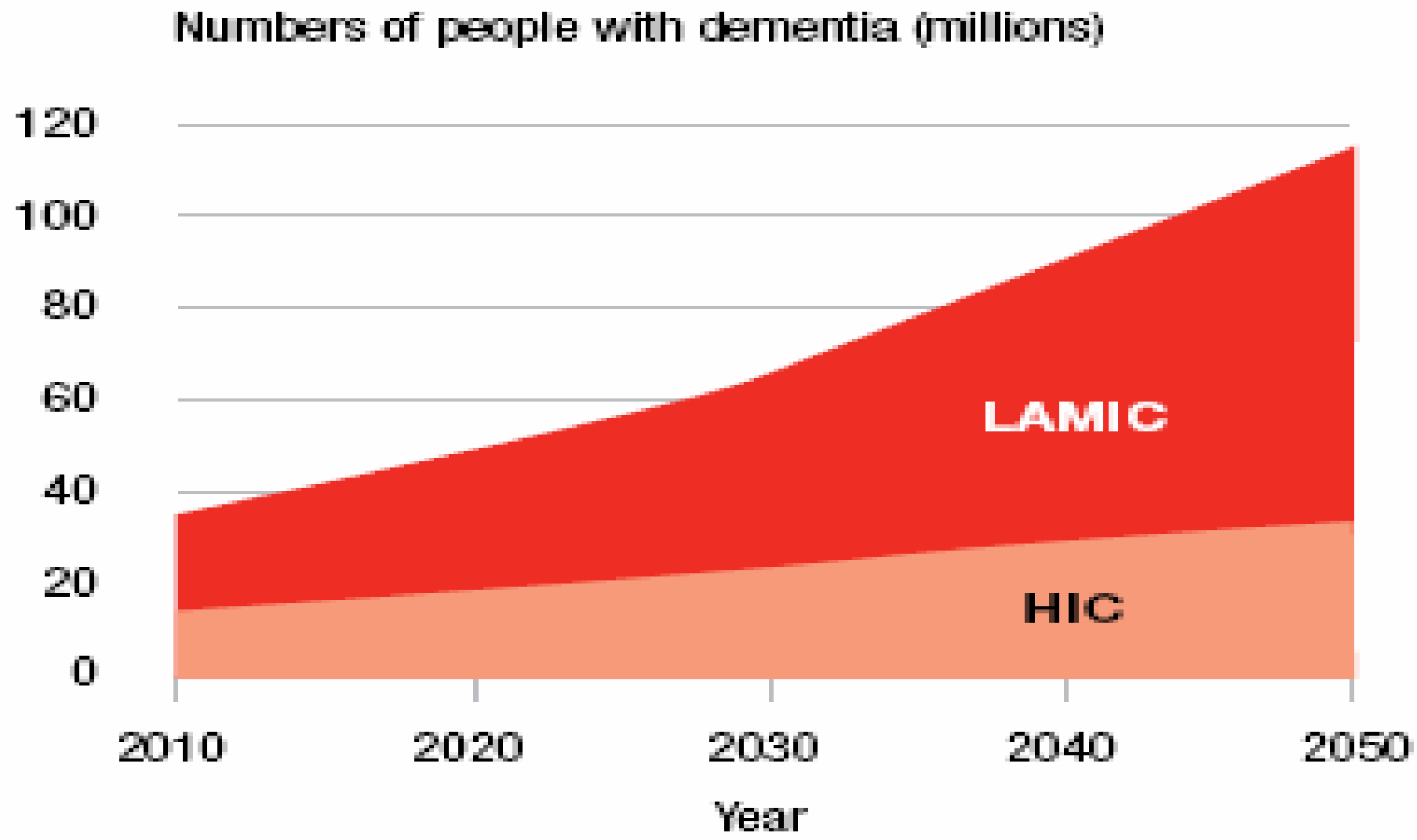
Brian Draper
Conjoint Professor, School of Psychiatry, University of NSW
&
Academic Department for Old Age Psychiatry
Prince of Wales Hospital, Randwick

# Dementia in the World

(ADI World Alzheimer Report 2009)

- In 2010, 35.6 million people have dementia worldwide
- 4.6 million new cases per year
- The number of people affected will double every 20 years to 65.7 million by 2030 & 115.4 million by 2050
- Increase in dementia cases will be much greater in developing countries - in 2010, 58% dementia cases live in these countries, 71% by 2050

**The growth in numbers of people with dementia in high income countries (HIC) and low and middle income countries (LAMIC)**

