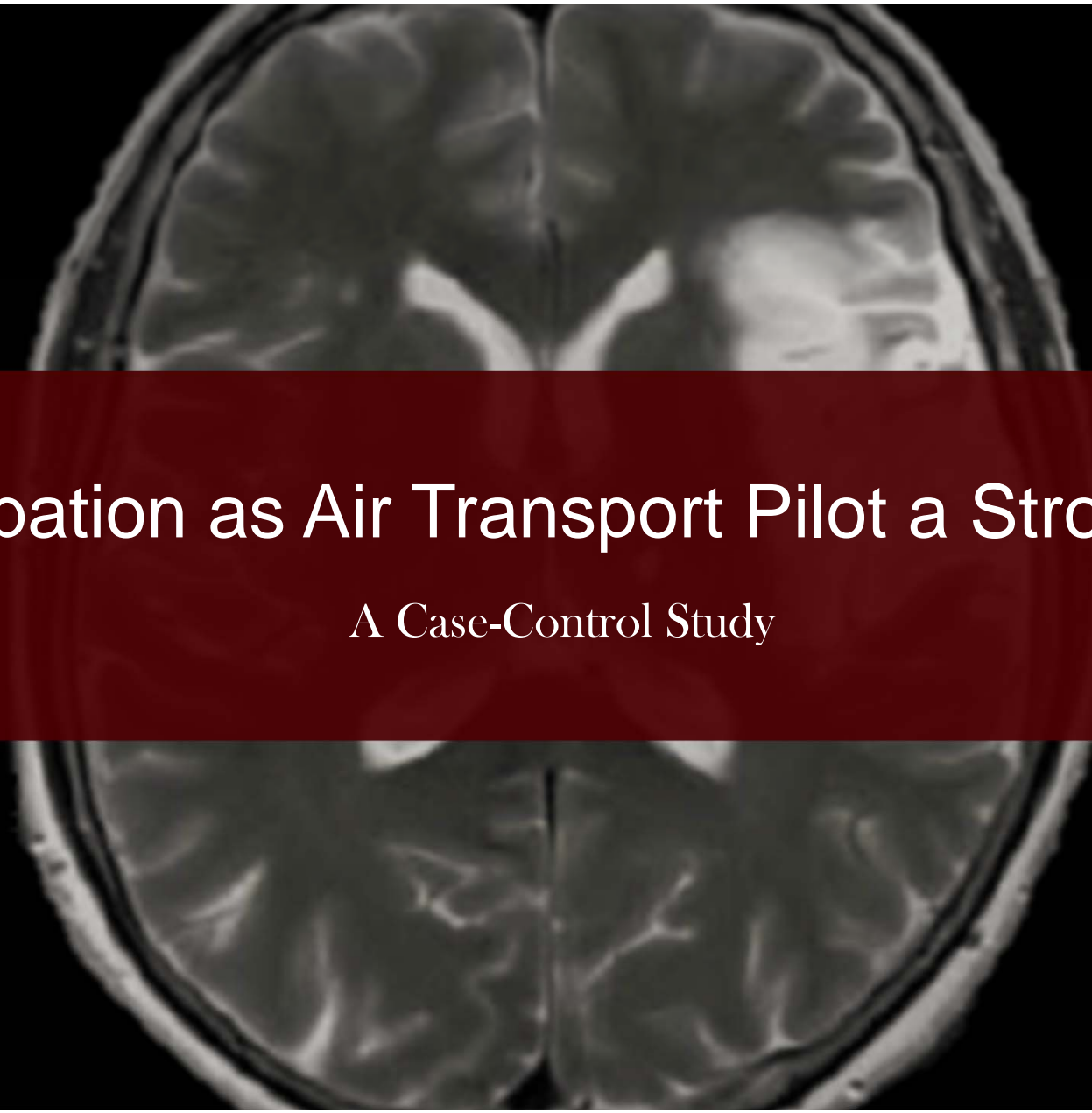


Dr Kevin Tan

Is Occupation as Air Transport Pilot a Stroke Risk?

