60th International Congress of Aviation & Space Medicine

60ème Congrès International de Médecine Aéronautique et Spatiale

Melbourne Convention Centre, Australia
16 - 20 September 2012
Centre de conventions et d’expositions de Melbourne, en Australie
du 16 au 20 septembre 2012

with the Asia Pacific Congress of Aviation and Space Medicine

Pushing the Aerospace Medicine Envelope

PROGRAMME & ABSTRACTS

PROGRAMME ET RÉSUMÉS
# Table of Contents

- Welcome Messages .................................................. 2
- Organising Committee ............................................ 4
- International Academy of Aviation and Space Medicine ......................... 4
- Congress Information ............................................. 5
- Programme Outline .................................................. 8
- Congress Programme ............................................... 9
- Registration Fee Inclusions ...................................... 16
- Social Programme .................................................... 17
- Technical Tours ....................................................... 18
- Optional Social Events ............................................. 19
- Accompanying Persons Programme ................................ 20
- Optional Excursions ................................................ 20
- General Information ................................................ 21
- Keynote Speakers .................................................... 23
- The Eric Stephenson Award for Best Presentation by an ASAM Member .................. 24
- Abstracts - Oral Presentations .................................. 27
- Programme - Poster Presentations ................................ 62
- Abstracts - Poster Presentations ................................ 64
- Sponsor and Exhibitor Profiles .................................... 79
- Exhibitor List .......................................................... 82
- Exhibition Area Floor Plan ....................................... 83
- Acknowledgements .................................................. 84
WELCOME MESSAGES

PROFESSOR ANTHONY BATCHELOR
President
International Academy of Aviation and Space Medicine

Welcome to the 60th International Congress of Aviation and Space Medicine and to the vibrant city of Melbourne where, behind the scenes, the local organising committee has invested a great deal of time and effort to ensure a successful event. With a full and varied scientific programme and some exciting educational visits planned, ICASM 2012 promises to combine academic sessions of high professional and educational standards with opportunities for networking and social interaction among international delegates with shared areas of interest.

I hope you have a rewarding and enjoyable Congress. Helen and I look forward to catching up with many old friends and colleagues, as well as to meeting as many delegates as possible during the days ahead.

DR CHONG CHUN HON
President
Asia-Pacific Federation of Aerospace Medical Associations

It gives me great pleasure to represent the Asia-Pacific Federation of Aerospace Medical Associations (APFAMA) in welcoming you to the 60th International Congress of Aviation and Space Medicine (ICASM).

The APFAMA was founded in 1991 by an enthusiastic group of Aerospace Medicine leaders from various countries in the Asia-Pacific region. Their aim was to encourage closer interactions amongst colleagues in the region and further advance the learning and practice of aerospace medicine cooperatively. As such, it is part of APFAMA’s charter responsibility to encourage the organization of international aerospace medicine scientific meetings within the Asia-Pacific region. It was just 2 years ago that the 58th ICASM was held in Singapore in conjunction with the 7th Asia-Pacific Congress of Aerospace Medicine (APCAM). In that meeting, delegates from the Asia-Pacific region accounted for a heartening 45% of the total congress attendance.

APFAMA is proud that our colleagues from the Australasian Society of Aerospace Medicine are hosting the 60th ICASM. Under the able leadership of Dr Gordon Cable, the organizing committee has put together an excellent scientific and technical program that you will enjoy. They have worked hard on every front to make this a great meeting. Please take the opportunity to benefit from the meeting and, more importantly, renew our ties with one another as one international fraternity of aerospace medicine professionals.

I wish all delegates a most pleasant and rewarding experience at this Congress.
WELCOME MESSAGE

As President of the Australasian Society of Aerospace Medicine, and Chairman of the ICASM Organising Committee 2012, we both take great pleasure in welcoming you to Melbourne for the 60th International Congress of Aviation and Space Medicine, held in conjunction with the Asia Pacific Congress of Aerospace Medicine.

It has been ten years since we last had the honour of hosting ICASM in Australia, so we are truly delighted once again to have the opportunity to showcase an outstanding scientific, technical and social program in Melbourne, recently voted the world’s most liveable city.

It has been a privilege to assist our colleagues on the Scientific Sub-committee and the Social Program Sub-committee to put together a Congress that we believe will be truly memorable. We sincerely thank and commend the efforts of all those who have assisted in bringing this Congress to fruition, in particular our hard-working conference organisers at Iceberg Events.

We both trust you will enjoy your time in Melbourne and look forward to meeting each of you personally during the course of the Congress.

Dr Greig Chaffey  
President  
Australasian Society of Aerospace Medicine

Dr Gordon Cable  
Chair  
ICASM Organising Committee 2012
The 60th ICASM is organised by the Australasian Society of Aerospace Medicine (ASAM). The event is held in conjunction with the Asia Pacific Congress of Aviation and Space Medicine and supported by the Asia Pacific Federation of Aerospace Medicine Association (APFAMA).

Organising Committee:
ICASM Chair: Dr Gordon Cable
ICASM Treasurer: Dr Andrew Marsden

Committee:
Dr Warren Harrex
Dr Eric Donaldson
Dr Pooshan Navathe
AIRCDRE (Dr) Tracy Smart
Dr Peter Wilkins
Dr Nader Abou Seif

Scientific Sub-Committee:
Dr Bhupinder Singh (Chair)
Dr Adrian Smith

Social Sub-Committee:
Dr Bernard Cresswell (Chair)
Dr Heather Parker

INTERNATIONAL ACADEMY OF AVIATION AND SPACE MEDICINE

Executive Council:
President: Dr Anthony Batchelor (UK)
Past President: Dr Michael Berry (USA)
President-Elect: Dr Daniel Lestage (USA)

Directors:
Dr Jean-Georges Mouchard (France)
Dr Jon Jordan (USA)
Dr Kenneth Edgington (United Kingdom)
Dr Chung Mien Peng (Singagore)

Chancellor: Dr Melchor Antuñano (USA)
Secretary General: Dr Claude Thibeault (Canada)
Deputy Secretary General: Dr Tony Evans (Canada)
CONGRESS INFORMATION

The 60th International Congress of Aviation and Space Medicine will be held in Melbourne, Victoria from Sunday, 16 September – Thursday, 20 September, 2012

THE MAIN CONGRESS VENUE IS THE MELBOURNE CONVENTION CENTRE

1 Convention Centre Place, South Wharf 3006
Phone: 03 9235 800    International dialling: +61 (3) 9235 8000
www.mcec.com.au

Plenary sessions will be held in Room 202 with catering and the Exhibition being hosted in Room 201. These rooms are located on Level 2 of the Convention Centre.

The Registration Desk will be located outside Room 201 and 202.

VENUE MAP
CONGRESS INFORMATION

GETTING TO THE MELBOURNE CONVENTION CENTRE

Arriving by Taxi
Ask your driver to drop off at Convention Centre Place, next to the Hilton South Wharf Hotel.

Local taxi companies include:
- Black and White Cabs: Phone 131 008
- Yellow Cabs: Phone 132 227

Arriving by Tram
Tram numbers 96, 112 and 109 travel down Spencer/Clarendon streets and stop opposite the Clarendon Street entrance of the MCEC.
Tram numbers 48 and 70 stop at the end of Flinders Street. Walk towards the Yarra River, across the new pedestrian bridge.

Please note: Melbourne is in the process of transitioning to a smart card ticketing system called myki. To travel by tram, you must pre-purchase a myki card and load an amount on the card for travel. The card price for a full fare myki is $6 and $3 for a concession, seniors’ or child myki.

You can buy a myki:
- From a myki machine at all metropolitan train stations and selected accessible tram stops and bus interchanges
- 7-Eleven stores
- Selected retailers where you see the myki sign

There are also myki Visitor Packs available for sale at the Visitor Information Centre at Federation Square. For more information visit www.myki.com.au

Arriving by Train
Take the train to Southern Cross Station. Tram numbers 96, 109 and 112 travel past Southern Cross Station down Spencer/Clarendon Streets and stop opposite the MCEC.

Arriving by Bus
The SkyBus transports visitors direct from Melbourne Airport to Southern Cross Station.

MCEC is a 10 minute walk from the station or catch tram 96 which stops opposite the Clarendon Street entrance of MCEC. Bus route 238 operates to and from Southern Cross Station to Convention Centre Place between the hours of 10:00 – 15:00, Monday to Friday. The coach pick-up/drop-off point is Coach Bay 1, Convention Centre Place (closest to DFO South Wharf). Visit http://ptv.vic.gov.au for timetable information.

Parking
The cheapest option is the MCEC car park off Normanby Road which offers a $13 early bird rate (arrive before 09:00, depart after 15:00).

Further options including maps of the best entrances can be found on the Melbourne Convention Centre website www.mcec.com.au
REGISTRATION INFORMATION

Organising Secretariat
Iceberg Events
Phone: 07 3876 4988   International dialling: +61 7 3876 4988
Email: admin@icebergevents.com.au   Website: www.icebergevents.com.au
Congress website: www.icasm2012.com

Registration Desk
The Registration Desk will be situated outside Room 201 and Room 202 at the Melbourne Convention Centre.

Operation Hours for the Registration Desk will be as follows:
Sunday, 16 September             14:00 – 18:00
Monday, 17 September 07:30 – 17:30
Tuesday, 18 September 07:30 – 17:30
Wednesday, 19 September 07:30 – 17:30

Language
The official language of the Congress is English. No translation will be provided.

Exhibition
The Exhibition area location is Room 201. All lunch and coffee breaks will be taken in this area.

Name Badges
Name badges are required for admission to all scientific sessions and social events and should be worn at all times. A fee of $20AUD will be charged for replacement name badges or tickets.

OFFICIAL CONGRESS HOTELS

Hilton South Wharf
Address: 2 Convention Centre Place, South Wharf, Melbourne
Phone: 03 9027 2000   International dialling: +61 3 9027 2000
Website: www.hiltonmelbourne.com.au/hilton-melbourne-south-wharf

Rendezvous Grande Hotel Melbourne
Address: 328 Flinders Street, Melbourne
Phone: 03 9250 1888   International dialling: +61 3 9250 1888
Website: www.rendezvoushotels.com/melbourne

The Victoria Hotel
Address: 215 Little Collins Street, Melbourne
Phone: 03 9669 0000   International dialling: +61 3 9669 0000
Website: www.victoriahotel.com.au

If you have booked your accommodation through the ICASM registration process, please contact the Registration Desk if you have any questions or concerns.
### Programme Outline

**Congress Venue:** Melbourne Convention Centre, 1 Convention Centre Place, South Wharf  
Rooms 201 & 202

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*Academy Meetings 08:00 - 18:00*

- **Opening Ceremony**
- **SCIENTIFIC SESSION 1: AEROMEDICAL DECISION MAKING**
- **SCIENTIFIC SESSION 2: CARDIOLOGY**
- **SCIENTIFIC SESSION 3: SPECIAL SENSES - 1**

*Scientific Session 4: Aviation Medicine Training & Special Senses - 2*

- **SCIENTIFIC SESSION 5: HEALTH & OPERATIONS**
- **SCIENTIFIC SESSION 6: POT POURRI**

*Scientific Session 7: Ernsting Panel: Hypoxia Training*

- **SCIENTIFIC SESSION 8: RESPIRATION**
- **SCIENTIFIC SESSION 9: CASE STUDIES**

*IAASM General Assembly in Room 201 (Academics only)*

- **SCIENTIFIC SESSION 10: ACCELERATION**

- **Technical Tours to return to Congress hotels**

- **Congress hotel transfers**

- **Travel to Werribee. Buses depart from Hilton South Wharf at 08:30**

- **Patterson Trust Lecture**

- **Lunch**

- **Technical Tours Buses depart to pre-registered Tours:**
  1. Royal Melbourne Hospital and the Air Ambulance Base
  2. The Alfred Hospital and the Air Ambulance Base
  3. Qantas Flight Training Centre
  4. RAAF Museum

- **Welcome Reception Melbourne Convention Centre, Room 201**

- **Congress Dinner Melbourne Cricket Ground, Members Dining Room**

- **ACADEMICS’ DINNER The Australian Club**

- **ACAsM DINNER Rendezvous Hotel**
CONGRESS PROGRAMME

CONGRESS VENUE: Melbourne Convention Centre, 1 Convention Centre Place, South Wharf

ROOMS 201 & 202

SUNDAY, 16 SEPTEMBER 2012

14:00 - 18:00 Registration Desk open

18:00 - 20:00 WELCOME RECEPTION Room 201, Melbourne Convention Centre

Dress: Smart Casual/Business

MONDAY, 17 SEPTEMBER 2012

07:30 - 17:30 Registration Desk open

08:20 Delegates to be seated for the Opening Ceremony

08:30 - 09:00 OPENING CEREMONY

09:00 - 10:00 ANDRÉ ALLARD LECTURE Dr Jonathan Clark

10:00 - 10:15 Morning Tea in Exhibition Area

SESSION 1 AEROMEDICAL DECISION MAKING

Chairs: PD Navathe, M Berry

10:30 - 10:45 English: AEROMEDICAL DECISION MAKING (ADM) IN REGULATORY MEDICAL CERTIFICATION
French: DISPOSITION ÀÉROMÉDICALE POUR LA CERTIFICATION MÉDICALE EN MILIEU RÉGULATOIRE
P Clem, I Cheng, M Drane, D Fitzgerald, A Hegde, P Navathe, D Randell

10:45 - 11:00 English: AEROMEDICAL DECISION MAKING (ADM) IN TRAUMATIC BRAIN INJURY
French: DISPOSITION ÀÉROMÉDICALE POUR LES CAS DE TRAUMATISMES CRÂNIENS
P Navathe

11:00 - 11:15 English: CERTIFICATION OF THE AGEING AVIATOR
French: CERTIFICATION DE L’AVIATEUR VIEILLISSANT
DJ Fitzgerald, P Navathe

11:15 - 11:30 English: AEROMEDICAL DECISION MAKING - CEREBRAL ANEURYSMS
French: DISPOSITION ÀÉROMÉDICALE EN CAS D’ANÉVRISME CÉRÉBRAL
M Drane, P Clem, I Cheng, P Navathe, D Fitzgerald, D Randell, A Hegde

11:30 - 11:45 English: AEROMEDICAL DECISION MAKING (ADM) IN TRANSIENT GLOBAL AMNESIA
French: DISPOSITION ÀÉROMÉDICALE EN CAS D’AMNÉSIE GLOBALE TRANSITOIRE
AA Hegde, M Drane, P Clem, I Cheng, D Fitzgerald, D Randell, P Navathe

11:45 - 12:00 English: AEROMEDICAL DECISION MAKING (ADM) FOLLOWING A CEREBROVASCULAR ACCIDENT; A CASE STUDY
French: DISPOSITION ÀÉROMÉDICALE À LA SUITE D’UN ACCIDENT VASCULAIRE CÉRÉBRAL: UNE ÉTUDE DE CAS
I Cheng, P Clem, M Drane, D Fitzgerald, P Navathe, A Hegde, D Randell

12:00 - 12:15 English: AEROMEDICAL DECISION MAKING IN EPISODIC HEADACHE
French: DISPOSITION ÀÉROMÉDICALE POUR LES MAUX DE TÊTE ÉPISODIQUES
DC Randell, I Cheng, M Drane, D Fitzgerald, A Hegde, P Navathe

12:15 - 13:15 Lunch

SESSION 2 CARDIOLOGY

Chairs: FS Pettyjohn, I Hosegood

13:15 - 13:30 English: USAF UPDATE AND REVIEW FOR AVIATORS WITH VALVULAR HEART DISEASE
French: MISE À JOUR ET RÉVISION DE LA USAF POUR LES AVIATEURS AVEC CARDIOPATHIE VALVULAIRE
ED Davenport, WB Kruyer

13:30 - 13:45 English: AEROMEDICAL IMPLICATIONS OF MECHANICAL PROSTHETIC AORTIC VALVE IMPLANTS
French: IMPLICATIONS ÀÉROMÉDICALES DES IMPLANTS PROTHÉTIQUES HÉMORRAGIQUES VALVULAIRES AORTIQUES
T Jagathesan

13:45 - 14:00 English: EPIDEMIOLOGY OF IN-FLIGHT CARDIOVASCULAR EVENTS.
French: L’ÉPIDÉMIÉLOGIE DES INCIDENTS CARDIOVASCULAIRES EN VOL
PM Alves, K MacKenzie, D Streitwieser, R DeJongh, N Nerwich

Please note that this programme was correct at time of printing; it is subject to change without notice.
<table>
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<th>Time</th>
<th>Session 2 CONT...</th>
<th>Session 3 SPECIAL SENSES - 1</th>
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| 14:00 - 14:15| English: CARDIAC PACEMAKERS AND THE MILITARY AVIATION ENVIRONMENT  
French: STIMULATEURS CARDIAQUES ET LE MILIEU DE L’AVIATION MILITAIRE  
PA Kay | Chairs: FS Pettyjohn, I Hosegood |
| 14:15 - 14:30| English: SUDDEN CARDIAC DEATH FROM AN ANOMALOUS CORONARY ARTERY IN A U.S. MILITARY AVIATOR MAY NOT BE THE CAREER ENDER IT FORESHADOWS  
French: LA MORT CARDIAQUE Soudaine D’UN AVIATEUR MILITAIRE AMÉRICAIN CAUSÉE PAR UNE ANOMALIE D’UNE ARTÈRE CORONAIRE N’IMPLIQUE PAS NÉCESSAIREMENT UNE FIN DE CARRIÈRE  
JW Cromar, DI Mirski | |
| 14:30 - 14:45| English: SLEEP, CIRCADIAN RHYTHMICITY AND PSYCHOLOGICAL HEALTH DURING LONG-TERM ANALOG SPACE MISSIONS  
French: SOMMEIL, RYTHMICITÉ CIRCADIENNE ET SANTÉ PSYCHOLOGIQUE PENDANT DES MISSIONS SPATIALES DE LONGUE DURÉE SIMULÉES  
TL Sletten, J Sullivan, SM Rajaratnam, J Ayton, SW Lockley | |
| 14:45 - 15:00| English: PRE-PARTICIPATION ECG SCREENING IN MILITARY RECRUITS  
French: UN ECG DE DÉPISTAGE EN PRÉ-PARTICIPATION CHEZ DES RECRUES MILITAIRES  
G Hirschhorn, A Grossman, A Prokupetz | |
| 15:00 - 15:30| Afternoon Tea | Chairs: MJ Antuñano, JCD Turner |
| 15:30 - 15:45| English: BINOCULAR ENHANCEMENT OF COLOR CONTRAST SENSITIVITY  
French: AMÉLIORATION BINOCULAIRE DE LA SENSIBILITÉ AU CONTRASTE DES COULEURS  
JM Gooch, JC Rabin, ST Wright | |
| 15:45 - 16:00| English: SAFETY-CRITICAL SYMBOLS IN MAPS - COMPARISON OF THE READABILITY OF TWO MAPS IN DAY AND NVG READING CONDITIONS, USING A CONTROLLED EXPERIMENT  
French: SYMBOLS CRITIQUES POUR LA SÉCURITÉ SUR LES CARTES GEOGRAPHIQUES - COMPARAISON DE LA LISIBILITÉ DE DEUX CARTES SOUS CONDITIONS DE JOUR ET DE NVG EN UTILISANT UN EXPÉRIENCE CONTRÔLÉ  
AS Wagstaff, B Haughom, T Larsen | |
| 16:00 - 16:15| English: NON-MYDRIATIC RETINAL IMAGING, 5 YEARS’ EXPERIENCE IN AEROMEDICAL ROUTINE EXAMINATION.  
French: RÉTINOGRAPHES NON MYDRIATIQUES, CINQ ANNÉES D’EXPÉRIENCE D’EXAMEN MÉDICAL DE ROUTINE  
R Quast | |
| 16:15 - 16:30| English: OPERATIONALLY-BASED VISION ASSESSMENT RESEARCH INVOLVING DEPTH PERCEPTION  
French: RECHERCHE SUR L’ÉVALUATION DE LA VISION SUR UNE BASE OPérationnelle IMPLiquant LA PERCEPTION DE LA PROFONDEUR  
MD Winterbottom, JM Gooch, ST Wright, JP Gaska, H Gao, CJ Lloyd | |
| 16:30 - 16:45| English: CASE STUDIES: THREE PROFESSIONAL AUSTRALIAN PILOTS WITH THE COLOUR PERCEPTION DEFECT OF PROTANOPIA  
French: ÉTUDES DE CAS: TROIS PILOTES PROFESSIONNELS AUSTRALIENS AVEC PROTANOPIE  
AM Pape, B Crassini | |
| 16:45 - 17:00| English: THE EMERGENCE OF CO2 AS A NON-SURROGATE, SELF-DETERMINING RESPIRATORY GAS IN EXTREME ENVIRONMENTAL ACCLIMATION.  
French: L’ÉMERGENCE DU CO2 COMME UN GAZ RESPIRATOIRE AUTO-DÉTERMINANT ET NON-SUBSTITUTIF DANS L’ACCLIMATATION À UN ENVIRONNEMENT EXTRÊME  
JD Sharma | |
| 20:35 - 23:30| OPTIONAL DINNER Colonial Tram Car Restaurant  
This is a ticketed event, please contact Iceberg Events for further information.  
Please note: Delegates to make their own way to the departure point at Tramstop 125, Corner Normanby Road & Clarendon Street, South Melbourne. Please see the Registration Desk should you require directions.  
| Dress: Smart Casual | |

Please note that this programme was correct at time of printing; it is subject to change without notice.
TUESDAY, 18 SEPTEMBER 2012

**SESSION 4**
**AVIATION MEDICINE TRAINING & SPECIAL SENSES - 2**
*Chairs: TL Smart, R Johnston*

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<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
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</table>
| 08:30 - 08:45 | English: AEROSPACE MEDICINE AS A MEDICAL SPECIALTY: AN AUSTRALIAN INITIATIVE TO RECOGNIZE 'SPECIALISTS IN AEROSPACE MEDICINE'  
French: LA MÉDECINE AÉROSPATIALE COMME SPÉCIALITÉ MÉDICALE: UNE INITIATIVE AUSTRALIENNE POUR RECONNAÎTRE LES ‘SPÉCIALISTES EN MÉDECINE AÉROSPATIALE’ | JC Turner, A Smith, G Cable                  |
| 08:45 - 09:00 | English: AVIATION MEDICINE TRAINING FOR MEDICAL OFFICERS IN THE REPUBLIC OF SINGAPORE AIRFORCE (RSAF)  
French: LA FORMATION EN MÉDECINE AÉRONAUTIQUE DES OFFICIERS MÉDICAUX DANS L’ARMÉE DE L’AIR DE LA RÉPUBLIQUE DE SINGAPOUR | C Chua, C Koh, R Tan                         |
| 09:00 - 09:15 | English: A NOVEL METHOD TO IMPROVE THE SOUND ATTENUATION OF AIRCREW HELMETS  
French: UNE NOUVELLE MÉTHODE POUR AMÉLIORER ATTÉNUATION SONORE DES CASQUES DU PERSONNEL NAVIGANT | B Singh, P Boraso                            |
| 09:15 - 09:30 | English: VESTIBULAR SCHWANNOMA (VS) AND FITNESS TO FLY: 10 YEARS EXPERIENCE  
| 09:30 - 09:45 | English: METRICS OF PHYSIOLOGICAL AND SUBJECTIVE MENTAL WORKLOAD IN MISSION ORIENTED NAVAL HELICOPTER OPERATIONS  
French: MESURE DE LA CHARGE PHYSIOLOGIQUE ET MENTALE SUBJECTIVE DANS LES OPÉRATIONS NAVALES HÉLIPORTÉES ORIENTÉES SUR LA MISSION | R Sarkar                                      |
| 09:45 - 10:00 | English: ELECTROACUPUNCTURE IMPROVES ORTHOSTATIC TOLERANCE IN HEALTHY SUBJECTS  
French: L’ÉLECTROACUPONCTURE AMÉLIORE LA TOLÉRANCE ORTHOSTATIQUE CHEZ LES SUJETS EN SANTÉ | XQ Sun, CB Yang, Y Gao                       |

**SESSION 5**
**HEALTH & OPERATIONS**
*Chairs: G Merchant, IC Cheng*

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
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</thead>
</table>
| 10:30 - 10:45 | English: TECHNOLOGICAL INNOVATIONS IN MEDICINE AND THEIR IMPACT IN AEROSPACE MEDICINE  
French: INNOVATIONS TECHNOLOGIQUES EN MÉDECINE ET LEUR IMPACT EN MÉDECINE AÉROSPATIALE | MJ Antuñano                                  |
| 10:45 - 11:00 | English: PUSHING THE ENVELOPE IN PILOT PHYSIOLOGIC MONITORING DURING EXTREME FLIGHT CONDITIONS  
French: REPOUSSER LES LIMITES DE LA SURVEILLANCE PHYSIOLOGIQUE DES PILOTES DURANT DES CONDITIONS EXTRÊMES DE VOL | JC McEachen, AN Issa, LW Steinkraus, BD Johnson |
| 11:00 - 11:15 | English: BODY MASS INDEX IN YOUNG EMIRATI AIRLINE PILOTS: DOES BMI CHANGE DURING TRAINING AND DOES IT CORRELATE WITH SICKNESS ABSENCE ONCE QULIFIED?  
| 11:15 - 11:30 | English: BODY MASS INDEX (BMI) AND HEALTH CO-MORBIDITIES IN AUSTRALIAN COMMERCIAL PILOTS  
French: INDICE DE MASSE CORPORELLE (IMC) ET CO-MORBIDITÉS CHEZ LES PILOTES COMMERCIAUX AUSTRALIENS | E O’Reilly, E Smith, N Ahmed, J Goodyer, D Harley, C Harris, P Navathe, E Paver, R Roberts, M Thompson |

*Please note that this programme was correct at time of printing; it is subject to change without notice.*
## TUESDAY, 18 SEPTEMBER 2012 (CONT...)