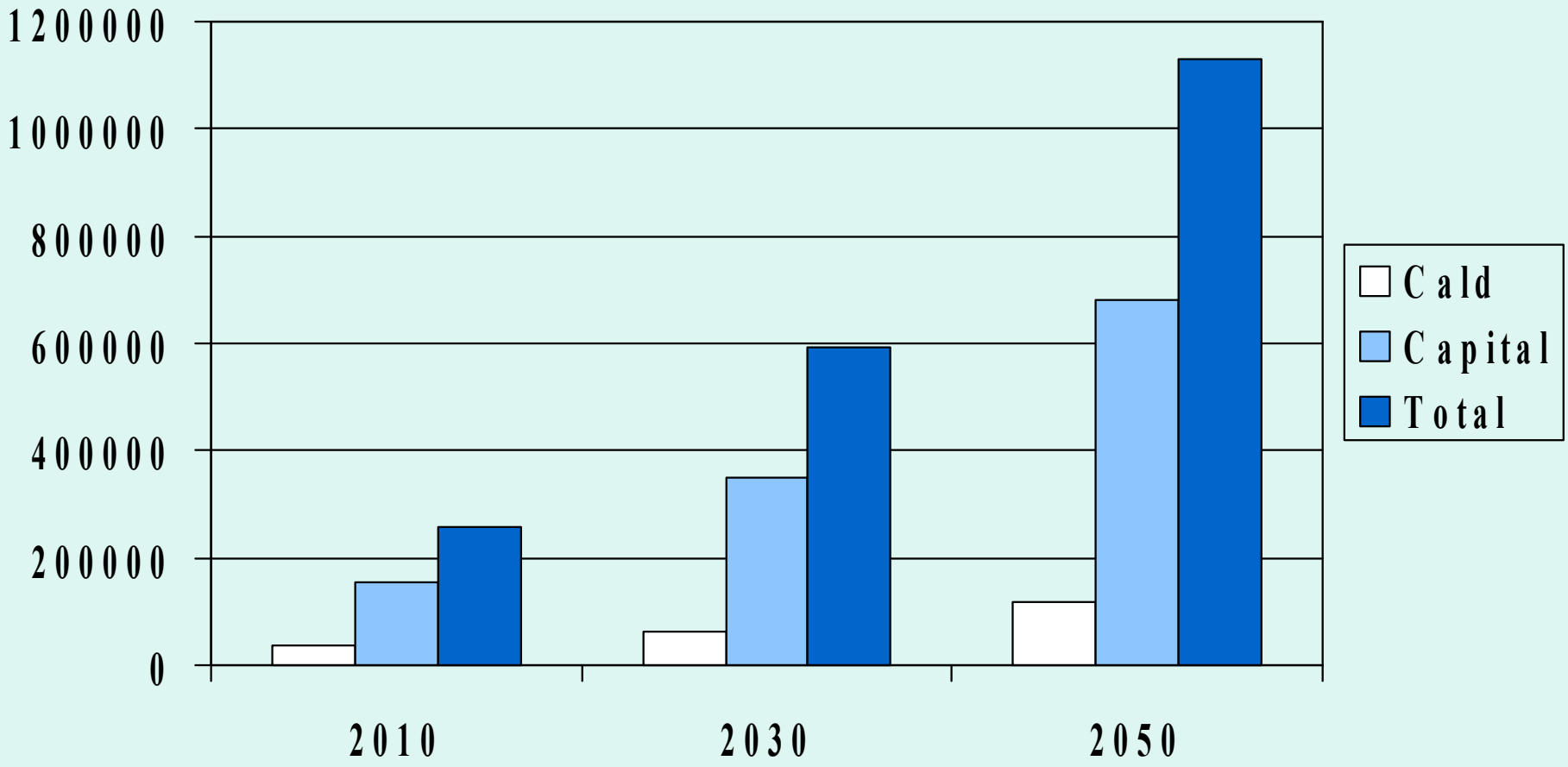



World Alzheimer Report (2009)

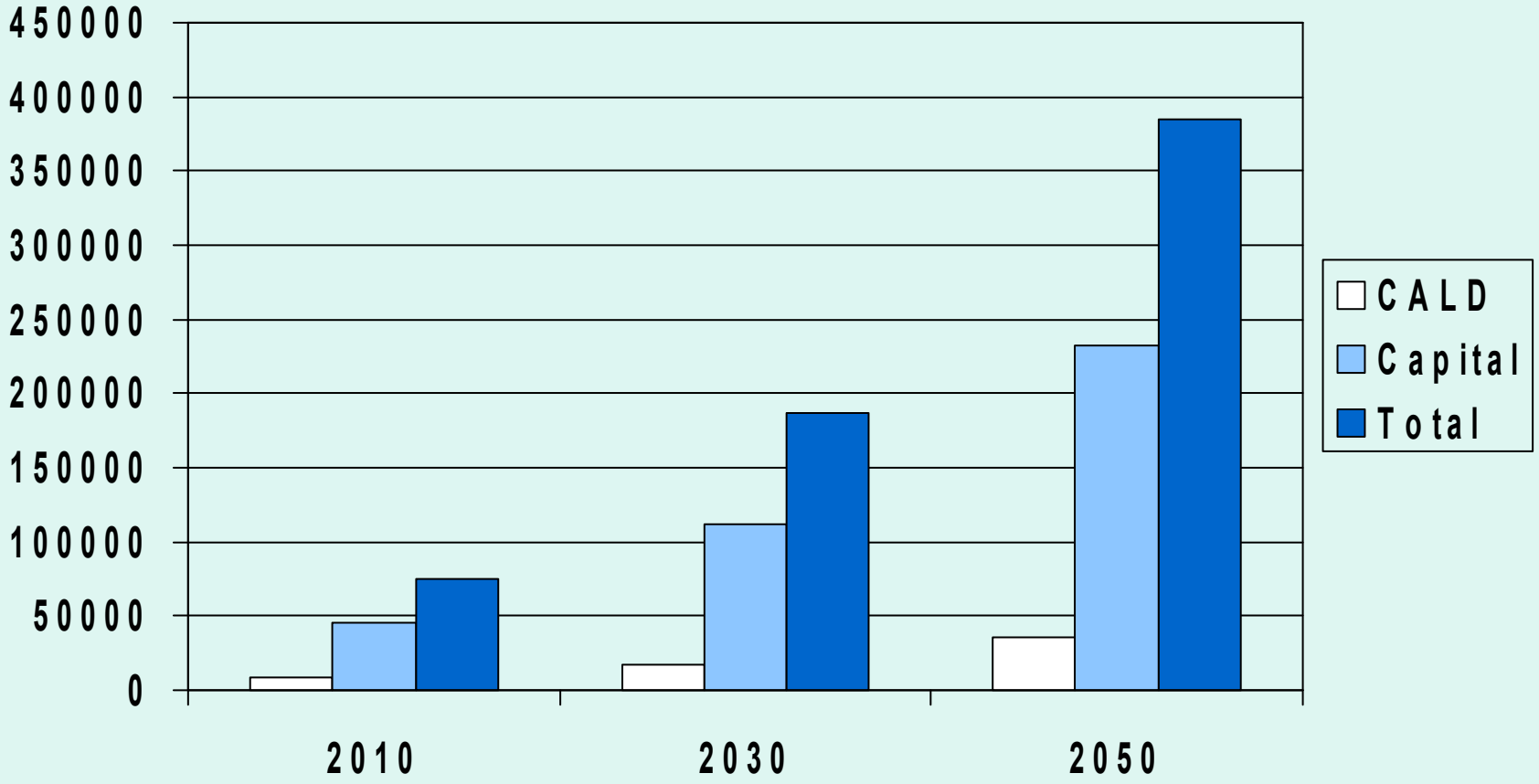
# Worldwide Societal Costs of Dementia 2009 Wimo et al 2010

- Worldwide societal cost in 2009 = US$421.6 billion (approx AUD$482 billion) based on 34.4 million dementia cases
- Of this US$142 billion (approx AUD$162 billion) (37%) are costs of informal care
- 74% of costs in the more developed countries where 46% of the prevalence is located
- 34% increase in worldwide dementia costs in the period 2005-2009