A Case-Control Study

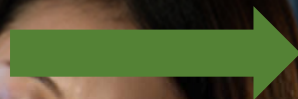


The image features a bronze statue of a man in a state of deep thought, known as 'The Thinker' by Auguste Rodin. The statue is positioned on the right side of the frame, sitting on a rock and resting its chin on its hand. The background is a dark, moody sky with scattered clouds. A prominent dark red horizontal band spans the middle of the image, containing the text 'Why this question?' in white, bold, sans-serif font.

Why this question?

Why?

Shift & Night Work



Ischaemic Stroke

4% increased stroke risk for every 5 years of night shift in nurses

Sleep Restriction



Ischaemic Stroke

Meta-analysis (n=559,252):
HR 1.15 (95% CI, 1.07-1.24) for short sleep

Air Transport Pilot
Occupation



Ischaemic Stroke

Brown et al. Rotating Night Shift Work and the Risk of Ischemic Stroke. American Journal of Epidemiology. 2009.
Vyas et al. Shift work and vascular events: systematic review and meta-analysis. British Medical Journal. 2012.
Leng Y, et al. Sleep duration and risk of fatal and nonfatal stroke: a prospective study and meta-analysis. Neurology 2015.

Aim of Study



Australian Government
Civil Aviation Safety Authority

All Australian Civilian Aviation Pilots
and Air Traffic Controllers

Stroke Cases

Air Transport Pilot
VS
Unexposed

Control Cases

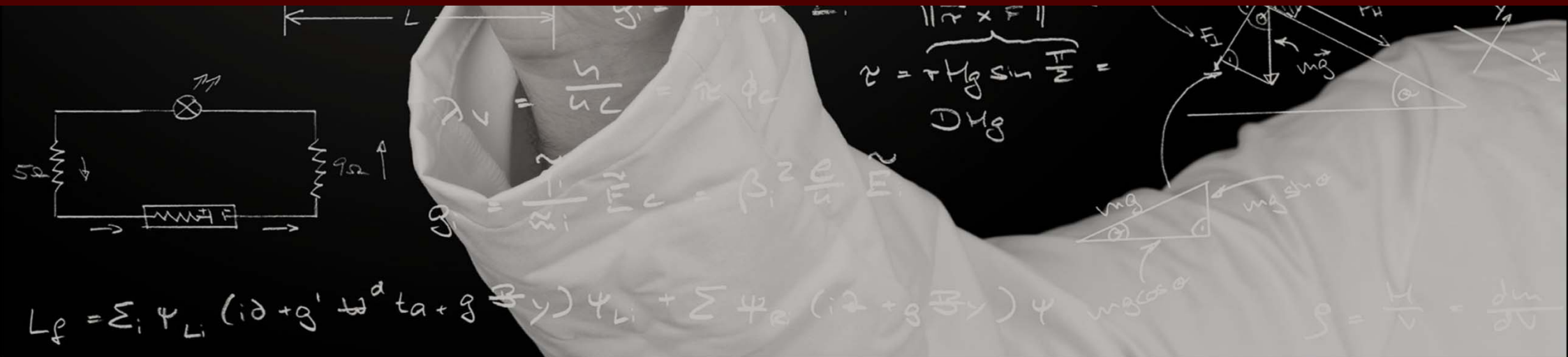
Air Transport Pilot
VS
Unexposed

Hypothesis:

Odds of long haul Air Transport Pilot occupation exposure versus non-exposed in stroke cases different to control cases? ($\alpha = 0.05$)



Method



Ischaemic Stroke Cases & Controls



Australian Government
Civil Aviation Safety Authority

All Australian Civilian Aviation Pilots
and Air Traffic Controllers

Stroke Cases

Ischaemic Stroke or TIA
First Event
Diagnosis by Neurologist

Control Cases

Random Selection
No matching or restriction
4:1

The Exposed

“Air Transport Pilot Occupied in Medium to Long Haul Work”

