Brain Health & Dementia in Urban Aboriginal Australians

Outcomes from the Koori Growing Old Well Study

Professor Tony Broe and the Aboriginal Health and Ageing Research Group

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Neuroscience Research Australia

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Overview of Talk

Background

• Do Aboriginal people grow old?
• The burden of dementia in remote people? The Kimberley Study

Koori Growing Old Well Study

• Aims
• Methods
• Results: Dementia Rates
• Associations & ‘Risk factors’

Discussion
BACKGROUND

- 548,370 Aboriginal & Torres Strait Islander Australians (2.5% overall Australian population)
- Increasing – 2 x rate of mainstream growth
- Aboriginal Population now approaching 1788 levels

20% INCREASE
2006 → 2011
National Census

Projected Indigenous population growth

Source: ABS Census, 2011
DO ABORIGINAL PEOPLE GROW OLD?

• A “young” population with lower average life-expectancy:
  • MEN = 67.2 years vs. 78.7 (GAP = 11.5 years)
  • WOMEN = 72.9 years vs. 82.6 (GAP = 9.7 years)

• Aboriginal health and lifespan today is much the same as non-Indigenous Australians 60 years ago

Source: The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples, ABS 2010
Aboriginal life expectancy today equals non-Indigenous ~ 1950
DO ABORIGINAL PEOPLE GROW OLD?

A “Young” population – overall
• Proportion of non-Indigenous population aged 60+ is 14%
• Proportion of Aboriginal population aged 60+ is 4%
• Varies with communities e.g. La Perouse an older population

However all communities have rising numbers of older people
• At older ages, life expectancy is greater and death rates closer to non-Indigenous (survival effect - 75+ x 1.3 ) (ABS; Cotter et al., 2012)
• Health & Lifespan improving from 1990s (ABS; Thomas et al NT 2006)
• Number of older Indigenous people (age 55+) will more than double between 2006 and 2021 (ABS)

Source: The Health and Welfare of Australia’s Aboriginal and Torres Strait Islander Peoples, ABS 2010
DEMENTIA in REMOTE ABORIGINAL PEOPLE

Kimberley (KICA) Study

• 363 Aboriginal Australians
• 45 – 96 years
• Prevalence of dementia:
  – 12.4% at 45 yrs+ ($n = 45$)
    5 x non-Indigenous 2.4%
  – 23.8% at 60 yrs+ ($n = 40$)
    3-4 x non-Indigenous 6.8%
• CIND prevalence = 8%

DEMENTIA IN REMOTE ABORIGINAL PEOPLE

Kimberley (KICA) Study (n=45)

<table>
<thead>
<tr>
<th>Type of Dementia</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alzheimer’s disease</td>
<td>11</td>
<td>24%</td>
</tr>
<tr>
<td>Vascular dementia</td>
<td>6</td>
<td>13%</td>
</tr>
<tr>
<td>Alcohol induced dementia</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Other medical conditions</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Type not defined</td>
<td>24</td>
<td>53%</td>
</tr>
</tbody>
</table>

DEMENTIA IN REMOTE ABORIGINAL PEOPLE

Kimberley (KICA) Study


www.neura.edu.au/aboriginal-ageing
Overview of Talk

Koori Growing Old Well Study

- Aims
- Methods
- Results
  - Dementia Rates
  - Associations
  - Potential ‘Risk factors’

Discussion
Highest number of Indigenous peoples = NSW 172,624 (2.5%)  
Highest proportion of Indigenous peoples = NT 56,779 (26.8%)
KOORI GROWING OLD WELL STUDY

5 URBAN/REGIONAL STUDY SITES

- Coffs Harbour
- Nambucca
- Kempsey
- Randwick/Botany
- Campbelltown

58% Coffs Harbour Nambucca Kempsey

42% Randwick/Botany Campbelltown

Disclaimer: This map indicates only the general location of larger groupings of people, which may include smaller groups such as clans, dialects, or individual languages in a group. The boundaries are not intended to be exact. This map is not suitable for use in native title or other land claims.
AIMS – NHMRC Grant

