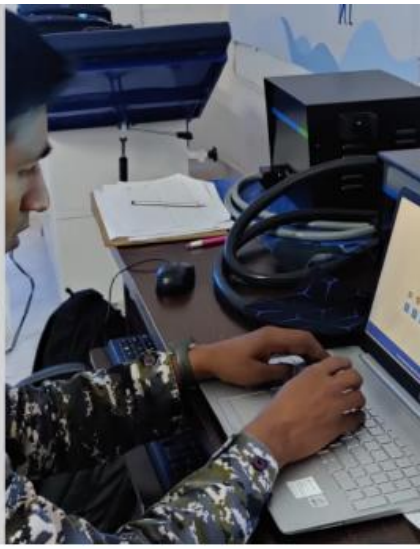
63rd ANNUAL CONFERENCE OF THE INDIAN SOCIETY OF AEROSPACE MEDICINE

05 - 07 DECEMBER 2024

INSTITUTE OF AEROSPACE MEDICINE

BENGALURU












AEROMEDICAL SIMULATORS AND FACILITIES AT IAM

63rd Annual Conference
of
the Indian Society of Aerospace Medicine

at

Institute of Aerospace Medicine

Bangalore, India

05 to 07 December 2024

Institute of Aerospace Medicine
Indian Air Force

A WARM WELCOME TO ALL THE PARTICIPANTS

Conference logo

Designed and conceptualised by

Gp Capt Punyashlok Biswal

Logo Description

This year, the 63rd ISAM Annual Conference honours inter-institutional collaboration with the theme "**सहकार्यम कुर्यन्तु शोधम"** which means **"Collaborate for Research".** Over the past few years, visionary leaders at the Institute of Aerospace Medicine have signed MOUs with national organisations such as ISRO, C-CAMP and ICMR. When Institutions break-down their silos, diverse experiences and expertise inspire fresh approaches, while pooled resources and equipment encourage creativity and innovation.

The conference logo this year also embodies the spirit of innovation and collaboration. It moves away from a traditional circular design, to a bold display of the Indian Society of Aerospace Medicine (ISAM) as the substratum which holds the spirit of collaboration in the form of two meeting hands at its centre. The commitment to **"Collaborate for Research"** is inscribed in Sanskrit, which embodies the foundation that propels us forward and yet connects us to our roots.

MESSAGES

एयर मार्शल एस पी धारकर पवि से मे अवि से मे
सह वायु सेना अध्यक्ष
भारतीय वायु सेना

Air Marshal S P Dharkar PVSM AVSM
Vice Chief of the Air Staff
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वायुसेना मुख्यालय
रफी मार्ग,
नई दिल्ली - 110011
Air Headquarters
Rafi Marg,
New Delhi - 110011

MESSAGE

1. I am immensely happy to be a part of the 63rd Annual Conference of the Indian Society of Aerospace Medicine (ISAM). The theme for the conference this year being 'Collaborate for Research' highlights the need for joining hands across expert agencies to deal with aeromedical challenges encountered in the aerospace domain.

2. The Indian Air Force has a diverse fleet of fighter, helicopter and transport aircraft alongside a slew of weapon systems. The capabilities of these assets can only be optimally utilised if crew remain physically and mentally fit. The issue is of even greater relevance to aircrew given the added challenges of the air domain. The fraternity of Aerospace Medicine, through it's role in aviator selection, training, functioning, sickness prevention, disability management and human performance optimization has provided a strong foundation to keep aircrew fit and operationally capable. The aeromedical consultancy provided by the fraternity in supporting the nation's Human Spaceflight Programme is praiseworthy indeed.

3. I am confident that the conference will provide an excellent platform for discussion and deliberation on aeromedical challenges being faced in the sky and beyond.

4. I wish the conference a great success.

Jai Hind.

(SP Dharkar)
Air Marshal
Vice Chief of the Air Staff

Date: 29 Nov 24

एयर मार्शल नगेश कपूर अ वि से मे वा मे

Air Marshal Nagesh Kapoor AVSM VM

वायु अफसर कमांडिंग-इन-चीफ

Air Officer Commanding-in-Chief

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प्रशिक्षण कमान मुख्यालय, भा वा से
जे सी नगर पोस्ट
बेंगलुरू - ५६०००६

HQ Training Command, IAF
JC Nagar Post
Bengaluru - 560 006

MESSAGE

1. It is an honor to be a part of 63rd Annual Conference of the Indian Society of Aerospace Medicine being organized at the Institute of Aerospace Medicine, Bangalore on 05-07 Dec 24.

2. Aerospace Medicine is uniquely positioned at the forefront of research and innovation. As we expand the frontiers of aviation and human spaceflights, we continue to encounter new challenges. This year's theme 'Collaborate for Research' resonates the need of joining hands to find operational solutions for the demanding and often unforgiving aviation environment, aircrew health, readiness and resilience.