Air Transport Pilot Licencing
Maximum Take-Off Weight (Fixed Wing) > 15,000 kg
Flight Hours Accumulated > 5000 hours
Multicrew command
Stated Employer a Medium to Long Haul Carrier

 QANTAS

 ANSETT AUSTRALIA

 cargolux

 DHL

 CATHAY PACIFIC

 virgin australia

 中華航空
CHINA AIRLINES



The Unexposed



- Private/recreational pilots (Class 2)
- Commercial pilots (Class 1, non-ATP)
- Air traffic controllers (Class 3)

Limited exposure to shift & night work and trans-meridian travel compared to Air Transport Pilots?

Confounder Management

Complete data on significant* ischaemic stroke risk factors was collected for each subject

*Age, sex, *hypertension, *current smoking, *diabetes,
*other cardiac/vascular disorders, BMI.

Multivariable logistic regression modelling to adjust for confounding by these risk factors

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OCCUPATIONAL AND ENVIRONMENTAL MEDICINE

Intervention trial of sedentary behaviour and low back pain
Bladder cancer and metalworking fluids
Shiftwork and colorectal cancers
Hand and arm disinfection and asthma
Cardiovascular effects in carbon nanotube workers
Air pollution and inhaler use in COPD patients

Impact
Factor
3.912

Results?