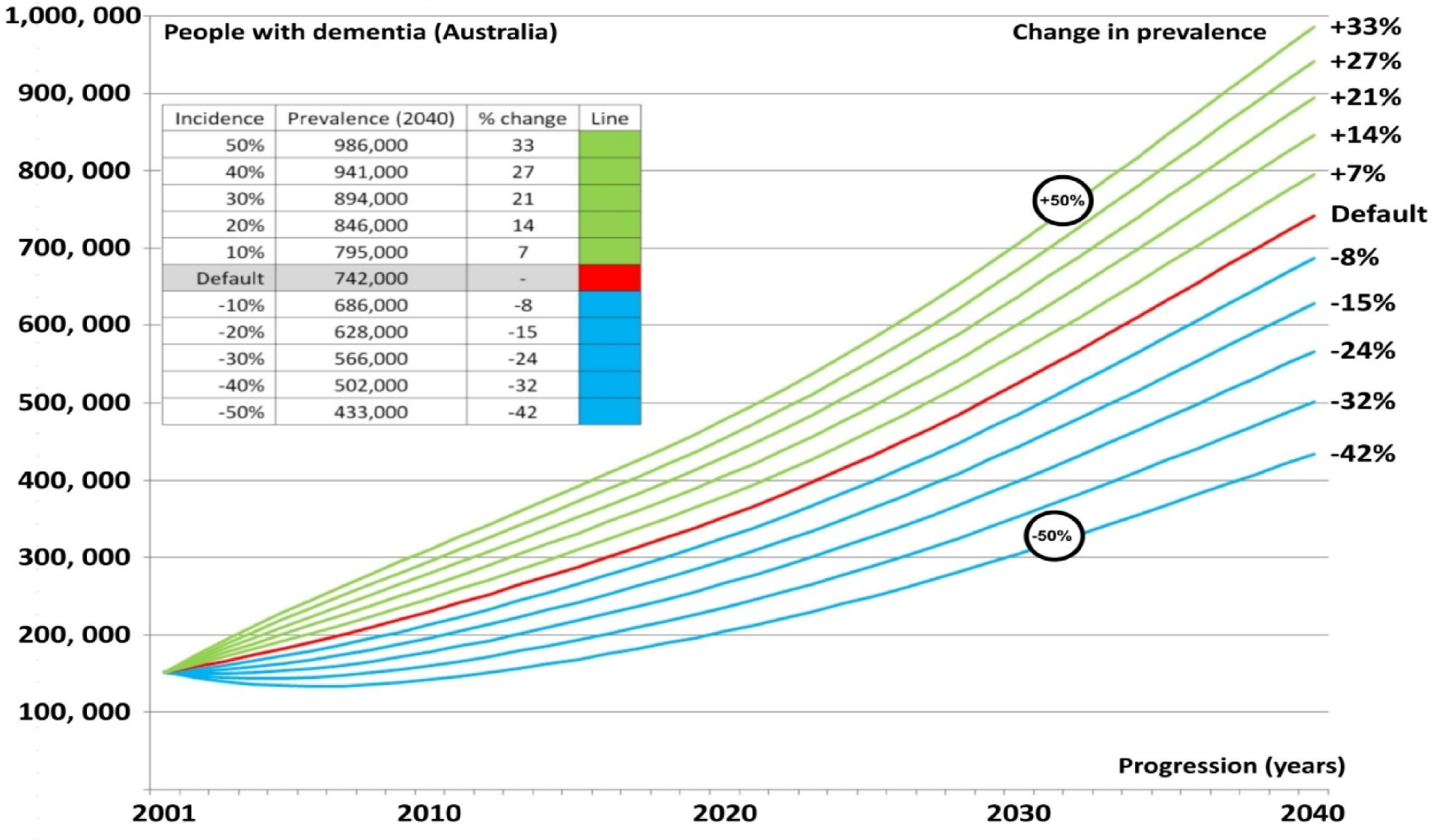
# Projections of Dementia Prevalence in Australia (Access Economics 2009)



# Projections of Dementia Incidence in Australia (Access Economics 2009)



# Sensitivity analysis for dementia incidence rate (Vickland et al submitted)




| Incidence | Prevalence (2040) | % change | Line |
|---|---|---|---|
| 50% | 986,000 | 33 | |
| 40% | 941,000 | 27 | |
| 30% | 894,000 | 21 | |
| 20% | 846,000 | 14 | |
| 10% | 795,000 | 7 | |
| Default | 742,000 | - | |
| -10% | 686,000 | -8 | |
| -20% | 628,000 | -15 | |
| -30% | 566,000 | -24 | |
| -40% | 502,000 | -32 | |
| -50% | 433,000 | -42 | |

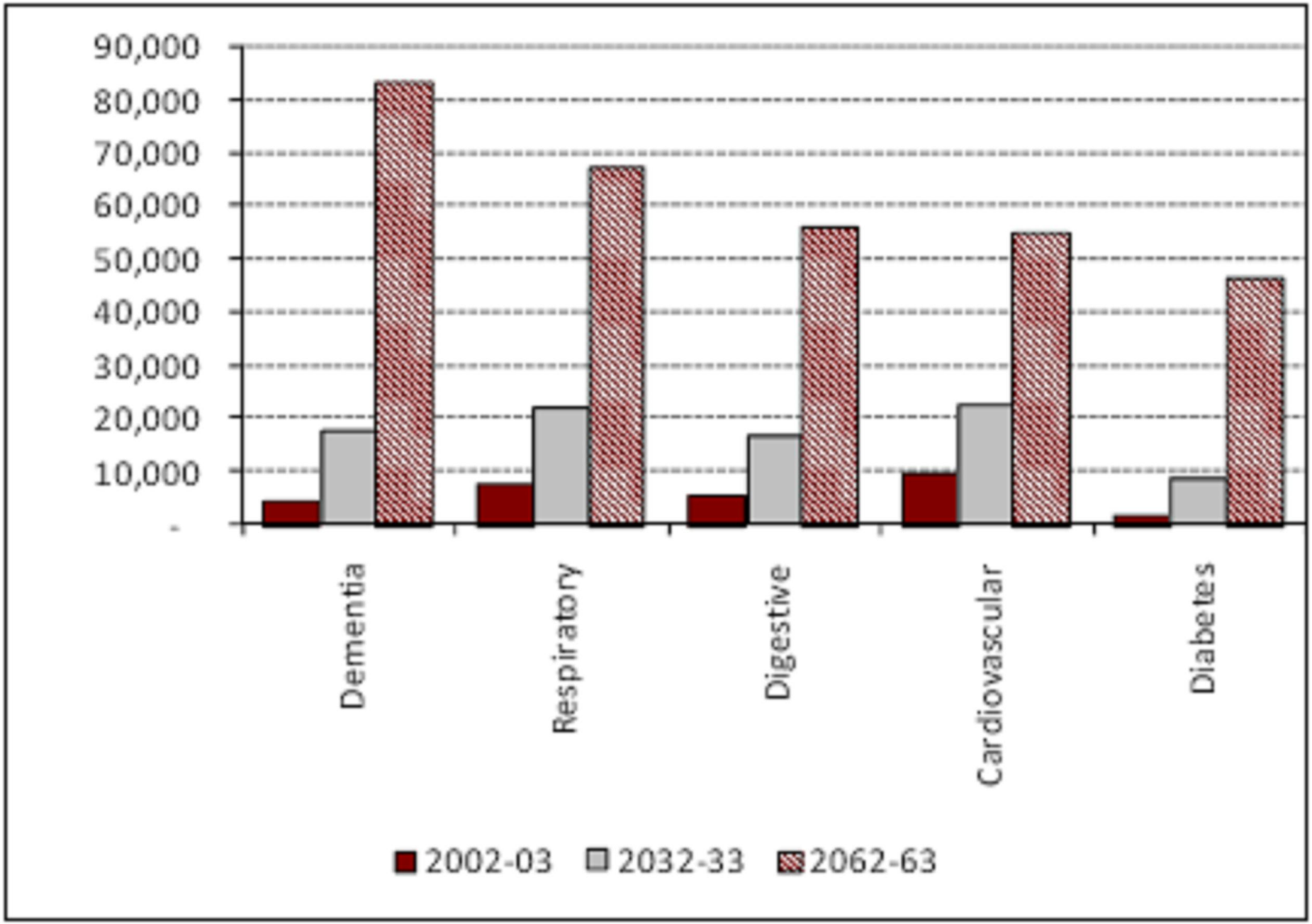
# Major Causes of all DALYs 2003 & 2023 – Males (Access Economics 2009)