<table>
<thead>
<tr>
<th>Session</th>
<th>Time</th>
<th>Session</th>
<th>Chairs</th>
<th>Talks</th>
</tr>
</thead>
</table>
| Session 5 | 11:30 - 11:45 | Health & Operations | G Merchant, IC Cheng | English: COUNTERMEASURES TO PREVENT POST-FLIGHT COMPARTMENT SYNDROME (PFCS)  
French: PRÉCAUTIONS POUR PRÉVENIR LE SYNDROME DU COMPARTIMENT ANTÉRIEUR APRÈS VOL  
LW Steinkraus, W Butler                                                                 |
|         | 11:45 - 12:00 |         |                 | English: THE TRAVEL HEALTH ADVISORY GROUP: A JOINT TRAVEL INDUSTRY AND TRAVEL HEALTH SPECIAL  
INTEREST GROUP PROMOTING HEALTHY TRAVEL IN AUSTRALIA  
French: LE GROUPE CONSULTATIF SUR LA SANTÉ VOYAGE: UN GROUPE D’INTÉRÊT FORMÉ DE L’INDUSTRIE DU VOYAGE ET DE LA SANTÉ VOYAGE SPECIAL FAISANT LA PROMOTION DE LA SANTÉ VOYAGE EN AUSTRALIE  
PA Leggat, I Cheng, B Hudson, N Zwar, T Gherardin, A Travel Health Advisory Group |
|         | 12:00 - 12:15 |         |                 | English: USE OF LUMBAR SUPPORTS BY CYPRUS AIR FORCE HELICOPTER PILOTS  
French: UTILISATION DE SUPPORTS LOMBAIRES PAR LES PILOTES D’HÉLICOPTÈRE DE L’ARMÉE DE L’AIR DE CHYPRE  
GA Stylianides, R Griffiths                                                                 |
|         | 12:15 - 13:15 |         |                 | Lunch                                                                                       |
French: L’ANTARTIQUE EST UN ENVIRONNEMENT CONFINÉ ISOLÉ (ICE) - UN ÉQUIVALENT DE L’ESPACE  
JM Aytont                                                                 |
|         | 13:30 - 13:45 |         |                 | English: OCCUPATIONAL ILLNESS AND INJURY AMONG AIRCREW IN AUSTRALIA: AN ANALYSIS OF SERIOUS  
WORKERS COMPENSATION CLAIMS  
French: MALADIES ET LÉSIONS PROFESSIONNELLES DU PERSONNEL NAVIGANT EN AUSTRALIE: UNE ANALYSE DES RÉCLAMATIONS SÉRIEUSES DES TRAVAILLEURS  
A Fattah                                                                 |
|         | 13:45 - 14:00 |         |                 | English: HIGH-ALTITUDE ASSOCIATED NEUROLOGIC DECOMPRESSION SICKNESS CEREBRAL INJURY:  
STRUCTURAL, SPECTROSCOPY, FRACTIONAL ANISOTROPY, AND NEUROCOGNITIVE RESULTS  
French: LE DOMMAGE CÉRÉBRAL DE LA MALADIE DE DÉCOMPRESSION NEUROLOGIQUE ASSOCIÉ À LA HAUTE ALTITUDE: RÉSULTATS NEUROCOGNITIFS ET STRUCTURELS, LA SPECTROSCOPIE ET L’ANISOTROPIE FRACTIONNELLE  
SA McGuire, PM Sherman, PV Kochunov                                                                 |
|         | 14:00 - 14:15 |         |                 | English: PREDICTING MENTAL HEALTH INDICES WITH TWO SELF-REPORT FATIGUE MEASURES  
French: INDICES DE PRÉDICTION DE SANTÉ MENTALE AVEC DEUX MESURES DE FATIGUE AUTODÉCLARÉES  
R Forsterlee                                                                 |
|         | 14:15 - 14:30 |         |                 | English: AN AUDIT OF AN AIRLINES ‘AGE 60 PILOT MEDICAL ASSESSMENT’  
French: AUDIT DE LA VISITE MÉDICALE DES PILOTES DE LIGNE DE PLUS DE 60 ANS  
N Ahmed                                                                 |
|         | 14:30 - 14:45 |         |                 | English: EFFECTS OF ALTITUDE ON SLEEP APNEA  
French: EFFETS DE L’ALTITUDE SUR L’APNÉE DU SOMMEIL  
JM Sill                                                                 |
|         | 14:45 - 15:00 |         |                 | English: CYTOKINE REGULATION MECHANISM FOR CX43 DOWNREGULATION IN RAT MYOCARDIUM BY  
SIMULATED MICROGRAVITY  
French: MÉCANISME DE RÉGULATION DE LA CYTOKINE POUR LA RÉGULATION À LA BAISSE DU CX 43 DANS LE MYOCARDE DU RAT EN MICROGRAVITÉ SIMULÉE  
ZX Liu, YP Wu, XL Deng                                                                 |
|         | 15:00 - 15:30 |         |                 | Afternoon Tea                                                                 |
|         | 15:30 - 17:00 |         |                 | IAAASM General Assembly & ASAM Annual General Meeting  
IAASM General Assembly in Room 201  
ASAM Annual General Meeting in Room 202                                                                 |
|         | 19:00 - Late |         |                 | ACADEMICIANS’ DINNER The Australian Club, 110 William Street, Melbourne (by Invitation only)  
*This is a ticketed event, please contact Iceberg Events for further information.*  
IAASM General Assembly & ASAM Annual General Meeting in Room 202 |
**CONGRESS PROGRAMME**

**CONGRESS VENUE:** Melbourne Convention Centre, 1 Convention Centre Place, South Wharf  
**Rooms 201 & 202**

**WEDNESDAY, 19 SEPTEMBER 2012**

<table>
<thead>
<tr>
<th>TIME</th>
<th>SESSION 7</th>
<th>ERNSTING PANEL: HYPOXIA TRAINING</th>
<th>Chairs: BJ Barker, A Wagstaff</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:30 - 17:30</td>
<td>Registration Desk open</td>
<td></td>
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</tbody>
</table>

**SESSION 7**

<table>
<thead>
<tr>
<th>TIME</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
</table>
| 08:30 - 08:45 | English: COMPARISON OF ALTITUDE HYPOXIA TRAINING IN HYPOBARIC VS NORMOBARIC ENVIRONMENTS  
               French: COMPARAISON DE LA FORMATION À RECONNAÎTRE L'HYP oxie D'ALTITUDE DANS UN MILIEU HYPOBARE VERSUS UN MILIEU NORMOBARE  
               MJ Antuñano, J Mandella, DA Self, V Prinzo, EM Forster, RM Shaffstall |                                                                                  |
| 08:45 - 09:00 | English: MULTIPLACE NORMOBARIC HYPOXIA TRAINING USING GO2ALTITUDE*: A PRELIMINARY EVALUATION IN A MILITARY TRAINING CONTEXT  
               French: FORMATION MULTIPLACE EN HYPOXIE NORMOBARE PAR L'UTILISATION DE GO2ALTITUDE*: UNE ÉVALUATION PRÉLIMINAIRE DANS UN CONTEXTE DE FORMATION MILITAIRE  
               GG Cable |                                                                                  |
| 09:00 - 09:15 | English: RECOGNITION OF HYPOXIA IN A SIMULATED FLIGHT ENVIRONMENT  
               French: LA RECONNAISSANCE DE L'HYP oxie DANS UN ENVIRONNEMENT DE VOL SIMULÉ.  
               A Smith |                                                                                  |
| 09:15 - 09:30 | English: PROBLEMS ASSOCIATED WITH ALTITUDE SIMULATION  
               French: PROBLÈMES LIÉS À LA SIMULATION D'ALTITUDE  
               RA Westerman, O Bassovitch |                                                                                  |
| 09:30 - 09:45 | English: RISK EVALUATION OF NORMOBARIC HYPOXIA TRAINING DEVICES (HYPOXICATORS)  
               French: ÉVALUATION DE RISQUES DES APPAREILS D'ENTRAINEMENT POUR L'HYP oxie NORMOBARE (HYPOXICATEURS)  
               O Bassovitch, RA Westerman |                                                                                  |
| 09:45 - 10:00 | English: TO DO OR NOT TO DO: HYPOXIA TRAINING FOR CIVIL AVIATION  
               French: FAUT-IL LE FAIRE OU PAS : L'ENTRAÎNEMENT À L'HYP oxie DANS L'AVIATION CIVILE  
               PD Navathe, B Singh |                                                                                  |

10:00 - 10:30 Morning Tea & Poster Presentations in Exhibition Area

**SESSION 8**

<table>
<thead>
<tr>
<th>TIME</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
</table>
| 10:30 - 10:45 | English: SUPPLEMENTAL OXYGEN REQUIREMENTS FOR OPERATIONS BELOW 15,000 FEET IN ADF AIRCRAFT  
               French: LES BESOINS EN OXYGÈNE SUPPLÉMENTAIRE POUR LES OPÉRATIONS EN DESSOUS DE 15 000 PIEDS DANS LES AVIONS DU ADF  
               GV Hampson, B Singh |                                                                                  |
| 10:45 - 11:00 | English: EMERGENCY PASSENGER OXYGEN SYSTEM (EPOS) ACTIVATION AT 25,000 FEET DURING AIRCREW HYPOXIA TRAINING  
               French: ACTIVATION DU SYSTÈME D'OXYGÈNE D'URGENCE DES PASSAGERS À 25,000 PIED PENDANT LA FORMATION DU PERSONNEL NAVIGANT À RECONNAÎTRE L'HYP oxie  
               J Owe |                                                                                  |
| 11:00 - 11:15 | English: DESCRIBING HELICOPTER REARCREW VENTILATORY PATTERNS: A STEP TOWARDS DEFINING REQUIREMENTS FOR PORTABLE OXYGEN DELIVERY SYSTEMS  
               French: DESCRIPTION DES MODÈLES VENTILATOIRES DE L'ÉQUIPAGE ARRIÈRE D'UN HÉLICOPTÈRE: UN PAS VERS LA DÉFINITION DE L'ÉQUIPEMENT REQUIS POUR LES SYSTÈMES PORTABLES D'ADMINISTRATION D'OXYGÈNE  
               PD Hodkinson, SJ Gaydos, DK Menon, ND Green |                                                                                  |
| 11:15 - 11:30 | English: MIDDLE CEREBRAL ARTERY BLOOD FLOW DURING PUSH-PULL EFFECT  
               French: LE FLUX SANGUIN DANS L'ARTÈRE CÉRÉBRALE MOYENNE DURANT LA MANOEUVRE PUSH-PULL  
               B Sekhar |                                                                                  |
| 11:30 - 11:45 | English: EFFECTIVENESS OF SCREENING FOR CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) IN ROYAL AUSTRALIAN AIR FORCE AIRCREW  
               French: L'EFFICACITÉ DU DÉPISTAGE DES MALADIES PULMONAIRES OBSTRUCTIVES CHRONIQUES CHEZ LE PERSONNEL NAVIGANT DE L'ARMÉE DE L'AIR AUSTRALIENNE  
               BD Oppermann |                                                                                  |

Please note that this programme was correct at time of printing; it is subject to change without notice.
## WEsdneSDaY, 19 September 2012 (COnT...)

### SESSION 8  CONT...

<table>
<thead>
<tr>
<th>Time</th>
<th>English</th>
<th>French</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:45 - 12:00</td>
<td>PNEUMOTHORAX DURING HYPERBARIC OXYGEN TREATMENT IN EARTHQUAKE SURVIVOR WITH MULTIPLE TRAUMA : CASE REPORT</td>
<td>PNEUMOTHORAX DURANT L’OXYGÉNOthéRAPIE HYPERBARE CHEZ UN SURVIVANT D’UN TREMBLEMENT DE TERRE AVEC TRAUMATISMES MULTIPLES: RÉSUMÉ D’UN CAS</td>
</tr>
<tr>
<td></td>
<td>T Cakmak, B Battal, F Ors, S Metin, S Yildiz</td>
<td></td>
</tr>
<tr>
<td>12:00 - 12:15</td>
<td>ANALYSIS OF 122 MEDICAL CERTIFICATE SPECIAL ISSUANCE CASES OF AIRLINE PILOTS IN CHINA</td>
<td>ANALYSE DE 122 CAS DE DÉROGATION MÉDICALE CHEZ DES PILOTES DE LIGNE EN CHINE</td>
</tr>
<tr>
<td></td>
<td>S Li, L Mei, J Yang</td>
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<tr>
<td>12:15 - 13:15 Lunch</td>
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</tbody>
</table>

### SESSION 9  CASE STUDIES

<table>
<thead>
<tr>
<th>Time</th>
<th>English</th>
<th>French</th>
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</thead>
<tbody>
<tr>
<td>13:15 - 13:30</td>
<td>FAA MEDICAL CERTIFICATION OF A PILOT AFTER A LEFT CEREBELLAR STROKE</td>
<td>CERTIFICATION MÉDICALE (FAA) D’UN PILOTE APRÈS UN ACCIDENT VASCULAIRE CÉRÉBELLEUX GAUCHE</td>
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<tr>
<td></td>
<td>MA Berry</td>
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<tr>
<td>13:30 - 13:45</td>
<td>AEROMEDICAL CONSIDERATIONS IN AIRCREW WITH ‘LOSS OF CONSCIOUSNESS’</td>
<td>LES CONSIDÉRATIONS AÉROMÉDICALES CHEZ LE PERSONNEL NAVIGANT SOUFFRANT DE SYNOCOPE</td>
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<td></td>
<td>S Sodhi</td>
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<tr>
<td>13:45 - 14:00</td>
<td>CASE PRESENTATION OF A CEREBROVASCULAR ACCIDENT (CVA) IN A MILITARY FAST JET PILOT</td>
<td>PRÉSENTATION D’UN CAS D’ACCIDENT VASCULAIRE CÉRÉBRAL CHEZ UN PILOTE DE CHASSE MILITAIRE</td>
</tr>
<tr>
<td></td>
<td>BJ Barker, R Beran, AA Hegde</td>
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<tr>
<td>14:00 - 14:15</td>
<td>EARLY ONSET PARKINSONS DISEASE - HOW LONG CAN WE KEEP THEM FLYING?</td>
<td>LA MALADIE DE PARKINSON À APPARITION PRÉCOCE - COMBIEN DE TEMPS POURRONS-NOUS LES GARDER EN VOL?</td>
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<tr>
<td></td>
<td>MS Clements</td>
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<tr>
<td>14:15 - 14:30</td>
<td>ASYMPTOMATIC PULMONARY SARCOIDOSIS IN A PILOT - A CASE REPORT</td>
<td>ASYMPTOMATIQUE SARCOÏDOSE PULMONAIRE À UN PILOTE - LE RÉSUMÉ D’UN CAS</td>
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<td>ML Anghel, MM Balasa, MA Macri</td>
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<tr>
<td>14:30 - 15:45</td>
<td>SARCOID IN AIRCREW - AEROMEDICAL RISK REVISITED</td>
<td>SARCOIDOSE CHEZ LE PERSONNEL NAVIGANT - LE RISQUE AÉROMÉDICAL REVISITÉ</td>
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<tr>
<td></td>
<td>FS Pettyjohn, JS McGhee, MD Quattlebaum, JF McKeon</td>
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<tr>
<td>15:00 - 15:30 Afternoon Tea</td>
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### SESSION 10  ACCELERATION

<table>
<thead>
<tr>
<th>Time</th>
<th>English</th>
<th>French</th>
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<tbody>
<tr>
<td>15:30 - 15:45</td>
<td>TACTICAL FLIGHT SIMULATION WITH AUTHENTIC IMPOSED ACCELERATION: PSYCHOPHYSIOLOGY AND TRAINING VALUE</td>
<td>SIMULATION DE VOL TACTIQUE AVEC IMPOSITION AUTHENTIQUE D’ACCÉLÉRATION: PSYCHOPHYSIOLOGIE ET VALEUR FORMATIVE</td>
</tr>
<tr>
<td></td>
<td>GW McCarthy, WF Mitchell, P Comtois, M Newman, S Glaser, A Bubka, F Bonato</td>
<td></td>
</tr>
<tr>
<td>15:45 - 16:00</td>
<td>LACK OF GRAVITY EXPOSURE DECREASES THE THRESHOLD OF FORMATION OF PETECHIAL HAEMORRHAGES</td>
<td>L’EXPOSITION INSUFFISANTE AU CHAMP GRAVITATIONNEL RÉDUIT LE SEUIL D’APPARITION D’HÉMORRAGIES PÉTÉCHIALES</td>
</tr>
<tr>
<td></td>
<td>B Ganse, U Limper, J Bühlmeyer, J Rittweger</td>
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<table>
<thead>
<tr>
<th>TIME</th>
<th>SESSION 10 CONT.</th>
<th>ACCELERATION</th>
<th>CHAIRS: J Singh, P Wilkins</th>
</tr>
</thead>
</table>
| 16:00 - 16:15| English: HEART RATE RESPONSES TO VARYING LEVELS OF VERTICAL ACCELERATION  
French: RÉPONSES DU RYTHME CARDIAQUE À DES TAUX VARIABLES D’ACCÉLÉRATION VERTICALE | P Renjhen                                                                   |                             |
| 16:15 - 16:30| English: AURICULAR ACUPUNCTURE AND THE EFFECT ON G-TOLERANCE: A REPEATED MEASURE DESIGN CONTROLLED TRIAL  
French: L’ACUPUNCTURE AURICULAIRE ET SON EFFET SUR LA TOLÉRANCE AUX FORCES GRAVITATIONNELLES: UNE ÉTUDE CONTRÔLÉE D’UN MODÈLE À MESURE RÉPÉTÉE | PA Pankey, DA Knight, RS Mayes, JR Fischer                                 |                             |
| 16:30 - 16:45| English: AN INITIAL LONGITUDINAL LOOK AT TURBULENCE ACCIDENTS  
French: UN PREMIER REGARD LONGITUDINAL AUX ACCIDENTS DÛ À LA TURBULENCE | DJ Schroeder                                                               |                             |
| 16:45 - 17:00| English: MEDICO-LEGAL ASPECT OF THE INVESTIGATION OF THE CRASH OF A BOEING 727 NEAR OUROMEIY AIRPORT IN IRAN  
French: L’ASPECT MÉDICO-LÉGISLÉ DE L’INVESTIGATION DE L’ACCIDENT D’UN BOEING 727 PRÈS DE L’AÉROPORT DE OUROMEIY EN IRAN | K Soleimani                                                               |                             |
| 19:00 - Late | ACAsM DINNER Rendezvous Hotel, 328 Flinders Street, Melbourne | This is a ticketed event, please contact Iceberg Events for further information. | Dress: Black Tie / Military Mess Dress |

**THURSDAY, 20 SEPTEMBER 2012**

Transport will be provided from Hilton South Wharf.

<table>
<thead>
<tr>
<th>TIME</th>
<th>JOHN LANE ORATION &amp; PATTERSON TRUST LECTURE</th>
<th>CHAIRS: B Cresswell, B Spackman</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30</td>
<td>Buses depart for Werribee Park Reception Centre from Hilton South Wharf</td>
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<tr>
<td>09:30 - 10:30</td>
<td>JOHN LANE ORATION Major Glenn Todhunter</td>
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<tr>
<td>10:30 - 11:00</td>
<td>Morning Tea</td>
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<tr>
<td>11:00 - 12:00</td>
<td>PATTERSON TRUST LECTURE Professor Michael Bagshaw</td>
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<tr>
<td>12:00 - 13:00</td>
<td>Lunch</td>
<td></td>
</tr>
</tbody>
</table>
| 13:00 - 15:30| Delegates to depart to pre-registered Technical Tours:  
1. Royal Melbourne Hospital and the Air Ambulance Base  
2. The Alfred Hospital and the Air Ambulance Base  
3. Qantas Flight Training Centre  
4. RAAF Museum |                                 |
| 15:30 - 17:00| Technical Tours to return to Congress hotels |                                 |
| 18:30        | Gather at Congress hotels for bus transport to the Congress Dinner | Dress: Black Tie |
| 19:00 - Late | CONGRESS DINNER Melbourne Cricket Ground, Members Dining Room |                                 |

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## Registration Fee Inclusions

Registration Fee covers the following items:

<table>
<thead>
<tr>
<th>Description</th>
<th>Full Registration</th>
<th>Day Registration</th>
<th>Accompanying Person Registration</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome Reception</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>Additional tickets may be available at a cost of $66AUD. Please check with the Registration Desk</td>
</tr>
<tr>
<td>Opening Ceremony</td>
<td>✓</td>
<td>For Monday, 17 Sept only</td>
<td>✓ including Morning Tea following</td>
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</tr>
<tr>
<td>Scientific Sessions</td>
<td>✓</td>
<td>Day of registration only</td>
<td>x</td>
<td></td>
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<tr>
<td>The Colonial Tram Car Dinner</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Additional tickets may be available at a cost of $120AUD. Please check with the Registration Desk</td>
</tr>
<tr>
<td>Academicians’ Dinner</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Additional tickets may be available at a cost of $150AUD. Please check with the Registration Desk</td>
</tr>
<tr>
<td>ACAsM Dinner</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Additional tickets may be available at a cost of $115AUD. Please check with the Registration Desk</td>
</tr>
<tr>
<td>Congress Dinner</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
<td>Additional tickets may be available at a cost of $150AUD. Please check with the Registration Desk</td>
</tr>
<tr>
<td>Technical Tours</td>
<td>✓</td>
<td>✓ for Thursday, 20 Sept only</td>
<td>Subject to availability, see the Registration Desk</td>
<td>Attendance on the tours is by pre-registration only and included in the registration fee for full delegates. Please check with the Registration desk for last minute spaces that may become available</td>
</tr>
<tr>
<td>Melbourne Laneways and Arcades Walk</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Morning Tea, Lunch and Afternoon Tea</td>
<td>✓</td>
<td>✓</td>
<td>x except on the Melb Laneways Walk</td>
<td></td>
</tr>
<tr>
<td>Programme and Abstract Book</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Delegate’s Satchel</td>
<td>✓</td>
<td>✓</td>
<td>x</td>
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SOCIAL PROGRAMME

All registered full delegates and registered accompanying persons are invited to attend the following functions. Name badges are required for admission.

WELCOME RECEPTION

Date: Sunday, 16 September  
Venue: Room 201, Melbourne Convention Centre  
Time: 18:00 – 20:00 
Dress code: Smart Casual / Business  

Additional tickets may be available at a cost of $66AUD. Please check with the Registration Desk.

CONGRESS DINNER

Date: Thursday, 20 September  
Venue: Melbourne Cricket Ground, Members’ Dining Room, Gate 2  
Melbourne Cricket Ground, Brunton Avenue, Jolimont  
Time: 19:00 - Late 
Dress code: Black Tie / Military Mess Kit  
Parking: Melbourne & Olympic Park - northern car park. Enter car park from Swan St (Entry D), walk across footbridge (blue) to the MCG. Head to your left, you will see GATE 2.

Additional tickets may be available at a cost of $150AUD. Please check with the Registration Desk.
TECHNICAL TOURS

Date: Thursday, 20 September
Departure Time: 08:30  Return Time: Between 15:30 - 17:00 depending on tour
Meeting Time: 08:15
Meeting Point: Outside Main Foyer, Hilton South Wharf. Buses will only depart from this location, and promptly at 08:30. Delegates are to make their own way to this point.

Dress Code: Smart casual with enclosed footwear suitable for walking.

All delegates will travel by coach to historic Werribee Mansion for scientific sessions and lunch. After lunch, the coaches will depart to the four technical tour locations. Attendance on the tours is by pre-registration only and included in the registration fee for full delegates. Please check with the Registration Desk for last minute spaces that may become available. You will be required to wear your ICASM name badge for all tours.

Tour 1 - Royal Melbourne Hospital and the Air Ambulance Base
Estimated time of return to hotels: 16:30
(Tour fully subscribed. Please see the Registration Desk if you would like to be placed on the waiting list)

Tour 2 - The Alfred Hospital and the Air Ambulance Base
Estimated time of return to hotels: 16:15
(Tour fully subscribed. Please see the Registration Desk if you would like to be placed on the waiting list)

Tour 3 - Qantas Flight Training Centre
Estimated time of return to hotels: 16:30
(Tour fully subscribed. Please see the Registration Desk if you would like to be placed on the waiting list)

Tour 4 - RAAF Museum
Estimated time of return to hotels: 15:30
(Limited availability. Please see the Registration Desk to register)

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OPTIONAL SOCIAL EVENTS

These events are not included in full delegate registrations and tickets must be purchased by delegates and accompanying persons should they wish to attend. There may still be tickets available for some events. Please check with the Registration Desk for details. Name badges are required for admission.

THE COLONIAL TRAM CAR RESTAURANT

Date:
Monday, 17 September

Time:
20:35 – 23:30

Meeting Point:
Tramstop 125, Corner Normanby Road & Clarendon Street, South Melbourne
Delegates will be required to make their own way to the Meeting Point. Detailed walking directions and transport options are available from the Registration Desk.

Dress code:
Smart Casual / Business

Parking:
Best options include the Crown Casino and Melbourne Exhibition and Convention Centre car parks

Additional tickets may be available at a cost of $120AUD.

THE ACADEMICIANS’ DINNER – FOR ACADEMICIANS & THEIR PARTNERS

Date:
Tuesday, 18 September

Venue:
The Australian Club, 110 William Street, Melbourne (Ellis Rowan Room)

Time:
19:00

Delegates will be required to make their own way to the venue. Detailed walking directions and transport options are available from the Registration Desk.

Dress code:
Black Tie

Parking:
Best options include the RACV City Club Melbourne car park open until 23:00 (access via New Chancery Lane) and the CQ Building car park (entrance off Little Collins Street)

Additional tickets may be available at a cost of $150AUD.

THE AUSTRALASIANS COLLEGE OF AEROSPACE MEDICINE INAUGURAL FELLOWS’ DINNER

Date:
Wednesday, 19 September

Venue:
Rendezvous Hotel, 328 Flinders Street, Melbourne

Time:
19:00 for 19:30

Delegates will be required to make their own way to the venue. Detailed walking directions and transport options are available from the Registration Desk.

Dress code:
Black Tie / Military Mess Kit

Parking:
Valet parking is available at the hotel for $35AUD. There is also a Secure parking station next to the hotel - enter via 300 Flinders Street

Additional tickets may be available at a cost of $115AUD.
ACCOMPANYING PERSONS PROGRAMME

The Accompanying Persons Programme includes the Melbourne Laneways and Arcades Walk in addition to attendance at the Welcome Reception and the Congress Dinner. There may still be tickets available for some events. Please check with the Registration Desk for details.

MELBOURNE LANEWAYS AND ARCADES WALK

Date: Monday, 17 September  
Venue: The lanes and arcades of the city of Melbourne  
Time: 14:00 – 17:00  
Meeting Time: 13:45  
Meeting Point: Registration Desk, Level 2, Melbourne Convention Centre  
Delegates will be required to make their own way to the venue.

Dress code: Smart casual with comfortable walking shoes

Additional tickets may be available at a cost of $88AUD.

OPTIONAL EXCURSIONS

KOALAS, KANGAROOS AND THE MORNINGTON PENINSULA

Date: Tuesday, 18 September  
Venue: Tour by bus  
Time: 09:00 – 16:00  
Meeting Time: 08:45  
Meeting Point: Outside the main foyer of Hilton South Wharf  
Delegates will be required to make their own way to the meeting point.

Dress code: Smart casual with comfortable walking shoes

Additional tickets may be available at a cost of $189AUD.
Certificate of Attendance
A Certificate of Attendance will be available at the Registration Desk from Wednesday, 19 September 2012. Should you wish this certificate to be emailed to you after the Congress, please email admin@icebergevents.com.au.

Disclaimer
The programme is correct at the time of printing, but the organisers reserve the right to alter the programme if necessary. In this instance, the Congress Organisers cannot be held responsible for any losses incurred by delegates.

Health
Should you require a doctor or dentist, your hotel should be able to arrange this for you. If you have a medical emergency outside your hotel or the Congress Venue, the phone number to dial for assistance in Australia is 000.

IPad App
The Congress has a free iPad app. This can be downloaded from the iTunes store by searching ‘International Congress of Aviation & Space Medicine 2012’. The app is compatible with iPhone, iPad and Android phones & tablets.

Liability
The Organising Committee, Host Organisation and/or Congress Organiser shall not be held liable for personal accidents, losses or damage to the private property of registered delegates attending the Congress. Delegates should make their own arrangements with respect to personal insurance.

Special Requirements
If you have dietary requirements or special needs and have not already notified the Congress Secretariat, please do so on-site at the Registration Desk.

Taxes and Refunds
The goods and services tax (GST) is a flat 10% tax on all goods and services – accommodation, eating out, transport, electrical and other goods, books, furniture, clothing etc. There are exceptions, however, such as basic foods (milk, bread, fruits and vegetables etc). By law the tax is included in the quoted or shelf prices.