3. It is my sincere belief that this conference will further strengthen our commitment to push boundaries, strengthen our capabilities, and make our skies safer than ever before.

4. I wish the organisers best of luck and the conference, a great success.

Jai Hind!

Air Marshal
Air Officer Commanding-in-Chief

02 Dec 24

एयर मार्शल आर के आनन्द वि से मे
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नई दिल्ली-११० १०६
Air Headquarters (Vayu Bhawan)
Rafi Marg, New Delhi-110 106

MESSAGE

1. I am delighted to learn that the Indian Society of Aerospace Medicine will hold its 63rd Annual Conference on 05-07 Dec 24.

2. Flying is a dynamic activity that requires an aircrew to have an extraordinarily high level of physical conditioning and mental agility. Flight stressors, if not addressed correctly, can have a detrimental effect on the aircrew's performance and jeopardise Aerospace Safety. The sustained efforts of the Aerospace Medicine professionals and the 'Squadron Docs' to keep the aircrew healthy in the flying stations are commendable. Further, the emerging challanges in the field demand effective collaboration from subject experts; hence, an aptly chosen theme for the conference.

3. On this momentous occasion of the Indian Society of Aerospace Medicine, I wish to congratulate everyone who has worked tirelessly to maintain the specialty and attain such patronizing heights.

4. I wish the 63rd Conference of ISAM a grand success.

Jai Hind!

एयर मार्शल राजेश वैद्या वि से मे
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MESSAGE FROM DGMS (AIR)

1. It is a matter of great pride that the Indian Society of Aerospace Medicine is holding its 63rd Annual Conference at IAM, Bangalore from 05-07 Dec 24.

2. This conference holds profound significance as it highlights the importance of collaboration and reaffirms our commitment to resilience, advancement in performance, and excellence that exhibit our dedication in ensuring mission success in a safe and capable aerospace environment.

3. Aerospace Medicine is not merely a discipline; it is the lifeline that ensures the well-being of all our air warriors who venture into the skies and beyond. It is a testament to our unwavering commitment to safeguarding aircrew health, pushing the boundaries of human potential and advancing the frontiers of aerospace operations.

4. This conference, with its theme of 'Collaborate for Research', serves as a beacon of knowledge, bringing together experts, researchers and professionals from diverse backgrounds who share a common purpose; to ensure that aviation safety and aircrew health preservation remain paramount. It is a forum where ideas converge, innovations are born and partnerships are forged in the field of aviation and space.

5. As the President of the Society, I extend a warm welcome to all delegates and veterans in the field of Aerospace Medicine and wish the Conference a resounding success.

Best wishes & Jai Hind!

Place: New Delhi

Date: 29 Nov 24

(Rajesh Vaidya)
Air Mshl
DGMS(Air)

एयर वाईस मार्शल रेणुका कुंटे
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MESSAGE

1. On the occasion of 63rd Conference of Indian Society of Aerospace Medicine, I extend my warm felicitations to all the members of the society. The theme of the Conference this year is 'Collaborate for Research'. It has been planned with a view to strengthen the interactions between the Aerospace Medicine specialists and other professionals involved in the enhancing Aerospace Safety.

2. The latest chapter of Space exploration and human space flight adds a new dimension and challenges unforeseen which will test the caliber of Aerospace Medicine specialists as well as all other stakeholders. It is of paramount importance to collaborate and come up with ideas that steer forward the progress in the field.

3. The Annual ISAM Conference is held not only to highlight accomplishments in this sector, but also to learn about fresh issues in the field of Aerospace Medicine as they emerge. The discussions and interactions at this academic session will enhance and stimulate all of the fraternity's youthful enthusiasts.

4. It is my pleasure, as the Conference's Chief Coordinator, to welcome all attendees and dignitaries to Bangalore. I also extend an invitation to illustrious veterans in the field of Aerospace Medicine to grace the occasion and help make the Conference a big success.

Jai Hind!

Air Vice Marshal
Principal Medical Officer

02 DEC 24

एयर कमोडोर राजेश कुमार
समादेशक
Air Commodore Rajesh Kumar
Commandant

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MESSAGE FROM COMMANDANT IAM

1. It is a proud privilege and an honor for me to serve as the Executive Coordinator for the 63rd Annual Conference of the Indian Society of Aerospace Medicine, which is being held at the Institute of Aerospace Medicine on 05-07 December 24.

2. ISAM provides a unique platform for aerospace medicine specialists, clinicians, human factors experts, engineers from all around the world to come together, exchange ideas, address critical challenges in aviation and space medicine. It offers an invaluable opportunity to engage in profound discussions and collaborative problem-solving, focusing on the evolving needs of aircrew as well as Gaganaut's health and safety.