1. To determine, in urban Indigenous populations (aged 60 years and over) the prevalence of dementia, of dementia subtypes (AD; VaD; LBD; FTD; ARBD; TBD) and of cognitive impairment
2. To assess the relative performance of a number of standard as well as adapted instruments for the diagnosis of dementia & cognitive impairment in this population (KICA; MMSE; RUDAS)
3. To examine risk factors for dementia and cognitive impairment in this population.
4. To examine the use of formal dementia services and community services by Indigenous people with dementia and describe the burden of dementia in their carers.
5. To build capacity, for Aboriginal researchers and other community members, in dementia assessment and care; risk factor detection and prevention.
Specific Methods
Aboriginal Population Health Research

• Have **Street Cred** with the local Aboriginal communities in support and provision of health services and health education

• Approach local communities through **Aboriginal Controlled Organisations** (Land Councils, ACCHOs, Elders Group, etc) - **To:** Outline the study, short term community goals, long term study goals; Plan **partnerships**; Obtain participation letters

• Recruit local **Aboriginal Researchers** at each site to engage community members, publicise the study, assist the census & approach & recruit participants & their ‘contact persons’

• Seek **Aboriginal Researcher access** to ‘community lists’; prior to further ‘snowball sampling’ to develop a 60+ “community census” - to remain the property of the community
Specific Methods
Aboriginal Population Health Research

• Obtain **AHMRC Ethics approval** on the basis of meeting NHMRC guidelines for Aboriginal Health research - prior to University and Area Health ethics approval

• Include **Sustainable outcomes** of the research in terms of local capacity building and service development with communities – in addition to specific research aims

• Develop **Local Aboriginal Guidance Groups** for each community to advise on protocols & instruments, guide recruitment and provide study support and an **Aboriginal Reference Group** to monitor study methods, procedures, & outcomes

• **Pilot the instruments & procedures** in the community for cultural acceptability, feasibility, emotional impact, time etc
Methods

CENSUS
How many Aboriginal people aged 60 and over live in the community?

NELIGIBLE PARTICIPANTS GIVE INFORMED CONSENT
Phase 1: Life span survey and cognitive screening

Screened positive
MMSE ≤ 26 &/or
mKICA ≤ 35 &/or
RUDAS ≤ 25

Screened negative
MMSE > 26 &
mKICA > 35 &
RUDAS > 25

Phase 2: Medical Assessment and Contact Person Interview

20% randomly selected
Phase 2: Medical Assessment and Contact Person Interview

End study participation and case reviewed by consensus panel for diagnosis

N = 153
N = 127
N = 175
N = 336
N = 161
N = 175
N = 555
METHODS – Clinical Consensus Diagnosis

• **Consensus Panel:** 3+ clinicians (neuropsychologists/geriatricians) Blind to all participant data except medical interviews

• **Dementia Diagnostic Criteria used:**
  • “All-Cause” Dementia (McKhann, et al., 2011 & DSM 111 R)
  • Alzheimer’s dementia (McKhann, et al., 2011; DSM-IV)
  • Vascular dementia (DSM-IV)
  • Dementia with Lewy Bodies/PDD (McKeith, 2005; DSM IV)
  • Fronto-temporal dementia (Neary et al., 1998)
  • Dementia due to substance abuse (DSM-IV)
  • Dementia due to other medical condition (DSM-IV)
  • Mixed dementia

• **Mild Cognitive Impairment** (Winblad et al., 2004)
KGOWS PARTICIPANTS – 60+

Study Census - 555 eligible people (ABS Census: 2006 - 609 people)
336 participants (a 61% sample)

• 328 Aboriginal people
• 2 Torres Strait Islander people
• 6 Both Aboriginal & TSI

• Aged 60-92 years (73% 60-69 yrs)
• 60% Female - 40% Male
• 2% ESL (60% in the Kimberley)
KGOWS PRELIMINARY RESULTS:

RESULTS: Dementia Prevalence at 60+

• Dementia Rate = 3 x non-Indigenous Australian rate

• Types of dementia:
  – Alzheimer’s 56%
  – Vascular 22%
  – Head trauma 12%
  – Alcohol ~ 5%
FACTORS ASSOCIATED with DEMENTIA

• In the KGOWS data we looked first at those positive associations with dementia identified in the KICA Study – and then at others of interest from the literature

• ‘Associations’ may suggest potential ‘Risk Factors’ - which then require further longitudinal & other studies
**KICA RESULTS:**

**FACTORS ASSOCIATED with DEMENTIA in KICA**

<table>
<thead>
<tr>
<th></th>
<th>KICA Prevalence</th>
<th>Multivariate OR [CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>46% 60yrs+</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>45%</td>
<td>3.1 [1.4 – 6.8]</td>
</tr>
<tr>
<td>No formal education</td>
<td>40%</td>
<td>2.7 [1.1 – 6.7]</td>
</tr>
<tr>
<td>Current smoker</td>
<td>35%</td>
<td>4.5 [1.1 – 18.6]</td>
</tr>
<tr>
<td>Previous stroke</td>
<td>9%</td>
<td>17.9 [5.9 – 49.7]</td>
</tr>
<tr>
<td>Head Injury</td>
<td>51%</td>
<td>4.0 [1.7 – 9.4]</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>3%</td>
<td>33.5 [4.8 – 232.3]</td>
</tr>
</tbody>
</table>

### KGOWS PRELIMINARY RESULTS:

**FACTORS ASSOCIATED with DEMENTIA - KGOWS**

<table>
<thead>
<tr>
<th></th>
<th>Prevalence</th>
<th>MULTI Odds Ratio [95% CI]*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (60-69)</td>
<td>73%</td>
<td>1.0</td>
</tr>
<tr>
<td>Age (70-79)</td>
<td>23%</td>
<td><strong>3.4 [1.64-6.85]</strong></td>
</tr>
<tr>
<td>Age (80+)</td>
<td>4%</td>
<td><strong>8.3 [2.38-29.02]</strong></td>
</tr>
<tr>
<td>Male</td>
<td>40%</td>
<td><strong>2.0 [.99-3.88]</strong></td>
</tr>
<tr>
<td>Low education</td>
<td>45%</td>
<td><strong>1.5 [0.74-2.91]</strong></td>
</tr>
</tbody>
</table>

*including age, sex, education*
KGOWS PRELIMINARY RESULTS:
EDUCATION – URBAN POPULATIONS - KGOWS

<table>
<thead>
<tr>
<th>Education Level</th>
<th>KGOWS</th>
<th>KGOWS - KICA Remote</th>
</tr>
</thead>
<tbody>
<tr>
<td>No schooling - KGOWS</td>
<td>6</td>
<td>40%</td>
</tr>
<tr>
<td>Primary</td>
<td>35</td>
<td>11%</td>
</tr>
<tr>
<td>Incomplete secondary</td>
<td>110</td>
<td>33%</td>
</tr>
<tr>
<td>Secondary yr 10+</td>
<td>34</td>
<td>10%</td>
</tr>
<tr>
<td>Nursing/Teaching</td>
<td>10</td>
<td>3%</td>
</tr>
<tr>
<td>Trade</td>
<td>19</td>
<td>6%</td>
</tr>
<tr>
<td>Certificate</td>
<td>67</td>
<td>20%</td>
</tr>
<tr>
<td>Diploma</td>
<td>31</td>
<td>9%</td>
</tr>
<tr>
<td>Bachelors degree or higher</td>
<td>21</td>
<td>6%</td>
</tr>
</tbody>
</table>
**KGOWS PRELIMINARY RESULTS:**