The tourist refund scheme (TRS) enables you to claim a refund, subject to certain conditions, of the goods and services tax (GST) and wine equalisation tax (WET) that you pay on goods you buy in Australia (but not on services). Further information can be found at http://www.customs.gov.au/site/page4646.asp or http://www.ato.gov.au/content/47516.htm

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  - International dialling: +61 3 8413 7200
- Yellow Cabs
  - Phone: 132 227
  - International dialling: +61 3 9277 3700
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**Weather**
Melbourne is renowned for its ever changing weather. Please ensure that you check local weather reports before heading out and take appropriate additional clothing/wet weather gear.

**Wifi**
Free wifi coverage extends throughout the Congress venue. It is suitable for webmail, Facebook, Twitter and basic internet browsing (not for streaming video such as Skype).
THE ANDRÉ ALLARD LECTURE: DR JONATHAN CLARK  M.D., M.P.H.

Dr Jonathan B. Clark is an Associate Professor of Neurology and Space Medicine at Baylor College of Medicine (BCM) where he teaches operational space medicine at BCM’s Center for Space Medicine. He is Clinical Assistant Professor in the Department of Preventive Medicine and Community Health at the University of Texas Medical Branch in Galveston, Texas where he teaches Residents in Aerospace Medicine. Dr Clark is Medical Director of the Red Bull Stratos Project, a manned stratospheric balloon freefall parachute flight test program, which in March 2012 successfully accomplished the first stratospheric freefall from above 70,000 feet in the last 50 years. He is also Chief Medical Officer for Excalibur Almaz, an orbital commercial space company. His professional interest focus on the neurologic effects of extreme environments and crew survival in space. He received his bachelor’s degree from Texas A&M University in College Station, Texas; his medical degree from the Uniformed Services University of the Health Sciences in Bethesda, Maryland; and his master’s degree in public health from the University of Alabama in Birmingham. He completed his internship and residency at Bethesda Naval Hospital. Dr Clark is Board certified by the American Board of Psychiatry and Neurology and the American Board of Preventive Medicine. Dr Clark is a Fellow of the Aerospace Medical Association and the American College of Preventive Medicine.

He was a Member of the NASA Spacecraft Survival Integrated Investigation Team from 2004 to 2007 and a Member of the NASA Constellation Program EVA Standing Review Board from 2007 to 2010. Dr Clark worked at NASA from 1997 to 2005 and was a Space Shuttle Crew Surgeon on six shuttle missions. He also was Chief of the Medical Operations Branch and an FAA Senior Aviation Medical Examiner at the NASA JSC Flight Medicine Clinic. Prior to joining NASA in 1997, Dr Clark was Head of the Spatial Orientation Systems Department at the Naval Aerospace Medical Research Laboratory in Pensacola, Florida; Head of the Aeromedical Department at the Marine Aviation Weapons and Tactics Squadron One in Yuma, Ariz.; and Head of the Neurology Division and Hyperbaric Medicine at the Naval Aerospace Medical Institute. Dr Clark served 26 years on active duty in the U.S. Navy where he flew on DOD Space medical evacuation missions in Operation Desert Storm with the U.S. Marine Corps. He qualified as a Naval Flight Officer, Naval Flight Surgeon, Navy Diver, U.S. Army parachutist and Special Forces Military Freefall parachutist.

THE JOHN LANE ORATION: MAJOR GLENN TODHUNTER

On September 22 1995, Major Glenn Todhunter found himself trapped in the wreckage of his aircraft after it had crashed heavily from 200ft during a training flight. He almost died. After several days in intensive care on life support, his journey back to health required amputation of both his legs below the knee and two months in hospital. What followed over the next seventeen years is a landmark journey rebuilding his life learning to walk, drive and fly again.

Today Glenn has flown both rotary and fixed wing aircraft for the Australian Defence Force. After having been told he would never fly again for the military with a disability, he succeeded in becoming the first and so far only disabled aviator in the history of the Australian Defence Force. Glenn enjoys sharing his experiences with others, speaking about the human side of his journey touching on the distinction of courage, the realm of human achievement and shifting paradigms. Glenn enjoys visiting schools to help raise awareness of disability as a mainstream issue, and he is an active member of the Queensland Amputees and Families Support Group.

In acknowledgement of his efforts, Glenn was awarded lifetime honorary membership to the Australasian Society of Aerospace Medicine.
Michael Bagshaw is Visiting Professor of Aviation Medicine at King’s College London, where he was previously Director Aviation Medicine. He is also visiting Professor at Cranfield University, contributing to teaching, examining and research. For 12 years he worked for British Airways, retiring as Head of Occupational and Aviation Medical Services in 2004. Prior to this Professor Bagshaw worked in the NHS as Consultant in neuro-otology at St George’s Hospital, London, and general practice in Berkshire, then was Establishment Medical Officer at the Royal Aerospace Establishment, Farnborough.

After graduation from the Welsh National School of Medicine in Cardiff, Professor Bagshaw followed a career in the Royal Air Force as a medical officer, Hunter and Jaguar pilot and flying instructor, retiring as Senior Medical Officer Pilot and Specialist in Aviation Medicine at the RAF Institute of Aviation Medicine, Farnborough, in 1986. He still holds an Airline Transport Pilot Licence and flies part-time as an instructor and flight examiner.

The first non-North American based President of the Aerospace Medical Association and past President of the Airlines Medical Directors’ Association, recipient of a number of major international honours and awards, Professor Bagshaw has contributed to the standard textbooks of aviation and travel medicine and the Oxford Textbook of Medicine, and published more than 80 scientific papers. He was Guest Technology Lecturer to the Royal Society in 1996, the Royal Aeronautical Society Stewart Lecturer in 2005 and the Allard Lecturer to the International Congress of Aviation and Space Medicine in 2009. In retirement, Professor Bagshaw continues as Honorary Civilian Consultant Adviser in Aviation Medicine to the British Army, Aeromedical Adviser to Airbus, and Medical Adviser to Netjets Europe. He is also Associate Consultant to BRE (formerly the Buildings Research Establishment), working with it on a number of European research projects developing standards for the aircraft cabin environment.

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Aeromedical decision making in a regulatory medical certification setting is required to be defensible and consistent, so as to ensure the safety of air navigation. At the same time, the decisions need to be reasonable, and must balance the aviation safety imperatives with the individual’s desires. This has meant that the process of certification needs to be a risk management process and in the current time it needs to be evidence-based. How does a regulator convert data from medical literature (with all its uncertainties) into a defensible regulatory decision? CASA has adopted a methodology based on the ISO standard for risk management, which it uses in making these decisions. This paper presents the aeromedical risk assessment process, identifies clinical and decision making issues, and suggests it as the approach to regulatory aeromedical decision making.

Aeromedical decision making in cases of traumatic brain injury (TBI) includes two well known problems: cognitive impairment and the risk of post-traumatic epilepsy (PTE). While there is agreement about the assessment of cognitive impairment, the assessment of PTE risk remains controversial, and there are varied approaches nationally and internationally to the subsequent risk assessment of aircrew. Literature documenting PTE risk contains a wide range of methodologies and uses a large number of definitions of injury severity. These differences are important in applying population evidence to a specific case. In view of the significance of this decision both to the safety of the aviation environment and also to the future career of aircrew and air traffic controllers, CASA sought an extensive literature review, and also expert opinion in formulating a risk assessment paradigm. This paper presents the aeromedical risk assessment process, identifies clinical and imaging-based risk factors for TBI, and suggests an approach to risk stratification of aircrew.

Certification bodies are increasingly faced with an ageing pilot population, both in the commercial and private realms. Medical concerns include effects of cardiovascular disease - ischaemia and arrhythmia, loss of visual function and cognitive impairment. This paper will outline a proposed surveillance scheme created by the Civil Aviation Safety Authority in Australia for detecting clinical issues in older pilots.
Cerebral aneurysms are found in approximately 5% of the population. They may be diagnosed as an incidental finding, or as a result of rupture and acute subarachnoid haemorrhage. Furthermore, there has been considerable debate concerning the prognostic significance of aneurysm size. The fact that many aneurysms do not rupture, yet rupture may be catastrophic for the individual, places a high level of responsibility on the regulator to ensure assessment paradigms are effective in managing this risk. This presentation reviews recent developments in diagnosis and treatment and presents an evidence-based approach to aeromedical certification.

Aeromedical decision making in cases of transient global amnesia (TGA) is directed toward four key issues: 1) Clarification of the case definition to minimise the possibility of serious differential diagnoses such as migraines, epilepsy and cerebrovascular ischaemia. 2) Definition of the recurrence rate of the condition and diagnosis of a serious condition in the time following the original incident. 3) Exploration of the implications of an in-flight recurrence of the condition or manifestation of a differential diagnosis. 4) Institution of safety nets such as a monitoring period or ‘as or with copilot’ restriction to allow for differential diagnoses as well as a recurrence of the condition to manifest without compromising flight safety. This paper presents a case of TGA that has been worked up at CASA to outline the requirements of the case definition and the aeromedical disposition process in action including literature reviews. It is evident that while TGA is an unusual and uncommon condition in clinical practice, the same ADM process that applies to all conditions can be used to recommend a simple flow chart for the aeromedical disposition of this condition.

Aeromedical decision making in cases of episodic headache includes two well known problems: migraine and cluster headaches. These headaches affect four percent of the community and can result in marked functional disability, even when appropriate therapies are used. They are thought to be under-diagnosed and sub-optimally managed in primary care. A high index of suspicion is needed to distinguish primary headache disorders from secondary headache disorders. While there is agreement about the assessment of headache severity and impairment, there is much less clarity about prediction of recurrence and risk stratification and the regulatory management of aircrew and air traffic controllers with episodic headache. This paper presents CASA’s risk assessment process for aviators and air traffic controllers with episodic headache.
Aeromedical decision following a cerebrovascular accident (CVA) includes assessment of the following risks: risk of recurrence, risk of seizure and management of any underlying risk factors contributing to the CVA. This paper presents a pilot who experienced a CVA with a subsequent incidental finding of a structural cardiac disorder. The paper also discusses the challenge of aeromedical decision-making with respect to the strengths and limitations of the literature, differing perceptions and risk assessments by specialists and the regulator, and what happens when the regulator’s certification decision is disputed.

**OR08**

**English:** USAF UPDATE AND REVIEW FOR AVIATORS WITH VALVULAR HEART DISEASE

**French:** MISE À JOUR ET RÉVISION DE LA USAF POUR LES AVIATEURS AVEC CARDIOPATHIE VALVULAIRE

**Ed Davenport, WB Kruyer**

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Valvular heart disease is not uncommon and presents in an estimated 2.5% of the population with no difference between men or women. Mild or less valvular insufficiency is commonly regarded as a normal variant, while moderate or greater insufficiency is pathological. Stenosis is commonly regarded as pathological in all cases. Other valvular disorders such as bicuspid aortic valve (BAV) and mitral valve prolapse (MVP) have increased risk beyond that of associated stenosis and/or regurgitation including other cardiac and non-cardiac associated disease. Prior to 2008, the United States Air Force performed echocardiography on all aviator applicants, which was later discontinued based in part on a permanent disqualification rate of less than 0.5%, with waivers allowed in up to 1.5%. Regular follow-up has continued on all aviators that went on to become pilots in the USAF. The USAF had the largest known aviator cardiac database with over 1.2 million cardiac studies on over 286,000 aviators which includes data from all echocardiograms done on aviators since the inception of 2D echocardiography. This presentation will discuss the pathophysiology of valvular heart disease and discuss the hemodynamic changes influenced by flight in both high-performance (>4Gz) and non high-performance aircraft. The incidence and prevalence of valvular heart disease in the aviator will also be discussed based on our database. The current policy and follow-up recommended by the American College of Cardiology and the American Heart Association for all patients as well as the USAF specific policy in aviators will be reviewed.

**OR09**

**English:** AEROMEDICAL IMPLICATIONS OF MECHANICAL PROSTHETIC AORTIC VALVE IMPLANTS

**French:** IMPLICATIONS AÉROMÉDICALE DES IMPLANTS PROTHÉTIQUES MÉCANIQUES VALVULAIRES AORTIQUES

**T Jagathesan**

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tania.jagathesan@caa.co.uk
ABSTRACTS - ORAL PRESENTATIONS

Mechanical prosthetic aortic valve implantation is associated with complication risks that include endocarditis, valve dysfunction, valve thrombosis, thromboembolism and anticoagulant-related haemorrhage. The published literature was reviewed for these complications. Methods to mitigate the aeromedically significant risks to a level safe for aircrew certification will be considered. The United Kingdom Civil Aviation Authority experience of such cases will be described and a policy for the medical certification of aircrew following implantation of mechanical prosthetic valves will be outlined.

OR10

English: EPIDEMIOLOGY OF IN-FLIGHT CARDIOVASCULAR EVENTS
French: L’ÉPIDÉMILOGIE DES INCIDENTS CARDIOVASCULAIRES EN VOL
PM Alves, K MacKenzie, D Streitwieser, R DeJongh, N Nerwich
Affiliation of first author: MedAire Inc., Tempe, AZ, USA
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Introduction: Coronary Artery Disease (CAD) is estimated to affect 7.3% of the general population in the age range from 40 to 70 years. Acute Coronary Syndrome (ACS) is a common initial manifestation of CAD. It is expected that cardiovascular events occur in-flight and play a significant role in medical diversions. This paper aims to study the epidemiology of In-flight Cardiovascular Events (ICVEs) in commercial aviation.

Methods: The data base of a ground-based medical advisory services provider was retrospectively reviewed for the year of 2011. For each case a diagnostic impression and diagnostic category was issued by hospital-based actively practicing care physicians. Epi-Info 7.0.9.34 was utilized for statistical analysis.

Results: 22,574 in-flight cases were available for analysis with 525 diversions. 1,891 (8.4%) were considered in-flight cardiovascular events (ICVEs) resulting in 134 (28%) diversions, representing the third most frequent medical category and the second most frequent cause of diversions. 7.7% of ICVEs resulted in a diversion. Male gender was involved in 57% of the cases, compared to 45% for non-ICVE cases (p higher for ICVEs (age 55) compared to non-ICVEs (age 43) (p=NS). Likelihood for diversion was higher when a volunteer medical person was present on board (OR 3.4, 2.2-5.0) diagnostic impression (35.9%), followed by atypical chest pain (27.3%).

Discussion: ICVEs carry the highest probability for diversion. Chest pain represented more than half of ICVE cases. Enhancing cardiac diagnostic resources in-flight would likely assist in the improved management of ICVEs. Not only would this avoid unnecessary diversion, but could enhance the opportunity for life-saving interventions.

OR11

English: CARDIAC PACEMAKERS AND THE MILITARY AVIATION ENVIRONMENT
French: STIMULATEURS CARDIAQUES ET LE MILIEU DE L’AVIATION MILITAIRE
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Introduction: Cardiac pacemakers are electronic implantable devices whose function is life-critical for the patient. In general, electronic equipment can malfunction in the presence of radio-frequency electromagnetic fields; like any electronic device, pacemakers can have their operation compromised by electromagnetic fields. This paper explores the possible implications of using a pacemaker in a military aviation environment.

Method/Background: Generally, the intensity of electromagnetic fields in the environment is regulated to ensure the safety of humans; the main deleterious effects of exposure to radiofrequency fields are localised and whole-body heating. The practical implementation of exposure limitation is delineation of exclusion zones, or places where people are not permitted access due to dangerously high fields. Exposure limit standards also exist for electronic equipment, to ensure that reliable operation can be maintained in the electromagnetic environment where the system will be used. Examples of some commonly applied equipment standards are given; the test signals and limits are discussed, and mechanisms for failure of electronic devices are presented.
**ABSTRACTS - ORAL PRESENTATIONS**

**Analysis:** The limits specified in human exposure radhaz standards are compared to typical electronic equipment standard limits, both for military hardware systems and for AAMI (Association for the Advancement of Medical Instrumentation) standard PC-69, which applies to cardiac pacemakers and similar devices. The manufacturer’s guidelines for users of one type of cardiac pacemaker are examined and explained in the context of the failure mechanisms applicable to pacemakers and similar devices.

**Conclusion:** The electromagnetic environment that may exist in a military aviation environment is found to be more hostile than the general civilian environment, and the failure mechanism for cardiac pacemakers is found to differ markedly from the usual mechanism for deleterious health outcomes due to human exposure to radio frequency energy. A summary of the radio frequency interference risks to pacemaker operation in the military aviation environment is given.

**OR12**

**English:** SUDDEN CARDIAC DEATH FROM AN ANOMALOUS CORONARY ARTERY IN A U.S. MILITARY AVIATOR MAY NOT BE THE CAREER ENDER IT FORESHADOWS

**French:** LA MORT CARDIAQUE SOUDAINE D’UN AVIATEUR MILITAIRE AMÉRICAIN CAUSÉE PAR UNE ANOMALIE D’UNE ARTÈRE CORONAIRES N’IMPLIQUE PAS NÉCESSAIREMENT UNE FIN DE CARRIÈRE

**CLINICAL CASE PRESENTATION**

**JW Cromar, DI Mirski**

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We present a clinical case of a patient with a rare and extremely lethal anomalous origin of the left main coronary artery and its significance in regards to aviation. The patient suffered sudden cardiac death during physical military training from which he was successfully revived. An in-depth cardiac evaluation revealed a rare, left main anomalous coronary artery arising from the anterior right coronary cusp, passing directly between the pulmonary artery and the aorta. This case highlights the lethality of certain anomalous coronary artery arrangements in an athletic, healthy and medically screened population. This presentation also emphasizes the relatively common association between anomalous coronary arteries and sudden death when compared to better-recognized causes, including various hypertrophic cardiomyopathies. Treatment involving coronary artery bypass grafting and successful re-implantation of the anomalous coronary artery allows a rapid return of full aerobic conditioning within three months and a return to aviation status in both the United States Air Force and the United States Federal Aviation Administration (FAA).

**OR13**

**English:** SLEEP, CIRCADIAN RHYTHMICITY AND PSYCHOLOGICAL HEALTH DURING LONG-TERM ANALOG SPACE MISSIONS.

**French:** SOMMEIL, RYTHMICITÉ CIRCADIENNE ET SANTÉ PSYCHOLOGIQUE PENDANT DES MISSIONS SPATIALES DE LONGUE DURÉE SIMULÉES

**TL Sletten, J Sullivan, SM Rajaratnam, J Ayton, SW Lockley**

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Ocular light exposure is the primary environmental time cue for synchronising the circadian pacemaker, including sleep-wake cycles, alertness and performance patterns, and many other hormonal and metabolic rhythms. Inappropriate or absent exposure to a 24-h light-dark cycle causes misalignment of the circadian pacemaker, resulting in sleep disturbance, impaired performance and disrupted metabolic and endocrine systems. Space mission operations create an unusual light environment where individuals receive minimal natural sunlight for long durations that may present considerable challenges to the circadian system without structured imposed light-dark cycles. The aim of this study is to assess sleep, circadian phase, cognitive functioning and psychological health in expeditioners over-wintering in Antarctica as an analog for long-duration Lunar and Mars missions. Thirty-one expeditioners (5F, aged 44.58 ± 11.45 years) stationed at three Australian Antarctic bases (Davis, Mawson and Casey) completed data collection during a six-month winter season (March to September 2011). Participants completed daily sleep diaries and a subset wore wrist activity monitors continuously for up to six months. Once each month participants completed numerous computer-based performance tests and questionnaires examining psychological health and wellbeing.
Expeditioners also completed monthly 48-hour urine collection for assessment of the urinary melatonin metabolite 6-sulphatoxymelatonin, considered a reliable marker of circadian phase. The study will provide data necessary to assess the degree of sleep loss and circadian desynchrony experienced during an Antarctic winter and to quantify the contribution of sleep loss and circadian deficiency on cognitive and psychological impairment. These data will inform the development of an integrated, comprehensive sleep and circadian intervention program to monitor and improve health, safety and psychology during long-duration expeditions. Supported by ROSES-2008 NASA Research Program, Moon and Mars Analog Mission Activities (MMAMA).

OR14
English: PRE-PARTICIPATION ECG SCREENING IN MILITARY RECRUITS
French: UN ECG DE DÉPISTAGE EN PRÉ-PARTICIPATION CHEZ DES RECRUES MILITAIRES

G Hirschhorn, A Grossman, A Prokupetz
Affiliation of first author: IDF/IAF MC, Kiryat Tivo'on, Yzrael Velley, ISRAEL
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Introduction: The objectives of this study were to evaluate the rate of abnormal findings on pre-participation electrocardiography (ECG) in young adults and the additional evaluations required based on these findings.

Methods: A retrospective - cohort study was conducted at the Israeli Air Force (IAF) aero medical center screening center for flight academy and elite units' candidates. Flight academy and elite units' candidates undergo pre-participation ECG prior to their enlistment to the Israeli Defense Forces (IDF). Since 2010, all ECGs are performed at the IAF aero medical center. All ECGs performed since January 2010 were analyzed by one of three cardiologists and all those in which significant findings were identified were referred to further evaluation based on the cardiologist's request. Causes of referral for further evaluation, the evaluations performed and the results of these evaluations are reported for the study population. The main outcome measures were the rate of abnormal ECGS in study population, further examinations requested, and the results of these evaluations. Results: 1455 ECGs were performed in the years 2010-2011. Of these, 1388 (95.39%) were interpreted as normal. Sixty-seven subjects were referred to further evaluation based on ECG findings. The most common findings leading to further evaluation were T wave changes (16 cases, 23.88%), pre-excitation pattern (14, 20.89%) and voltage criteria for left ventricular hypertrophy (11, 16.41%). Only 7 subjects (10.44%) had abnormal findings which were considered clinically significant at the end of the medical evaluation.

Conclusions: The rate of significant findings leading to disqualification from military activity is extremely low and referral to continued investigations based on 12-lead ECG findings should be judicious.

15:30 - 17:00 (SCIENTIFIC SESSION 3) SPECIAL SENSES 1

OR15
English: BINOCULAR ENHANCEMENT OF COLOR CONTRAST SENSITIVITY
French: AMÉLIORATION BINOCULAIRE DE LA SENSIBILITÉ AU CONTRASTE DES COULEURS

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Introduction: Object recognition and task performance are enhanced when viewing the world with two eyes vs. one. Binocular enhancement of contrast sensitivity (CS) is well-established for luminance contrast, but less is known about color-defined stimuli. Our purpose was to determine if binocular enhancement of color CS is comparable to the 40% improvement reported for luminance CS (Campbell FW, Green DG. Monocular vs. binocular visual acuity. Nature 1965; 208:191-2).
Methods: Color CS was measured with the computer-based cone contrast test (CCT) which presents a series of colored letters on a grey background visible only to red (L), green (M), or blue sensitive (S) cones. Cone contrast was varied based on a response-driven staircase algorithm to determine L, M and S CS thresholds. Monocular and binocular L, M, and S cone CS were measured in 20 color normal (CVN) and 10 color deficient (CVD) subjects confirmed to be CVN or CVD on a battery of screening tests (Ishihara, Dvorine, HRR).

Results: Binocular CS exceeded monocular CS in both CVN (F=14.7) CVD subjects (F=8.1) for L cone CS, 34% for M cone CS, and 48% for S cone CS; mean binocular enhancement = 38%. CVD subjects showed mean enhancement of 39% for the cone CS corresponding to their CVD (protan or deutan), 36% for the unaffected L or M cone CS, and 33% enhancement for S cone CS. Conclusions: Enhancement of color CS with two eyes vs. one is comparable to improvement in luminance CS. Color contrasts tests, such as the CCT, are designed for monocular testing. Mild-moderate CVD individuals viewing the CCT binocularly may achieve falsely normal scores. Testing should be carried out monocularly in clinical settings since this provides the highest probability of detecting CVD individuals. Binocular scoring should be developed for users interested in characterizing test performance for occupational purposes.

OR16

English: SAFETY-CRITICAL SYMBOLS IN MAPS - COMPARISON OF THE READABILITY OF TWO MAPS IN DAY AND NVG READING CONDITIONS, USING A CONTROLLED EXPERIMENT.

French: SYMBOLES CRITIQUES POUR LA SÉCURITÉ SUR LES CARTES GÉOGRAPHIQUES - COMPARAISON DE LA LISIBILITÉ DE DEUX CARTES SOUS CONDITIONS DE JOUR ET DE NVG EN UTILISANT UN EXPÉRIENCE CONTRÔLÉ

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Introduction: An increase in the number of man-made obstacles such as radio masts and windmills may lead to cluttered maps, giving rise to possible misperceptions and potential flight safety implications. Also, the Introduction of night vision goggles (NVG) provides a visual environment in which the readability of some colours may be compromised. In a cooperation project between Norwegian and Swedish armed forces, a new map has been developed, partly based on current Swedish symbology, with implementation of changes to address these problems. The aim of the current project was to compare the new map with a standard Norwegian NATO map using relevant measures of readability.

Methods: Scientists and aircrew worked together to develop operationally relevant tests to assess the maps, both in workshops and in trial flights. Objective tests measuring time and accuracy in performing different map related tasks were devised, as well as a video tracking test. These tests were repeated for different map sections. Both normal classroom and NVG visual conditions were used, utilising a balanced experimental design after randomisation in groups. Subjective scoring was done at the end of the day as a supplement.

Results: 21 Norwegian and Swedish aircrew participated with a mean flight experience of 2200 flight hrs. The tracking test gave inconclusive results, probably due to methodological issues. The new obstacle symbols showed significantly better readability, particularly when reading in cluttered areas. Power line and span symbols also showed statistically significant improvements which were augmented in NVG lighting conditions. The subjective ratings supported the experimental results.

Conclusions: The tests showed significant improvements in some aspects of safety-critical map symbology. Proposal for changes have been put forward in a NATO standardisation group. Symbology improvements may be implemented in digital as well as paper formats, and may offer flight safety benefits.
OR17

**English:** NON-MYDRIATIC RETINAL IMAGING, 5 YEARS EXPERIENCE IN AEROMEDICAL ROUTINE EXAMINATIONS

**French:** RÉTINOGRAPHIES NON MYDRIATIQUES, CINQ ANNÉES D’EXPÉRIENCE D’EXAMEN MÉDICAL DE ROUTINE.

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**Methods:** 15 000 examinations have been done by fundus photography. A random sample of 956 consecutive photographs has been chosen for evaluation of feasibility and quality of the method has been chosen.

**Results:** On 904 of 956 photographs (94.5%) optic disc, macula, vessels and inner 30° of the retina could be assessed completely, on 43 (4.5%) images only disc and major vessels could be assessed, on 9 (1%) images the quality was too poor for assessment of the optic disc. The pathologic findings included markedly excavated optic disc (7), definite glaucoma, not yet diagnosed (1), macular changes (7), other pigment changes (3), optic disc drusen (2), choroidal naevus (1), myelinated nerve fibres (1) suspected choroidal osteoma (1), vitreous deposits (1).

**Discussion:** Fundus photography can be done by a technician, takes usually less than 2 minutes per eye, the images can be evaluated by experts. It provides high quality results in the vast majority of examinations. Only 1% of the images cannot be evaluated sufficiently. However, in routine examination for pilot licensing non-mydriatic fundus photography proved to be an ideal tool, reveals more pathological results than fundoscopy alone and provides an excellent documentation, and the pilot may go back to work immediately. The number of pathologic findings was higher than expected. Early diagnosis of treatable disorders such as glaucoma and monitoring of pilots with suspicious ocular findings is much better feasible. There is a disadvantage as well. It is questionable whether search for peripheral retinal changes in an asymptomatic low risk-patient is necessary. In our experience undilated fundus photography led to an enormous improvement of the quality of our ophthalmological exams. Additionally a valid documentation allows follow-up and early detection of initially asymptomatic disorders such as glaucoma.