3. 'Collaborate for Research', a theme that underscores the crucial need for collaboration so as to address the challenges of aviation and space medicine. The emphasis is on efforts to drive progress, develop evidence-based solutions, and pioneer advancements in the realm of aerospace medicine. This fosters a collaborative environment which brings in innovative solutions for the health and safety of aircrew. This conference serves as a forum for exchange of ideas, where shared insight and expertise will drive new perspective in pioneering research.

4. It gives me immense pleasure to welcome all the dignitaries and delegates to Bangalore and to the 63rd ISAM conference. We look forward to your presence and to a conference filled with inspiring discussions, valuable connections and meaningful progress in the field of aerospace medicine.

Jai Hind!

(Rajesh Kumar)
Air Cmde
Commandant

Place: Bengaluru
Date: 30 Nov 24

COMMITTEES

COLLABORATE FOR RESEARCH

63rd ISAM

सहकार्यम कुर्वन्तु शोधम

63rd Annual Conference of the Indian Society of Aerospace Medicine

Conference Advisory Committee

Society President
Air Mshl Rajesh Vaidya VSM, DGMS (Air)

Society Secretary
Gp Capt NK Tripathy

Chief Coordinator
AVM Renuka Kunte VSM

Executive Coordinator
Air Cmde Rajesh Kumar

Conference Organising Committee

Organising Secretary	Gp Capt P Biswal
Asst Organising Secretaries	Wg Cdr BN Vasudev Wg Cdr Avinash BK
Organising Secretariat	Maj Sunil Kumar Sqn Ldr Nikeata Jha Sqn Ldr Ketan Deshpande Dr Harshitha
Scientific Programme Committee	Gp Capt YS Dahiya Dr CHN Sowgandhi Sc-F Sqn Ldr DD Ghosh Sqn Ldr Harshavardhan Sqn Ldr Varun Y Sqn Ldr Gaurav Garg Maj Kishore P

Stage Committee	Sqn Ldr Harshavardhan Sqn Ldr Gaurab Ghosh Sqn Ldr Uday Bansal Surg Lt Cdr Ala Rakesh Sqn Ldr Meghna Sqn Ldr Nikeata Jha Surg Lt Cdr Manish Kharub Dr Ruchika Rana Dr Bhavana
MC	Sqn Ldr Gaurab Ghosh Sqn Ldr Uday Bansal Sqn Ldr Nikeata Jha
Invitation, RSVP, Seating and ushering Reception, Registration & Delegate Kits	Gp Capt MB Suja Wg Cdr KK Singh Wg Cdr Abhisheka S Wg Cdr Santosh TS Lt Col Savina George Surg Lt Cdr Arjun Maj Venkatesh Sqn Ldr Rahul Tiwari Surg Lt Cdr Abhilash PT Dr Gokul Harish
Slide Projection & Photography	Gp Capt Bornali Gogoi Wg Cdr KK Singh Sqn Ldr Uday Bansal Surg Lt Cdr Alla Rakesh 1 yr resident
Poster Presentation	Surg Lt Cdr Karthikeyan S Sqn Ldr Varun Y Sqn Ldr Ganesh S Dev

Folders, Banners, Printing & E-Souvenir	Lt Col Srinivasa Bhattachar Surg Lt Cdr Karthikeyan S Sqn Ldr Gaurav Garg Sqn Ldr Ganesh S Dev
Catering & Banquet	Gp Capt DK Khukhar Wg Cdr Arnabh Ghosh Wg Cdr Santosh TS Sqn Ldr Suyash Mishra Surg Lt Cdr S Karthikeyan Surg Lt Cdr Harsha Ranganath Sqn Ldr Shivaling Maj Y Sai Chandra Dr Shawn
PRO	Dr Biswajit Sinha Sc F
Treasurer	Dr SR Santosh Sc F
Ladies Day Out	Wg Cdr Nidhi Singh Lt Col Savina George Wg Cdr Pallavi Dhanvijay Surg Lt Cdr V Rajesh Reddy Maj Manu Murali Dr Preethi R Dr Sneha Kahalekar Dr Gokul Harish
Transport	Gp Capt Urmila Sahu Gp Capt Bornali Gogoi
Business meetings & SMO's Conference	Wg Cdr Nidhi Singh Sqn Ldr Santosh
TMS Co-ordination	Lt Col Srinivasa AB Lt Col Savina O George
Technical Support	Gp Capt Bornali Gogoi Wg Cdr KK Singh

Administrative Support	Gp Capt MK Chopra Wg Cdr Ankit Jain
Medical Cover	Gp Capt MB Suja Wg Cdr Pallavi Dhanvijay
Facilitation of BAIL	SMO Yelhanka
Officers Mess Support	PMC, Offrs Mess
Beverages	OIC Canteen
Orations	Org Secretariat
Trophies & Awards	Wg Cdr Nidhi Singh Lt Col Srinivasa Bhattachar
CME Credits	Wg Cdr BN Vasudev
ISAM Video	Wg Cdr Sneha Dinakar Sqn Ldr Gaurab Ghosh Sqn Ldr Avishek Sharma Sqn Ldr Uday Bansal Surg Lt Cdr Alla Rakesh

