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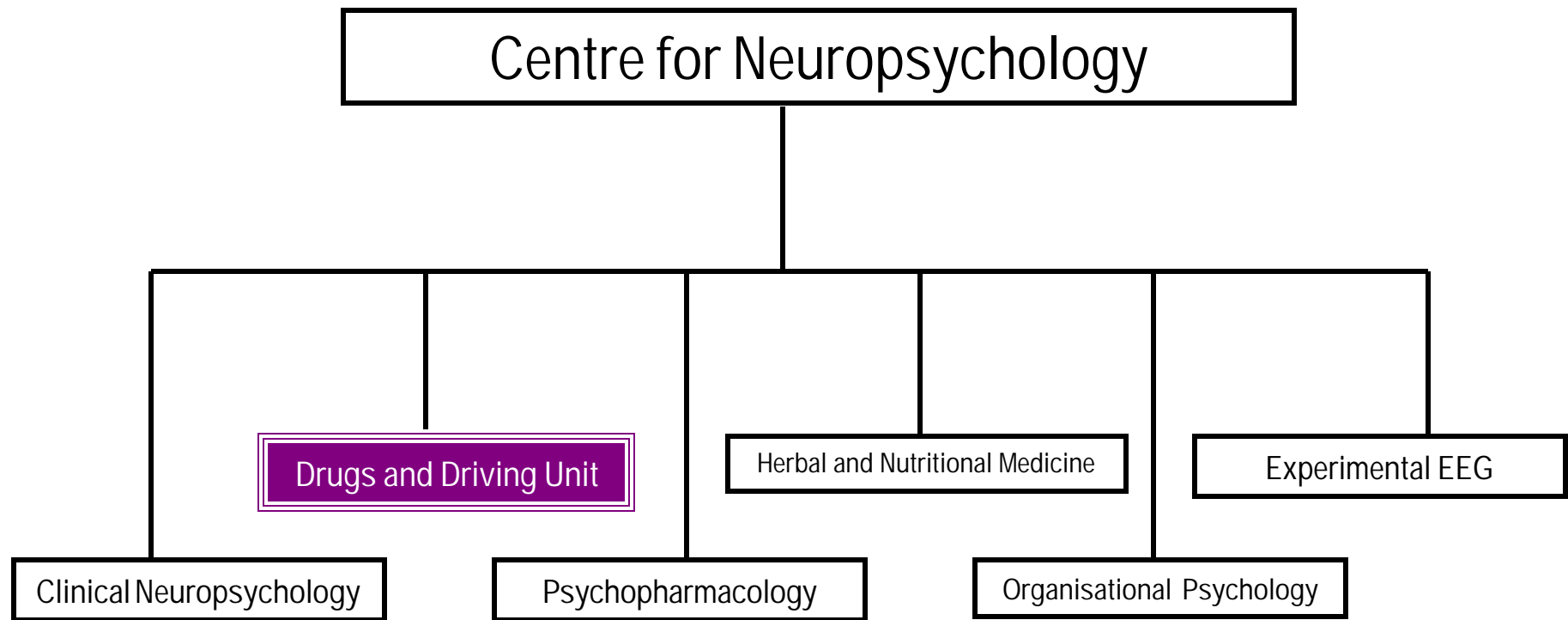
SWINBURNE  
UNIVERSITY OF  
TECHNOLOGY

# The Effects of Dexamphetamine on Driving Performance

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# The Centre for Neuropsychology



# Drugs and Driving Research Unit

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- Swinburne University
  - Professor Con Stough (Director)
  - Dr Katherine Papafotiou (Unit Co-ordinator)
  - Dr Edward Ogden (Medical Officer)
  - Jenny Lloyd (Research Nurse)
  - Kristine Lim (Research Nurse)
  - Cindi Hinch (Research Officer)
  - Amy Fredickson (Research Assistant)
  - Beata Silber (PhD Student)
  