OR18

**English:** OPERATIONALLY-BASED VISION ASSESSMENT RESEARCH INVOLVING DEPTH PERCEPTION

**French:** RECHERCHE SUR L’ÉVALUATION DE LA VISION SUR UNE BASE OPÉRATIONNELLE IMPLIQUANT LA PERCEPTION DE LA PROFONDEUR

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**Introduction:** Currently, the United States Air Force (USAF) uses a battery of tests to quantify depth perception capability, including the Optec Vision Tester (OVT) stereopsis test, AO Vectograph, Randot or Titmus, and Howard-Dolman (HD). In fact, variations of the HD have been in use without interruption by the USAF since 1939. Thus the use of tests of depth perception in assessing aircrew quality of vision in the USAF has a long history. However, very little research has been carried out to establish quantitative relationships between clinical tests of vision and operational aircrew performance, including clinical tests for depth perception, which is the goal of the USAF Operationally-Based Vision Assessment (OBVA) program. In particular, it is unclear whether existing aircrew screening standards are adequate for selection of aircrew for the next generation of aerial refueling tankers (e.g. Boeing KC-46, USAF; Airbus KC-30, RAAF; Boeing KC-10, RNLAIF; KC- 767, JASDF), in which boom operators will use relatively recently developed stereo displays in place of direct view crew stations. The level of stereoacuity and oculomotor capabilities required to maintain stereo fusion with these new displays in rested and fatigued states are generally unknown.

**Methods:** The USAF OBVA laboratory is pursuing research on several topics related to depth perception: 1) Developing a new computer-based test to assess stereo-acuity thresholds, 2) comparing available tests and assessing correlations with other measures of depth perception and ocular alignment (e.g. phorias, zone of clear single binocular vision, speed of fusion, microtropias, etc.) 3) investigating the effect of fatigue on stereo-acuity and assessing the predictive value of several clinical measures listed above, and 4) investigating the relationship between clinical test results related to depth perception and performance on operationally-relevant tasks using an aerial refueling simulation.
Results and Conclusions: Preliminary results and on-going research will be discussed.

OR19

English: CASE STUDIES: THREE PROFESSIONAL AUSTRALIAN PILOTS WITH THE COLOUR PERCEPTION DEFECT OF PROTANOPIA

French: ÉTUDES DE CAS: TROIS PILOTES PROFESSIONNELS AUSTRALIENS AVEC PROTANOPIE

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The Aviation Signal Light Test (ASLT) and the Practical Lantern Test (PLT) are two screening instruments nominated by the Australian Civil Aviation Safety Authority (CASA) to determine whether colour vision defective pilots should be given unrestricted scope to exercise the privileges of the Airline Transport Pilot License. To be useful, screening instruments such as these require two fundamental and essential characteristics: The first is reliability (i.e., they must produce consistent results upon repeated application); the second is validity (i.e., they must measure what they purport to measure, thereby allowing appropriate screening). This second characteristic begs the question: What are the ASLT and the PLT purporting to measure? Given that the purpose of the CASA is to ensure a safe aviation environment, the obvious answer to the question above is that these tests are measuring the ability of pilots to fly aircraft safely, thereby enabling the screening out of people who are unlikely to pilot aircraft in a safe manner. In this paper the flying histories of three pilots, each of which has the colour vision defect of protanopia and each of which has failed the ASLT and PLT, is presented. Each pilot has in excess of 6000 hours of safe, professional flight time, involving instructing, single pilot operations under Instrument Flight Rules (IFR) by day and night, and in modern glass cockpit (EFIS) equipped aircraft. The extensive and safe flying histories of these pilots are problematic for the validity of the ASLT and PLT as screening instruments, and highlight the need for the development of screening instruments that more closely and accurately represent the environments in which pilots operate when flying aircraft.

OR20

English: THE EMERGENCE OF CO2 AS A NON-SURROGATE, SELF-DETERMINING RESPIRATORY GAS IN EXTREME ENVIRONMENTAL ACCLIMIZATION

French: L’ÉMERGENCE DU CO2 COMME UN GAZ RESPIRATOIRE AUTO-DÉTERMINANT ET NON-SUBSTITUTIF DANS L’ACCLIMATISATION À UN ENVIRONNEMENT EXTRÊME

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Introduction: The interface between expired and inspired gas in the dyadic structure of lung, has a labile-dynamic governed by CO2 changes (Lahiri S, 2003), pari passu with the interface of O2 at the alveolus and the interstitial tissues of the lung. Elegant mathematical models of P(CO2) with and for short term hypoxia (Wolf MB, 2007), surrogates its role to altitude training (Self, 2011) and in-flight O2 delivery. However the hypercapnic point at high altitude and hypobaria far surpasses the hypoxic point with lesser lung function changes (Nielsen TM, 1976), permissive hypercapnia, and emphysematous lung stretch (O’Croinin D, 2005). State of the Art. Arterial blood O2/CO2, measures of blood flow (conventionally by the Ficks Principle) are used for integral controls of breathing under varied environmental and physiological adaptations (Ainslie PN, 2009). Progressive elevation of inspired CO2, with disruptions of the normal patterns of tidal volume, rhythm and frequency feedback of the Mackey-Glass model (Landa PS, 1995), had been an understudy to O2, due to the measuring misfit and reduction in the range of linear respiratory response to CO2, (Gelfand R, 1980). Time transients of O2 in rapid breathing differ from those of changing PCO2 (Gardener WB, 1980); with turbulent diffusional resistance concept (Ben Jebria A, 1987); three dimensional bulbac acini and labyrinthine branching ducts, (H. Kitaoka, 2000); CO2-Oxford Fan modulation by the reduced oxygen pressure, (Fowler AC, 2002); viscosity and density (Prestele K, 1976) with friction effects in the Maxell-Stefan Model and intricate acinar-mixing (Boudin L, 2010); accrue for a non-surrogate role of CO2. Conclusions. Versatility of delta V/delta PACO2 understanding can delineate, orchestrate and extend its role in extreme environments, better applicable in hypobaric stratospheric and suborbital conditions with parallel Pitot tubelike measurements (Porszasz J, 1994) and respiratory diffusion activity in the Space environment.
AEROSPACE MEDICINE AS A MEDICAL SPECIALTY: AN AUSTRALIAN INITIATIVE TO RECOGNIZE ‘SPECIALISTS IN AEROSPACE MEDICINE’.

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Aerospace medicine is seen as a clinical specialty in many parts of the world; however, in Australia and New Zealand it has been viewed for many years as a ‘special interest group’ of general practitioners and occupational physicians. Within this paradigm, interest to pursue a career in aerospace medicine has diminished - to the point it has become difficult to identify people with the knowledge and experience to fill key functions in aerospace medicine. The Australasian College of Aerospace Medicine was established to provide an academic structure to support and develop those doctors in Australia and New Zealand who practice aerospace medicine at a high level of expertise, and to support and train junior doctors who aspire to a career in aerospace medicine - with an aspirational goal of having aerospace medicine recognized as a clinical specialty by the wider medical community. This presentation will describe the way the College is working towards these goals, and outline a model for specialist recognition that will interest specialists in aerospace medicine from countries where aerospace medicine is not recognized as a clinical specialty.

AVIATION MEDICINE TRAINING FOR MEDICAL OFFICERS IN THE REPUBLIC OF SINGAPORE AIRFORCE (RSAF)

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Introduction: Since the mid 1990s, the RSAF has been building a pool of regular Medical Officers to serve its development into a modern and capable air force. The regular MOs in RSAF are required to specialise in Aviation Medicine in order to provide professional expertise in clinical and operational support to RSAF’s flying operations, and maximise health and performance potential of our aviators. To serve their roles effectively, our Aviation MOS (AvMOs) would require deeper operational insights in order to develop holistic aeromedical support programmes for our future warfighters. In order for AFMS (RSAF Medical Service) to continue to generate AvMOs who will be able to meet the needs of the 3rd Generation RSAF, the training programme was reviewed and formalised in 2005.

Methods: The pedagogy of the AvMO training programme (ATP) was reviewed holistically by a core group of senior aviation medicine practitioners in the RSAF in early 2005. This review aimed to revamp the ATP by incorporating identified core modules, streamlining the training timelines and deliverables, and to implement a structured framework that aligned with mainstream clinical training. After the first batch of trainees reached the advanced phase of training, a post implementation review was carried out in 2009 and the highlighted areas for improvement were addressed. This review comprised reports submitted by the AvMO trainees from their workplace attachments and surveys targeted at both the senior AvMO community as well as the trainees.

Conclusion: A formalised and structured training programme to nurture and groom aviation medicine practitioners is required to systemically and holistically train our future generation of AvMOs. The programme will need to be reviewed regularly to ensure it remains relevant as the scope and demands of aeromedical support evolves.
**OR23**

**English:** A NOVEL METHOD TO IMPROVE THE SOUND ATTENION OF AIRCREW HELMETS

**French:** UNE NOUVELLE MÉTHODE POUR AMÉLIORER ATTÉNUATION SONORE DES CASQUES DU PERSONNEL NAVIGANT

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**Introduction:** The cockpit noise levels in military aircraft can be very high (110-115 dB), often requiring the use of double hearing protection (helmet and earplugs) to prevent hearing loss and to keep the exposure to noise within the legal limits. A variety of devices are available for additional noise protection--foam earplugs, communications earplugs (CEP) with foam tips, custom moulded earplugs (mCEP), and ANR. However, all of these devices have limitations. This task was undertaken to modify the aircrew helmet to improve its sound attenuation. The objective of the task was to determine whether the passive sound attenuation provided by the modified helmet is adequate to permit flying without the need to use additional protection.

**Methodology:** A number of modifications were carried out on the shell and earcups of an aircrew helmet. The modified versions of the helmet were subjected to attenuation testing using the Real Ear Attenuation Testing (REAT) method in a laboratory. Cockpit noise data from fast jets and helicopters was used to compute the noise levels at the pilots' ears while using the modified helmet types. Daily Personal Exposure Level (LAeq,8h), Percentage Exposure, and the Permissible Daily Exposure Duration (PDED) were computed.

**Results & Conclusions:** It was concluded that the modifications to the aircrew helmet resulted in a significant improvement of sound attenuation. One modified configuration of the helmet had the potential to provide adequate hearing protection to the pilot to permit unrestricted flying in both the LIF Hawk and F/A-18 Hornet without the use of additional protection in the form of CEP, foam earplug, or active noise reduction.

**Recommendations:** The modified configuration of the HGU-55/P helmet should be subjected to further attenuation testing in accordance with the relevant national standards and in-flight testing in the fast jets and helicopters.

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**OR24**

**English:** VESTIBULAR SCHWANNOMA (VS) AND FITNESS TO FLY: 10 YEARS EXPERIENCE

**French:** SCHWANNOME VESTIBULAIRE ETAPTITUDE AÉRONAUTIQUE: 10 ANS D’EXPÉRIENCE

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**Introduction:** Le VS est une pathologie dépistée lors des visites ORL du personnel navigant civil et des visites médicales du pilote privé. Grâce à l’évolution de lIRM pour son diagnostic et sa surveillance et à l’amélioration des thérapies, cette pathologie peut relever d’une aptitude par dérogation, selon certains critères respectant la sécurité aérienne et sur décision de l’autorité de l’Aviation Civile.

**Méthode:** étude rétrospective sur 10 ans des dossiers de VS examiné par l’autorité. Résultats: entre 2001 et 2010, 18 dossiers ont été répertoriés avec 7 pilotes professionnels, 5 pilotes privés et 6 hôtesses. 41% des pilotes ont obtenu une aptitude par dérogation, (2 pilotes professionnels et 3 pilotes privés). Du fait de sa spécificité évolutive et de ses complications propres ou iatrogènes, sur l'équilibre, laudition ou le nerf facial, chaque dossier doit être analysé au cas par cas et surveillé régulièrement

**Conclusion:** L’abaissement des futures normes d’audition européennes diminueront la possibilité de dépistage de cette pathologie, donc la nécessité d’examen ORL de ce personnel. Une fois diagnostiqué le VS demande de la part du médecin expert du médecin du travail et du médecin classe2 un contrôle spécifique de son évolutivité pour le maintien de l’aptitude par dérogation
OR25

English: METRICS OF PHYSIOLOGICAL AND SUBJECTIVE MENTAL WORKLOAD IN MISSION ORIENTED NAVAL HELICOPTER OPERATIONS

French: MESURE DE LA CHARGE PHYSIOLOGIQUE ET MENTALE SUBJECTIVE DANS LES OPÉRATIONS NAVALES HELIPORTÉES ORIENTÉES SUR LA MISSION

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Introduction: The capabilities of the aircrew to perform in battle intensive conditions are central to the achievement of mission goals. This study has tried to examine aircrew capabilities in correlation to physiological and subjective mental workload indices in Sea King 42B Observers during various tactical and operational missions undertaken in a real time operational scenario from an aircraft Carrier. It also aims to correlate how flying experience and time of the day influenced aircrew in terms of workload.

Methods: 12 male Indian Naval Aircrew volunteered for the study. Aircrew were divided into 2 groups (>500hrs and monitoring (heart rate, NIBP, respiratory rate, SpO2, surface skin temperature) of the aircrew was carried out in flight during various missions (Radar-ESM, ASV mission, ASW Sonar, ASW Sonics, Manual Hoisting of Sonar). Post-flight subjective assessment of the mission performance was done using analysis of mental workload (NASA-TLX).

Results: Significant variations of heart rate were seen between the two groups across all mission profiles during day and night flying. Variations in HR were more for the novice group. ASV mission saw the most significant change (P=0.00089). There were significant variations for all profiles in the total workload scores between the two groups. Night flying results also showed significant variation between the groups. There were consistent variations between the groups in different dimensions of the workload scores. HR was the physiological variable that correlated well with NASA TLX scores.

Discussion & Conclusion: This study was unique due to the use of the actual, not simulated, environment. The study concludes that mission performance is dominated by flying experience. Time- and precision-demanding missions were associated with more mental workload. Findings of observers can be compared to that of pilots in similar conditions. Proper crew pairings can reduce inflight workload, especially in highly cognitive tasks. The inflight environment was also responsible for determining responses towards mission effectiveness.

OR26

English: ELECTROACUPUNCTURE IMPROVES ORTHOSTATIC TOLERANCE IN HEALTHY SUBJECTS

French: L’ÉLECTROACUPUNCTURE AMÉLIORE LA TOLÉRANCE ORTHOSTATIQUE CHEZ LES SUJETS EN SANTÉ

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Introduction: Orthostatic intolerance is a well-known consequence of microgravity. Recent studies have demonstrated that electroacupuncture (EA) enhances tolerance to cerebral hypoperfusion/ischemia, elicits an acute pressor response, and improves hypotension after spinal anesthesia. However, whether EA may improve tolerance to orthostatic hypotension has never been investigated. Therefore, we hypothesized that EA might be an effective therapeutic intervention in improving orthostatic tolerance.

Methods: In a randomized, controlled, and crossover fashion, 20 healthy subjects received no EA, EA for 30 minutes at the acupuncture point Neiguan or at a nonacupoint before combination of head-up tilt (HUT) and lower body negative pressure (LBNP). Blood pressure, heart rate, heart rate variability, cardiac function, cerebral blood flow velocity, and plasma catecholamine were measured. Orthostatic tolerance was defined as the duration until presyncope while undergoing 10 minutes of 70° HUT, followed by additional increasing LBNP.
**Results:** EA at Neiguan immediately before the test postponed presyncopal symptoms, improved supine hemodynamic responses to HUT and LBNP, and blunted decreased cerebral blood flow velocity. EA also decreased the high-frequency ranges of R-R interval and increased the low-frequency ranges of R-R interval, and increased plasma catecholamine concentrations.

**Conclusion:** EA pretreatment at the Neiguan is effective in improving orthostatic tolerance. Improving cardiac function and activating peripheral sympathetic nervous system are largely responsible for improved orthostatic tolerance after EA immediately before the test.

**10:30 - 12:15 (SCIENTIFIC SESSION 5) HEALTH & OPERATIONS**

**OR27**

**English:** TECHNOLOGICAL INNOVATIONS IN MEDICINE AND THEIR IMPACT IN AEROSPACE MEDICINE  
**French:** INNOVATIONS TECHNOLOGIQUES EN MÉDECINE ET LEUR IMPACT EN MÉDECINE AÉROSPATIALE

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This presentation will discuss the factors that have enabled exponential technological innovations including: Moores Law, RAM Cost, RAM Size, Average Transistor Price, Average Microprocessor Cost, Microprocessor Clock Speed, and Supercomputer Power. These factors have had a significant impact on accelerated technological breakthroughs in artificial intelligence, mobile computing, robotics, cloud computing, 3D printing, nano-technology, mobile communications devices, microfluidics, digital memory storage, augmented/virtual reality, social networking, immersive computer interfaces, crowd sourcing/distributed problem solving, etc. In turn, these breakthroughs have enabled accelerated technological innovations in medicine such as digital medicine, bio-engineering, virtual medical imaging, regenerative medicine, stem cells therapies, cloning, brain computer interfaces, biomedical devices, micro-electro-mechanical systems (MEMS), genomics and gene therapies, nanomedicine, neuro-technology, medical robotics, engineered replacement organs, networked health care, etc. Several life altering medical breakthroughs on the horizon include: restoring vision to the blind, organs on demand, brain repair and augmentation, elimination of genetic conditions, cures for neurological conditions, prevention of heart attacks, elimination of cancer deaths, development of smart drugs, and vaccines against cancer. Medical technological innovations are creating increasingly complex challenges for aerospace medicine, including: changes in medical care of aerospace personnel, evolving roles and responsibilities of aerospace medical personnel, changes in medical certification criteria for aerospace personnel, human factors considerations to ensure safety in aerospace operations, and global implementation and harmonization issues. It is time to expand our discussions in international forums on the regulatory, operational and personal implications of these technological medical innovations and their impact in aerospace medicine.

**OR28**

**English:** PUSHING THE ENVELOPE IN PILOT PHYSIOLOGIC MONITORING DURING EXTREME FLIGHT CONDITIONS  
**French:** REPOUSSER LES LIMITES DE LA SURVEILLANCE PHYSIOLOGIQUE DES PILOTES DURANT DES CONDITIONS ExtrêMES DE VOL

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**Introduction:** In an era where the limits of human performance are being stretched to the razor’s edge, many aerospace medicine specialists are calling for a deeper understanding of the physiologic processes that underlie human tolerance in extreme environments. Acquiring this data stream in a reliable, real-time and functional manner is no small feat. We explored the challenges associated with obtaining in-flight physiologic data using available technology during dynamic flight test involving multiple high-G maneuvers.
**Methods:** An IRB-approved, retrospective review was performed on over 4000 minutes of physiologic data obtained from F-22 Test Pilots using off-the-shelf monitoring devices during 6 ground tests and 15 experimental flight tests at Edwards AFB, CA between July and September 2011. Experimental flight tests included over 40 sustained high-G events (defined as >6Gz) with times synchronized, physiologic monitoring data captured at rates of 1Hz (heart rate, oxygen saturation) and 0.067Hz (respiratory rate).

**Results:** Important considerations in portable monitoring device selection were found to be: available ‘real estate’ on the pilot’s body, device dimensions, ease of time-synchronization with aircraft systems, data acquisition rate, frequency emissions, storage capacity and power source. Issues of device rigidity were less of a concern than originally anticipated. During high-G manoeuvres, the data drop-out rate for heart rate data captured with a chest harness device was significantly less at 5% as compared to 59% with a finger-mounted pulse oximeter (p < 0.001). With successive G-loading, an increase in heart rate and respiratory rate was readily tracked using chest harness metrics. Key limitations with off-the-shelf equipment concerned the duration and rate of data acquisition which favored a more customized device.

**Conclusion:** With careful a priori analysis and device selection, the ability of portable monitoring devices to provide reliable, real-time, and functional measurement of a pilot’s physiological metrics in an extreme flight environment appears within reach.

**OR29**

**English:** BODY MASS INDEX IN YOUNG EMBRATI AIRLINE PILOTS: DOES BMI CHANGE DURING TRAINING AND DOES IT CORRELATE WITH SICKNESS ABSENCE ONCE QUALIFIED?

**French:** INDICE DE MASSE CORPORELLE CHEZ LES JEUNES PILOTE DE LA LIGNE AÉRIENNE EMBRATI: EST-CE QUE L’IMC CHANGE AU COURS DE L’ENTRAINEMENT ET Y A T’IL UN CORRÉLATION AVEC L’ABSENCE POUR MALADIE UNE FOIS LE PILOTE QUALIFIÉ?

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**Background:** Obesity is associated with significant morbidity in workers including airline pilots, yet little is known of the impact in the high risk population of young Emirati pilots.

**Objectives:** To describe the Body Mass Index (BMI) characteristics of a group of cadet pilots over the 4.5 years training period and determine any correlation between BMI and sickness absence in this group during the first year as fully trained pilots.

**Methods:** The entire cohort of 67 cadet pilots commencing flying training between January 1st 2007 and December 31st 2008 was identified from training records. BMI at pre-employment medical was tested (t-Test) against the most recent BMI. Sickness Absence measures (total days, short term episodes days, long term episodes >7 days, total episodes, Bradford factor) were obtained from the operational database for the most recent 12 month period and tested against categorized BMI data (WHO categories) for significant differences (Wilcoxon Rank Sum test). Correlation was also assessed.

**Results:** There was a significant rise in BMI of 0.8 kg/m2 (p = 0.013). Greater fluctuation, both positive and negative, was seen in the higher BMI categories whilst those initially in the low and normal categories invariably gained weight. There appeared to be a trend towards higher sickness absence at the extremes of BMI but when tested this was not statistically significant.

**Conclusions:** This high risk cohort does gain weight but the study does not have sufficient power to demonstrate a correlation with sickness absence. Clinical interpretation, practical application, and future approaches to address this important question are discussed.
**OR30**

**English:** BODY MASS INDEX (BMI) AND HEALTH CO-MORBIDITIES IN AUSTRALIAN COMMERCIAL PILOTS

**French:** INDICE DE MASSE CORPORELLE (IMC) ET CO-MORBIDITÉS CHEZ LES PILOTES COMMERCIAUX AUSTRALIENS

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**Introduction:** The health of commercial airline pilots is of the utmost importance in ensuring public safety. Pilots who are overweight or obese may develop health co-morbidities, which can affect their capacity to fly safely. This study has examined the relationship between BMI and a number of clinically significant co-morbid health conditions. This is the first study, to our knowledge, that has examined overweight and obesity in commercial airline pilots in Australia.

**Method:** Data was analysed for 83 ideal weight (BMI ≤ 25) and 104 overweight or obese (BMI > 25) class 1 (commercial) pilots registered with the Australian Civil Aviation Safety Authority (CASA). Subjects were selected from the CASA database of registered pilots. Subjects were stratified by BMI in 2012. Study subjects were then randomly selected from the two groups. Subjects were excluded if they were not currently registered as a class one pilot or if there was no data available for them 10 years previously. Data was collected from annual medical assessment in 2011/12 and 10 years previously, 2001/02. The presence of hypertension (140mmHg systolic and/or 90mmHg diastolic), ischemic heart disease, myocardial infarct, stroke and Type 2 Diabetes Mellitus (T2DM) was recorded. The risk of having co-morbid health conditions in the ideal weight group was compared to the overweight group and calculated for 2011/12 and 2001/02.

**Results:** Hypertension and T2DM were the only co-morbid conditions recorded. In 2011/12, the prevalence of co-morbidities was 12% in the overweight group and 4% in the ideal weight group, giving a prevalence ratio of 3.19 (CI 0.93-10.94), p=0.058. In 2001/02, the prevalence of co-morbidities was 7% in the overweight group and 4% in the ideal weight group, giving a prevalence ratio of 1.86 (CI 0.50-6.78), p=0.516.

**Conclusion:** Overweight and obese pilots appear to have an increased risk of developing co-morbid health conditions, specifically hypertension and T2DM, when compared to ideal weight pilots. Ours was a small, preliminary study. Nonetheless, the association of obesity with hypertension and T2DM in 2011/12 nears statistical significance. This study forms the groundwork for further studies exploring the relationship between BMI and health co-morbidities in commercial airline pilots, and the potential impact of this relationship on aviation safety. Recommendations for future research in this area, as well as strategies for maintaining a healthy pilot workforce, are discussed.

**OR31**

**English:** COUNTERMEASURES TO PREVENT POST-FLIGHT COMPARTMENT SYNDROME (PFCS)

**French:** PRÉCAUTIONS POUR PRÉVENIR LE SYNDROME DU COMPARTIMENT ANTÉRIEUR APRÈS VOL

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**Introduction:** Compartment Syndrome is a limb-threatening problem resulting from serious injury. The primary countermeasure is fasciotomy. Such injuries precipitate capillary leaks exacerbating interstitial swelling; capillary integrity is not regained until 24-48 hours post-injury. Given Aeromedical Evacuation (AE) logistics, patients are regularly transported well within this 24-48 hour period. These patients may not demonstrate symptoms until arrival at their next staging area—hence “post-flight compartment syndrome (PFCS).” Early rapid transport could well be an additional contributor. It is hypothesized that edema is enhanced with hypobaria producing further swelling stretching the intercapillary distance and reducing oxygen delivery to tissues at risk. Countermeasures include supplemental oxygen and cabin altitude restriction (CAR). Aggressive use of these countermeasures may reduce PFCS incidence. A first step in investigating this premise was an ecologic study looking at the association between CAR and post-flight complications. This study used CAR rate as a surrogate metric denoting aggressive VFS activity as flight surgeons are not encouraged to use CARs on AE flights (due to higher fuel burn, possible longer flight times, and resultant stress on aircraft structures).
**Methods:** A retrospective ecological analysis was performed on AE and casualty data for 2264 patients transported from Southwest Asia on USAF aircraft from January 2007 through February 2008. Monthly CAR rates and Post-AE Complication rates were then calculated. A Spearman Correlation was performed.

**Results:** A Spearman rho correlation between CAR rate and Post-AE Complications equalled -0.666 with a p = 0.009. Limiting the analysis to the most aggressive VFS action, January 2007 through September 2007, the Spearman rho equalled -0.667 with a p = 0.049. CAR rate was thus negatively correlated to Complication rate. This finding bears further investigation.

**OR32**

**English:** THE TRAVEL HEALTH ADVISORY GROUP: A JOINT TRAVEL INDUSTRY AND TRAVEL HEALTH SPECIAL INTEREST GROUP PROMOTING HEALTHY TRAVEL IN AUSTRALIA

**French:** LE GROUPE CONSULTATIF SUR LA SANTÉ VOYAGE: UN GROUPE D’INTÉRÊT FORMÉ DE L’INDUSTRIE DU VOYAGE ET DE LA SANTÉ VOYAGE SPECIAL FAISANT LA PROMOTION DE LA SANTÉ VOYAGE EN AUSTRALIE

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**Introduction:** The Travel Health Advisory Group (THAG), established in 1997, is a joint initiative between the Australian travel industry and travel medicine professionals that aims to promote healthy travel. THAG seeks to promote cooperation in improving the health of travellers between the travel industry and travel medicine professionals and to raise public awareness of the importance of travel health.

**Methods:** The major activities of THAG are described which include: networking and exchange among groups interested in travel health; undertaking travel health research; travel health promotion targeting travel service providers and the public; and the redevelopment of an increasingly popular travel health public website.

**Results:** THAG became affiliated with The Australasian College of Tropical Medicine (ACTM) as a Special Interest Group in 2011. THAG’s welltogo.com.au website, developed in 2004, was updated and relaunched in 2011, and was ranked Page 1 (#4) on a search of Google.com.au (as at 15 June 2012). The THAG website is mirrored on other websites, such as welltogo.org.au, launched in 2011. THAG members advocate for healthy travel in a number of forums, including aviation medicine. An updated travel health bookmark is now available. THAG has also undertaken a number of research projects published in leading travel medicine journals.