SCIENTIFIC PROGRAMME

63rd ISAM

COLLABORATE FOR RESEARCH

सहकार्यम कुर्वन्तु शोधम

Day 1 (05 Dec 24, Thursday)

0800 h Onwards – Registration of Delegates

0845 h: All Delegates to be seated

Inaugural Session (AVM Srinagesh Auditorium): 0900 h onwards

0900 h : Arrival of the Chief Guest at Srinagesh Auditorium, IAM
0901 – 0905 h: Audio-visual presentation on 63rd Annual Conference of ISAM
0906 – 0912 h: Welcome address by Commandant, IAM
0913 – 0925 h: Presidential Address by DGMS (Air)
0926 – 0938 h: Inaugural Address by VCAS
0939 – 1000 h: Award Ceremony, Release of IJASM & TMS, Exchange of Mementoes & Release of Book 'White Coats Blue Skies'

Air Marshal Subroto Mukerjee Memorial Oration (1000 – 1100 h)

Orator: Dr VR Lalithambika, Professor of Practice, IIT Madras. Distinguished Scientist, Former Director DHSP, ISRO

Topic: **"The Next Giant Leap: My Reflections on India's Human Spaceflight Programme"**

Chairperson: **Air Mshl Rajesh Vaidya VSM, DGMS (Air)**

High Tea at "The Court": 1100 – 1145 h

Srinagesh Auditorium	Engineer Auditorium
Scientific Session 1: Military Medicine: From the Flight Clinics (1145 – 1300 h) Chairpersons: **Air Mshl MS Sridhar, Surg Capt PD Ayengar** • Vascular Injury in An Aircrew: Aeromedical Decision Making for Reflighting - *Gp Capt Ranjan Sarkar* • Prevalence of Tolerance to Coriolis Stimulus at 25 RPM Among Non-Airsick Flight Cadets - *Wg Cdr Ajay Kumar* • Is 24-Hour Ambulatory BP monitoring (ABPM) Useful Tool for Screening of Latent Hypertension Among Obese Air Warriors? *Gp Capt NK Tripathy* • A Retrospective Analysis of Motion Sickness Desensitization Therapy at Institute of Aerospace Medicine and Way Forward. *Surg Lt Cdr Karthikeyan* • Acute Pain Management in Aircraft Accident: Roadmap to New Approach and Modalities. Wg Cdr Ashu Chandra	**Scientific Session 2: Residents in Aerospace Medicine (RAM Session-1) (1145 – 1300 h)** Chairpersons: **Gp Capt DK Khukhar, Gp Capt Stuti Mishra** • Aeromedical Decision Making in Case of Lead Splatter Injury Following Ejection - *Dr Bhavana KJ* • Fitness For Commercial Airlines Flying in a Resolved Case of Non-Hodgkin's Lymphoma: Aeromedical Risk Assessment & Disposal - *Maj Jeya Karthik* • A Rare Case of 'Congenital Anomaly of Kidney and Urinary Tract' in an Aviator: An Approach to Aeromedical Disposition – A Case Report - *Surg Lt Cdr Harsha MR* • Aeromedical Decision Making in Cases of Thumb Amputation. *Dr Harshitha TA* • 'Hypertension in Young' In Military Aircrew: A Case Series with Aeromedical Deliberations - *Sqn Ldr Gaurav Garg*
Scientific Session 3: Fit to Fly : Evaluating Pilot Fitness for Aviation Safety (1300-1400 h) Chairpersons: **Lt Gen Sandeep Thareja SM VSM**, Gp Capt SS Mohapatra** • Hb Electrophoresis for Screening of Haemoglobinopathies in Military Aircrew at IAM IAF - *Sqn Ldr A Upadhyay* • Post LASIK Criteria Dilemma: Mydriatic Eye Drops & Corneal Thickness Changes in Aspirational Candidates. *Wg Cdr Atul Kumar Singh* • Study of Ocular Axial Parameters with Height Among Emmetropic Candidates for Medical Evaluation. *Wg Cdr Sridhara Reddy* • Lifestyle Diseases in Aircrew Post Initial Non-Related Medical Evaluations at Boarding Centre: Retrospective Analysis - *Wg Cdr Snehangsh*	**Scientific Session 4: Civil Aviation Symposium – Safety in the Skies (1300 – 1400 h)** Chairpersons: **Air Cmde Vipin Sharma, Gp Capt YS Dahiya** • "Mental health evaluation – an AME's perspective". Dr Punita Masrani • Indian Perspective on Pilot Peer Support Group & Safety Initiatives in Airline Ops - Col (Dr) Rohit R Kochhar (Retd) • Innovations In Medical Management of Inflight Medical Emergencies – Col (Dr) S Sodhi (Retd) • Setting Up Benchmark Process and Procedure in Safety Regulation: Challenges and Considerations of Reinstating a Commercial Trainee Pilot After Cannabis Use - Dr Archana
Lunch (1400-1500 h) at 'The Court'	
Scientific Session 5: Operational Aerospace Medicine: Where Medicine meets Aviation (1500-1600 h) Chairpersons: **Maj Gen VV Joshi VSM, Gp Capt MPS Marwaha** • Preliminary Assessment for Aviation Personnel to Understand Fatigue Onset through Neuropsychological Assessment & Biomedical Signal Analysis. *Dr Viren Sardana* • Continuous Wakefulness Study to Identify Potential Biomarkers of Sleep Deprivation. *Dr Santhosh SR* • *Military Aircraft Accident Investigation: A Case of Wet Drowning. Wg Cdr KK Singh* • Overall" Modification. *Lt Col Urmimala B*	**Scientific Session 6: Physiology: Back to Basics(1500-1600 h)** Chairpersons: **Air Cmde P Ghana VSM, Gp Capt MS Nataraja** • Physiological Parameters as Markers of Acute Stress during Simulator Flying- Application to Improve Flying Training. *Lt Col Srinivasa B* • A Comparative Study of Postural Stability between Healthy Aircrew & Groundcrew Using CDP. *Wg Cdr YS Thakur* • Hypoxia Hangover Following Exposure to Simulated Hypobaric Hypoxia. *Wg Cdr Deepan Rai* • Determinants of Vit D Levels in Healthy Aircrew at a Medical Evaluation Centre. *Wg Cdr Neha Gupta*

