Aviation Physiology Training (new evidence on hypoxia training and training developments in RNZAF)

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Aviation Physiology Training and RNZAF Training Developments

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ROYAL NEW ZEALAND AIR FORCE
Expression of Interest

The Royal New Zealand Air Force Aviation Medicine Unit offers training commercially and as such discloses this interest.

The conclusions and opinions expressed in this presentation are those of the author cultivated in the freedom of expression and academic environment. They do not reflect the official position of the Royal New Zealand Air Force.
Presentation Outline

• Hypoxia Awareness Training
• New Hypoxia Training Profiles
• Rapid Decompression Training
• Night Vision Device Training
Hypobaric Training

- Widely used by military aviation organisations
- ASIC Air Standard
- NATO Standardisation Agreement
Hypobaric Training
Aims of Hypoxia Training

• Prevention of hypoxia accidents and incidents through
  – Increased appreciation of risk
  – Improved recognition of symptoms
  – Improved recognition of signs in others
RNZAF Type 1 Hypoxia Profile

- Rate of Ascent/decent: 5,000 FPM
- Mass Hypoxia Demo
- 30 mins Denitrogenation
- Acute Hypoxia Demo
Published Research

• Cable 2003; Trained aviators recognised symptoms, no comparison group
• Woodrow, Webb 2010; Correlation of hypoxia symptoms between 5 year trg
• Smith 2008; ‘Hypoxic Signature’
RNZAF Study

- To test whether the aircrew’s memory of their ‘hypoxia signature’ was stable over varying durations, especially greater than 3 years
- If possible establish the pattern of change over time
Hypoxia Scores (Previous and Recent training)

![Boxplot showing hypoxia scores for previous and recent training with median values of 8.3 and 10.3 respectively.](image)
Fig 1a Frequency of symptoms experienced (Previous and Recent training)

- Cognitive impairment: Previous 21, Recent 23
- Visual changes: Previous 20, Recent 21
- Lightheaded/dizzy: Previous 18, Recent 16
- Incoordination: Previous 14, Recent 12
- Slurred speech: Previous 13, Recent 15
- Shaking limbs/tremor: Previous 12, Recent 9
- Lethargy: Previous 9, Recent 10
- Tingling/numbness: Previous 7, Recent 3
- Unwell: Previous 5, Recent 4
- Hot/cold flushes: Previous 5, Recent 1
- Headache: Previous 4, Recent 1
- Loss of consciousness: Previous 1, Recent 1
- Other: Previous 1, Recent 1
Previous Hypoxia Scores by time since previous training

Mean = 9.43

1 - <=2 yrs

2 - <=4 yrs

4 - <=6 yrs

>6 yrs

8.17

10

6.5
Conclusions

- ‘Hypoxia signature’ replicated
- Symptom replication is reliable enough to confer training benefit for periods exceeding 5 years
- Pattern of change over time not clearly established
- There was no difference in the frequency of most hypoxia symptoms
Unanswered Questions

• What is the optimal frequency of refresher training?
• Is hypoxia awareness training the best way of mitigating the risk?
• Is the training operationally significant?
Low Altitude Hypoxia Training
Rotary Wing Operators
The Rationale for Change

• Traditional hypoxia training
  – Poor match with rotary environment
  – DCS risk
  – Takes longer
  – Pre and post run restrictions
RNZAF Type 3 Hypoxia Profile

- 30 Minutes at 14K
- Night Vision Demo
Experience to Date

• Data re aircrew acceptance from trials
• Safety Considerations
• Planned improvements
  – Visual demonstration at 14K
  – Use of NVG for monitoring
Rapid Decompression Training

• Currently investigating reintroduction
• New profiles
  – Lowered risk of DCI
RNZAF Rapid Decompression Profile

25 K

10 K

8 K

GL
RNZAF Rapid Decompression Profile

Rapid Decompression 4.5 psi

Ear/Sinus Check

GL

25 K

10 K

5 K
Future NVG Training
Physical Terrain Board

- Static, limitations, large foot-print, must have dedicated room.
VTB Concept: Sensor Stimulation

- The Virtual Terrain Board is a Night Vision Goggle Sensor Stimulation system to replace physical terrain board instruction.
QUESTIONS

For more information please contact:

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Hypoxia Training Alternatives

- Reduced Oxygen Breathing Device (ROBD)
- Combined Altitude and Depleted Oxygen (CADO)
High Contrast, High Illumination Scene
High Contrast, Low Illumination Scene