**Conclusion:** A partnership approach between the travel industry and travel medicine professionals can effectively support a range of activities to promote the health of travellers. THAG programs, including the welltogo.com.au website, are making an important contribution in providing information to the Australian public on travel health.

**THAG Member organizations:** Anton Breinl Centre, James Cook University (Peter Leggat); Australasian Society of Aerospace Medicine (Ian Cheng); Australian Federation of Travel Agents (Jayson Westbury); Diploma World Travel Service (Karen McGee); Faculty of Travel Medicine, ACTM (Tony Gherardin), MASTA Australia (Bernie Hudson), Qantas Airways (vacant), and Royal Australian College of General Practitioners (Nick Zwar). Member at large: Bronwyn Claxton; Observers: Australia Medic Alert Foundation (Sandra Turner).
OR33

English: USE OF LUMBAR SUPPORTS BY CYPRUS AIR FORCE HELICOPTER PILOTS
French: UTILISATION DE SUPPORTS LOMBAIRES PAR LES PILOTES D’HELICOPTÈRE DE L’ARMÉE DE L’AIR DE CHYPRE

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Introduction: In many air forces including Cyprus Air Force, military helicopter pilots are provided with ergonomically designed lumbar supports as part of a backache mitigation strategy. This study describes the Cyprus Air Force helicopter pilot experience and evaluation of using this personal protection equipment.

Methods: A semi-structured questionnaire was administered to all (60) active duty helicopter pilots of the Cyprus Air Force. The questionnaire concerned backache experience and pilot self appraisal of using lumbar supports.

Results: 54% reported backache prior to using lumbar supports in 30% lasting up to 4 hours after the sortie. There was generally good acceptance of the device which was considered ‘useful’ by 73% and ‘generally satisfactory’ by 65%. The return for flying hours with the support was on average 325, but compliance with the instruction to wear it during flight was variable (81% and 57% used it for more than 25% and 70% of the time flown, respectively). Improved compliance was noted in those suffering from back pain. 54% reported significant pain reduction whilst experiencing little difficulty in handling or positioning it. They were on the whole unaware of the support in flight and it did not adversely affect their control of the aircraft. Sitting comfort was improved in 51% with less fatigue after the flight in 40%.

Conclusions: Back pain is common among Cyprus Air Force helicopter pilots who generally consider appropriately fitted lumbar supports an acceptable and effective intervention with few adverse effects when used properly in flight.

OR34

English: ICE - ISOLATED CONFINED ENVIRONMENTS -ANTARCTICA - A SPACE ANALOGUE
French: L’ANTARTIQUE EST UN ENVIRONNEMENT CONFINÉ ISOLÉ (ICE) - UN ÉQUIVALENT DE L’ESPACE

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Antarctica is an Isolated Confined Environment (ICE) with both operational medical aspects and human biology and medicine research conducted in Antarctica has been acknowledged as a space analogue. Australia’s Antarctic program supports four wintering stations, three continental in East Antarctica and one subantarctic. These scientific stations are some of the most isolated populations in the world. The extremes of the Antarctic environment, and limited logistics mean small groups of Australian expeditioners are totally isolated for up to 9 months over winter. Comprehensive medical support is provided by a lone Antarctic Medical Practitioner supported remotely by the Australian Antarctic Division(AAD) Polar Medicine Unit in Hobart Tasmania. The AAD has collaborated with NASA since 1993 on operational and research aspects of Antarctica as a space analogue. Operational aspects of AAD medical support will be highlighted with relevance to Space Medicine including predeparture screening, preventative care, risk of appendicitis and response to medical emergencies including the use of telemedicine. Applied Human Biology And Medicine research of relevance to space undertaken to date has included epidemiology, immunology, small group psychology, circadian rhythms and vitamin D research. Australia’s role in space medicine research and operational medicine in extreme and austere medical environments will be highlighted and the opportunity for future collaboration in Antarctic research.
ABSTRACTS - ORAL PRESENTATIONS

OR35

English: **OCCUPATIONAL ILLNESS AND INJURY AMONG AIRCREW IN AUSTRALIA: AN ANALYSIS OF SERIOUS WORKERS COMPENSATION CLAIMS**

French: **MALADIES ET LÉSIONS PROFESSIONNELLES DU PERSONNEL NAVIGANT EN AUSTRALIE: UNE ANALYSE DES RÉCLAMATIONS SÉRIEUSES DES TRAVAILLEURS**

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**Introduction:** Aviation vocations involve work duties which inherently entail several risk elements, which may result in excess morbidity and mortality among aircrew. This study was carried out to elucidate the leading underlying causes of occupational illness and injury among aircrew in Australia, following analysis of previously unpublished workers’ compensation claims data.

**Methods:** The National Dataset for Workers’ Compensation Statistics (NDS) consists of accepted serious workers’ compensation claims made under respective Australian Commonwealth, State and Territory workers’ compensation Acts. Previously unpublished NDS data were provided by Safework Australia, an Australian Government statutory agency. Claims were associated with a fatality, permanent or temporary disability resulting in work absence of 1 week or more, based on an employee’s typical working week. Data were stratified by year, gender, mechanisms of injury and breakdown agencies.

**Results:** From 2000-10, n=1,095 accepted claims were reported for Air Transport Professionals, including 75.8% for male aircrew. The three leading mechanisms of injury in males were ‘body stressing’ (52.4%), ‘falls/trips/slips of a person’ (13.9%) and ‘other/unspecified mechanism’ (9.0%). Leading mechanisms for females were ‘body stressing’ (50.9%), ‘falls/trips/slips of a person’ (17.0%) and ‘being hit by moving objects’ (11.3%). The three leading breakdown agencies (i.e. the chemical, product, process or equipment most closely associated with the claimed event) for males were ‘fastening/packaging equipment’ (33.7%), ‘air transport’ (23.5%) and ‘other/unspecified agencies’ (9.6%). The leading breakdown agencies for females were ‘fastening/packaging equipment’ (24.5%), ‘furniture/fittings’ (13.2%), ‘air transport’ (7.5%) and ‘other substances’ (7.5%).

**Conclusions:** The findings suggest the burden of compensated occupational illness and injury among aircrew in Australia, was predominantly associated with musculoskeletal pathology and/or other injuries, most of which were apparently precipitated by specific work activities and environmental factors. These insights may be utilised in aviation occupational health and safety risk management.

OR36

**English:** **HIGH-ALTITUDE ASSOCIATED NEUROLOGIC DECOMPRESSION SICKNESS CEREBRAL INJURY: STRUCTURAL, SPECTROSCOPY, FRACTIONAL ANISOTROPY, AND NEUROCOGNITIVE RESULTS**

**French:** **LE DOMMAGE CÉRÉBRALE DE LA MALADIE DE DÉCOMPRESSION NEUROLOGIQUE ASSOCIÉ À LA HAUTE ALTITUDE: RÉSULTATS NEUROCOGNITIFS ET STRUCTURELS, LA SPECTROSCOPIE ET L’ANISOTROPIE FRACTIONNELLE**

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**Introduction:** Neurologic decompression sickness (NDCS) affects high-altitude pilots causing variable central nervous system symptoms. Recent NDCS episodes in United States Air Force U-2 pilots prompted this investigation.

**Methods:** Quantitative analysis utilizing a Siemens 3-T MRI as previously described was performed on 86 U-2 pilots and 31 non-aviator doctorate degree volunteers. Hyperintense white matter (HWM) lesion burden; N-acetylaspartate (NAA), phosphocreatine (CrP), and choline (GPC) spectroscopy; and fractional anisotropy (FA) results were compared to normative subjects. Neurocognitive testing performed on U-2 pilots was compared to individual baselines and to USAF pilot norms.
**Results:** The NDCS pilot group had significantly increased whole brain (p=0.026) and insular (p=0.018) HWM lesion volume as compared to non-NDCS pilots. The entire U-2 pilot cohort compared to normative controls had significantly increased numbers of HWM lesions (p=0.0007) and more rapid age-related decrease in FA (-0.9431 vs. -0.4101). The NDCS pilot group compared to non-NDCS pilots had more rapid age-associated change in NAA (-0.1045 vs. -0.0676), GPC (-0.78577 vs. 0.0004) and CrP (-0.0384 vs. 0.0008). The U-2 pilots with clinical NDCS had a significance difference in neurocognitive performance (p=0.02).

**Conclusions:** A clinical episode of NDCS is associated with a significant increase in HWM lesion volume, especially in the insula, and a more rapid age associated change in NAA, GPC, and CrP consistent with neuronal injury. The U-2 pilot population as a group demonstrated significant imaging differences compared to normative controls. Neurocognitive injury was demonstrated in U-2 pilots with clinical NDCS compared to USAF pilots. We believe this to be due to extreme hypobaric exposure rather than hypoxia. Long term consequences of this cerebral injury are unknown. Further studies are necessary to better understand the underlying pathophysiology and the neuronal injury pattern and prognosis.

**OR37**

**English:** PREDICTING MENTAL HEALTH INDICES WITH TWO SELF-REPORT FATIGUE MEASURES

**French:** INDICES DE PRÉDICATION DE SANTE MENTALE AVEC DEUX MESURES DE FATIGUE AUTODÉCLARÉES

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**Introduction:** The increased rate and length of operations has required the Fleet Air Arm (FAA) of the Royal Australian Navy to examine the impact of fatigue on workplace performance within its maintenance population. Two divergent fatigue scales, the Occupational Fatigue Exhaustion/Recovery Scale (OFER) and Checklist of Individual Strength - revised (CIS-20R), were evaluated for their relationship with 4 dimensions of Mental Health Inventory (MHI).

**Methods:** The sample comprised 23 females and 245 males ranging from 19 to 52 years (M = 30.25, S.D. = 7.8). The measures included: a) the CIS-20-R subscales of Subjective fatigue, and reduced Concentration, Motivation, and Physical Activity levels; (b) the OFER subscales of Acute and Chronic fatigue, and fatigue Recovery; and (c) the MHI dimensions of Well-being, Anxiety, Depression, and Cognitive Interference.

**Results:** A series of Stepwise regression analyses revealed the OFER’s Chronic fatigue and the CIS-20R’s reduced Concentration subscales contributed to the prediction of all MHI variables. As anticipated, the analysis of Well-being indicated that all measures were negatively related to the construct with the reduced Motivation and Physical Activity of the CIS-20R contributing toward the 37% of the measure’s variance. A total of 53% of the variance for the Depression measure was predicted using the reduced Motivation and Subjective fatigue subscales of the CIS-20R. The level of Anxiety’s prediction equation included the OFER’s Fatigue Recovery and CIS-20R’s Subjective fatigue that accounted for 48% of the variance. Finally, only the Chronic fatigue and Concentration subscales predicted the level of Cognitive Interference, accounting for 42% of the variance.

**Discussion:** The use of the either the OFER or CIS-20R within the FAA’s maintenance population is credible. Choosing between them should consider if acute or chronic conditions are present. That is, the CIS-20R focuses on the preceding fortnight, whereas the OFER requires consideration over 6 months.

**OR38**

**English:** AN AUDIT OF AN AIRLINES ‘AGE 60 PILOT MEDICAL ASSESSMENT’

**French:** AUDIT DE LA VISITE MÉDICALE DES PILOTES DE LIGNE DE PLUS DE 60 ANS

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**Introduction:** An audit was carried out of the pilot medical assessments for pilots aged 60 and over working for a Middle East Airline in 2011.
**Method:** We retrospectively looked at the medical records over the initial 5-year period since the new regulations had become active. The additional regulatory requirements of cardiovascular blood tests, an exercise ECG, an extended eye examination, a psychological assessment and screening for alcohol excess were analysed together with a Prostate Specific Antigen (PSA) screening test commonly offered at this age. The sick leave rates were compared to the company average for pilots also.

**Results:** 42 pilots had valid licenses. They came from 18 different nationalities, aged between 60 and 64.9 years old. Half had previous restrictions on their license before the aged 60 medical. Two subsequently had medical loss of license. Only 37% had normal computer read ECGs; 37.5% were on antihypertensive treatment; 77.5% had hyperlipidaemia; 17.5% were obese; 40% had Impaired Glucose Regulation or Diabetes Mellitus. 100% passed the psychological assessment. 10% had PSA results which were elevated, elevating or had prostate cancer. Those aged 60 took on average three time the sick leave compared to the company average.

**Conclusion:** This group of pilots remains generally healthy. Risk assessments and mitigations against possible significant aeromedical conditions are possible. Some of the additional requirements seem more valid than others. Additional tests or other screening tools may be worthwhile (e.g. sleep studies) that are not currently tested. Airlines may need to additionally consider productivity issues when considering company specific retirement ages.

**OR39**

**English:** EFFECTS OF ALTITUDE ON SLEEP APNEA

**French:** EFFETS DE L’ALTITUDE SUR L’APNÉE DU SOMMEIL

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**Introduction:** Obstructive sleep apnea (OSA) is an increasingly common diagnosis. Aeromedical concerns include fatigue, drowsiness, delayed reaction times, memory problems, and impaired cognition. As part of their waiver evaluation, all pilots and navigators with OSA are evaluated at the Aeromedical Consultation Service (ACS), where repeat polysomnography (PSG) is performed. Our service members are increasingly being deployed to areas of higher elevation, such as Afghanistan. Central sleep apnea (CSA) becomes more prevalent with increases in altitude, but little is known about altitude’s effects on OSA. Several small studies have evaluated the effects of altitude on OSA and CPAP performance, and yielded conflicting results. To our knowledge this has never been studied in a military population.

**Methods:** We retrospectively reviewed the medical records of aviators referred to the ACS for OSA from bases at altitudes > 1500 m. We compared PSG results performed at altitude with those done on the same patients near sea level. Patients with surgical treatment or significant weight changes were excluded. Parameters that were evaluated included the AHI, pulse oximetry nadir, CPAP pressure requirement, and the presence of central events.

**Results:** Twelve pilots were included in the final analysis. On average, PSGs performed at altitude demonstrated a worse AHI (31.1 vs. 12.5; p = 0.011), oxygen nadir (82% vs. 88.5%; p = 0.023), and CPAP requirement (12.8 vs. 9.6 cm H2O; p = 0.199). Central events accounted for some, but not all of the increase in AHI.

**Conclusions:** In addition to causing CSA, sleeping at higher altitudes has significant effects on the characteristics and treatment of OSA. Service members deployed to higher altitudes should use CPAP machines that are capable of adjustment for altitude. Even if this is done, clinicians should be aware of the potential for concomitant central sleep apnea and worsening of sleep disordered breathing at higher altitudes.
**OR40**

**English:** CYTOKINE REGULATION MECHANISM FOR CX43 DOWNREGULATION IN RAT MYOCARDIUM BY SIMULATED MICROGRAVITY

**French:** MÉCANISME DE RÉGULATION DE LA CYTOKINE POUR LA RÉGULATION À LA BAISSE DU CX 43 DANS LE MYOCARDE DU RAT EN MICROGRAVITÉ SIMULÉE

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**Introduction:** Since cytokine is known to regulate many molecular and physiological responses in cardiac remodelling in various kinds of diseases. Experiments were designed to investigate its possible regulatory mechanisms in CX43 downregulation by Simulated Microgravity.

**Methods:**
1. 20 Male Wistar rats were randomly divided into normal group (C) and 2-week tail-suspension group (S). Cardiac mRNA abundance of 96 cytokines in two groups were detected by cDNA microarrays. Two genes whose expressions were found to be greatly changed were chosen for a real time RT-PCR. Then protein contents of the one were detected by ELISA. 2. Primary neonatal rats cardiomyocytes were randomly divided into 3 days hermetically cultured group (C) and 3 days clinorotation cultured group (R). CX43 protein concentrations of it were detected via Western blot. 3. Cardiomyocytes in C group were normally cultured for 24h (CN), R group were randomly divided into normally cultured recovery of 24h (RN), and cultured with various concentration of IGF-1. CX43 protein concentrations in 6 groups were detected via Western blot.

**Results:** 5 genes in R were transcriptionally increased and 12 genes decreased more than 2-fold. Realtime RT-PCR results of IGF-1 and IGF-2 and ELISA results of IGF-1 validate the change which was detected by gene chips. After clinorotation culture for 3days, CX43 expression level in R was about 20% decreased. IGF-1 shows a dose-effect relationship between IGF-1 and CX43, in which 30 nM of IGF-1 had the most countermeasure effect on down-regulation of CX43 induced by simulated microgravity.

**Conclusions:** 2-week simulated microgravity could induce a net imbalance of the cytokine in rat myocardium. Expression of most growth factors are regulated downward, and part of inflammatory cytokines are obviously regulated upward. Down regulation of IGF-1 might be one of the most important regulation mechanism mediating CX43 decrease in simulated weightlessness.

**Acknowledgment:** Supported by the National Natural Science Fundation (30400158) and Spaceflight Foundation (SJ200611).

**OR41**

**English:** COMPARISON OF ALTITUDE HYPOXIA TRAINING IN HYPOBARIC VS NORMOBARIC ENVIRONMENTS

**French:** COMPARAISON DE LA FORMATION À RECONNAÎTRE L’HYPOXIE D’ALTITUDE DANS UN MILIEU HYPOBARE VERSUS UN MILIEU NORMOBARE

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**Introduction:** There is a controversy whether normobaric and hypobaric hypoxic exposures are equivalent. We have evaluated if physiological differences between normobaric and hypobaric pressure environments would result in actual differences in hypoxia symptoms.
**Methods:** 20 subjects were exposed to 5-min 25,000 ft (7620 m) equivalent environments in an altitude chamber and then in a ground-level portable reduced-oxygen training enclosure (PROTE). Heart rate and hemoglobin oxygen saturation (SAO2) were continuously monitored. Alveolar gas samples were collected at 1-, 3-, and 4-min elapsed time. Subjects completed hypoxia symptom questionnaires at the same time points.

**Results:** Mean 4th min alveolar oxygen tension (PAO2), alveolar carbon dioxide tension (PACO2), and respiratory quotient (RQ) differed significantly between the altitude chamber and PROTE. Reductions in SAO2 appeared biphasic, with steepest declines seen in the first minute. Rates of SAO2 reduction over the 5-min exposure were significantly different. Heart rate was not different, even when indexed to body surface area. Mean number of hypoxia symptoms between hypobaric and normobaric environments after 1 min were significant. However, the temporal pattern of symptom frequencies across subjects between the chamber and PROTE were similar.

**Conclusions:** Alveolar gas composition, as well as arterial hemoglobin oxygen desaturation patterns, differed between a ground-level and hypobaric exposure. Differences in mean number of hypoxia symptoms between hypobaric and normobaric environments after 1 min, but not at 3 and 4 min, coupled with similar patterns in symptom frequencies, suggest that ground-level hypoxia training may be a sufficiently faithful surrogate for altitude chamber training.

**OR42**

**English:** MULTIPLACE NORMOBARIC HYPOXIA TRAINING USING GO2ALTITUDE®: A PRELIMINARY EVALUATION IN A MILITARY TRAINING CONTEXT

**French:** FORMATION MULTIPLACE EN HYPOXIE NORMOBARE PAR L’UTILISATION DE GO2ALTITUDE ®: UNE ÉVALUATION PRÉLIMINAIRE DANS UN CONTEXTE DE FORMATION MILITAIRE

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**Introduction:** Hypobaric chamber training has risks associated with it and alternative methods of altitude hypoxia training are becoming more common. A five station Go2Altitude® normobaric training system has been used for hypoxia training at the RAAF Institute of Aviation Medicine since December 2011, but utility of such a system for routine military aviation medicine training is uncertain.

**Methods:** A questionnaire survey was provided to all Australian Defence Force (ADF) personnel attending the RAAF Institute of Aviation Medicine for initial or refresher altitude physiology training between December 2011 and May 2012 who underwent Go2Altitude® hypoxia training. The questionnaire collected demographic data and included 11 questions specifically related to their training experience using the Go2Altitude® system. Additional comments and suggestions about the training could also be provided.

**Results:** Survey results were received from 224 ADF personnel. Ab initio students were excluded from the analysis (n = 64) who had no previous hypoxia training experience with which to compare. Personnel included in the study had experienced previous hypobaric chamber training. Combined Altitude Depleted Oxygen (CADO) training or both. Of the 160 respondents, 98% agreed that Go2Altitude® produced symptoms that they recognised as hypoxia; 88% agreed that symptoms experienced were similar to those experienced in previous forms of hypoxia training; and 95% believed that the normobaric system is an effective training experience for altitude hypoxia. The majority of the respondents found the system to be user friendly and in some cases superior to traditional hypobaric chamber training, however their comments highlighted some of the limitations for military aviation physiology training.

**Conclusion:** This normobaric system provides a useful, portable and expedient training modality for demonstrating hypoxia signs and symptoms, and demonstrated a high level of acceptance among military users. However there are some distinct disadvantages for use in a military context, making this system a useful adjunct, not a stand-alone alternative, to traditional hypobaric chamber training methods.
OR43

**English:** RECOGNITION OF HYPOXIA IN A SIMULATED FLIGHT ENVIRONMENT.

**French:** LA RECONNAISSANCE DE L’HYPOXIE DANS UN ENVIRONNEMENT DE VOL SIMULÉ.

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**Introduction:** For many years hypoxia awareness training has been conducted in a benign training environment in which aircrew are required to identify their hypoxia signature whilst performing simple neurocognitive tests. This project aimed to determine if conducting hypoxia training in a simulated flight environment diminished the ability of aircrew to recognize their hypoxia signature.

**Methods:** 13 experienced aircrew were briefed to undertake a 45- min simulated sortie in a part-task trainer, during which hypoxia would be initiated without prior warning. The time for aircrew to recognize hypoxia symptoms and initiate recovery action was recorded, along with the SpO2 at the time of recovery. The spectrum of symptoms and symptom severity was recorded immediately after recovery. As a baseline, hypoxia was repeated without the simulated flight task but with prior warning; elapsed time and symptoms were recorded. The baseline and experimental conditions were compared to each other, and to the individuals memory of hypoxia from previous training.

**Results:** There was significant overlap in the symptoms of hypoxia experienced in the baseline and simulated flight conditions, although the simulated flight environment appeared to highlight neurocognitive and psychomotor effects more than the baseline condition. 60% of subjects initiated recovery 15 seconds earlier in the simulated flight environment than the baseline condition (paired t-test, p<0.05). By 2 minutes, 70% of aircrew had recovered in the simulated flight environment, compared to only 55% in the baseline condition. This study suggests that aircrew may be better able to recognize hypoxia in a simulated flight environment than in a benign training setting, possibly because they are engaged in a familiar task environment within which they are able to detect subtle impairments in performance.

OR44

**English:** PROBLEMS ASSOCIATED WITH ALTITUDE SIMULATION

**French:** PROBLÈMES LIÉS À LA SIMULATION D’ALTITUDE

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**Introduction:** Hypobaric hypoxia (chamber) training has been accepted world-wide by military and civil authorities and pilots as a useful hypoxia experience for over 70 years. Recently normobaric simulation techniques (hypoxicators) were suggested as equivalent to the chamber training without the associated hypobaria risks but its accuracy was questioned.

**Methods:** When calibrating chambers or normobaric hypoxicators the same assumptions are made that (a) 20.9% of oxygen (by volume) at barometric pressure of 760mmHg corresponds to sea level (b) reduced barometric pressure at altitude and the consequent reduced pO2 is fairly accurately physiologically simulated by proportionally reducing FiO2. Although the reduced bioavailability of oxygen determines the hypoxia level during altitude simulation, Conkin suggested that alveolar pH2O introduced an error into normobaric altitude simulation. The inspired air entering alveoli is always fully saturated with water vapour at 37oC.

**Results:** All training systems in use, whether hypobaric chambers or normobaric hypoxicators make measurements at ambient temperature and pressure. In chambers the target simulated altitude is set by using an altimeter without special compensation for pH2O, and most importantly without ambient temperature correction. In normobaric hypoxicators, the same physiological effect is achieved by reducing FiO2. Published experience using all types of hypoxicators shows that hypoxia awareness training objectives have been achieved well. Other factors which may affect the accuracy and fidelity of altitude simulation include: (a) temperature compensation for altitude lapse-rate; (b) Instrumental accuracy of oxygen analysers used to set inspired oxygen concentrations (c) oxygen composition of recovery gas mixture ranging from 20.9% to 100%.
Conclusion: Hypoxia training results, including cardiorespiratory adjustments, individual symptoms, behavioural and cognitive deficits, using normobaric hypoxicators or traditional hypobaric chambers are so similar that no urgency attaches to correcting the simulated altitude values for either training. However, of much higher importance and priority is verification of the safety and educational impact of this relatively new technology.

OR45

**English:** RISK EVALUATION OF NORMOBARIC HYPOXIA TRAINING DEVICES (HYPOXICATORS)

**French:** ÉVALUATION DE RISQUES DES APPAREILS D’ENTRAINEMENT POUR L’HYPOXIE NORMOBARE (HYPOXICATEURS)

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Background: Normobaric hypoxia training is an emerging alternative to hypobaric chamber technology. Validation studies of this technology suggest that it is efficient for demonstrating individual hypoxia symptoms to aviators, whilst removing the risks of hypobaria. The relatively low cost and mobility of hypoxicators and systems make their use attractive for both military and civil aviation hypoxia awareness training.

Aims: The hazards associated with the use of hypoxicators were not previously assessed in literature; therefore, the aim of this study is to provide risk evaluation of this new technology using applicable standards and to suggest risk mitigation strategies for all manufactures of hypoxicators.

Methods: A systematic review and evaluation of hazards associated with the use of hypoxicators for aviation personnel training against international standard IEC60601.02 were undertaken. A literature search was done on available regulatory bodies’ publications and adverse effects reports. Identification of hypoxicator-specific risks was done as well as quantification of their probability of occurrence and the severity of outcome based upon risk management standard ISO 14785 and (new) Usability Engineering standard IEC 62366:2007. Elaboration of risk mitigation strategies is addressed.

Results: Hypoxicators may fall under the definition of medical device because their intended use is for delivery of hazardous gases to the patient’s respiratory system, aiming to modify the physiological process. Stringent requirements are applicable to medical devices. Hypoxicator-specific risks are death or injury from severe hypoxemia or anoxia. The risk mitigation strategy is to implement automatic safety cut-off mechanism (automatic session abort) triggered by dangerously low SpO2 or excessively high HR.

Discussion and Conclusion: Although new technology eliminates health risks of hypobaria, its safety does not come automatically. That is because the traditional hypobaric chamber operation is backed up by a team of experienced instructors and aviation medicine professionals, whereas new generation “desk-top” hypoxicators offer a portable classroom solution and can be operated by a single operator who can make mistakes and may not be adequately trained. Systematic post-market monitoring does not reveal any reported adverse effects when using mild short-term hypoxia exposures (sporting arena). However, a major adverse effect was reported in the result of severe hypoxia episode at near sea level followed by 100% oxygen for recovery. This recovery technique is completely new to the existing hypobaric hypoxia training routine and requires more comprehensive review. Recovery at pO2=760mmHg may unnecessarily amplify the oxygen paradox and produce adverse effects not known before. Our evaluation points to the need to seek compliance of hypoxicators with medical device standards, mitigating risks to patient’s safety and wellbeing.