Conference Dinner at 'Sterling Mac Hotel' (1930 h onwards)

Day 2 (06 Dec 24, Friday)

Srinagesh Auditorium

Scientific Session 7: Mind in the Cockpit: A Critical Component of Aviation Safety (0830-0930 h)

Chairpersons: **AVM Kaushik Chatterjee, Dr CHN Sowgandhi**

- Trait Anxiety: Neural Correlates and Possible Implications in Aviation. *Shilpi Modi*
- Echoing Personality Through Paralanguage: An Exploratory Study. *Sibin Raj K*
- A Novel Approach to Air Sickness Desensitisation for Cases of Intractable Air Sickness - *Wg Cdr Ajay Kumar*
- *A Case of Autism Spectrum Disorder (ASD) on Hyperbaric Oxygen Therapy (HBOT) Treatment. Wg Cdr Santosh TS*

Engineer Auditorium

Scientific Session 8: Residents in Aerospace Medicine (RAM Session-2) (0830-0930 h)

Chairpersons: **Gp Capt M Dahiya, Gp Capt S Gambhir**

- Effectiveness of AI Based Language Model-Chat Gpt 4.O in Aeromedical Vis-À-Vis Clinical Decision-Making. Dr Gokul Harish
- Effectiveness of AI Based Large Language Model-Chat Gpt 4.O in Clinical Decision Making Compared to Older Model Chat Gpt 3.5. Dr Sneha Kahalekar
- Analysis of MRI Findings in Post Ejection Cases: A Retrospective Study. Sqn Ldr Uday Bansal
- Poly-trauma in Military Aircrew Aeromedical Decision Making During Reflighting. Sqn Ldr Varun Yenuga

Tea (0930 -1000 h) at 'The Court'

AVM MM Srinagesh Memorial Oration (1000 – 1100 h)

"Effective Healthcare Strategies for Low Resource Settings: Insights Gained from My IAF Journey"
by Wg Cdr (Dr) Kartik Kalyanram (Retd), Chief Co-Ordinator, Rishi Valley Rural Health Centre

Chairperson: **Air Mshl (Dr) CK Ranjan AVSM VSM (Retd)**

JHF Manekshaw Panel (1100 – 1200 h)

- **"Behavioural Forensic Clues: Way Forward to Connect the Dots" by Dr SL Vaya, Professor (Forensic Psychology), RRU**
- **"Collaboration in Human Space Research" by Dr Hanamantray Baluragi, Director, DHSP, ISRO**

Chairpersons: **AVM Anupam Agarwal VSM ACAS (Med), Air Cmde Rajesh Kumar**

Scientific Session 9: Anthropometry: Science behind Crew Cockpit Compatibility (1200-1300 h)

Chairpersons: **Surg RAdm Vivek Hande, Gp Capt NK Tripathy**

- Standardisation of Measurement Protocol in 3D-Laser Whole Body Scanner for Anthropometric Parameters. *Lt Col B Sekhar*
- Comparative Analysis of Critical Anthropometric Parameters from Anthropometric Data of 10 Years (2015-24). *Wg Cdr Vasudev BN*
- Changes in Anthropometric Parameters Causing Rejection of Aircrew to Fly Trainer Aircraft. *Surg Cdr Arjun Anchan*
- The Functional Role of Individual Fingers in Hand Grip: Analysis and Its Aeromedical Implications - Lt Col Srihari Iyer