| Condition | 2003 | | 2023 | |
|---|---|---|---|---|
| Type 2 Diabetes | 5.2% | 2 | 8.6% | 1 |
| Ischaemic Heart | 11.1% | 1 | 7.1% | 2 |
| Anxiety/Depression | 4.8% | 3 | 4.5% | 3 |
| **Dementia** | **2.5%** | **11** | **4.4%** | **4** |
| Adult Hearing Loss | 3.1% | 7 | 4.2% | 5 |
| Lung Cancer | 4.0% | 4 | 3.4% | 6 |
| Stroke | 3.9% | 5 | 3.2% | 7 |
| Prostate Cancer | 2.7% | 9 | 3.1% | 8 |
| Colorectal Cancer | 2.5% | 10 | 2.4% | 9 |
| Suicide/Self Harm | 2.8% | 8 | 2.4% | 10 |

# Major Causes of all DALYs 2003 & 2023 – Females (Access Economics 2009)

| Condition | 2003 | | 2023 | |
|---|---|---|---|---|
| Anxiety/Depression | 10.0% | 1 | 8.7% | 1 |
| Type 2 Diabetes | 4.9% | 4 | 8.0% | 2 |
| **Dementia** | **4.8%** | **5** | **7.4%** | **3** |
| Ischaemic Heart | 8.9% | 2 | 6.1% | 4 |
| Stroke | 5.1% | 3 | 3.8% | 5 |
| Breast Cancer | 4.8% | 6 | 3.5% | 6 |
| Lung Cancer | 2.7% | 8 | 3.5% | 7 |
| COPD | 3.0% | 7 | 2.8% | 8 |
| Asthma | 2.7% | 9 | 2.4% | 9 |
| Osteoarthritis | 1.6% | 12 | 2.2% | 10 |

## Chart 3.2: The 'Big 5' health expenditure conditions of the future (2006-07 million dollars)




Source: Access Economics derived from Goss et al (2008).

# Future Times – Rejoice?

- Prevention
- Early Diagnosis
- Effective Treatment

# Prevention of Alzheimer's disease - Elimination

The Model

– Smallpox vaccination

The Potential Treatment

- Gene Therapy and/or Stem Cell grafts

When?

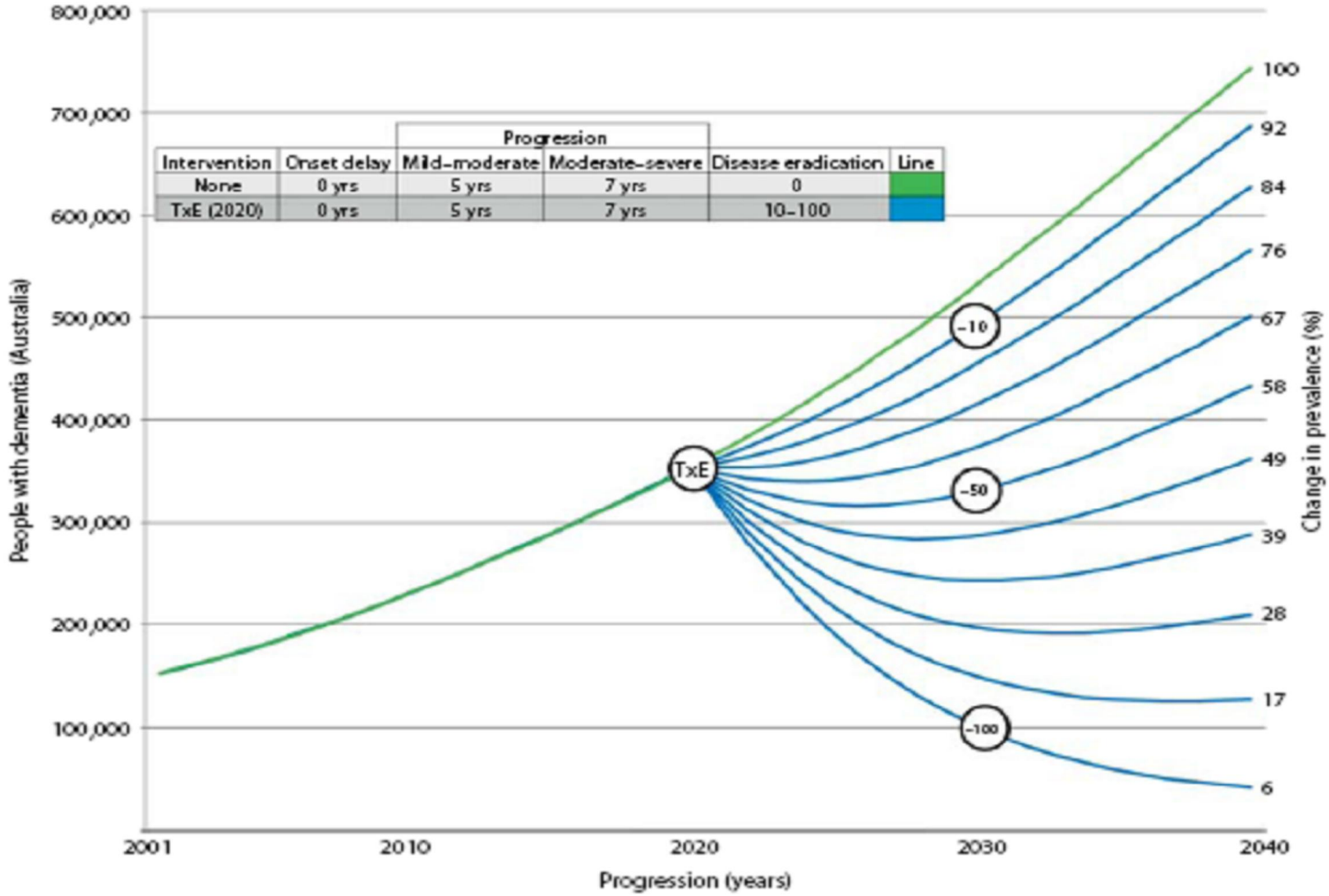
In 20 to 50 years (if at all)

Who?