oem.bmj.com

BMJ

Sampling Characteristics

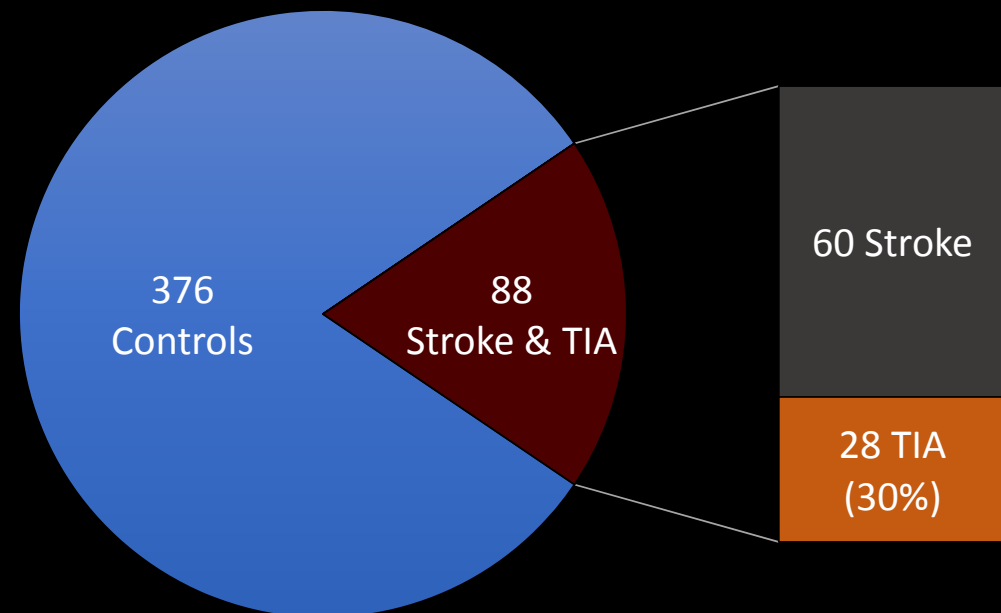
Records: 1985 to 2017

Total subjects 464

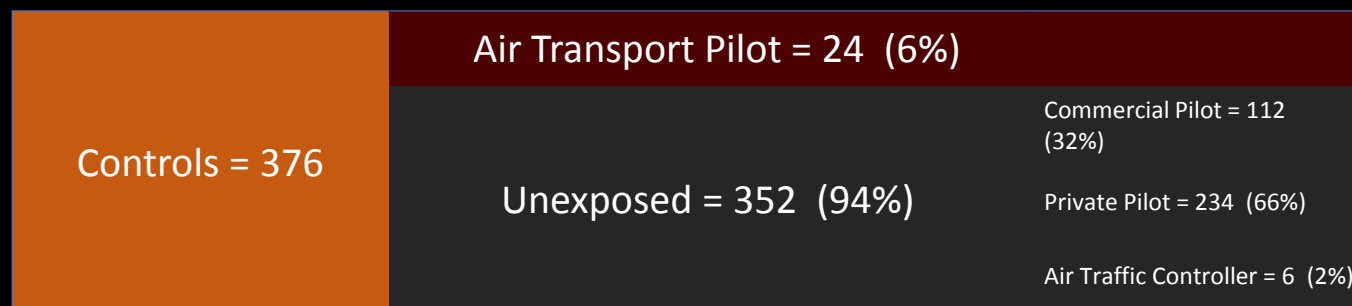
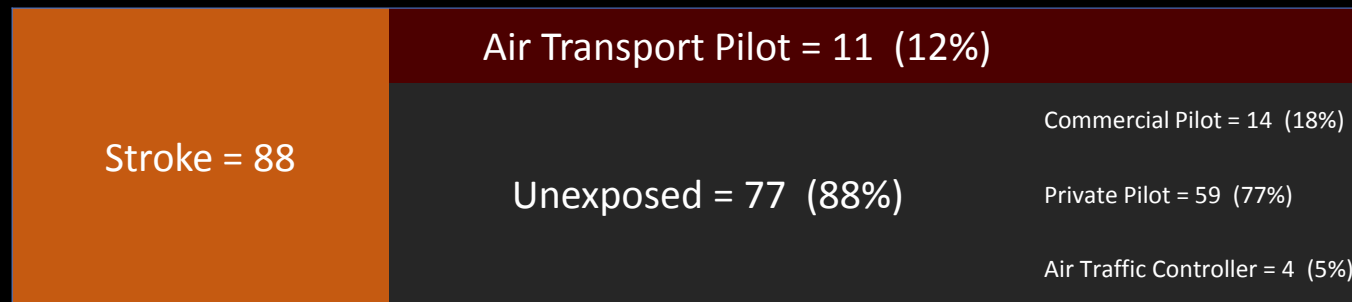
18 years to 88 years age