OR46

**English:** TO DO OR NOT TO DO: HYPOXIA TRAINING IN CIVIL AVIATION

**French:** FAUT-IL LE FAIRE OU PAS : L’ENTRAINEMENT À L’HYPOXIE DANS L’AVIATION CIVILE

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Hypoxia training is something that is considered almost de rigeur by most militaries, as loss of cabin pressurisation remains a strong possibility in military operations, and so most military jurisdictions world wide require training to
be carried out. Refresher training is also required at periodic intervals. The civil aviation regulators have not required hypoxia training so far. Is this because the level of risk offered is different? Is the evidence for hypoxia training compelling? These and other questions are addressed in this presentation, which also discusses the process of risk management in civil aviation, the differences with the military, and the differences in the levels of acceptable risk. While the paper does not express an outcome, it suggests a pathway for future decision making.

10:30 - 12:15 (SCIENTIFIC SESSION 8) RESPIRATION

OR47

**English:** SUPPLEMENTAL OXYGEN REQUIREMENTS FOR OPERATIONS BELOW 15,000 FEET IN ADF AIRCRAFT
**French:** LES BESOINS EN OXYGÈNE SUPPLÉMENTAIRE POUR LES OPÉRATIONS EN DESSOUS DE 15 000 PIEDS DANS LES AVIONS DU ADF

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The Royal Australian Air Force Institute of Aviation Medicine was tasked to provide guidance on supplemental oxygen requirements for operations below 15,000 ft, based on a review of current knowledge and international practice.

**Review of Literature:** Studies have revealed variation in the lowest altitude at which significant hypoxia symptoms occur. Variation is attributed to individual factors, flight profile and task complexity. Up to 10,000 ft, a normal resting subject breathing air has no symptoms of hypoxia, but novel tasks may be impaired. Physical or mental activity will reduce the altitude at which symptoms of hypoxia are experienced. Research suggests that the maximum altitude at which pilots should breathe air is 8,000 ft. Policies in Australia, USA, and UK, mandate the use of oxygen at altitudes of 10,000 ft or above, but permit limited sojourns above 10,000. Only Canadian Forces mandate the use of oxygen from 8,000 ft.

**Discussion:** The regulations for the use of oxygen should aim to prevent significant hypoxia. Traditional standardisation of the use of oxygen by altitude is empirical and arbitrary. Minimum altitude to operate an aircraft without supplemental oxygen should be based on consideration of; flight profile, ambient conditions, individual factors and energy expenditure.

**Conclusions & Recommendations:** Aircrew not be exposed to physiologically equivalent altitudes of more than 8,000 ft; as already met in ADF pressurised aircraft. Restriction of 8,000 ft without the use of oxygen will have a major impact on ADF un-pressurised aircraft operations. Short sojourns above 8,000 ft, up to a maximum of 12,000 ft, without supplemental oxygen should be permitted with a rigorous AVRM process. For night flying operations, supplemental oxygen should be used above 6,000 ft. Hypoxia training should be mandatory for all ADF aircrew, including those flying unpressurised fixed-wing and rotary-wing aircraft.

OR48

**English:** EMERGENCY PASSENGER OXYGEN SYSTEM (EPOS) ACTIVATION AT 25.000 FEET DURING AIRCREW HYPOXIA TRAINING
**French:** ACTIVATION DU SYSTÈME D’OXYGÈNE D’URGENCE DES PASSAGERS À 25,000 PIED PENDANT LA FORMATION DU PERSONNEL NAVIGANT À RECONNAÎTRE L’HYPOXIE

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**Introduction:** Loss of cabin pressure and other emergencies in flight may require individual protection from hypoxia, smoke and fumes. Many military transport aircraft use a smoke hood with integrated O2 supply and CO2 removal for passenger protection, the Emergency Passenger Oxygen System (EPOS). Donning of EPOS (unpacking the device from a vacuum packed bag, activating the O2-bottle and pulling the hood over the head without damaging the neck seal) is more complicated than desirable for passenger emergency equipment. Rapid decompression (RD) and hypoxia may further aggravate donning, but documentation in the literature is limited.
**ABSTRACTS - ORAL PRESENTATIONS**

**Methods:** To gain experience with EPOS before introduction in RNoAF C-130 J Hercules, EPOS recovery was included in the altitude chamber training at the Norwegian Armed Forces Medical Services IAM. Our standard chamber profile for C-130 aircrew is RD 8000-22.500 ft in 12 sec, followed by hypoxia at 25.000 ft. Students are monitored by pulse oximetry and video. In a typical run with 9 students and 2 inside instructors, 1-2 students were asked to recover on EPOS after their hypoxia exposure. None of the students had tried EPOS before. They were given a short brief and read the instructions on the bag. 20 attempts to activate EPOS after 2-3 min of hypoxia at 25.000 ft are included in this material.

**Results:** Of the 20 students, 12 (60%) successfully activated the hood, average donning time 49 sec, 5 (25%) needed some instructor assistance, average donning time 68 sec, 3 (15%) were stopped after 90 sec due to neck seal damage. All 17 students donning the hood reported immediate relief from hypoxia symptoms, SaO2 96-100%.

**Other remarks:** Some reduction in visibility due to the yellow, multi-layer hood material and condensation inside the hood after 5-6 min when the oxygen bottle is empty. Communications problems. Hot inside the hood due to heat from the CO2 scrubber.

**OR49**

**English:** DESCRIBING HELICOPTER REARCREW VENTILATORY PATTERNS: A STEP TOWARDS DEFINING REQUIREMENTS FOR PORTABLE OXYGEN DELIVERY SYSTEMS.

**French:** DESCRIPTION DES MODÈLES VENTILATOIRES DE L’ÉQUIPAGE ARRIÈRE D’UN HÉLICOPTÈRE: UN PAS VERS LA DÉFINITION DE L’ÉQUIPEMENT REQUIS POUR LES SYSTÈMES PORTABLES D’ADMINISTRATION D’OXYGÈNE

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**Introduction:** A portable oxygen delivery system for helicopter aircrew is required. To conserve oxygen, constant flow and pulsed-dose oxygen delivery systems have been considered, aiming to provide protection equivalent to breathing air at 8000 ft pressure altitude. The protection provided by these systems is affected by individual ventilatory patterns in a manner that traditional aircrew demand regulators are not. Ventilatory data for pilots have previously been published. This study aims to describe ventilatory patterns for Chinook rearcrew.

**Methods:** 12 healthy male Chinook rearcrew volunteered and provided written informed consent. The Ministry of Defence Research Ethics Committee approved the study. Pulmonary ventilation was measured using the MetaMax 3X system (Cortex Biophysik, Leipzig, Germany). The rearcrew were dressed in operational flying assemblies with ballistic plates. They were measured at rest, during a simulated approach and while loading and unloading 23 kg strops. The assessments were conducted on a static Chinook helicopter inside a hangar at ground level (405 ft).

**Results:** During rest, approach and loading/unloading minute ventilations were 14.8±4.3, 28.8±7.7, and 70.2±13.4 L/min (BTPS), and tidal volumes were 0.95±0.29, 1.32±0.43, and 2.16±0.38 L (BTPS), respectively. Data presented are mean±S.D.. Ambient temperatures were 14.5-17.9 degrees Celsius.

**Discussion:** Providing adequate oxygenation at these minute ventilations and tidal volumes during simulated approach and loading/unloading for rearcrew will be more challenging using constant flow and pulsed-dose oxygen delivery systems than the previously reported data for pilots. Oxygen systems tested against pilot ventilatory patterns may, therefore, provide inadequate protection to rearcrew. Other factors in operational flying, such as thermal burden, exercise at altitude and psychological stress may mean inflight ventilation is greater than reported here. This study provides an insight into the range of ventilatory patterns that should be considered when defining oxygen delivery system requirements for helicopter rearcrew.
ABSTRACTS - ORAL PRESENTATIONS

OR50

English: MIDDLE CEREBRAL ARTERY BLOOD FLOW DURING PUSH-PULL EFFECT
French: LE FLUX SanguIN DANS L’ARTÈRE CÉRÉBRALE MOYENNE DURANT LA MANOEUVRE PUSH-PULL

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Introduction: Even though the consensus among the Acceleration Physiologists for the cause of decreased +Gz tolerance during Push-pull effect is divergently opposite hemodynamic stresses on cardiovascular reflexes, few studies have implicated the role of cerebral vasculature. Hence this study was designed to understand the Middle Cerebral Artery (MCA) flow dynamics during Push-pull run.

Methodology: Ten healthy human volunteers participated. Transcranial Doppler (TCD) of MCA was done during a +3Gz control run and a Push-pull run. The Push-pull epoch consisted of a ×1.5Gz for 10 sec exposure immediately followed by comparable +Gz exposure. The mean and SD of peak systolic (PSV) and end diastolic (EDV) velocities during pre, +3Gz phase and post +Gz phase of control run and pre, ×1.5Gz, +Gz and post +Gz phase of Push-pull run were analyzed.

Results: The PSVs of control run during baseline, +3Gz and post +3Gz phases were 99.4±18, 106±24 and 102.5±16 cm/sec respectively while that of Push-pull run were 99.5±43, 98.3±15 and 95.4±14 cm/sec respectively. Similarly the EDVs of control run were 42.7±11, 35.7±15 and 31.3±9 cm/sec and that of Push-pull run were 42.7±11, 21±13 and 26.8±12 cm/sec respectively. There were no significant differences in the PSVs among the control and Push-pull runs. However, the EDV during +Gz phase is significantly slower in Push-pull run (p=0.002). The diastolic blood flow within the Push-pull run was significantly lower during -1.5Gz compared to baseline.

Conclusion: Decreased EDV during +Gz phase of Push-pull run can be attributed to persistent cerebral vasoconstriction during the +Gz period of Push-pull effect. This can be a contributing factor for decreased +Gz tolerance.

ORS1

English: EFFECTIVENESS OF SCREENING FOR CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) IN ROYAL AUSTRALIAN AIR FORCE AIRCREW
French: L’EFFICACITÉ DU DÉPISTAGE DES MALADIES PULMONAIRES OBSTRACTIVES CHRONIQUES CHEZ LE PERSONNEL NAVIGANT DE L’ARMÉE DE L’AIR AUSTRALIENNE

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Background: COPD, defined as non-reversible airway limitation, has the potential to impact upon fitness for flying duties. Over a ten-year period between 2000 and 2010 no cases of COPD within the RAAF aircrew population were notified to AVMED as the regulatory authority, thus theoretically denoting a zero prevalence of disease across an approximate 20 000 person-year observation period. Such a low reported prevalence is in stark contrast to the prevalence of COPD in the general community.

Objectives: This study aimed to validate the effectiveness of extant screening occupational medical examinations for RAAF aircrew in early detection of COPD. A secondary objective of this study was to ascertain the prevalence of cigarette smoking (as the primary risk factor for development of COPD) within the RAAF aircrew population. Methodology: Eligible aircrew subjects (≥ 35yrs age) were screened using a simple proprietary questionnaire for COPD, followed by office spirometry (PiKo-6TM) if a positive questionnaire response was declared. Positive PiKo-6TM spirometry results, defined as FEV1/FEV6 ratio less than 73%, were further assessed against results of previous spirometry as undertaken at time of prior routine occupational medical examination.

Results: 141 out of an eligible 205 (68.8%) subjects participated in the study, with 27% of participants being current or former smokers. 11 positive PiKo-6TM spirometry results were observed, with review of past spirometry records for these subjects demonstrating one probable case of mild COPD. A further 5 subjects had markedly abnormal spirometry results not thought likely to reflect COPD, but for which further investigation was recommended.
**Discussion:** Whilst the true prevalence of COPD within the RAAF aircrew population is not thought to be as high as the general population, this study has demonstrated that the true prevalence is unlikely to be zero. Results from this study highlight several areas for improvement in routine spirometric screening of RAAF aircrew.

**OR52**

**English:** PNEUMOTHORAX DURING HYPERBARIC OXYGEN TREATMENT IN EARTHQUAKE SURVIVOR WITH MULTIPLE TRAUMA: CASE REPORT

**French:** PNEUMOTHORAX DURANT L'OXYGÉNOThÉRAPIE HYPERBARE CHEZ UN SURVIVANT D'UN TREMBLEMENT DE TERRE AVEC TRAUMATISMES MULTIPLES: RÉSUMÉ D'UN CAS

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**Introduction:** During the ascent phase (decompression) of Hyperbaric Oxygen (HBO) treatment, an intrapulmonary gas expansion may rarely result in pneumothorax which is generally associated with an underlying risk factor.

**Materials/methods:** We present a 28-year-old male 7.2 earthquake survivor who was rescued from a collapsed building after 33 hours. He was intubated for three days and diagnosed with pulmonary thromboemboli and acute respiratory distress syndrome. He was receiving hemodialysis treatment due to acute renal failure and had three fasciotomies in each lower extremity for compartmental syndrome. Due to his crush injury the patient was referred to our center for HBO treatment. On the admission to our clinic he was hemodynamically stable. We evaluated him and planned to perform 100% oxygen at 2.4 ATA for 90 minutes a day for 20 sessions. Despite the apparent absence of pneumothorax or any formation of bulla or bleb lesions according to chest x-ray and computerized tomography (CT) prior to hyperbaric session, the patient developed tension pneumothorax with a sudden onset sharp chest pain in the right hemithorax, dyspnea, tachycardia, tachypnea, decrease in arterial blood pressure, in arterial oxygen saturation and in breath sound in the decompression phase just before surfacing in the seventh HBO session. The pneumothorax caused a cardiac arrest and CPR was immediately initiated by the attendant physician. The diagnosis was confirmed with CT scan. Chest tube, attached to an underwater seal below the level of the chest, was inserted and it dramatically improved the symptoms. We terminated the HBO treatment and decided to observe the patient.

**Result:** We suggest that chest x-ray and CT examinations may be not enough to exclude the pneumothorax possibility and there is also a need for a high index of suspicion for pulmonary barotrauma in a recently intubated and extubated patient with multiple trauma undergoing HBO treatment.

**OR53**

**English:** ANALYSIS OF 122 MEDICAL CERTIFICATE SPECIAL ISSUANCE CASES OF AIRLINE PILOTS IN CHINA

**French:** ANALYSE DE 122 CAS DE DÉROGAITION MÉDICALE CHEZ DES PILOTES DE LIGNE EN CHINE

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**Introduction:** Since 2008, the Civil Aviation Administration of China has set up a committee of experts to review all medical certificate special issuance applications. The special issuance procedure required the operators' comments on flight skills and regional administration's review of all the medical conditions before the personal application is delivered to CAAC. After the applicants are approved, the follow-up and health management requirement of the operators' medical department should be very helpful for their consistent fitness. We studied the committee's database to assess the effects of this procedure.

**Methods:** Medical data from all special issuance applicants, including diagnosis, examination findings, and reviewed results were collected and analyzed. Personal flight experiences were assessed through a postal survey.
Results: There were 122 applicants over three years. The total approved rate is 75.25%. The most common reason in the applicants is coronary artery disease (34.43%), followed by kidney stone (18.03%) and tumors after treatment (14.75%). Two-thirds of coronary artery disease applicants were denied, while most of the kidney stone (95.24%) and all of the tumor after treatment applicants were approved. The flight experiences surveys and data revealed no flight safety issues or any abnormal flight records for any cases. Every approved applicant reached their limits of duty, time or both, at least for the first year.

Conclusion: The high approval rate is considered related to the procedure itself. As medical technology and the civil aviation industries develop dramatically, aeromedical decision makers will have to face more applications of special issuance with more complicated medical issues. We must be aware of the important role that the applicants, operators, and company medical departments could play in this regard. Ultimately, getting everyone involved would be an effective and efficient way to improve the safety level of the special issuance procedure.

### 13:15 - 15:00 (Scientific Session 9) Case Studies

#### ORS4

**English:** FAA Medical Certification of a Pilot After a Left Cerebellar Stroke  
**French:** Certification Médicale (FAA) d’un Pilote Après un Accident Vasculaire Cérébelleux Gauche

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Airman medical standards in most countries follow the ICAO medical standards as published in Annex 1. There is variation among countries in allowing an exception to the published medical standards. A case of an airman with a cerebellar stroke will be presented. In the United States, airman medical standards are published in the Code of Federal Regulations (CFR)-14 CFR Part 67. An airman who has had a stroke does not meet the medical standards for a regular unrestricted medical certificate. However, an airman with a stroke, depending on the medical history, may be granted authorization for a Special Issuance Medical Certificate if certain very specific conditions are met. The case to be discussed is of a 50 year old corporate pilot who was in relatively good health. While on an overnight trip, he awoke for flight duties around 3:45 AM, and suffered a brief episode of spatial disorientation and some nausea and vomiting. He was able to perform pilot duties in flight that day. On arriving home that night, he felt tired. He did not experience any other neurologic symptoms, but he visited his physician the next day. Brain imaging with a CT showed a low attenuating area in the left cerebellar hemisphere, and an MRI showing findings consistent with acute infarcts involving the left cerebellar hemisphere. A complete medical work-up was normal His diagnosis was left cerebellar stroke. He was followed for 18 months, and all studies remained normal. At 20 months post-incident, he was granted a Special Issuance First Class Medical Certificate for the diagnosis of left cerebellar cryptogenic stroke. The clinical course of this case and the conditions of the Special Issuance Medical Certificate will be discussed. as well as the aeromedical decision making process related to granting the Special Issuance Medical Certificate as it relates to the mitigation of safety risks associated with this airman's medical diagnosis.

#### ORS5

**English:** Aeromedical Considerations in Aircrew with ‘Loss of Consciousness’  
**French:** Les Considérations Aéromédicales Chez le Personnel Navigant Souffrant de Syncope

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The paper describes three clinical cases of loss of consciousness amongst class I pilots—one 43 years old and two in their early twenties. The diagnostic dilemma of labelling such cases as ‘seizure’, the importance of history-taking and the value of EEG in evaluating such cases is highlighted. Finally the aeromedical factors that need to be considered in making decisions regarding flying status of aircrew are discussed.
This presentation will outline the history and aeromedical disposition of a CVA in a 43 year old military fast jet instructor pilot. The CVA occurred during a maximal effort declined bench press with increased head level blood pressure (BP) from straining against a closed glottis. The clinical picture and radiography confirmed an infarct in the region of the left posterior inferior cerebellar artery (PICA). The diagnosis was of an intimal tear in the vertebral artery creating a flap that blocked off the PICA due to the increase in blood pressure that subsequently healed and the pilot was directed to rehabilitation and avoidance of activities that may increase head level BP. The risk assessment in this case was directed towards the following issues: 1. Ensuring accuracy of the diagnosis and causative factor to minimise the possibility of a serious progressive and common differential diagnosis such as connective tissue disorder and atherosclerotic vascular disease that skew the rates of recurrence in epidemiological studies of CVA in young people. 2. Accounting for individual risk factors for CVA recurrence including the Pilots excellent premorbid healthy lifestyle and the operational context of flying military fast jets with high +Gz resulting in a drop in head level blood pressure even with the use the anti-G straining manoeuvre and G-suit. 3. Appropriate utilisation of restrictions in the form of a grounding period immediately after the incident to monitor for consequences of the CVA that could endanger flight safety such as epilepsy and use of as or with co-pilot restriction to return to high performance aircraft flying while the individual risk of recurrence is unable to be accurately defined. This case highlights that it is essential to assess the individual in every sense of the word for pioneering military aeromedical decision-making rather than relying upon the cook book use of Waiver Guides.

“Doc, that Freedom of the City Parade we just did, I was standing behind you at attention and I could hear a rattling noise, I looked down and I noticed that my hand was shaking my scabbard.” Parkinson’s disease (PD) is a progressive motor disorder that also has well recognised clinically significant neuropsychiatric and non-motor symptomatology. PD is currently of unknown cause with a prevalence of 0.3 percent of the general population rising to 1 percent of those aged above 60. The cardinal features of PD are resting tremor, rigidity and bradykinesia however the timeline of the progression of the disease and resulting effects on various systems and functions vary dramatically from patient to patient. For any regulator the prospect of certifying a pilot as fit to fly with the diagnosis provides a raft of challenges, in both identifying current effects of disease, predicting potential effects and devising a suitable monitoring program for recertification. Pilot X is a previously fit and well multi engine pilot in his late 30’s with no predisposing risk factors who was found to have Early Onset PD with classic tremor, rigidity and single limb bradykinesia. After a series of flight checks, neurological assessments, neuro-psychiatric assessments and fine motor functioning tests Pilot X was recertified temporarily to fly as or with copilot. Further research is underway to better understand the potential risks of continuing the flight category and employment of this military pilot as the disease progresses. Once Pilot X requires pharmacotherapy for symptom control, recertification is likely to be more problematic.
OR58

English: ASYMPTOMATIC PULMONARY SARCOIDOSIS IN A PILOT - A CASE REPORT
French: ASYMPTOMATIQUE SARCOÏDOSE PULMONAIRE À UN PILOTE - LE RÉSUMÉ D’UN CAS

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Sarcoidosis is a rare chronic granulomatous disease of unknown etiology that is characterized by the presence of noncaseating, granulomatous, epithelioid tissue at the sites affected, with marked variability in prevalence and pattern of organ involvement. The lungs and lymphatic system are most often affected, but sarcoidosis may affect any organ. A 28 yrs old military helicopter pilot was diagnosed with sarcoidosis at his annual medical exam at National Institute of Aerospace Medicine. He was asymptomatic, but chest X-ray examination revealed well-developed small nodular infiltrates, disseminated uniformly in both pulmonary fields. The pilot had no pathology in his medical history, had no relative with significant disease. Until that time, he was smoking 7 package-year. Clinical exam was in normal range, routine blood tests were normal (including ACS). He was investigated by pulmonary function tests, bronchoscopy, laryngeal endoscopy, chest CT, Doppler echocardiography, 24 h ambulatory electrocardiographic monitoring, exercise ECG testing, neurological and ophthalmological examinations. The final diagnosis was confirmed by pulmonary biopsy. There are only a few such cases reported in specialty literature. Pulmonary sarcoidosis and its associated aeromedical concerns will be largely presented.

OR59

English: SARCOID IN AIRCREW - AEROMEDICAL RISK REVISITED
French: SARCOÏDOSE CHEZ LE PERSONNEL NAVIGANT - LE RISQUE ÀÉROMÉDICAL REVISITÉ

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Introduction: Aviation medicine is dedicated to ensure the fitness and health of aircrew. Discovery of Sarcoid in trained aircrew requires extensive cardiovascular(CV) evaluation to exclude cardiac lesions with the risk of life threatening arrhythmias reported in 11% or greater (Pettyjohn, et.al. Aviat Space Environ Med 1977). The Flight Surgeon and Aviation Medicine Examiner (AME) must determine cardiac and pulmonary involvement, the risk, and fitness for flying duty. Recent advances in myocardial imaging/perfusion studies have improved the identification of aircrew at risk of arrhythmias. This review was conducted to determine the incidence of cardiac and pulmonary Sarcoid in aircrew. The data was extracted from the US Army Aeromedical Epidemiology Data Register (AEDR), Fort Rucker, Alabama, USA.

Methods: The Aeromedical Epidemiology Data Register (AEDR) was established in 1984 and contains approximately 685,000 FDME records. Search for the ICD-9 code of 135.0 Sarcoid as of the most recent Flying Duty Medical Examination (FDME) was conducted.

Results: During the period 2009-2011, there was an average rated aviator population of 14,919 with an average of 10.33 pilots in any given year with a diagnosis of Sarcoid. This provided a period prevalence of 6.9 cases per year. During 1988-2011, a total of 18 cases were noted (0.12%). For the more recent period 2007-2011, a total of 11 cases, 7 pilots, 3 flight surgeons and 1 crew chief were identified. Of the aviator group, five (71%) were initially granted waivers; two (28%) were disqualified (one due to cardiac involvement [20%] and one due to worsening pulmonary disease). Review of the evaluation and followup requirements of FAA, JAA,ICAO, and military will be discussed.

Conclusions: Trained aircrew with diagnosis of cardiac and pulmonary Sarcoid require extensive evaluation and followup. Aircrew without underlying cardiac lesions and stable pulmonary function could be considered for return to unrestricted flight duty in both the military and civilian sectors.
**OR60**

**English:** HEAD INJURY AND RETURN TO FLYING: A CASE SERIES OF NAVAL AVIATORS AND DISCUSSION OF INTERNATIONAL POLICY.

**French:** TRAUMATISME CRÂNIEN ET RETOUR AU VOL: UNE SÉRIE DE CAS D’AVIATEURS NAVALS ET DISCUSSION D’UNE POLITIQUE INTERNATIONALE.

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A case series of three Naval aircrew with head injury and their aeromedical disposition will be presented. Comparison of Australian and international civilian and military waiver guidelines and policies for return to flying following head injury will be discussed.

**15:30 - 17:00 (SCIENTIFIC SESSION 10) ACCELERATION**

**OR61**

**English:** TACTICAL FLIGHT SIMULATION WITH AUTHENTIC IMPOSED ACCELERATION: PSYCHOPHYSIOLOGY AND TRAINING VALUE

**French:** SIMULATION DE VOL TACTIQUE AVEC IMPOSITION AUTHENTIQUE D’ACCÉLÉRATION: PSYCHOPHYSIOLOGIE ET VALEUR FORMATIVE

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**Introduction:** Unlike airline training simulators, tactical simulators are useful for skill acquisition, but actual flight is necessary for skill maturity and proficiency. Centrifuges have been used for decades to study acceleration and to train aircrew in the Anti-G Straining Manoeuvre (AGSM). Advances in structural design, flight dynamics modelling, and display fidelity have resulted in integrated training devices that impose both authentic tactical tasking and corresponding acceleration. However, normal pilot head motion in such simulators generates Coriolis forces that produce motion artifact and simulator sickness.

**Methods:** Adaptation to Coriolis was examined. Eight (8) aerobatic pilots, passively riding, were required to gaze at off-center angles up to 90deg at +3.0Gz daily for five (5) day exposures of 11 min. Other, non-experimental groups of pilots have been observed while in simulated, high-G, tactical flight, and have been surveyed as to the fidelity and training value.

**Results:** Normalized mean Motion Sickness (MS) scores were 58% less on Day 5 of the adaptation week than on Day 1. Ninety-seven percent (97%) of the adaptation which occurred between Day 1 and Day 5 was retained at 22 days. No postural instability was found. Motion artefacts persisted and decreased significantly only after Day 5. Majority opinion indicates that tactical simulation with acceleration is acceptable. Pilots use coping strategies, primarily limitation of head movement, to minimize motion artefact.

**Conclusions:** Adaptation to Coriolis force occurs, and persists for a useful training period of days to weeks. Motion artefacts decrease more slowly; the effect on training is not clear. Pilots prefer high fidelity simulation, but research indicates that skill acquisition is adequate with moderate fidelity. MS, adaptation, decay, and training effectiveness will be discussed.
OR62

English: **LACK OF GRAVITY EXPOSURE DECREASES THE THRESHOLD OF FORMATION OF PETECHIAL HAEMORRHAGES**

French: **L’EXPOSITION INSUFFISANTE AU CHAMP GRAVITATIONNEL RÉDUIT LE SEUIL D’APPARITION D’HÉMORRAGIES PÉTÉCHIALES**

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Well known causes for petechial hemorrhage include infectious diseases, vasculitis, thrombocytopenia, tumors, and physical pressure (e.g., in strangulation). It is less widely appreciated, however, that exposure to acceleration often induces G-measles in astronauts, fighter pilots, bungee-jumpers, or during human centrifugation, rollercoaster rides and car accidents. Mechanisms leading to a high inter-individual variation in the occurrence of petechiae are currently not understood. Here we present a case from an experimental bed-rest study to suggest that simulated microgravity decreases the threshold of petechiae formation. A 42-year-old male test subject without any history of thrombosis, hemorrhage or petechiae, and with a negative thrombophilia screening took part in a 2x21-day bedrest study with cross-over-design. The subject performed a tilt table test before (pre) and after (post) the bed-rest phase for each of two campaigns. Testing involved 80° head-up tilt for 15 minutes, followed by lower body negative pressure at gradually increasing levels of -10 mmHg every 3 minutes. Lower body negative pressure is a standard means in gravitational physiology to augment gravity’s pull on the vascular system. Surprisingly, the subject developed petechiae during the post-testing, but not during the pre-testing in both campaigns. Hemorrhages were distributed throughout the lower legs and most pronounced at the shin in a stocking-like fashion. Petechiae appeared with a reproducible distribution pattern across campaigns. It has yet been un-reported that bed-rest affects the appearance of petechiae, and the observation suggests that the endothelial barrier of capillaries can be altered by g-exposure. It has likewise not been known that G-measles distribute in a reproducible pattern.