**FACTORS ASSOCIATED with DEMENTIA - KGOWS**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Prevalence</th>
<th>MULTI Odds Ratio [95% CI]*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current smoker</td>
<td>26%</td>
<td>1.7 [0.8 – 3.7]</td>
</tr>
<tr>
<td>Previous stroke</td>
<td>24%</td>
<td>4.1 [2.0 – 8.2]</td>
</tr>
<tr>
<td>Head Injury</td>
<td>29%</td>
<td>2.9 [1.5 – 5.9]</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>8%</td>
<td>5.0 [1.7 – 14.2]</td>
</tr>
<tr>
<td>Diabetes</td>
<td>44%</td>
<td>1.7 [0.9 – 3.3]</td>
</tr>
<tr>
<td>Hypertension</td>
<td>63%</td>
<td>0.7 [0.3 – 1.4]</td>
</tr>
</tbody>
</table>

*controlling for age
**KGOWS PRELIMINARY RESULTS:**

**FACTORS ASSOCIATED with DEMENTIA - KGOWS**

<table>
<thead>
<tr>
<th></th>
<th>Prevalence</th>
<th>MULTI Odds Ratio [95% CI]*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current alcohol</td>
<td>41%</td>
<td>1.7 [0.8 – 3.7]</td>
</tr>
<tr>
<td>Past alcohol</td>
<td>72%</td>
<td>2.6 [0.9 – 7.1]</td>
</tr>
<tr>
<td>High AUDIT-C (current)</td>
<td>20%</td>
<td>1.8 [0.8 – 4.3]</td>
</tr>
<tr>
<td>High AUDIT-C (past)</td>
<td>48%</td>
<td>2.7 [1.2 – 6.2]</td>
</tr>
<tr>
<td>Depression (lifetime)</td>
<td>31%</td>
<td>1.2 [0.6 – 2.6]</td>
</tr>
</tbody>
</table>

*controlling for age*
Overview of Talk

• Discussion

Why are dementia rates so high - in both Urban and Remote Aboriginal people

How could Social Determinants translate into Biological Outcomes - such as Alzheimer’s?

What comes next?
Why are dementia rates so high?

- **KGOWS** has confirmed that Urban Aboriginal people - 60 yrs+ have very high rates of dementia (21%) - 3 x non-Indigenous. Urban rates are comparable to those in Remote people aged 60+ in the KICA Study (23.8%)

- **High dementia rates** occur despite significant group differences between urban & remote Aboriginal people in - lifestyle, culture, language, education, social organisation & some health indices.

- **What are the potential brain risk factors in common?** for urban & remote Australian Aboriginal people
Aim - To examine potential dementia risk factors across the lifespan

• Proximal factors in mid life (primarily biological) e.g. vascular/metabolic risks - which have been the focus of Aboriginal Health research to ‘close the gap’ - with some success (Thomas D 2006; ABS 2010)

• Distal factors in early life (primarily social) affecting brain growth - may increase Aboriginal mid-life health risks and contribute directly to dementia pathology (Snowden 1996; Starr 2000; Felliti 2002; Danese 2009; Maselko 2010)
Proximal or mid-life factors assessed

- Hypertension, Cholesterol,
- Obesity, Diabetes
- Heart Disease, Stroke
- Smoking, Alcohol, Drugs
- Head Injury
- Mental illness

Known causes of early death & disability
Known risk factors for cognitive decline in non-Indigenous studies
Distal or early life factors assessed

• Separation from family/stolen generations
• Parenting
• Education - formal & informal
• Childhood Trauma (CTQ)
  – Exposure to violence towards women
  – Childhood violence & emotional & sexual abuse
  – Childhood exposure to Alcohol/Drug abuse and to Mental Illness
  – Childhood exposure/entry to Criminal Justice system
• These factors may contribute directly to brain ageing (Broe 2003)
• They may also cause high rates of mid-life cigarette & alcohol use; mental illness; vascular/metabolic risk (Felliti 2002; Danese 2009)
Why are dementia rates so high?
*Likely social determinants we could not assess*

– From 1788 Aboriginal people were progressively removed from their lands & *‘Purpose-in-life’* - developed over thousands of years - to manage the land, plants and animals through the dreaming, fire, paths, water: At a local level by families and local kin - at an area level by language groups or ‘nations’ - at a universal level across Australia *(Gammage ‘The Biggest Estate on Earth’ 2012)*

– As Aboriginal groups were displaced from their own lands their role was rapidly reduced to one of **Dependency**: on blankets & rations; on stations, missions & the APB; on cigarettes & alcohol; and - with a lack of good education & ‘knowledge’ jobs - on social security payments

– Skilled jobs & on-going education must be high priorities
Next Question?