Median age of 42 years in both groups

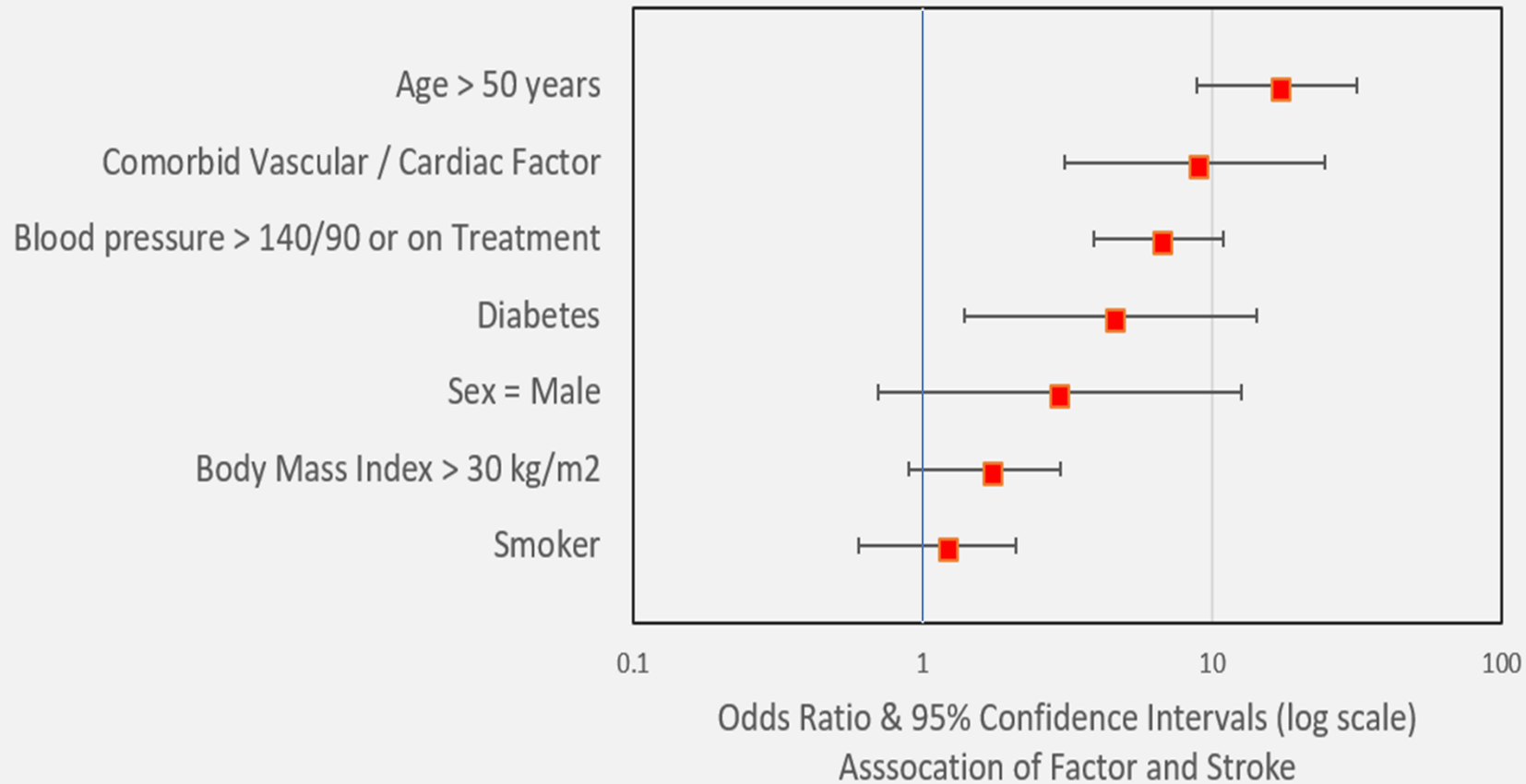
Mostly male (94.4%)



Raw Numbers – Occupational Exposure



Explanatory Factors (Unadjusted)