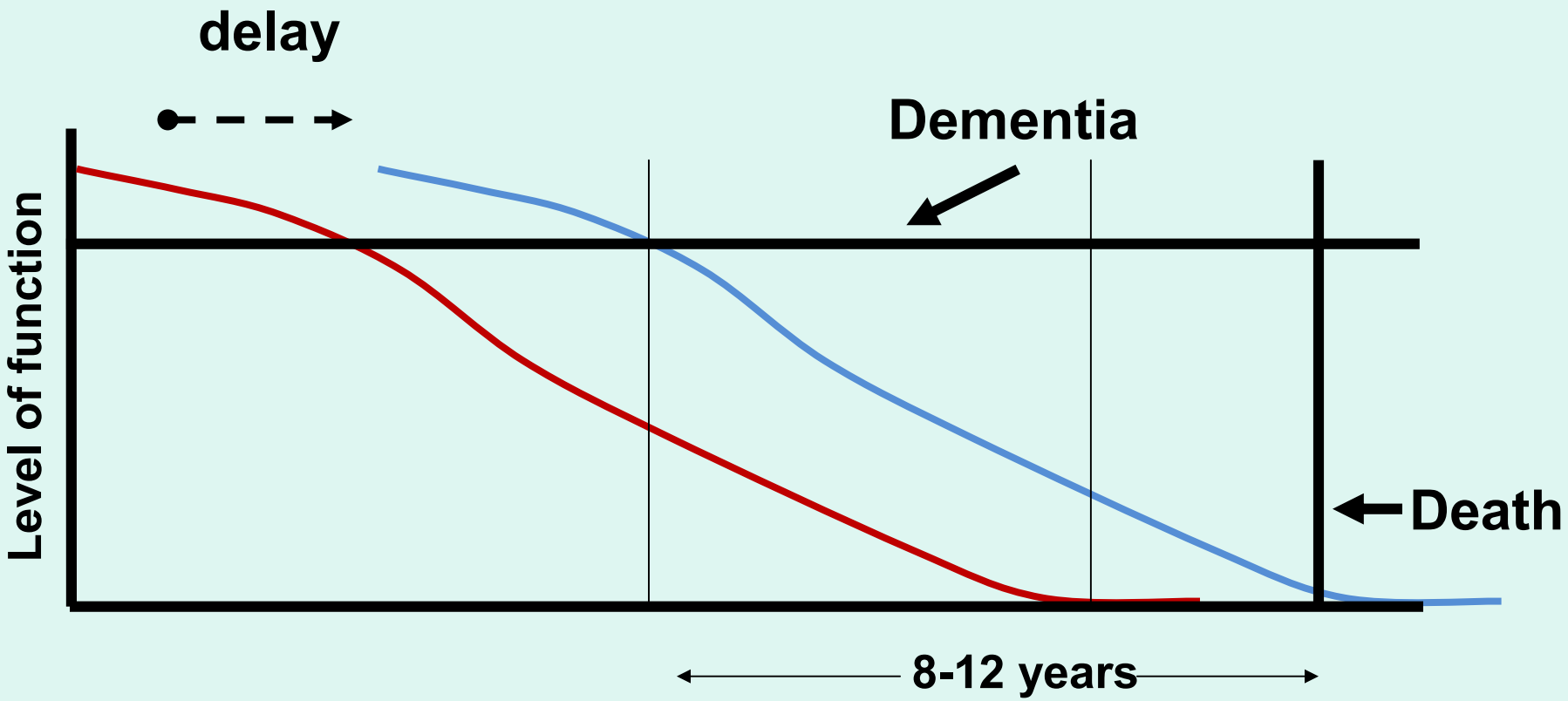
targeted i.e. at people at risk

universal i.e. whole population

# Reduction in Dementia Prevalence Due to Elimination of Types of Dementia (Vickland et al 2010)

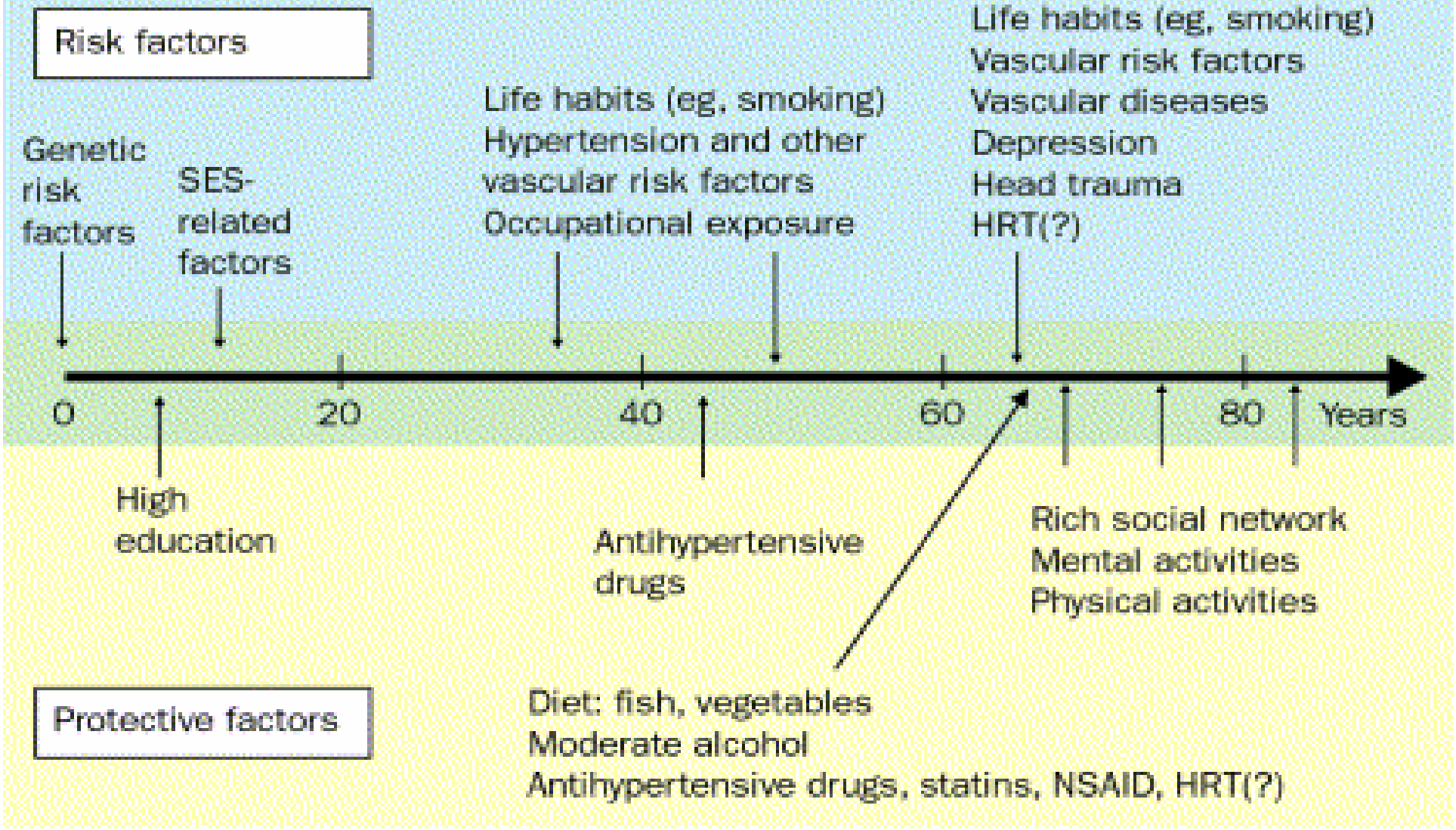