Scientific Session 10: Understanding Hypoxia & Hypobaria (1200-1300 h)

Chairpersons: **Brig Amit Khurana, Gp Capt R Sarkar**

- Decompression Chamber Test for Aircrew: Need for Customised Standardisation. *Gp Capt DK Khukhar*
- Physiological Changes & Effect of Intermittent Normobaric Hypoxia Exposure on Acclimation to High Altitude. *Sqn Ldr G Harshavardhan*
- Accelerated Altitude Acclimatization and Hypobaric Hypoxia: A Proof-Of-Concept Study from Rats To Humans. *Dr Yasmin Ahmad*
- Nine Step Tympanometry: Screening Tool for Eustachian Tube Dysfunctions. *Flt Lt Neha Rao*

Lunch (1300 -1345h) at 'The Court'

Scientific Session 11: Space: New Horizons & Quest for New Solutions (1345 – 1445 h)

Chairpersons: **Maj Gen Dharmesh, Gp Capt P Biswal**

- Roadmap for IAM Spaceflight Aeromedical Certification Standards & Comparison with Existing Global Practices. *Sqn Ldr G Ghosh*
- Astronaut Health Stabilization Programme: Roadmap for Gaganyaan Mission. *Wg Cdr P Sannigrahi*
- Dynamics of Carotid Arterial Blood Flow During Simulated Microgravity and Lunar Gravity. *Sqn Ldr Saurav Gain*
- Isokinetic Muscle Strength Changes of Knee After 24 Hrs Simulated Microgravity & Efficacy of Exercise Protocol. *Lt Col Savina O George*

Scientific Session 12: G-Tolerance: Aeromedical Stressors Understanding the Core Issues (1345–1445 h)

Chairpersons: **Col KK Sharma, Gp Capt Murtaza**

- Effect of Anti-Hypertensives on Baroreflex Sensitivity & Relaxed +Gz Tolerance. *Wg Cdr B Bhowmick*
- High G Training Program with 'Push-Pull' Elements: A Review of IAF Experience. *Wg Cdr Avinash BK*
- Centrifuge Evaluation of Cases of Suspected Low G-Tolerance (2008-24): An IAM Experience. *Maj Sunil*
- Operational Centrifuge Training of Fighter Aircrew: Two Cases of G Measles. *Dr Shawn James*

Day 2 (06 Dec 24, Friday)

Srinagesh Auditorium	Engineer Auditorium
Scientific Session 13: Free Papers (1445-1545 h) Chairpersons: **AVM Avinash Das, Col S Bhardwaj** • Perception of Oral Health and Related Quality of Life Assessment. *Col SK Kaushik* • Adjunctive use of HBOT in Non-Healing wounds – A South Indian Experience. *Dr Ajith Kumar S* • Vestibular Schwannoma and Aviation Safety: Guidelines for Pilot with Fitness to Fly. *Wg Cdr Jagadeeswaran VU* • Comparative Efficacy of Three Types of Alcohol Breath Analyser Machines. *Wg Cdr Parul Goel*	**Scientific Session 14: Closed Door Session: Human Factors in Aviation (1445-1545 h)** Chairpersons: **AVM SGS Datta, Surg Capt DK Kagti** • Aerospace Safety Review & Projects underway to enhance Safety. Gp Capt Asheesh Sharma • Assessment of Sleep & Fatigue among Aircrew & Groundcrew During Sustained Operations. *Gp Capt MS Nataraja* • Fighter Aircraft Accident: HFACS-90 - Lessons to Learn. *Gp Capt Murtaza* • *Ejection Spinal Injury Pattern Analysis: An Evidence Based Explication . Sqn Ldr Devdeep Ghosh*

Tea: 1545-1615 h

ISAM General Body Meeting (1615 h) (Srinagesh Auditorium)

ISAM Fellows' Night (Fellows only) at Vayu Vihar Officers' Mess, Challaghatta (1915 h onwards)

Day 3: 07 Dec 24 (Saturday)

Srinagesh Auditorium	Engineer Auditorium
SMOs' Conference (on AFNET platform): (0915 – 1100 h)	**DGCA's Workshop for Medical Examiners (0830 - 1500 h)**
Tea: 1100 – 1130 h	
Scientific Session: Final Words: Partnership for Progress (1130 – 1230 h) Chairpersons: **AVM Renuka Kunte, Air Cmde Mukul Bhatia** • Collaborative Research: Nuts and Bolts. *AVM S Shankar* • Innovations for Defence Excellence (iDEX)– *Ms Kriti Taneja (Recorded talk)*	**Inaugural & Keynote Address (0830 – 0945 h)** **Tea & Group Photography (0945 – 1015 h)** **Session I (1015 – 1200 h)**
Workshop on PALSS (1230 – 1400 h) at 'The Lounge' & Ante-room	**Lunch at 'The Court' (1200-1300 h)** **Session II (1300 – 1400 h)**
Lunch at 'The Court' (1400 h onwards)	**Session III (1400 – 1500 h)**

