My memory really sucks Mildred, so I changed my password to “incorrect”
My memory really sucks Mildred, so I changed my password to “incorrect”.
That way when I log in with the wrong password, the computer will tell me ... “Your password is incorrect.”
Changing demographics: Australia

ABS: Population by Age and Sex, Australian States and Territories Jun 2010.
ABS: Population projections, Australia, 2006 to 2101.
Living Longer and Living Better
Auguste Deter
51 yrs
100 years ago

Paul McCartney
69 yrs

John Howard
72 yrs

Hugh Hefner
84 yrs

Living Longer
and Living Better

DCRC
Dementia Collaborative Research Centres

CHeBA
Healthy Brain Positive Ageing

UNSW
The University of New South Wales
Patterns of disease over last 100 years

Death rates Australia (1907-2003): Infectious diseases

Magnus & Sadkowsky 2006. Cat. no. PHE 73. Canberra: AIHW.
Patterns of disease over last 100 years

Death rates Australia (1907-2003): Circulatory diseases

Magnus & Sadkowsky 2006. Cat. no. PHE 73. Canberra: AIHW.
Patterns of disease: 85+yr olds

Death rates Australia (1968-2003): nervous system diseases

Magnus & Sadkowsky 2006. Cat. no. PHE 73. Canberra: AIHW.
Is dementia inevitable?

• Biggest barrier to healthy, happy ageing is brain disease
• But not inevitably, dementia affects
  – 5% of people > 65 years but not 95%
  – 20% > 80 .... 80%
  – 30% > 90 .... 70%
Tripling in Australia

Access Economics for Alzheimer’s Australia, 2009
What is the Sydney Memory and Ageing Study (MAS)?

- A longitudinal epidemiological study of people aged 70-90 in 2006
- Funded by NHMRC Program Grants

www.cheba.unsw.edu.au
What is MCI?

- MCI = Mild Cognitive Impairment
- COGNITIVE means related to memory and other thinking functions such as language, reasoning, way-finding
- MCI definition requires:
  - Subjective cognitive complaint
  - Objective impairment on testing
  - Essentially normal function
- MCI is not dementia but may be pre-dementia
What is dementia?

- Acquired decline in cognition and function
- Not caused by acute confusional state (delirium) or psychiatric condition
- Over 100 causes
- Alzheimer’s is most common
- Vascular dementia is second most common
Who are MAS and partners?

Sydney Memory and Ageing Study
Brain and Ageing Research Program
www.cheba.unsw.edu.au
Who participated in the study?

• Population based sample
  – 70-90 yo\textsuperscript{s}, Electoral Roll, Eastern Sydney
  – Community dwelling

• Excluded people with:
  – dementia, major psychiatric disorders
  – neurological disorders
  – developmental disability
  – active malignancy
  – insufficient English to test
What we did?

• Comprehensive assessment of 1037 participants and informants
  – detailed neuropsychological tests
  – MRI (52.3%); bloods, genetics (>90%)
• Follow up: at 1, 3 & 5 yrs by telephone and at 2, 4 & 6 yrs with comprehensive assessment

Why we did the study?

• What is rate of mild cognitive impairment?
• What happens to people with MCI?
• What is rate of new cases of MCI and dementia (incidence)?
• What predicts cognitive decline?
• What predicts improvement?
• What is general health of older population
How common is MCI?

• Baseline MCI prevalence 34.8% (in ESB)
• Most published MCI rates range 3-25%
• New MCI cases 2 years later 104.6 per 1000 person years; (men more than women)

Brodaty et al. (2013) *Alzheimer’s & Dementia*
Bad news: Progression to Dementia

• Progression MCI to dementia = 4.8% / 2 yrs
  – Similar to 2.6% annual reported for long term studies

• Progression No Cognitive Impairment to dementia = 1.2%
  – Slightly lower than estimated 1.8% for similarly aged persons

Petersen et al (2001) *Neurology*; 56(9):1133-1142
Brodaty et al. (2013) *Alzheimer’s & Dementia,*
Good news: MCI better or stable

• Two years later, of those with MCI
• 28.2% at baseline reverted to normal
  – Similar to published rates 31-37%\textsuperscript{1,2,3}
• About 2/3 were stable MCI

\textsuperscript{1}Manly et al. (2008). *Ann Neurol*;63(4):494-506.
\textsuperscript{3}Artero et al. (2008). *J Neurol Neurosurg Psychiatry*; 79(9):979-984
Risk Factors for developing MCI

• Increased MCI risk:
  – Apolipoprotein E4
  – High homocysteine
  – Heart disease

• Reduced MCI risk:
  – Better odour identification
  – Visual acuity
  – Mental activity
Reversion MCI to normal *more likely if*:

- Higher complex mental activity
- Greater openness to experience
- Better vision
- Better smelling ability
- Larger combined volume of left hippocampus and left amygdala
- Larger drop in diastolic blood pressure over 2 years
Reversion MCI to normal /less likely if:

- Multiple cognitive deficits
- More severe cognitive impairment
- Informant-based memory complaint
- Arthritis?
Depression and cognition
Simone Reppermund
Bernhard Baune
Depression & cognitive impairment

• Depression
  – Current depressive symptoms and
  – Past depression
• 800 participants (57% F, mean age 78.6 yrs)
• Clinically significant symptoms of depression (GDS score ≥ 6) = 6.1%
• 16.6% reported a history of depression
Depression, cognition and function

- Current and past depressive episodes are associated with
  - poorer cognitive performance memory and executive function
  - but not with functional abilities
Depression and inflammation

- Age associated with inflammation in body
- Inflammatory markers (IL-6 and IL-8) associated with current depressive symptoms
- And with new onset (IL-8) of depressive symptoms over two years
- Some inflammatory markers may be causative, some a result of depression.
- No association with anxiety symptoms
- Could inflammation be link between depression and AD?
The hippocampus

- parietal lobe
- occipital lobe
- frontal lobe
- thalamus
- amygdala
- hypothalamus
- locus coeruleus
- cerebellum
- dorsal raphe nucleus

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Work & hippocampal atrophy

• 151 cognitively intact; mean age 80.8yrs
• Follow-up over 2-3 years
• Supervisory work in mid-life associated with 5x slower hippocampal atrophy in late-life than those without such experience
• Not accounted for by age, sex, physical activity, Apoε4, depression
• Suggests link between mid-life cognitive lifestyle & long-term neuroplasticity

Suo et al NeuroImage 2012; 63: 1542-1551
Academic output

• 55 papers published in refereed journals
• 81 papers in progress
  – Epidemiology – rates, risks and protectors
  – Diabetes, lipids, inflammation, proteins
  – Neuroimaging
  – Diet, body size
  – Falls, balance, gait, dizziness
  – Neuropsychology
  – Depression, anxiety, personality change
• Capacity Building
So what?

• We know MCI is common and who is at risk of progression
• We are working with other groups to determine interventions to slow or prevent
  – Computer Cognitive Training plus
    • Physical exercise (SMART trial)
    • Transcranial direct current stimulation (tDCS)
  – Trial of antibody against amyloid protein in brain
  – POW Hospital, Lynne 9382 3733
Thank you

Centre for Healthy Brain Ageing
Sydney Memory and Ageing Study
Brain and Ageing Research Program
www.cheba.unsw.edu.au