# Prevention of Dementia -Postponement

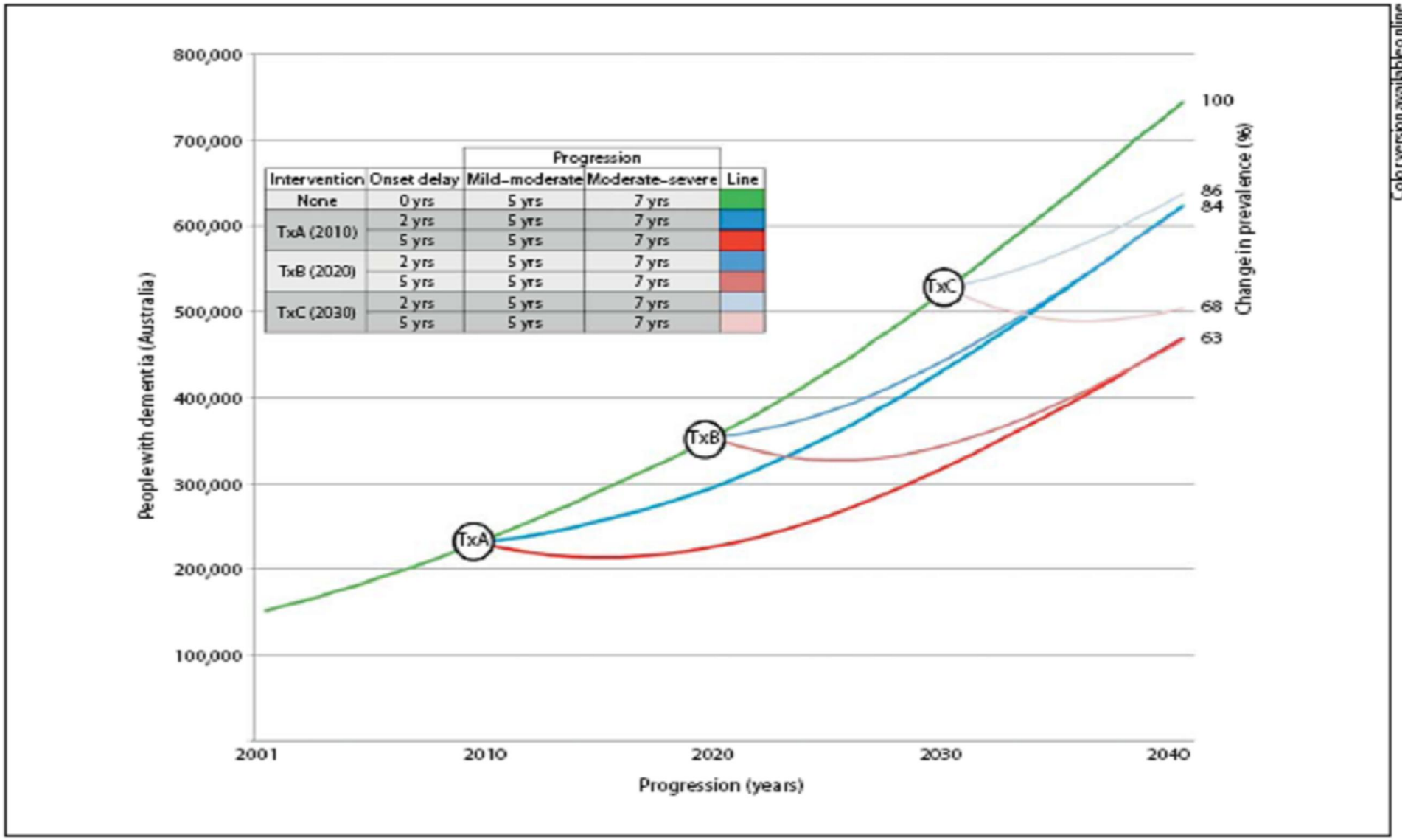



- **Postponement may not reduce duration of illness**
- **THOUGH: Age is strongest predictor of dementia survival time** **(Wolfson et al, NE J Med, 2001; 344: 1111-6)**