Poster Sessions (Ante-room)

Session 1 (05 Dec 24, 1300 – 1400 h) • Aeromedical Challenges in Flying Exercises Overseas. *Wg Cdr Sneha Dinakar* • Heat Stress in Low-Level High-Speed Flying & Pre Take-off Phase in Modern Fighter Aircraft & Trainer Aircraft: Is 'FITS' The Right Guide? *Gp Capt P Goswami* • Aeromedical Concerns: Dry Eye Disease and Prolonged Flight Hours in Civil Pilots. *Wg Cdr Atul Kumar Singh* • Disinfection & Disinsection of IAF Aircraft: The Need of an SOP. *Sqn Ldr Mohin M Sakre* • Functional Outcome of USG Guided Single Injection of Platelet Rich Plasma v/s Corticosteroid in Treatment of Supraspinatus Tendinosis or Partial Supraspinatus Tear. *Sqn Ldr Mainak Chandra Das* • *Aftermath of Introduction of Drug Testing Policy in Civil Aviation: A Case Report. Surg Lt Cdr B Vinod* • Aeromedical to Clinical Perspectives: Is LCMS An Enigma? *Wg Cdr Ashwini Kumar* • Evaluation of NVG Fitted with Indigenised Image Intensifier Tube. *Wg Cdr P Sannigrahi*	**Session 2 (05 Dec 24, 1500 – 1600 h)** • Aero-toxic Syndrome among Aircrew in Fighter Stream. *Sqn Ldr Mayuri Verma* • Effect of Lifestyle Factors & Genetic Predisposition on Development of HASH. *Sqn Ldr Devdeep Ghosh* • Role of Gynaecologists in Combat Medical Care. *Gp Capt Shahla Yazdani* • Use of Mefloquine for Aircrew: Evaluation of Efficacy & Safety Compared to Alternative Therapies. *Wg Cdr V Raghunandan* • Unexplained Cerebellar Stroke in a Young Aviator: Clinical Presentation & Aeromedical Implications. *Wg Cdr Snehangsh* • *Aeromedical Decision Making in a Case of Asymptomatic Myocardial Bridge: Stressors, Challenges and Approach. Lt Col Manu N* • Correlates of Aircrew Selection Parameters Using Laser 3D Scanner Compared to Manual Anthropometric Limits. Sabyasachi Nayak
Session 3 (06 Dec 24, 0830 - 0930 h) • How Benign is 'Benign Essential Tremors'. Lt Col Urmimala • Optimizing Aeromedical Disposal for Hypertension in Fighter Aircrew. Sqn Ldr Krishnaveni • Aeromedical Decision Making in a case with Tibial Varus after Repeated Stress Fractures. Sqn Ldr Shivalinga • Compressive Visual Field Defect: A Rare Case of Cavernoma in an Aircrew. Sqn Ldr Rahul Dev • Effectiveness of Smartphone Otoscope in Management of Ear Ailments at Primary Healthcare Level. Wg Cdr Shikha Gianchand • Arthropod Vector Surveillance Using UAV Technology: Pilot Project in Desert Terrain. Sqn Ldr VS Srikanth • Lessons Learnt During a Pan India Exercise: Through The Eyes of an Young Medical Officer. Flt Lt Meera Dandge	**Session 4 (06 Dec 24, 1200 – 1300 h)** • Need For Detailed Medical Policy for Crew of Remotely Piloted Aircraft System. Lt Col TS Rana • Aeromedical Deliberations in Refighting an Aircrew with Recurrent Shoulder Dislocation. *Flt Lt Saurav Chauhan* • Cruising to Success: Leveraging Body Composition Analysis for Aspiring Airmen. *Dr Ketan Pakhale* • Analytical Cross-Sectional Study of UV Radiation-Related Eye Issues. *Flt Lt Aman Arya* • Altitude DCS: A Systematic Review. *Dr Syed Lateef* • Visionary Warriors: Enhancing Career Opportunities through Early Ophthalmological Evaluation. *Sqn Ldr Robin Malik* • Impact Of Covid-19 Pandemic on Morbidity Pattern of Communicable Diseases. Sqn Ldr Avinash Kr Ray

ORATIONS

Air Marshal Subroto Mukerjee Memorial Oration

Air Marshal Subroto Mukerjee, OBE

Air Marshal Subroto Mukerjee OBE (05 Mar 1911- 08 Nov 1960) lived a life of determination, dedication and total commitment to the cause of the service that he guided from its inception until its transformation into the Air Arm of independent India. In the early 1930's, when the British government in India could no longer ignore the growing demands of the Indian people for greater representation in the higher ranks of the defence services, it grudgingly began the process of 'Indianisation' of the services. As a result, the Indian Air Force (IAF) came into being on 08 October 1932.