OR63

English: **HEART RATE RESPONSES TO VARYING LEVELS OF VERTICAL ACCELERATION**

French: **RÉPONSES DU RYTHME CARDIAQUE À DES TAUX VARIABLES D’ACCÉLÉRATION VERTICALE**

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**Background:** +Gz acceleration is the most common acceleration experienced by the aircrew during fighter flying. The human body and in particular the cardiovascular system responds to the +Gz stress causing an increase in the heart rate of the aircrew. Heart rate, a measure of ANS response increases directly with increasing +Gz levels reaching a maximum within a few seconds of exposure. The effect of varying levels of the +Gz exposure on HR was explored in this study.

**Method:** 150 subjects, divided into 3 separate groups (50 aircrew each) were exposed to a varying level of +Gz (Group I: 7G x 15 sec, Group II: 7.5 x 15sec, Group III: 9 G x 5 sec). An open loop profile was selected with an onset rate of 6G/s. Electrocardiographic recordings and heart rate of the subjects was recorded during the runs. One way analysis of variance (ANOVA) was performed along with Tukeys Multiple Comparison Test for comparison of the Delta HR in the three different groups. A level of p< 0.05 was considered as significant.

**Results:** The mean baseline HR of the three groups was not significantly different. The peak HR at different G level of exposure was significantly different from the baseline values of the corresponding G level exposure. There was no significant difference between the Delta HR for the 7G, 7.5 G and 9G exposures.

**Conclusion:** The present study was done to examine whether the change in HR at peak acceleration from the baseline value (Delta HR) is different for varying levels of vertical acceleration. It was hypothesized that there would be a change in the Delta HR of the subjects during the different G level exposures. However, no significant difference in the delta HR was noticed during different G level exposures in these subjects.
**OR64**

**English:** AURICULAR ACUPUNCTURE AND THE EFFECT ON G-TOLERANCE: A REPEATED MEASURE DESIGN CONTROLLED TRIAL

**French:** L’ACUPUNCTURE AURICULAIRE ET SON EFFET SUR LA TOLÉRANCE AUX FORCES GRAVITATIONNELLES: UNE ÉTUDE CONTRÔLÉE D’UN MODÈLE À MESURE RÉPÉTÉE

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**Introduction:** Auricular acupuncture has been widely used within the military for pain control and other constitutional symptoms. Its use has been minimal in the aviation population due to a poor understanding of its long and short term effects in an aerospace environment.

**Methods:** Fifteen subjects were spun in a centrifuge according to standard operating procedures with a gradual onset rate (GOR) of 0.1 G/s. Subjects served as their own controls by completing a baseline control spin daily for resting G-tolerance. Battlefield acupuncture (BFA) protocol was placed immediately after baseline spin, and subjects were then re-spun in either a 20-min cohort (simulating cockpit/flight line treatment) or a 2-h cohort (simulating a routine mission). Endpoint for each spin was the subject perceiving 100% peripheral light loss or 50% central light loss (standard measures for G-tolerance), at which point the subject would let go of the hand brake, which automatically stops the centrifuge.

**Results:** There was no statistically significant effect of acupuncture on resting GOR G-tolerance in either cohort. In both cases, the difference between the acupuncture trial and baseline was about 0.1 Gz. A power calculation was conducted and showed that the study had sufficient power (85%) to detect changes as small as 0.45 Gz and 0.3 Gz for the 20-min and 2-h conditions, respectively, when testing at the 0.05 one-tailed alpha level.

**Conclusion:** Auricular acupuncture caused no statistically significant decrease in resting G-tolerance with a GOR centrifuge protocol for the 20-min and 2-h cohorts. These data, along with future studies to assess rapid +Gz conditions, can provide evidence for the revision of AFI 48-123.

**OR65**

**English:** AN INITIAL LONGITUDINAL LOOK AT TURBULENCE ACCIDENTS

**French:** UN PREMIER REGARD LONGITUDINAL AUX ACCIDENTS DÛS À LA TURBULENCE

**DJ Schroeder**

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**Introduction:** Turbulence-related injuries have been a continuing concern for both the FAA and NTSB. A joint safety analysis team was initiated in 2001 to review turbulence accidents and identify data driven interventions. The FAA formed a second team (JSIT) to identify the most viable intervention strategies. This investigation was designed to assess longitudinal changes in turbulence injuries.

**Methods:** A query of the NTSB Aviation/Incident Data System was focused on turbulence accidents from 1992 to 2010 that involved Part 121 operations. Information was gathered regarding the number of serious and minor injuries to passengers and cabin crew. Additional information included the type of turbulence, altitude, type of injury, and number of cabin crew and passengers.

**Results:** A total of 208 accidents were identified. Of that group several were associated with abrupt maneuvers that arose from TCAS or GPWS alerts and other non-turbulence events, resulting in a total of 183 accidents. Those events involved 271 injuries to flight attendants (156 serious and 115 minor) and 491 injuries to passengers (67 serious and 424 minor). Only two pilots received turbulence-related injuries during the last 19 years. While 2003 was the peak year for turbulence accidents (17) 1997 was the peak year for injuries (34 FAs and 189 passengers and a single fatality). When compared with the 1992-2001 data there was a smaller percentage of Clear Air Turbulence events (23% versus 32%) and a higher percentage of Turbulence events (39% versus 33%) the last 9 years.
**Conclusions:** The number of serious and minor passenger injuries was lower the last nine years than in the earlier decade. For FAs, serious injuries occurred at a similar rate while there were fewer minor injuries. Ankle injuries were most common. Even though turbulence events are often unpredictable, improved communications and crew resource management could reduce the number of injuries associated with those events.

**OR66**

**English:** MEDICO-LEGAL ASPECT OF THE INVESTIGATION OF THE CRASH OF A BOEING 727 NEAR OUROMEIY AIRPORT IN IRAN

**French:** L’ASPECT MÉDICO-LÉGAL DE L’INVESTIGATION DE L’ACCIDENT D’UN BOEING 727 PRÈS DE L’AÉROPORT DE OUROMEIY EN IRAN

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**Introduction:** This paper describes the medico-legal aspect of investigations and identification after the air crash of the Boeing 727 near Ouromeiy airport in Iran. The investigation and identification team comprising investigators, forensic pathologists, odontologists, police and medico-legal doctors from Legal Medicine rapidly recovered and identified 78 of the victims, with 27 serious injuries that were found by search and rescue team and transferred to hospital.

**Methods:** Casualties were classified into four categories: immediate care, delayed care, minor care, and deceased; after initial triage. The bodies were undressed, searched, and examined. Identification techniques for the victims were based on documents, clothing, jewellery, medical findings, tattoos, x-rays, dental identification, exclusion, visual, fingerprints, and through DNA typing. Full autopsies were performed on all fatalities to determine patterns of injury and cause of death.

**Results:** It is critical to assemble a multidisciplinary team of practitioners especially trained for managing medico-legal investigation in mass disaster and the ability of identification techniques, dental identification, fingerprints and DNA technology to solve complex identification problems.

**Discussion and Conclusion:** A disaster such as an aircraft accident raises legal problems. The goals of the medico-legal team are to identify the victims and the cause of death, to report the patterns of injury, to look for the presence of intoxicants or evidence of explosives and/or firearm injuries and to determine the time of death. The success of the identification operations of the victims after an aircraft accident such as the crash of the Boeing 727 of IR.IRAN depends on the use of perfected techniques as well as on a multidisciplinary team.
### MONDAY, 17 SEPTEMBER 2012

| PR01 | English: HEALTH IMPROVEMENT THROUGH PHYSICAL ACTIVITY IN AVIATION EMPLOYEES  
       | French: AMÉLIORATION DE LA SANTÉ PAR L'ACTIVITÉ PHYSIQUE CHEZ LES EMPLOYÉS DE L'AVIATION  
       | M Bilban |
| PR02 | English: OVERWEIGHT, EXERCISE AND RELATED MEDICAL FINDINGS IN MILITARY PILOTS  
       | French: SURPOIDS, EXERCICE ET ASSOCIES LA COMMISSION MEDICALE EN PILOTES MILITAIRES  
       | S Ilbasmis, E Ercan, L Senol |
| PR03 | English: HEARING AID USE IN PILOTS WITH HEARING LOSS  
       | French: L'UTILISATION D'APPAREIL AUDITIF CHEZ LES PILOTES AVEC PERTE AUDITIVE  
       | E Aydin, N Ata, Z Dulkadir |
| PR04 | English: COMPARISON OF DIETARY ANTIOXIDANTS INTAKE AND SERUM MALONDIALDEHYDE LEVELS BETWEEN PILOTS AND NON-FLIGHT STAFF OF THE ARMY FORCE  
       | French: COMPARAISON DE L'INGESTION D'ANTIOXYDANTS ALIMENTAIRES ET DES NIVEAUX SÉRIQUES DE DIALDÉHYDE MALONIQUE ENTRE LES PILOTES ET LE PERSONNEL AU SOL DE L'ARMÉE DE TERRE  
       | E Amiri Taleghani, G Sotoudeh, K Amini, M Heidari Araghi, K Soleimani, H Sadrzadeh Yeganeh |
| PR05 | English: CERVICAL SCHWANNOMA IN A COMMERCIAL PILOT: A CASE REPORT  
       | French: UN SCHWANNOME CERVICAL CHEZ UN PILOTE DE LIGNE  
       | Z Dulkadir, N Ata, E Aydin, A Akin |
| PR06 | English: INTERNAL CAROTID ARTERY ANEURYSM IN A COMMERCIAL PILOT: A CASE REPORT  
       | French: ANÉVRISME DE L’ARTÈRE CAROTIDE INTERNE CHEZ UN PILOTE PROFESSIONNEL: LE RÉSUMÉ D’UN CAS  
       | M Cetinguc, N Ata, Z Dulkadir, E Aydin |

### TUESDAY, 18 SEPTEMBER 2012

| PR07 | English: DISEASES OF FEMALE MILITARY AVIATORS DETECTED DURING PERIODIC MEDICAL EXAMINATIONS, AND THEIR EFFECTS ON FLIGHT SAFETY  
       | French: MALADIES DES FEMMES AVIATRICES MILITAIRES DÉTECTÉES DURANT LES EXAMENS MÉDICAUX PÉRIODIQUES, ET LEURS EFFETS SUR LA SÉCURITÉ DES VOLS  
       | L Senol, S Metin, E Ercan |
| PR08 | English: GENOMICS AND PERSONALISED AEROSPACE MEDICINE - CREATING THE WORLD’S SAFEST AIRLINES  
       | French: GÉNOMIQUE ET MÉDECINE AÉRONAUTIQUE PERSONALISÉE - CRÉER LA COMPAGNIE AÉRIENNE LA PLUS SÉCURITAIRE AU MONDE  
       | AP Winnington |
| PR09 | English: AGING OF BASIC COGNITION AND ITS EFFECTS ON THE DUAL-TASK ABILITY OF PILOTS 60-ABOVE  
       | French: VIEILLISSEMENT DE LA FONCTION COGNITIVE DE BASE ET SES EFFECTS SUR L’ABILITÉ À FAIRE DEUX TÂCHES SIMULTANÉES CHEZ LES PILOTES DE 60 ET PLUS  
       | K Xu, X Xu, W Jiang, Y Zhou, T Feng, F Liu |
| PR10 | English: A FIVE YEAR ANALYSIS OF MYOCARDIAL PERFUSION IMAGING IN AVIATORS  
       | French: UNE ANALISE D’IMAGERIE DE PERFUSION MYOCARDIQUE DES AVIATEURS SUR UNE PÉRIODE DE CINQ ANS  
       | A Kumar |
| PR11 | English: EFFECT OF PHYSICAL FITNESS ON RESPIRATORY FUNCTIONS AT DIFFERENT ALTITUDES  
       | French: EFFET DE LA CONDITION PHYSIQUE SUR LES FONCTIONS RESPIRATOIRES À DIFFÉRENTES ALTITUDES  
       | E Ercan, N Ata |
| PR12 | English: C-130 IN-FLIGHT MONITORING OF ARTERIAL OXYGEN SATURATION DURING AEROMEDICAL EVACUATION TRAINING MISSIONS  
       | French: SURVEILLANCE EN VOL DE LA SATURATION D’OXYGÈNE ARTÉRIEL DURANT LES MISSIONS D’ENTRAÎNEMENT D’ÉVACUATION AÉROMÉDICALE À BORD DE C-130  
       | MB Sides, LD Tripp |
| PR13 | English: ANXIETY LEVELS OF PILOTS DURING PHYSIOLOGICAL TRAINING  
       | French: LES NIVEAUX D’ANXIÉTÉ DES PILOTES DURANT L’ENTRAÎNEMENT PHYSIOLOGIQUE  
<pre><code>   | N Ata, B Aytac, M Cetinguc |
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<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Abstract</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR14</td>
<td>English: A HELICOPTER PILOT WITH MITRAL VALVE POSTERIOR LEAFLET PROLAPSE AS AN EXCEPTIONAL CASE OF MITRAL INSUFFICIENCY - CASE REPORT</td>
<td>French: UN PILOTE D’HÉLICOPTÈRE AVEC UN PROLAPSUS DU VOLET POSTÉRIEUR DE LA VALVULE MITRALE COMME UN CAS EXCEPTIONNEL D’INSUFFISANCE MITRALE - UNE HISTOIRE DE CAS</td>
<td>C Ozturk, S Metin, A Sen, H Tore, A Akin, A Sen</td>
</tr>
<tr>
<td>PR15</td>
<td>English: THE NEXT STEP: INTEGRATION OF A NORMOBARIC HYPOXICATOR WITH FULL FLIGHT SIMULATOR.</td>
<td>French: LA PROCHAINE ÉTAPE : L’INTÉGRATION D’UN GÉNÉRATEUR D’HYPOXIE NORMOBARE À UN SIMULATEUR COMPLET DE VOL’</td>
<td>O Bassovitch, RA Westerman</td>
</tr>
<tr>
<td>PR16</td>
<td>English: COMPARATIVE STUDY ON CARDIOVASCULAR RESPONSE TO ORTHOSTATIC STRESS AFTER TWO MODELS OF REPEATED POSTURE CHANGES</td>
<td>French: ÉTUDE COMPARATIVE SUR LA RÉPONSE CARDIOVASCULAIRE AU STRESS ORTHOSTATIQUE APRÈS DEUX MODÈLES DE CHANGEMENTS DE POSTURE RÉPÉTÉE</td>
<td>B Wu, Y Wang</td>
</tr>
<tr>
<td>PR17</td>
<td>English: THE IMPACT OF PARTNER PSYCHOLOGICAL PRESENCE/ABSENCE ON FUNCTIONING IN EXTREME ENVIRONMENTS</td>
<td>French: L’IMPACT DE LA PRÉSENCE/ABSENCE PSYCHOLOGIQUE DU PARTENAIRE SUR LE FONCTIONNEMENT DANS DES ENVIRONNEMENTS EXTRÊMES</td>
<td>KA Norris, D Paton, J Aytton</td>
</tr>
<tr>
<td>PR19</td>
<td>English: ASSESSMENT OF AVIATION TRAINING PROGRESS BASED ON IN-FLIGHT RECORDINGS OF PSYCHOPHYSIOLOGICAL PARAMETERS</td>
<td>French: ÉVALUATION DE LA PROGRESSION DE LA FORMATION AÉRONAUTIQUE BASEÉE SUR L’ENREGISTREMENT EN VOL DES PARAMÈTRES PSYCHOPHYSIOLOGIQUES</td>
<td>L Dziuda, M Krej, K Rozanowski, P Skibniewski, M Burek, M Bylinka</td>
</tr>
<tr>
<td>PR20</td>
<td>English: INCIDENTALLY DETECTED ASYMPTOMATIC SEVERE AORTIC VALVE DISEASE ACCOMPANIED BY MILD MITRAL VALVE DISEASE IN A JET PILOT - CASE REPORT</td>
<td>French: DÉCOUVERTE INOPINÉE D’UNE MALADIE SÉVÈRE ASYMPTOMATIQUE DE LA VALVULE AORTIQUE ASSOCIÉE À UNE MALADIE LÉGÈRE DE LA VALVULE MITRALE CHEZ UN PILOTE D’AVION À RÉACTION - UNE HISTOIRE DE CAS</td>
<td>C Ozturk, A Akin, A Sen, S Metin, H Tore, A Sen</td>
</tr>
</tbody>
</table>
PR01

**English:** HEALTH IMPROVEMENT THROUGH PHYSICAL ACTIVITY IN AVIATION EMPLOYEES

**French:** AMÉLIORATION DE LA SANTÉ PAR L’ACTIVITÉ PHYSIQUE CHEZ LES EMPLOYÉS DE L’AVIATION

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**Introduction:** Due to the nature of the pilots work, the constraining daily and weekly rhythms, predominantly sitting work, and responsibility and stress that they are subjected to, risk factors for ischemic heart disease are serious consideration. The factors include increased blood pressure, high cholesterol and blood sugar, smoking, obesity, a sedentary lifestyle, and insufficient activity in sports or recreation. A shift to a more active lifestyle brings a significant decrease of risk of coronary disease.

**Materials and methods:** Our analysis involved 148 pilots, 100 stewardesses, and 104 other employees of the national carrier. At their physical examination they filled out a questionnaire on free-time physical activity.

**Results:** Pilots had normal body weight in 52% of cases, while 39% were overweight, and 8% were obese. Among stewardesses, 75% were of normal weight, 10% were underweight, 10% overweight and 5% obese. Among other employees, 45% were of normal weight, 35% were overweight, and 20% were obese. 83.5% of the subjects considered themselves physically active in 78% the reason for activity was maintaining physical fitness, in 68% it was preserving their health, and in 61% was spending time in nature. Pilots were the most physically active of the categories, followed by stewardesses. 48% of the subjects considered their work markedly stationary, while a quarter made use of their time at work to exercise.

**Conclusion:** Our results indicate pilots are at a lower risk for cardiovascular disease than the general population. Most pay considerable attention to their physical health; however, over 10% remain wholly physically inactive, putting themselves at a greater risk for cardiovascular disease. We will collaborate with their employer to organise health-promotion activities that will involve all employees and motivate them to live healthier lives and to take personal responsibility for maintaining appropriate physical and mental fitness.

PR02

**English:** OVERWEIGHT, EXERCISE AND RELATED MEDICAL FINDINGS IN MILITARY PILOTS

**French:** SURPOIDS, EXERCICE ET ASSOCIES LA COMMISSION MEDICALE EN PILOTES MILITAIRES

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**Introduction:** Overweight and obesity are becoming more trouble for both the general population and aviation community. Body mass index (BMI) is used to determine obesity levels. People whose BMI is between 25 and 30 kg/m2 are called overweight and obese term is used if their BMI is greater than 30kg/m2. The objective of this study was to review the fitness and related medical findings of military pilots.

**Methods:** 60 pilots (age range 27-41) taking their aircrew periodic examination were included in this study. A survey was administered to the pilots and medical records reviewed. Pilots were grouped according to their BMI. Group I (normal) consisted of 25 pilots with BMI between 20-25. Group II (overweight) consisted of 35 pilots with BMI between 25-30. Demographic and laboratory finding means were compared with independent samples t-test.

**Results:** There were not any statistically differences between the two groups according to their age, flight hours, total cholesterol, triglyceride mean variables. Naturally lipid profile (cholesterols and triglycerides) means of Group II were higher than Group I but were statistically insignificant (p>0.05). 17 subjects (68%) of Group I and 23 subjects (65%) of Group II stated that they were doing regular exercise. The most frequent cited sport in Group I was jogging (58.8%) and
in Group II was trekking (82.6%). Only 3 (12%) subjects had overweight-related medical diagnoses in Group I but 20 subjects (57.1%) in Group II. Hepatosteatosis was the most frequent diagnosis for both groups.

**Conclusion:** Overweight, obesity and reduced physical activity are some of the most challenging troubles of our community for present and next century. Planning campaigns and countermeasures against this problem for aircrew are essential and in need of data. Enlarging this study would be useful for this purpose.

**PR03**

**English:** HEARING AID USE IN PILOTS WITH HEARING LOSS

**French:** L’UTILISATION D’APPAREIL AUDITIF CHEZ LES PILOTES AVEC PERTE AUDITIVE

**E Aydin, N Ata, Z Dulkadir**

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**Introduction:** Unprotected exposure to loud noise, such as aircraft noise, may cause a permanent hearing loss. So hearing shall be tested at all examinations. There shall be no hearing loss in either ear, when tested separately, of more than 35dB at any of the frequencies 500, 1000, and 2000 Hz, or of more than 50dB at 3000Hz. If hearing loss is diagnosed, hearing aid can be used by pilots. Applicants with hypoacusis may be assessed as fit by the Aeromedical Section (AMS) if a speech discrimination test demonstrates a satisfactory hearing ability. The purpose of this study was to determine the pilots who use hearing aids in Turkish civil aviation.

**Material and Method:** This prospective study comprises 9 pilots using hearing aids. The analyzed parameters were level of hearing loss, length of follow-up and hearing level after using hearing aid.

**Results:** All 9 patients were Class 1 medical certificate holders. Out of 9, 7 had bilateral hearing loss. Average speech reception threshold was 41.4dB in right ears and 47.2dB in left ears and average speech discrimination was 76dB in right ears and 75.1dB in left ears. Average speech reception threshold after using hearing aid was 27.2dB and average speech discrimination after using hearing aid was 80.8dB. Average length of follow-up was 27 months. All pilots were assessed as fit by the AMS.

**Conclusions:** All possible steps should be taken to reduce noise at source and ear protection should be used. However, if hearing loss is diagnosed, a hearing aid can be used. Whenever a pilots hearing performance can be improved significantly by the use of a hearing aid, it should be considered a benefit for flight safety. The aid must be approved by a specialist acceptable to the AMS and an extra aid and battery should be carried by the pilot on duty.

**PR04**

**English:** COMPARISON OF DIETARY ANTIOXIDANTS INTAKE AND SERUM MALONDIALDEHYDE LEVELS BETWEEN PILOTS AND NON-FLIGHT STAFF OF THE ARMY FORCE

**French:** COMPARAISON DE L’INGESTION D’ANTIOXYDANTS ALIMENTAIRES ET DES NIVEAUX SÉRIQUES DE DIALDÉHYDE MALONIQUE ENTRE LES PILOTES ET LE PERSONEL AU SOL DE L’ARMÉE DE TERRE

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**Background:** Pilots are exposed to higher radiation which may lead to lipid peroxidation. Dietary intakes of antioxidants and their relation to oxidative stress state has not been studied in pilots. The aim of this study was to compare dietary intake of antioxidants and serum malondialdehyde (MDA) levels between pilots and non-flight staff of the army force

**Methods:** This study was a descriptive analytical cross-sectional study. Forty-five pilots and 45 non-flight staffs of the army force were randomly selected. Semi-quantitative food frequency questionnaire was used for determining antioxidants intake of individuals during the previous month. Serum malondialdehyde levels were measured using spectrophotometry method.
Results: The median serum malondialdehyde was significantly higher in pilots than the non-flight staff (3.9±0.8 versus 3±1.1 nmol/ml) (p>0.001). Even though the median vitamin C intake was high in both groups, non-flight staff had higher median vitamin C intake than pilots (239±154.98 versus 202.01±132.14 mg/d) (p=0.02). Dietary intakes of selenium, vitamin E and A were not different between the two groups.

Discussion: Pilots had higher lipid peroxidation and lower dietary vitamin C intake. The requirement for dietary vitamin C in pilots may be higher than other people.

PR05

English: CERVICAL SCHWANNOMA IN A COMMERCIAL PILOT: A CASE REPORT
French: UN SCHWANNOME CERVICAL CHEZ UN PILOTE DE LIGNE

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Schwannomas are benign nerve sheath tumors. They arise from the supportive tissue within the nerve itself. As these tumors grow, they displace and compress important nerve fascicles within the nerve. This causes pain, weakness, and numbness. Cervical schwannomas are rare, as fewer than 250 cases have been reported in the literature. A 47-year-old Class-1 medical certificate holder pilot applied to aeromedical center (AMC) for removal of his Operational Multicrew Limitation (OML). He reported that he had a neurosurgical procedure because of the cervical schwannoma 8 months ago and Aeromedical Section (AMS) assessed him fit with OML. He was a retired military jet pilot. His total flight time was about 3800 hours. During his military flying career, he had no neurological symptoms. But he had some neurological symptoms after he retired and flew as a commercial pilot, and cervical schwannoma was diagnosed. Schwannoma localization was between C2-C3 cervical vertebrae which caused significant cord compression. Brain tissue was reported normal after MRI. Electroencephalogram was reported within normal limits. The patient underwent an operation for decompression of the C2-C3 tumor. After surgical removal, pathology result was reported as C2-C3 intervertebral benign tumor (schwannoma), and C2-C3 level extradural mass. All medical examinations are within normal limits during our medical examination. No other clinically or aeromedically significant neurological sequelae persisted or developed after the surgery. So we proposed to AMS to remove his limitation and AMS assessed him fit without limitation. An applicant or a pilot shall be free from any congenital or acquired neurological abnormality, and any wound, injury or surgery sequel, such as could entail a degree of functional incapacity which is likely to interfere flight safety. So neurological assessment should include careful medical history and physical examination.

PR06

English: INTERNAL CAROTID ARTERY ANEURYSM IN A COMMERCIAL PILOT: A CASE REPORT
French: ANÉVRISME DE L’ARTÈRE CAROTIDE INTERNE CHEZ UN PILOTE PROFESSIONNEL: LE RÉSUMÉ D’UN CAS

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A 40-year-old F-16 pilot was retired after 20 years of service in the Air Force and applied to Aeromedical Center (AMC) for civil aviation medical examination. His total flight time was approximately 3500 hours. During his military flight career, he had no neurological disorders. His medical examination was unremarkable, but neurologist had doubt that there was brain pathology. His brain magnetic resonance (MR) imaging was normal. Magnetic resonance angiography was performed to evaluate the brain arteries. Vascular bulging of the internal carotid artery was detected with MR angiography, but these findings were not specific enough to make a diagnosis. 2.5mm x 2.2mm posterior-inferior overturned aneurysm in the cavernous portion of the right internal carotid artery was identified with a conventional cerebral angiogram. The prevalence of incidental intracranial aneurysm among adults is 5%. Most intracranial aneurysms remain asymptomatic until they rupture. Some grow to a large size and present with neuropathies. Aneurysms smaller than 7 mm have an extremely low rate of rupture, annual risk is about 0.1% yearly. Our patient had absence of vascular risk factors such as hypertension, diabetes, and rheumatic diseases, and had no neurological deficit. Because of these positive results we proposed he be assessed as fit by the Aeromedical Section (AMS) with operational multi-pilot limitation (OML). AMS has since decided that he may be assessed as fit with OML limitation and very close follow-up by a neurologist. After 8 years of follow-up, he continues in his flight career without any pathology.
PR07

English: DISEASES OF FEMALE MILITARY AVIATORS DETECTED DURING PERIODIC MEDICAL EXAMINATIONS, AND THEIR EFFECTS ON FLIGHT SAFETY

French: MALAÎDIES DES FEMMES AVIATRICES MILITAIRES DÉTECTÉES DURANT LES EXAMENS MÉDICAUX PÉRIODIQUES, ET LEURS EFFETS SUR LA SÉCURITÉ DES VOLS

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Introduction: There are physical differences between males and females that relate to different patterns of disease and illness. The aim of this study was to determine the patterns of disease in female aviators and analyze any effects on flight safety.