- Victoria Police
  - Inspector Martin Boorman
  
- VicRoads
  - Professor Phillip Swann



# Drugs and Driving Research Unit

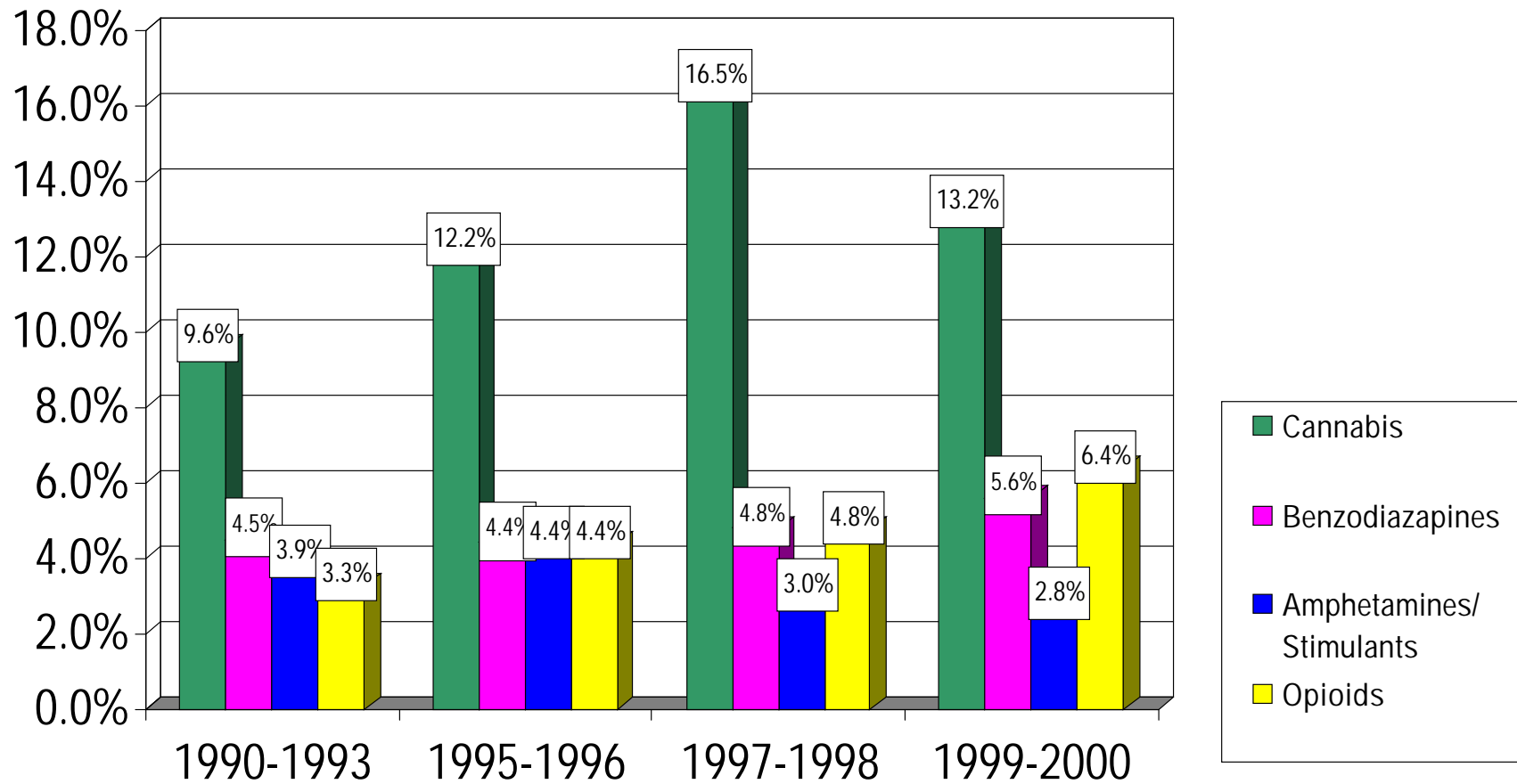
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## ➤ Advisory Panel

- Dr Katherine Papafotiou (chair and minutes secretary)
- Professor Con Stough
- Dr Edward Ogden
- A/Prof Phillip Swann (VicRoads)
- Superintendent Martin Boorman (Victoria Police)
- Superintendent Harry Hayes
- Ms Beata Silber
- Dr Maurice Odell
- Mr Brendan Murphy QC
- Corresponding Members: Dr Marceline Burns (USA), Barry Sweedler (USA), Jim Fell (USA), Professor Gunther Kroj (Germany)