# Dementia Risk Factors Across the Life Cycle



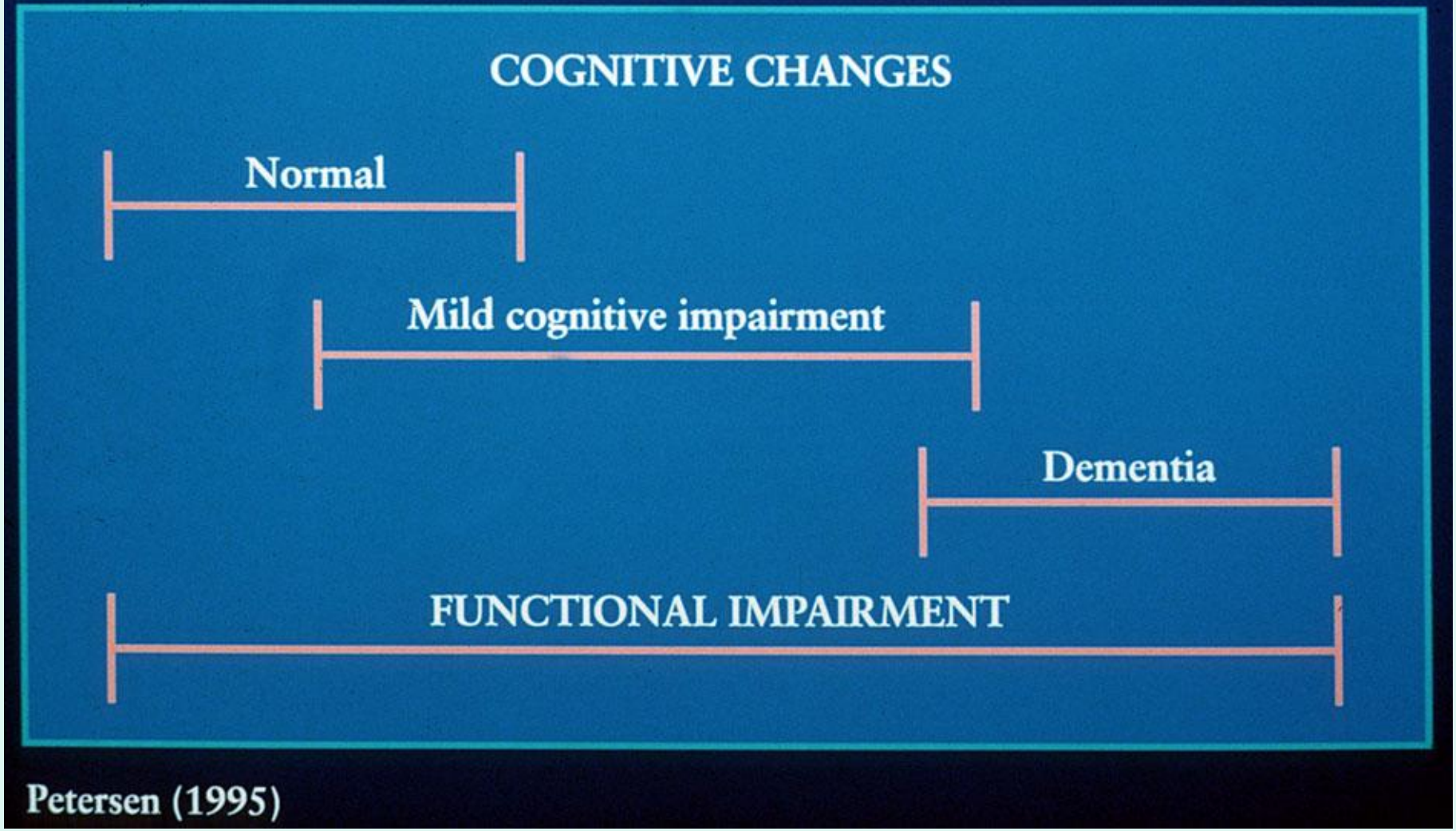
# Reduction in Dementia Prevalence Due to Delay in Onset (Vickland et al 2010)



# Early Diagnosis of Alzheimer's Disease

- Detection of pre-symptomatic Alzheimer's disease will involve a combination of
  - Tests of Brain function – neuropsychology
  - Diagnostic blood /CSF tests – tau protein, APP and A beta protein
  - Neuroimaging – MRI, PET, PIB

# Continuum from normal aging to AD



# Mild cognitive impairment

- Not an absolute difference between MCI and dementia & MCI and normality
- MCI research is still trying to identify ‘high risk’ individuals
- Neuropsychology tests of amnestic syndrome of hippocampal type have sensitivity of 80% & specificity of 90% in predicting AD – but not other types of dementia

# CSF/Blood Biomarkers and Progression of Mild Cognitive Impairment to Dementia

- **Blood biomarkers** are unlikely to be sufficiently accurate or reliable as diagnostic tools but may be useful in distinguishing Alzheimer's disease from other types of dementia & to monitor therapy
- **CSF biomarkers** using a combination of A beta protein and tau proteins are showing promise in identifying which patients with MCI progress to AD

# Neuroimaging of MCI

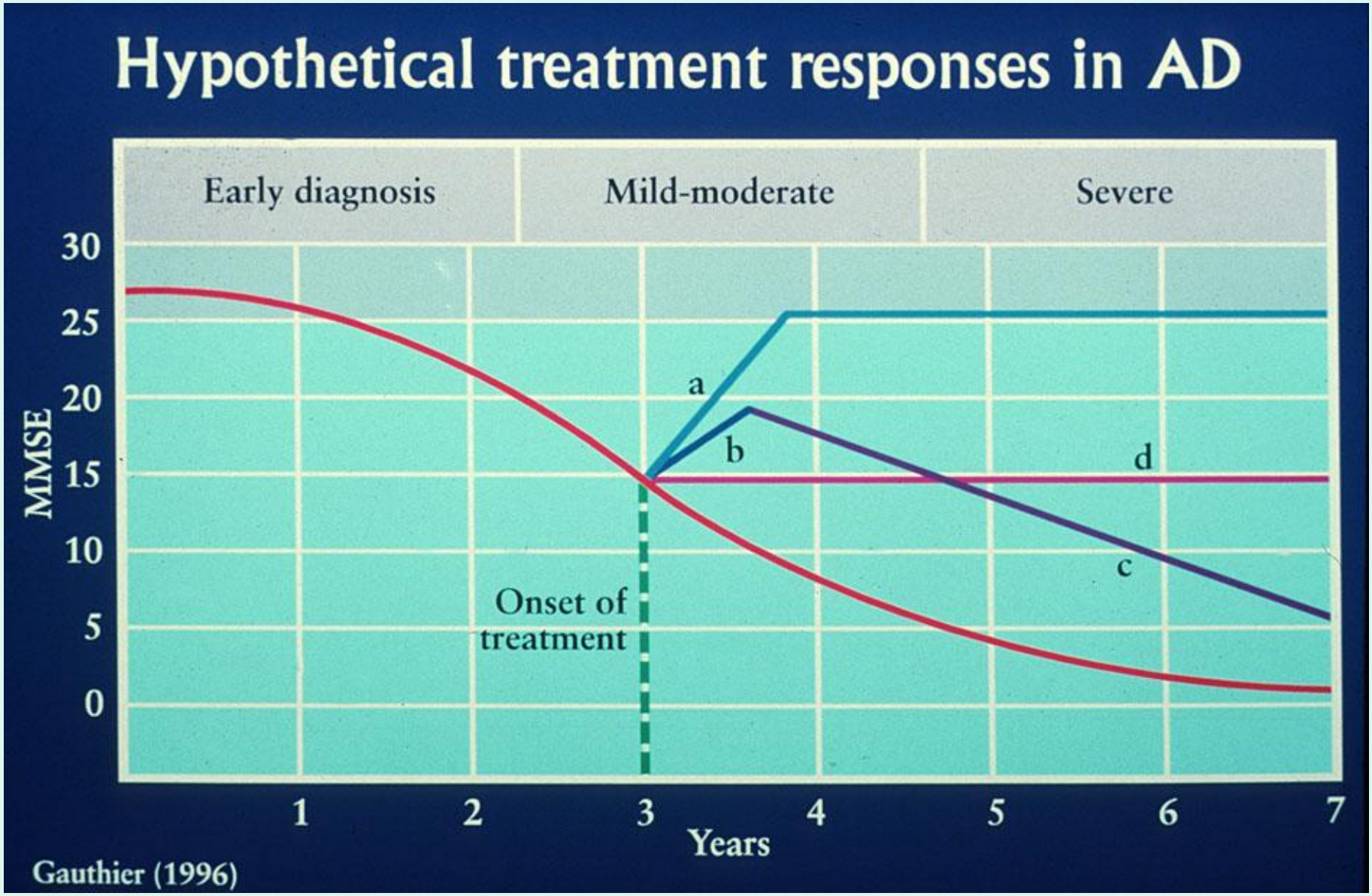
- Structural Neuroimaging (CT, MRI scans)
  - Will remain the cornerstone of early diagnosis but assisted by
    - better databases that provide clinicians access to normal images to compare scans e.g. ANDI – a normative imaging database
    - Serial scans 1-2 years apart with automated volumetric analysis of hippocampus – approx 80% accuracy of predicting dementia when combined with clinical examination