Method: The study is retrospective and descriptive. We evaluated military female aviators who applied to our center for aircrew five-yearly medical examinations between 01 January 2007-31 December 2011. Demographic characteristics, detected diseases and decisions about continuation in flight duties are recorded.

Results: 88 female aviators applied for their physical examination. Their ages were between 22-43 (mean 30.74±4.31). Subjects consisted of pilots (75% n= 66), aircrew personnel (14.8% n= 13), and cadets (10.2% n= 9). The most frequent disease was refractive error (37.70% n= 23). Other diseases that were stated in our study were anemia (9.84% n= 6), mitral valve diseases (8.20% n= 5), and urolithiasis (4.92% n= 3). Pregnancy, ovarian cyst and uterine myoma were detected in three aviators as obstetrics & gynecology disorders. After the physical examinations, 87.5% (n= 77) of the aviators were decided fit for flight duties, 8% (n= 7) were temporary grounded, 2.3% (n= 2) were permanently grounded, and 2.3% (n= 2) needed to change aircraft type.

Conclusion: There is no gender-specific condition that affects the flight performance of the female aviator except obstetrics & gynecology disorders. Accelerative forces (G) that can be seen in ejection seat-equipped or high performance aircraft, and hazardous effect of altitude like hypoxia and decompression sickness are not appropriate for pregnant aviators. Anemic aviator can experience severe hypoxia-related hazards at lower altitudes.

PR08

English: GENOMICS AND PERSONALISED AEROSPACE MEDICINE - CREATING THE WORLD’S SAFEST AIRLINES

French: GÉNOMIQUE ET MÉDECINE AÉRONAUTIQUE PERSONALISÉE - CRÉER LA COMPAGNIE AÉRIENNE LA PLUS SÉCURITAIRE AU MONDE

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Direct-to-consumer genetic testing is becoming increasingly more available and affordable. Physicians are, however, presented with an increasing number of consultations regarding the significance of the results. This includes patients that possess the single nucleotide polymorphisms (SNPs) associated with venous thrombo-emboli(for example rs1799963) who are planning flights to long-haul destinations. Recent advances in SNP genotyping have other implications to the aviation industry and the practice of aerospace medicine. Aircrew and air traffic controllers with SNPs that have been statistically validated for pathogenic phenotypes will undergo increased monitoring and have their occupational health improved with preventive medical strategies. Genomic information has been shown to enhance patient compliance with lifestyle modification recommendations, such as smoking cessation and preventing hypercholesterolemia. Airlines can also improve flight safety by screening potential employees for a predisposition to sudden incapacitation; that is, sudden cardiac arrest, aneurysms, strokes, acute coronary syndrome, and pulmonary emboli. Clinically validated SNPs for alcohol dependence are also available. This presentation examines the accuracy and reliability of SNP assays relevant to the aviation industry and outlines the role of exome sequencing in creating the world’s safest airlines.
**ABSTRACTS - POSTER PRESENTATIONS**

**PR09**

**English:** AGING OF BASIC COGNITION AND ITS EFFECTS ON THE DUAL-TASK ABILITY OF PILOTS 60-ABOVE

**French:** VIEILLISSEMENT DE LA FONCTION COGNITIVE DE BASE ET SES EFFECTS SUR L'ABILITÉ À FAIRE DEUX TÂCHES SIMULTANÉES CHEZ LES PILOTES DE 60 ET PLUS

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**Introduction:** The present study explored the aging of basic cognition and dual task ability of pilots who were older than 60 years old. The result provided supports to extend the life of flight.

**Methods:** 422 participants were selected from airline pilots who were older than 60 years old. They were asked to finish the basic cognitive capacity tests on computer, which included digit discrimination, mental arithmetic, Chinese character rotation, digit working memory, recognition of dual words, recognition of tri-digits and recognition of meaningless figure (m=1.06, sd=0.16; m=1.86, sd=0.44; m=0.52, sd=0.16; m=0.69, sd=0.21; m=6.10, sd=2.1; m=13.07, sd=3.55; m=12.36, sd=4.52). They also finished dual-task ability, which included arithmetic of 4-figure consecutive addition, computer simulated flying attitude control task and the dual-task (m=4.19, sd=2.24; m=4.50, sd=2.16; m=3.29, sd=2.42; m=3.26, sd=2.32) which was composed by above two.

**Results:** The results showed that the capacities of the basic cognition of pilots older than 60 years old were significantly higher than the normal people in the same age period. However, the dual-task ability of the aged pilots was not higher than the normal airline pilots. More interesting, we found significant correlation between the reaction time of basic cognition and the dual-task ability (r= -0.15, p < 0.05). But no other correlations were found (r=0.05, p = 0.33).

**Conclusion:** This study provided an indication that the dual-task ability of the airline pilots who were older than 60 years old would not decline by the aging of basic cognition.

**PR10**

**English:** A FIVE YEAR ANALYSIS OF MYOCARDIAL PERFUSION IMAGING IN AVIATORS

**French:** UNE ANALISE D’IMAGERIE DE PERFUSION MYOCARDIQUE DES AVIATEURS SUR UNE PÉRIODE DE CINQ ANS

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**Introduction:** For early diagnosis of CAD and medical reinstatement of aviator post coronary event, we need an investigating modality having a high sensitivity and also being a good prognostic marker. Normal stress MPI means relevance for certification of aviators. The usage of this modality in the current day practice of medical evaluation of aviators needs to be analyzed.

**Materials and methods:** Over a 5-yr period, MPIs of 84 consecutive aviators referred to our centre were prospectively analyzed. ECAM camera with Autocardiac software was used. 5 subsets were defined: Aviators who underwent Primary PTCA, cases of asymptomatic ECG abnormalities, those with Positive routine TMT, Old CAD cases and aviators for chest pain evaluation.

**Results:** Four patients underwent serial MPIs at 1-3 days after primary PTCA and then 6-9 months later as follow-up. The average change in EF was 5.26% and reduction in perfusion score was 26%. 10 cases were referred for having positive TMT. Only one was detected to have perfusion defect. Of the 10 cases referred for atypical chest pain only one was detected to be positive. 48 cases were referred for ECG abnormalities, of which 6 were detected to have defects. Twelve aviators were follow-up cases of CAD of which only 1 had reversible defect.
**Conclusion:** In aviators, early detection of CAD and proper follow-up in known cases can prevent catastrophe. Also unnecessary invasive procedures need to be avoided. In this respect MPI has a much better diagnostic accuracy than stress ECG alone. With its ability to provide information about the physiological significance of stenosis, functional scoring, viability and objective parameters for follow up, MPI is ideally suited to assess for fitness after intervention too.

**PR11**

**English:** EFFECT OF PHYSICAL FITNESS ON RESPIRATORY FUNCTIONS AT DIFFERENT ALTITUDES

**French:** EFFET DE LA CONDITION PHYSIQUE SUR LES FONCTIONS RESPIRATOIRES À DIFFÉRENTES ALTITUDES

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**Introduction:** FVC (Forced Vital Capacity) and FEV1 (Forced Expiratory Volume in 1 second) decrease at high-altitude due to hypoxia induced vasospasm/bronchoconstriction. PEF (Peak Expiratory Flow) elevate depending on increased large airway resistance and low density of air at high altitude. Physically active people’s breathing capacity at the same age, height and weight is higher than people who are not. We investigated the effect of physical fitness on PEF and FEV1 parameters at two altitudes, 2500 feet (Eskisehir’s Altitude) and 8000 feet (Commercial Aircraft Cabin Altitude) in our study.

**Methods:** 29 non-smoker pilot candidates were included in this study. Their ages ranged from 21 to 24 years. A questionnaire was applied and height, weight, resting pulse rate were measured. A physical fitness test (PT) was applied to determine the fitness of candidates. Pilot candidates were subsequently graded and grouped (Good, Moderate, Poor) according to the scores obtained from the PT. PEF and FEV1 values were measured with PEF meter just before the hypobaric chamber training (Pre), during the training at 8000 feet (TR) and immediately after the training (Post). One-Way ANOVA and repeated measures ANOVA tests were used for statistical analysis.

**Results:** Moderate PT group’s mean Pre-PEF and FEV1 values were found higher than Good and Poor PT groups’ values (p all groups and TR PEF values increased in moderate and poor PT groups. Only Good PT group’s POST FEV1 values returned to pre-training values.

**Discussion:** According to our findings physical fitness positively affects pulmonary functions at moderate altitudes and facilitates recovering from altitude induced pulmonary adverse effects. Our results concordance with the literature except IR PEF values in Good PT group. Low number of subjects might be responsible for these results in our study. Further studies should be conducted at different altitudes with more cases.

**PR12**

**English:** C-130 IN-FLIGHT MONITORING OF ARTERIAL OXYGEN SATURATION DURING AEROMEDICAL EVACUATION TRAINING MISSIONS

**French:** SURVEILLANCE EN VOL DE LA SATURATION D’OXYGÈNE ARTÉRIEL DURANT LES MISSIONS D’ÉVACUATION AÉROMÉDICALLES À BORD DE C-130

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**Introduction:** As tactical aeromedical mission requirements change to accommodate patients who are less than stable, so must our approach to in-flight monitoring of these patients change to coincide with the severity of their conditions. One way of providing enhanced care in flight is through the use of pulse oximetry. Pulse oximetry provides the patient care team with both real time on line arterial oxygen saturation as well as heart rate data. These data may be useful in determining the appropriateness of various medical interventions such as oxygen administration, intravenous therapy, or adjustments in cabin altitude pressurization.
**Methods:** Fifteen subjects, 11 male and 4 females, were briefed and provided written consent prior to participating in this study. Subjects were members of the 928th Aeromedical Evacuation Squadron, O’Hare IAP, ARS,II. and all maintained current flying class III physical exams. Subjects were instrumented with a commercial oxisensor which was connected to pulse oximeters. SaO2 data were collected prior to take-off, during ascent, at cruise altitude (26,000 ft.) during descent, and after landing. Aircraft cabin altitude pressurization was maintained at approximately 5,000 ft once at cruise altitude.

**Results:** A repeated measures ANOVA revealed a significant main effect for in-flight SaO2. Post-hoc pairwise comparisons (t-tests) indicated that ascent, cruise altitude, and descent phases were significantly greater than during pre-flight baseline differences between pre- and post-flight baseline SaO2 values.

**Conclusions:** Changes in cabin altitude pressurization significantly affect oxygen saturation levels in subjects during aeromedical evacuation. These findings may have implications for health status of patients during air transport.

**PR13**

**English:** ANXIETY LEVELS OF PILOTS DURING PHYSIOLOGICAL TRAINING

**French:** LES NIVEAUX D’ANXIÉTÉ DES PILOTEs DURant L’ENTRAÎNeMENT PHYSIOLOGIQUE

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**Introduction:** Flight personnel of the Turkish Armed Forces receive initial and refresher physiological training in at the Aircrew Health, Research and Training Center after detailed medical examination. Physiological training consists of an academic course, hypoxia training in hypobaric chamber, human centrifuge training in G-lab, spatial disorientation training in Gyro-Lab, night vision training and ejection seat training. The most common causes of failure in these trainings are G-LOC, nausea and vomiting in g-lab or claustrophobia and mask inadaptability in hypobaric chamber. The purpose of the present study was to assess the jet pilot candidates anxiety levels before and after physiological training.

**Methods:** The study consisted of 61 jet pilot applicants who applied for initial physiological training. To analyze the effect of the devices on the anxiety levels, trait anxiety survey was first administered after the academic course. Then, state anxiety survey and visual analogue scale (VAS) was administered before and after the centrifuge and hypoxia training sessions. In addition, arterial tension and pulse measurements were performed before and after the human centrifuge training.

**Results:** Paired samples t-test scores revealed a statistically significant difference between the pre-g-lab state anxiety (M=39.45) and pre-hypobaric state anxiety levels (M=31.57). When compared to pre-hypobaric state anxiety, there was a significant decrease in post-hypobaric state anxiety level (M= 29.75). Furthermore, a significant decrease was found between pre-g-lab VAS (M=42.69) and post-g-lab VAS (M=21.05) and between pre-hypobaric VAS (M=24.08) and post-hypobaric VAS (M=15.77). Applicants who had high pre-g-lab state anxiety score had also higher pre-hypobaric state anxiety score. Also, applicants had higher anxiety before human centrifuge training.

**Conclusions:** Jet pilot applicants felt more anxiety during the centrifuge training because it is a prerequisite to pass the centrifuge training for them in order to become a pilot. However failing rates of hypoxia training were lower than the centrifuge training.
PR14

**English:** A HELICOPTER PILOT WITH MITRAL VALVE POSTERIOR LEAFLET PROLAPSE AS AN EXCEPTIONAL CASE OF MITRAL INSUFFICIENCY - CASE REPORT

**French:** UN PILOTE D’HÉLICOPTÈRE AVEC UN PROLAPSUS DU VOLET POSTÉRIEUR DE LA VALVULE MITRALE COMME UN CAS EXCEPTIONNEL D’INSUFFISANCE MITRALE - UNE HISTOIRE DE CAS

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**Introduction:** We present a pilot, applied to our center for 5-yearly periodic medical examinations, with mitral valve posterior leaflet prolapse and mitral insufficiency.

**Methods:** Our case was 38-year-old male navy helicopter pilot. After obtaining his medical and family history, he underwent physical examination, chest X-ray, electrocardiography (ECG), transthoracic echocardiography (TTE) and biochemical blood testing.

**Results:** Upon cardiac auscultation we detected grade 2/6 late systolic murmur and mid-systolic click over apex. He had sinusal rhythm in his ECG and biochemical blood test results were normal. TTE revealed normal left ventricular dimensions. End-diastolic and end-systolic diameters were 51 mm and 31 mm respectively. Mitral valve posterior leaflet was 12 mm prolapsing during systole into the left atrium and there was an extraordinarily (eccentric) late systolic mitral insufficiency towards the interatrial septum. The TTE showed also a mild hyperechogenicity of the mitral valves. The anterior leaflet was normal and the left atrium diameter was 37 mm. The patient was asymptomatic and his disease was detected for the first time in the 5 yearly medical examination thanks to the routine use of TTE. He had not previously been examined at our center and it was not known whether the systolic murmur had ever been detected before. As the pilot was not operating a high performance aircraft, he was not being recommended for surgery and was scheduled only for 6 monthly follow-up visits due to risk of incapacitation.

**Conclusion:** Mitral valve prolapse is generally characterized by the displacement of the anterior leaflet into the left atrium. Our case had posterior leaflet prolapse which was towards interatrial septum instead of mitral annulus. As a result along with the development of medical technology and progress even though TTE is an indispensable tool in the periodic medical examinations, history of the patient and performing physical examinations should be considered still highly important.

PR15

**English:** THE NEXT STEP: INTEGRATION OF A NORMOBARIC HYPOXICATOR WITH FULL FLIGHT SIMULATOR.

**French:** LA PROCHAINE ÉTAPE : L’INTÉGRATION D’UN GÉNÉRATEUR D’HYPOXIE NORMOBARE À UN SIMULATEUR COMPLET DE VOL’

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**Background:** Validation of normobaric hypoxia training systems developed in USA and Australia demonstrate their usefulness as alternatives to hypobaric chambers. Trainees can sense their individual symptoms and experience how gradually developing hypoxia insidiously affects cognitive function and psychomotor performance. Traditional pen and paper tests or desktop flight simulators are used for the purpose of hypoxia demonstration (ROBD). Purpose-developed fully computerised classroom cognitive and physiological testing hypoxicator systems (GO2Altitude®) are used for multi-person classroom type training. Currently no hypoxicators are system integrated with task specific flight simulators for added realism and training fidelity.
Methods: Analyse and evaluate suitability of currently available technologies for integration with flight simulators for hypoxia detection during a series of pre-programmed flight missions. Identify their strengths, weaknesses and safety aspects. Formulate concepts of integration and synchronisation of the flight simulator software and the hypoxicator.

Results: ROBD utilises an industrial gas mixer of bottled nitrogen and oxygen, the monitoring operator communicates voice instructions and continuously interrogates the trainee about perceived hypoxia symptoms. Parameters of heart rate (HR) and SpO2 can be monitored but are not used for automatic safety cut-off. GO2Altitude® is a purpose designed fully computerised hypoxicator system comprising: onsite automatic generation of medical grade hypoxic air using semi-permeable membrane air-separation technology; Hypoxia is automatically aborted if any critical parameters (SpO2 and HR) are reached. GO2Altitude® “on-demand” version is directly compatible with military oxygen mask and replicates breathing sensations. Because GO2Altitude® is Microsoft based and computer controlled, it is a relatively straight forward task to synchronise it with any flight simulator software including full motion.

Conclusions: Normobaric hypoxicators provide convenient, cost-effective hypoxia awareness training, without hypobaric chamber risks. Education on altitude physiology and individual symptoms is very efficient in a dedicated multi-person class-room system. A merit of in flight mission hypoxia-recognition is in testing and evaluating hypoxia education efficiency. Should both paradigms be combined now?

PR16

English: COMPARATIVE STUDY ON CARDIOVASCULAR RESPONSE TO ORTHOSTATIC STRESS AFTER TWO MODELS OF REPEATED POSTURE CHANGES

French: ÉTUDE COMPARATIVE SUR LA RÉPONSE CARDIOVASCULAIRE AU STRESS ORTHOSTATIQUE APRÈS DEUX MODÈLES DE CHANGEMENTS DE POSTURE RÉPÉTÉE

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Introduction: The purpose of this study was to compare the cardiovascular response differences between two models of repeated posture changes.

Methods: Twelve healthy male volunteers underwent two models of repeated posture changes. Model I consisted of 10 bouts of consecutive head-down and head-up tilt changes. Model II consisted of 10 supine and head-up tilt changes. Each lasted for about 30 min. +75° head-up tilt (HUT) test was carried out before and after repeated posture changes.

Results: During the HUT test after repeated posture changes, DBP and MAP at 1 min of HUT significantly decreased (³DBP = -3.59±0.7 mmHg, ³MBP = -2.58±0.2 mmHg). In Model II, blood pressure did not significantly change. TPR significantly increased and CO significantly decreased, which were almost the same in Model I and II.

Conclusion: The effects of different models of repeated posture changes on human cardiovascular responses were different. It is suggested that we should choose proper models of repeated posture changes in pilot or astronaut selection and training.

PR17

English: THE IMPACT OF PARTNER PSYCHOLOGICAL PRESENCE/ABSENCE ON FUNCTIONING IN EXTREME ENVIRONMENTS

French: L’IMPACT DE LA PRÉSENCE/ABSENCE PSYCHOLOGIQUE DU PARTENAIRE SUR LE FONCTIONNEMENT DANS DES ENVIRONNEMENTS EXTRÊMES

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Introduction: Many individuals working in extreme environments are separated from intimate partners who remain at home. The impact of this separation on the expeditioner’s occupational performance is not well documented outside military populations. Understanding this impact is important in order to maximize occupational performance as well as support the relationship unit. Using Hill’s (1949) concept of psychological presence/absence, the current study aimed to investigate how this phenomenon impacted functioning of Australian expeditioners working in Antarctica.
Method: The study incorporated 282 Australian expeditioners working in Antarctica who had partners remaining at home. Qualitative interviews and quantitative surveys assessing psychological health and well-being were completed on a monthly basis during their deployment.

Results: Expeditioners who demonstrated partner psychological absence reported few non-work related intrusions on motivation, engagement and effectiveness in work-related tasks until two months prior to leaving Antarctica. At this time they expressed concern about reintegrating into the relationship unit and this began to dominate thinking and undermine performance, due to increased psychological distress. In contrast, expeditioners who demonstrated partner psychological presence were more distressed throughout the deployment at issues occurring at home over which they could not exert control. Such individuals reported decreased motivation, engagement, and effectiveness in work-related tasks until two months prior to leaving Antarctica when the impending reunion signalled an end to their sense of powerlessness.

Conclusion: Expeditioners who demonstrate partner psychological absence whilst working in Antarctica are less distressed and more productive than those who demonstrate partner psychological presence, until the last two months of deployment. At this time the roles reverse. Proactive prevention and intervention strategies to address the distress engendered by these strategies are discussed.

PR18

English: LEVEL OF CONCERN OF TRAVELLERS FOR SAFETY AND INFECTIOUS DISEASES WHEN TRAVELLING ABROAD: RESULTS OF THE QUEENSLAND SOCIAL SURVEY

French: NIVEAU DE PRÉOCCUPATION DES VOYAGEURS EN MATIÈRE DE SÉCURITÉ ET DE MALADIES INFECTIEUSES LORSQU’ILS VOYAGENT À L’ÉTRANGER: RÉSULTATS DE L’ENQUÊTE SOCIALE QUEENSLAND

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Introduction: Little is known about the level of concern of travellers concerning personal safety and infectious disease when travelling abroad. This study was designed to investigate these in the Australian context.

Methods: Data were collected by interviews as part of the Queensland Social Survey (QSS) 2011. Specific questions were incorporated regarding travellers’ concerns regarding various safety issues and infectious disease risks abroad.

Results: There were 1,277 respondents (31.9% response rate). The sample was equally divided between males and females (50.0% vs 50.0%). On a five-point rating scale (1 - being not at all concerned to 5 - being extremely concerned), median ratings of travellers’ concern for various issues in personal safety and infectious disease were similar. These included being hurt in an accident (2), caught up in terrorism (3), being a victim of a crime (3), and natural disasters (2) and for concern for contracting infectious disease (3). More than half of travellers (50.3%) had indicated that they had made at least one international trip in the past 3 years.

Conclusion: Travellers expressed more concern for being caught up in terrorism, being a victim of a crime or contracting an infectious disease compared to being hurt in an accident or being involved in a natural disaster.
PR19

English: **ASSESSMENT OF AVIATION TRAINING PROGRESS BASED ON IN-FLIGHT RECORDINGS OF PSYCHOPHYSIOLOGICAL PARAMETERS**

French: **ÉVALUATION DE LA PROGRESSION DE LA FORMATION AÉRONAUTIQUE BASÉE SUR L’ENREGISTREMENT EN VOL DES PARAMÈTRES PSYCHOPHYSIOLOGIQUES**

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**Introduction:** The authors present the current status of their research work on the possibility of assessing the progress of flight training using frequency analysis of the heart rate variability (HRV). Two main indicators reflecting the activity of the autonomic nervous system can be distinguished: power in the low frequency (LF) band, and is specific to the sympathetic division, whereas power in the high frequency (HF) band is specific to the parasympathetic system. Mental effort in the pilot made due to in-flight workload can be estimated using the autonomic balance, i.e. the LF/HF ratio.

**Methods:** The research work was carried out for two years and involved two successive classes of cadets of the Polish Air Force Academy being at the initial stage of their training on PZL-130 Orlik aircraft. In the first year of the study the class comprised 21 cadets, a year after 26 cadets were enrolled. The Ventus recorder, developed at the Military Institute of Aviation Medicine, allowed for recording the ECG signal during flight. HRV analyses were performed using Matlab and Statistica environments.

**Results:** We analyzed four types of flight missions designed to learn the circle-to-land manoeuvre according to the VFR principles: 1) flight with an instructor at an altitude of 200m, 1) flight with an instructor, h=300m, 3) exam, h=200 & 300m, 3) unassisted flight, h=200 & 300m. In most of the analysed cases LF/HF indicator begins to rise before each flight (analyzed time interval: 2 min.), reaches the maximum during the flight (6 min.) and significantly decreases after the flight (2 min.). Moreover, particular mission types evoke different mental effort.

**Conclusion:** The HRV indicators are able to differentiate the pilot’s mental effort before, during and after flight as well as to determine the pilot’s workload while performing various types of air missions. This approach also allows for assessing the progress of flight training and the authors will continue to develop this issue.

PR20

English: **INCIDENTALLY DETECTED ASYMPTOMATIC SEVERE AORTIC VALVE DISEASE ACCOMPANIED BY MILD MITRAL VALVE DISEASE IN A JET PILOTT - CASE REPORT**

French: **DÉCOUVERTE INOPINÉE D’UNE MALADIE SÉVÈRE ASYMPTOMATIQUE DE LA VALVULE AORTIQUE ASSOCIÉE À UNE MALADIE LÉGÈRE DE LA VALVULE MITRALE CHEZ UN PILOTE D’AVION À RÉACTION - UNE HISTOIRE DE CAS**

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**Introduction:** We present a case of an F-16 pilot with asymptomatic severe aortic valve disease accompanied by mild mitral valve disease who applied for 5 yearly periodic medical examination.

**Methods:** Our case was 29-year-old male F-16 pilot. After obtaining his medical and family history, he underwent physical examination, chest X-ray, electrocardiography (ECG), transthoracic echocardiography (TTE) and biochemical blood testing.

**Results:** Cardiac auscultation revealed a grade 3/6 systolic murmur and a grade 2/4 diastolic murmur. He had loss of R wave progression in leads V1-3 along with sinus rhythm and left ventricular strain pattern in his ECG. Biochemical blood test results were within normal limits. TTE revealed enlarged left ventricle dimensions. Left ventricle end-diastolic diameter was 57 mm and end-systolic diameter was 33 mm. Grade 3 severe aortic insufficiency with calcified leaflets, aortic stenosis with a maximum gradient measured as 57 mm, mild poststenotic dilatation of the ascending aorta (41 mm) were also found. Left atrium diameter was 47 mm. He had calcific mild mitral stenosis and the mitral valve area was 2.0 cm². The patient was asymptomatic and his disease was diagnosed incidentally in the 5 yearly aircrew periodic medical examinations for the first time. This was his first visit to our center and it was not known whether he had these findings previously. Due the fact that he is a jet pilot with aortic valve and mitral valve diseases he was grounded because of a risk of incapacitation and was scheduled to undergo surgery with 6 monthly follow-up visits.

**Conclusion:** Although TTE is an indispensable diagnosis tool for aircrew 5 yearly periodic medical examinations, anamnesis and physical examination have still the important value in these examinations.
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<table>
<thead>
<tr>
<th>Exhibitor</th>
<th>Booth No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMST</td>
<td>7</td>
</tr>
<tr>
<td>Aspen Medical</td>
<td>6</td>
</tr>
<tr>
<td>ETC</td>
<td>4</td>
</tr>
<tr>
<td>Go2 Altitude</td>
<td>5</td>
</tr>
<tr>
<td>Human Solutions</td>
<td>2</td>
</tr>
<tr>
<td>International SOS</td>
<td>3</td>
</tr>
<tr>
<td>USAF 711</td>
<td>1</td>
</tr>
</tbody>
</table>
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CONGRESS VENUE: Melbourne Convention Centre, 1 Convention Centre Place, South Wharf
Room 201, Level 2

Please note that this floor plan is not to scale and is subject to change without notice.
ACKNOWLEDGEMENTS

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All panel speakers

All sponsors

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And all others who have contributed in one way or another
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