# Statistics on drug-related road fatalities



# Statistics on drug-related road fatalities

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- 23.5% of Australian road fatalities are drug related (Drummer, *et al.*, 2003)
- 4.1% of Australian drivers killed over 10-year period tested positive to stimulants (Drummer, *et al.*, 2003)
  - 23% of truck drivers tested positive to stimulants
- Culpability studies in Australia (Drummer, *et al.*, 2003)
  - THC odds ratio 2.7 (THC above 5ng/ml OR = 6.6)
  - stimulants odds ratio 2.3 (increased to 8.8 in truck drivers)
  - other psychoactive drugs odds ratio 3.8

# Aim

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- To examine the acute effects of 0.42mg/kg dexamphetamine on simulated driving performance, and to establish which, if any, driving abilities become impaired following dexamphetamine administration

# What is dexamphetamine?

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- CNS Stimulant
- Facilitates action of dopamine and noradrenaline



# Methodology - sample

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- 20 participants (10 male, 10 female)
- Aged 21 - 32years
- Medical examination (no illness or disorder)
- Full drivers license (no probationary drivers)
- Previously consumed amphetamines
- Not regular users ( < once month)

# Methodology - drug

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- 5mg Dexamphetamine Tablet (Sigma Pharmaceuticals Pty Ltd, Victoria, Australia)
- 0.42 mg/kg Dexamphetamine Tablet mixed with flour

# Methodology – experimental design

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- Repeated measures, double blind, placebo controlled design
- 2 treatment conditions:
  - i) placebo
  - ii) 0.42mg/kg dexamphetamine



# Methodology - measures

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- CyberCAR™ LITE driver training and evaluation simulator (Thoroughbred Technologies Pty. Ltd.)
- Driving Module consists of 2 tasks
  - freeway traffic driving
  - city traffic driving
- Both tasks completed in day & night conditions
  - In total 20 minutes of driving tasks (5 min each)
- 34 relevant variables were analysed

# Methodology – blood & saliva

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- Two blood and saliva samples
- Blood and saliva samples were analysed for amphetamine levels using the GC/MS method



# Methodology - procedure

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- Practice driving simulator on separate day
- Drug administration
- 1<sup>st</sup> blood & saliva sample (2hrs post-drug admin)
- Driving simulator tasks
  - 4 tasks at 5 minutes each – 20 min in total of driving
- SFSTs
- 2<sup>nd</sup> blood & saliva sample (approx 3hrs post-drug admin)