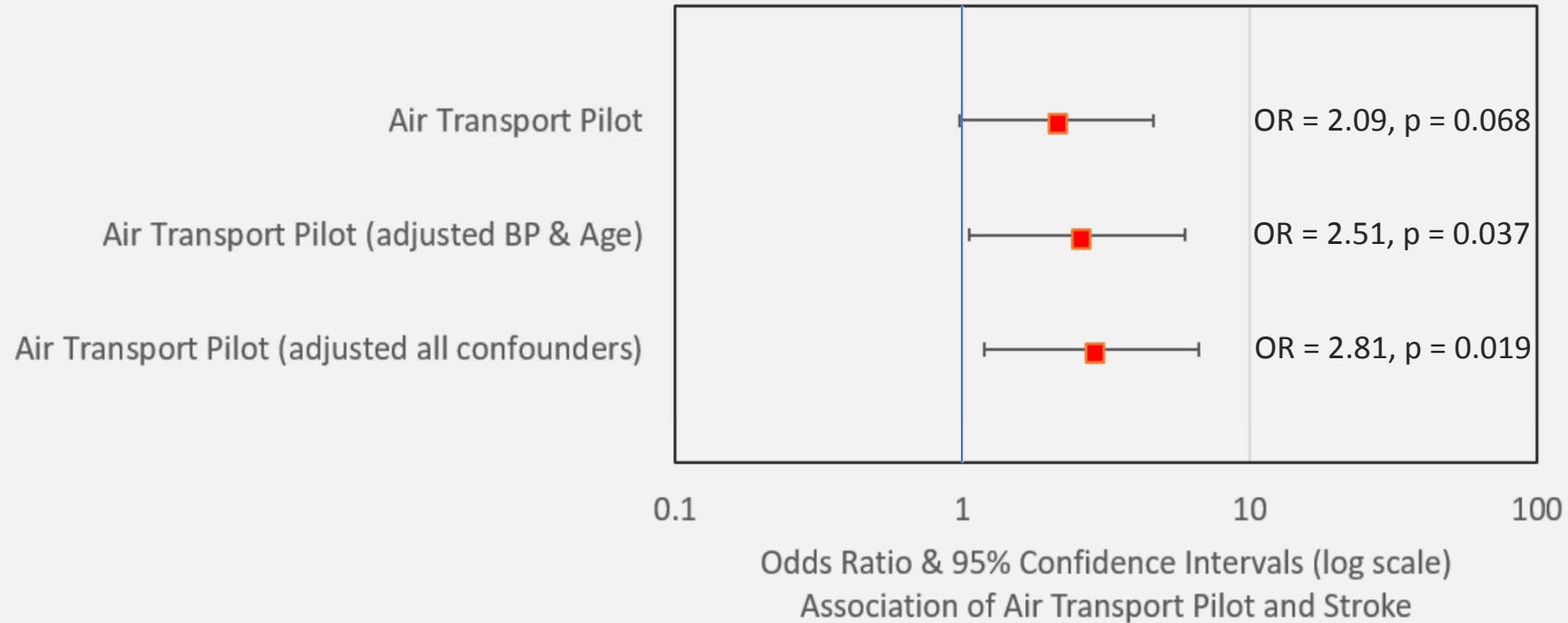


Unadjusted Primary Association & Qualitative Confounder Relationships

Unadjusted Odds Ratio of Air Transport Pilot Exposure and Stroke		Pooled Odds Ratio (Mantel-Haenzsel)
2.09 (95% CI: 0.98, 4.46; p = 0.068)		
Age < 50	Age > 50	Age
1.46	1.52	1.51
Normal BP	BP > 140/90 or Treated BP	BP > 140/90 or Treated BP
4.00	0.78	2.70
BMI < 30	BMI > 30	BMI > 30
2.17	1.96	2.13

*Comorbid cardiac and vascular disease, gender, diabetes, and smoking not amendable to stratified analysis due to small number drop out in some strata.

Primary Outcome – Air Transport Pilot Occupation




The image features a bronze statue of a man in a state of deep thought, known as 'The Thinker' by Auguste Rodin. The statue is positioned on the right side of the frame, sitting on a rock with his chin resting on his hand. The background is a dark, moody sky with scattered clouds. A prominent dark red horizontal band spans the width of the image, containing the word 'Discussion' in white, bold, sans-serif font.

Discussion

2.8–fold Increased Risk of
Stroke in Air Transport Pilot
Occupation?



Weaknesses of this Study



Modest Ischaemic Stroke Case Numbers
Differential Case Selection in the Exposed Group (potential)
Residual Confounding (potential)

Replicate or do better studies?



A photograph of a pilot in a white uniform with a striped tie, looking out of a cockpit window. The sky outside is filled with soft, white clouds. The cockpit interior is visible in the foreground, showing various instruments and controls.

Potential Implications?

- What is the difference between Air Transport Pilots and other Civilian Aviation Participants?
 - Circadian disruption / sleep disruption?
 - Prolonged hypobaric environment?
 - Cosmic radiation? ...
- Possible aeromedical safety risk implications?

Dr Kevin Tan

Is Occupation as Air Transport Pilot a Stroke Risk?

Yes it could be

Acknowledgements

Dr Eugen Mattes, FAFOEM

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Dr Derchieh Hung, Statistician CSL

Dr Craig White, FAFOEM

Dr Kevin Tan

Is Occupation as Air Transport Pilot a Stroke Risk?

Yes it could be



Differential selection of stroke cases wrt ATP status

SOURCE POPULATION

Air Transport Pilots who developed stroke
vs
Other Pilots / ATCs who developed stroke

Some may not apply
for re-certification



Australian Government
Civil Aviation Safety Authority

“Exploratory” Factors (Unadjusted)