Does Alzheimer’s disease have major Social Determinants? We believe it has

If so, how could the Social Determinants that I have outlined in early life, and across Aboriginal communities as a whole, translate into Biological Outcomes such as the ‘Amyloid Cascade’ in Alzheimer’s Disease?
Social Determinants of Biological Outcomes?

• There are plenty of Biologically Plausible Theories:
  
  – **Brain plasticity** – Our brains grow with cognitive, physical, emotional activity over our lifespan (but more in early life)
  
  – **Brain reserve or capacity** - viewing the brain as a muscle - is most popular & (to me) least satisfying theory (Jorm 1997)
  
  – **Selective neuronal vulnerability** in specific brain networks
    - Stress related loss of hippocampal neurons due to cortisone output – The oldest theory but still out there (Sapolski 1992 etc)
    - Structural changes in Frontal networks e.g. in PTSD (De Bellis 2002)
  
  – **Epigenetic modifications** of gene products in response to environmental factors e.g. education (Kwok et al 2013)
  
  – **Telemere erosion** (a marker of cell ageing) – is associated with violence during childhood (Shalev et al, Mol Psych 2013)
**Hypothesis:** Over a lifespan these cumulative risks create an **Amyloid Cascade** in the brain.

- **Childhood Risks:**
  - Birth weight;
  - Parenting; removal;
  - Childhood trauma;
  - Education;
  - Epigenetics

- **Early Adult Life Risks:**
  - Employment;
  - Further education;
  - Discrimination;
  - Head injury;
  - AD risk genes

- **Later-life Risks:**
  - Age; alcohol; cigs; mental illness; mental & physical inactivity; obesity; BP; heart disease; small strokes

**Co-morbid pathologies:**
- tau, α-synuclein

**A Cascade of Risk Factors for Alzheimer’s**

**Amnestic MCI - Alzheimer’s Disease - AD+**
What comes next?
What comes next? These Projects have initial funding

- **Koori Dementia Care Project 2012-2013** *(ADHC funded)*
  To build capacity in Partner Communities in dementia knowledge & in accessing dementia care services

- **Koori Lifespan Project 2012-2014** *(RW & JG Fellowship)*
  To explore links between childhood social determinants, adult cognition and MRI structural brain measurements
What comes next? Applications pending

• **Koori Healthy Brain Ageing Project** - NHMRC Appl 2013
  To translate mid-life research findings into adult prevention (50+) using physical, social, cognitive interventions

• **KGOWS Follow-up (Risk Factors)** - NHMRC Appl 2014

**Longer term - Child/Adolescent Research Partnerships**
To translate any early-life findings into brain growth, educational & skilled job strategies
SUMMARY

• The number of older Aboriginal Australians is increasing rapidly - with most Aboriginal people (70%) living in urban (non-remote) areas of Australia

• The burden of dementia - particularly Alzheimer dementia - is very high, unrecognised, and requires better support systems for older Aboriginal people

• A process of cumulative social & biomedical dementia risks across the life-course is likely and needs study

• As well as current action on mid-life biomedical risks – child & family support, early & continuing education, & skilled jobs - are crucial to brain health & a better life
Acknowledgements

Aboriginal communities & study partners:
La Perouse Land Council & ACHC Health Link; Tharawal ACMS, Campbelltown; Durri ACMS and Booroongen Djugun Kempsey; Darrimba Maarra AHC, Nambucca; Galambila AHS, Coffs Harbour

• NHMRC/AHMRC
• Department of Health and Ageing
• Ageing Disability & Home Care NSW
• Dementia Collaborative Research Centres
• Alzheimer’s Australia Research
• Australian Association of Gerontology
• Our Participants