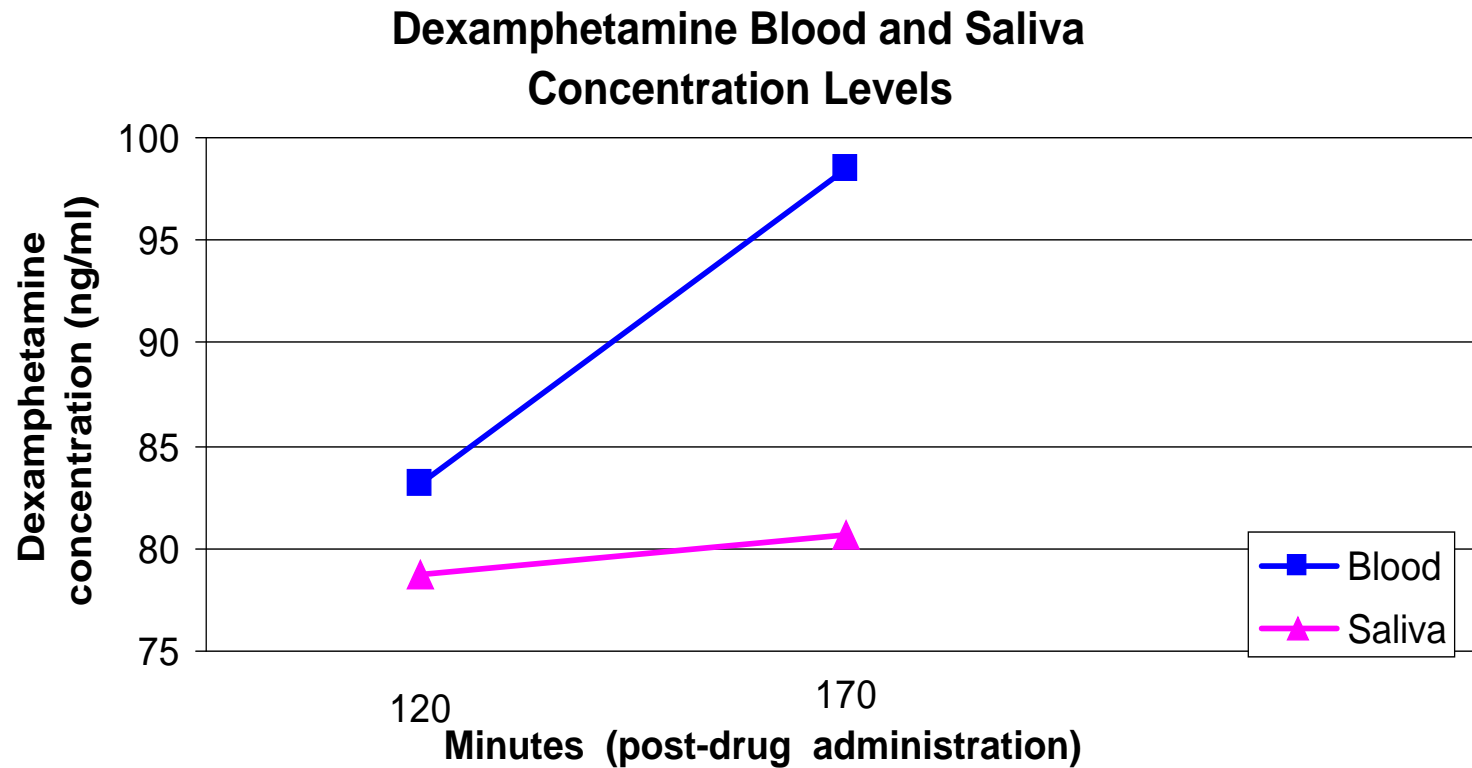
# Statistical analyses

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- Data analysed separately for day and night conditions
- Overall driving performance (day and night separately)
  - Test of difference in proportions based on paired data (Newcombe, 1998)
- Individual driving variables (day and night separately)
  - Wilcoxon signed-rank tests

# Results – blood and saliva





# Results

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- OVERALL DRIVING ABILITY significantly decreased in dexamphetamine condition during DAY task only

$$p < 0.05, 95\% \text{ CI} = -0.528 \text{ to } -0.028$$

- INDIVIDUAL DRIVING VARIABLES which indicated a trend towards a decrease in performance in dexamphetamine condition ( $p < .09$ ):

- DAY

- Incorrect Signalling (moderate effect size,  $d = .7$ )
- Failing to stop at red traffic light (moderate effect size,  $d = .67$ )
- Travelled at slower speed on the freeway when emergency situation occurred (moderate effect size,  $d = .78$ )

- NIGHT

- Slowed reaction time (small effect size,  $d = .7$ )

# Discussion

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- 0.42mg/kg dexamphetamine significantly decreased overall simulated driving performance in DAY conditions only
- Blood & saliva dexamphetamine levels approx. 90ng/ml & 80ng/ml respectively when impairment observed

# Discussion

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- Dexamphetamine can cause tunnel vision effects
  - Mills et al. 2001 study
- Why was driving effected only for DAY conditions?
  - Tunnel Vision?

# Conclusion

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- Dexamphetamine decreases simulated driving performance in recreational users in a daytime driving scenario
- Some evidence to suggest dexamphetamine effects
  - signalling
  - traffic light adherence
  - Slowed driving on freeway when emergency situation occurred
  - slowed reaction time
- Results consistent with tunnel vision effects
- Further research is needed



# Possible Limitations

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- Low dose administered
- Small sample size
- Short period of driving simulator time

# Future

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- What times of day are drivers predominantly apprehended for amphetamine related impaired driving/ road fatalities?
- DDRU currently conducting research with methamphetamine and driving
- DDRU to begin research with MDMA and driving

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Thank You.