# Neuroimaging of MCI

- Functional Neuroimaging (PET, PIB)
  - PET scans predict conversion from MCI to AD with 80% accuracy.
  - Pittsburgh Compound B (PIB) scans can detect amyloid plaques in vivo. Studies confirm high rates of PIB positive scans in persons with AD and in persons with MCI that subsequently develop dementia. However there are false positives and negatives

# Drug Treatments for Alzheimer's Disease

- Three Types of Treatment
  - Cure
  - Disease Modifying
  - Symptomatic – current situation, all modest effectiveness
    - Cognition - cholinesterase inhibitors, memantine,
    - Behaviour - atypical antipsychotics, antidepressants


Hypothetical treatment responses in AD
Early diagnosis
Mild-moderate
Severe
30
25
20
15
10
5
0
MMSE
a
b
c
d
Onset of treatment
1
2
3
4
5
6
7
Years
Gauthier (1996)

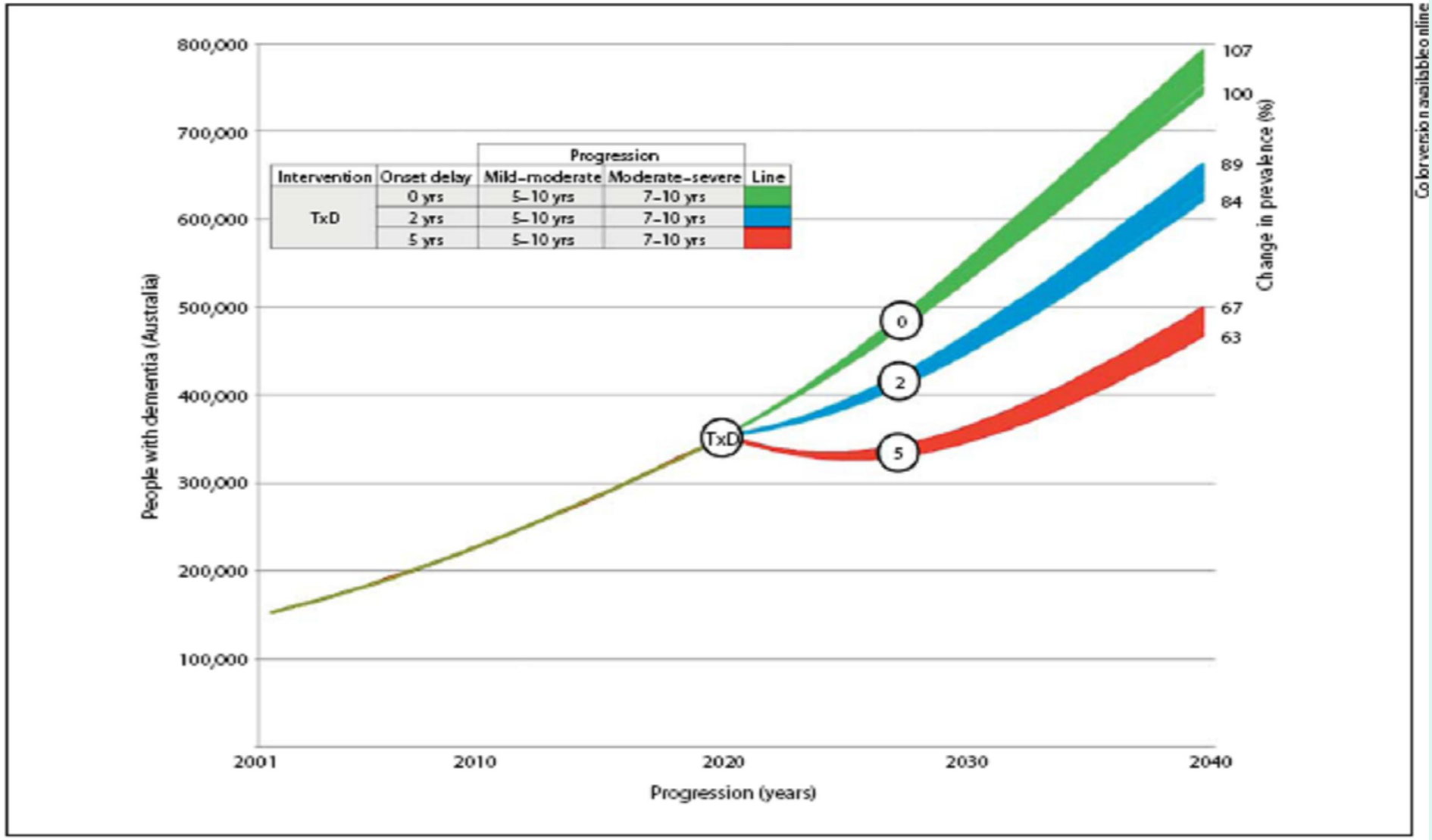
# Disease Modifying Drugs

- Most experimental drugs in some way target the production or elimination of amyloid beta protein
- Disappointing research outcomes over the past 5 years
- Of 13 drugs in Phase III trials in June 2009, 10 were unsuccessful, 3 ongoing
- Of 25 drugs in Phase II trials in June 2009, only 3 were successful, most were ongoing or negative
- At least 17 drugs in Phase I trials in June 2009

# Disease Modifying Drug Treatment

- It is unlikely that there will be any disease modifying treatments for Alzheimer's disease for at least 5 years
- Perhaps within 10 years there will be more effective treatment options available
- It is difficult to predict the effects of such treatment on disease prevalence and burden
- It is unlikely that there will be a cure in the foreseeable future

# Changes in Dementia Prevalence due to Slowed Progression with and without delay of Onset (Vickland et al 2010)



# Conclusion

- The prevalence and incidence of Dementia will rise steeply over the next 40 years
- Dementia disease burden will have a concomitant increase
- There are currently no proven effective prevention and treatment strategies
- Even if effective prevention and/or treatment strategies were implemented in 2010, there will still be considerable incidence, prevalence and burden of dementia in 2050
- There are major workforce ramifications of these changes

# Thank You!

**Brian Draper**

B.Draper@unsw.edu.au

**www.med.unsw.edu.au/adfoap**