Profile and Risk Factors of Post-Stroke Cognitive Impairment in Diverse Ethno-Regional Groups: the STROKOG consortium

Jess Lo
Centre for Healthy Brain Ageing (CHeBA)
University of New South Wales, Sydney, Australia
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- About STROKOG
- Results from our first project
Consortia at CHeBA

- Combine data from cohort studies from around the world
- Provide larger sample sizes necessary to address important research questions
- Provide the ability to replicate findings in different geographical areas and ethnic groups
- Develop a research community
STROKOG

- a consortium which brings together international studies of cognitive decline and dementia following stroke or TIA
- Led by Perminder Sachdev
- Established in 2015

Aims:
- Facilitate a better understanding of the determinants of vascular contributions to cognitive disorders;
- Help improve the diagnosis and treatment of vascular cognitive disorders.
Membership criteria

- Prospectively recruited patients with stroke/TIA
- Longitudinal (at least 1 follow-up)
- N > 75
- Major outcome measures include dementia / CI

- Willing to share data
- Willing to contribute intellectually
Our members

- Currently 32 studies
- 18 countries
- Total N >17,000
STROKOG data

Types of data
- Hospital + community based
- Various age ranges (18+, 40+, no limit)
- Follow-up: median 5 yr, up to 21 yr
- Sample size: 80 to 6000 (median 250)

Assessments:
- ✔ neuropsychological test battery
- ✔ stroke-related data
- ✔ functional tests
- ✔ blood tests
- ✔ MRI (22 studies)
- ✔ PET (6 studies)
- ✔ GWAS (a few studies)
Projects

- **First project** on the profile of and risk factors for post-stroke CI completed
- Welcome members and external researchers to propose and conduct projects. E.g.:

  - *External validation of dementia risk models in stroke-survivors*  
    Eugene Tang,  
    Newcastle University, UK
  - Stroke recovery associated with cognitive impairment  
    Clare Flach  
    King’s College London, UK
First project

Title: Profile of and risk factors for post-stroke cognitive impairment in diverse ethno-regional groups

Aim:

1) To examine the profile of cognitive impairment at 1 – 6 months after stroke/TIA

2) To examine the relationship of vascular risk factors with post-stroke/TIA cognitive function
First project - demographics

- **13 studies** from 8 countries
- **3,520** participants
- 39% female, 61% male
- Mean age: 67.0 years (SD=11)
First project - medical history

Index event

- Ischaemic stroke, 92%
- TIA, 4.7%
- Haemorrhagic stroke, 1.8%

History of medical conditions

- Hypertension: 74%
- Diabetes: 27%
- AF: 14%
- Past stroke: 15%
- Smoker: 49%
First project – methods

Harmonising neuropsychological test scores

- Assign each test to one of 5 cognitive domains
First project – methods

Harmonising neuropsychological test scores

- A regression method was used to calculate **standardised** z-scores **adjusted** by sex, age, education, using control or appropriate normative data.

- **Domain z-score** is the standardised average of all available tests in a domain.

- **Global cognition z-score** is the standardised average of the 5 domain scores.
First project – methods

Assessing domain impairment

- Use the -1.5 SD cut point in the control group

< -1.5 SD = impaired
Results: Domain impairment in each study

- Global cognition: 45%

Combined group
### Mean z-scores in combined cohort

<table>
<thead>
<tr>
<th></th>
<th>Attention &amp; processing speed</th>
<th>Memory</th>
<th>Language</th>
<th>Perceptual motor</th>
<th>Executive function</th>
<th>Global</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.98</td>
<td>-0.84</td>
<td>-1</td>
<td>-1.03</td>
<td>-1.1</td>
<td>-1.47</td>
</tr>
</tbody>
</table>

Attention & processing speed: Memory, Language, Perceptual motor, Executive function, Global.
Risk factors

- Hypertension
- Diabetes
- AF
- Smoking
- History of prior stroke

Key analyses
- Linear mixed models (1-step IPD meta-analysis)
- Outcome: domain and global cognition scores
- Adjusted for sex, age, education, risk factors
## Association of risk factors and cognitive domain scores

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Attention &amp; Processing Speed</th>
<th>Memory</th>
<th>Language</th>
<th>Perceptual Motor</th>
<th>Frontal Executive Function</th>
<th>Global Cognition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effect size; p-value</td>
<td>Effect size; p-value</td>
<td>Effect size; p-value</td>
<td>Effect size; p-value</td>
<td>Effect size; p-value</td>
<td>Effect size; p-value</td>
</tr>
<tr>
<td>Hypertension</td>
<td>-0.09; 0.21</td>
<td>-0.06; 0.30</td>
<td>-0.14; 0.012</td>
<td>-0.13; 0.07</td>
<td>-0.12; 0.07</td>
<td>-0.16; 0.02</td>
</tr>
<tr>
<td>Diabetes</td>
<td>-0.46; &lt;0.001</td>
<td>-0.23; &lt;0.001</td>
<td>-0.16; 0.004</td>
<td>-0.31; &lt;0.001</td>
<td>-0.29; &lt;0.001</td>
<td>-0.47; &lt;0.001</td>
</tr>
<tr>
<td>Smoking (ever)</td>
<td>-0.08; 0.25</td>
<td>-0.13; 0.023</td>
<td>-0.01; 0.93</td>
<td>-0.24; 0.001</td>
<td>-0.01; 0.87</td>
<td>-0.13; 0.06</td>
</tr>
<tr>
<td>Atrial Fibrillation</td>
<td>-0.31; 0.001</td>
<td>-0.03; 0.66</td>
<td>-0.07; 0.38</td>
<td>-0.17; 0.07</td>
<td>-0.26; 0.004</td>
<td>-0.26; 0.005</td>
</tr>
<tr>
<td>History of past stroke</td>
<td>-0.44; &lt;0.001</td>
<td>-0.17; 0.017</td>
<td>-0.25; &lt;0.001</td>
<td>-0.36; &lt;0.001</td>
<td>-0.35; &lt;0.001</td>
<td>-0.45; &lt;0.001</td>
</tr>
</tbody>
</table>

Linear mixed model, adjusting for sex, age, education
Project 1 key conclusions

- We conducted the first large-scale examination of the cognitive profile of stroke survivors in a diverse international setting.
- We found a high prevalence of cognitive impairment in stroke patients across different ethno-regional groups internationally.
- All domains were equally affected.
- Diabetes was strong and independent risk factor for cognitive impairment.
Next/current projects

- Trajectory of cognitive decline in stroke patients
Next/current projects

> Papers focused on a risk factor (e.g. diabetes, AF, hypertension)

- For diabetes: to examine the relationship between pre-diabetes (as defined by fasting blood glucose levels) and CI
For more information

- **Methodology paper**

- **Website**
  [https://cheba.unsw.edu.au/group/strokog](https://cheba.unsw.edu.au/group/strokog)

- **Contact us:**
  Jess Lo  
  STROKOG coordinator  
  jessica.lo@unsw.edu.au

  Perminder Sachdev  
  STROKOG lead  
  p.sachdev@unsw.edu.au