While the older services were marked for partial Indianisation, the IAF became the first truly Indian service, as only Indians could be granted commission or enrolled in its ranks. In those early days, a career in the Air Force was an uncharted path for Indians, made all the more difficult by the prevailing discriminatory and obstructive mindset of the majority of the British in India who were extremely skeptical of the ability of the 'natives' to fly military aeroplanes. Air Marshal Subroto Mukerjee was one of the six Indians selected for training as pilots at the RAF College, Cranwell. The date of commission of this small pioneering band coincided with the date of formation of the Indian Air Force. In July 1938, he was put in command of 'B' Flight of the No.1 IAF Squadron in the rank of Flying Officer. He became the first Indian Officer to command a Squadron when he took over No.1 on 16 March 1939. After converting to the Hawker Hart, the Squadron moved to Miranshah in the North West Frontier Province (NWFP). It was here that he led the Squadron into action against the tribals of the NWFP. When the war broke out in the East, Mukerjee was at the Air HQ as a Wing Commander. He served in various staff assignments during the war and for his services, during World War-II, Mukerjee was given the Order of the British Empire (OBE) in 1944. At the time of Independence, Mukerjee was the senior most Air Commodore serving with the IAF. On 15 August 1947, when India achieved Independence, the Armed Forces too became independent forces. They were no longer under the British Army or the King.

However, as there was a lack of senior officers, it was decided to put serving British Officers as Commanders. Accordingly, Air Marshal Sir Thomas Elmhirst became the Air Force Chief. Air Commodore Mukerjee was promoted to Air Vice Marshal and posted as the Deputy Chief of the Air Staff at Air HQ. He served as the Vice Chief for over 6½ years. Working under three different British Chiefs helped him groom himself for the top post. On 01 April 1954, he took over from Air Marshal Gerald Gibbs as the Chief of the Air Staff of the Indian Air Force. At that time, he was just about 43 years old. Upon him fell the task of re-equipping and restructuring the Air Force with newer aircraft & equipment. Under his tenure, the Air Force inducted a variety of state-of-the-art aircraft. The Dassault Mystere, the Hawker Hunter, the BAe Canberra and even the Folland Gnat was inducted during his tenure. Over the next few years, he was to lead the fledgling service through its trials and tribulations, taking it from strength to strength, till it was ready to take its place amongst the leading Air Forces of the world. Mukerjee took care to see that even the personnel and human resources planning, and development received much attention. His task was commendable for he had to deal with the post-independence non-violence driven defence policy.

Tragically, Air Marshal Subroto Mukerjee's brilliant career was cut short in its prime in 1960 at the age of 49. Yet, his legacy lives on, and forms the cornerstone of the hallowed traditions of the service whose very foundations he laid, and whose edifice he built in the early years of its history.

Air Marshal Subroto Mukerjee not only laid the foundation of our Air Force but also the Medical Services of IAF. It is largely due to his unfailing interest and foresight that a well-established medical service, to cater to the needs of the Air Force was formed. The well-known Institute of Aerospace Medicine, which is the first of its kind in Asia, owes its existence mainly due to his patronage and support.

The Aeromedical Society of India (now Indian Society of Aerospace Medicine) was formed in 1952. Air Marshal Subroto Mukerjee was its first patron and remained so till his untimely demise in 1960. He took keen personal interest in the affairs of the Society and was the main pillar of support in its formative years.

As a gesture of the Society's gratitude and appreciation, in 1971, the Aeromedical Society of India instituted an oration in his name to be delivered during the inaugural function of the annual meeting of the Society. A medal is also presented to the eminent personality who delivers the oration.

Air Marshal Subroto Mukerjee Memorial Orations

1972-2024

Sl No	Year	Orator	Topic
1.	1972	Mai Gen Inder Singh	Rehabilitation of Cases of Ischemic Heart Disease in The Armed Forces
2.	1973	Dr Rustom Jal Vakil	Electro-Cardiographic Abnormalities in Normal and Apparently Normal Individuals
3.	1974	Gp Capt Peter Howard	Current Research in Aviation Medicine In The Royal Airforce
4.	1975	AVM MM Srinagesh	The Values of Aviation Medicine In The Changing World
5.	1976	Dr PN Chuttani	Alcohol: The First Drug of Addiction
6.	1977	Lt Gen RS Hoon (Retd)	Incidence of Cardiovascular Problems Among Flying Personnel and Their Evaluation
7.	1978	Dr Raja Rammanna	Aviation and Radiation Hazards
8.	1981	Dr MMS Ahuja	The Art and Science of Adaptation
9.	1986	Dr Madan Mohan	Recent Advances in Ophthalmology and The Development World
10.	1989	Dr MR Girinath	Role of Coronary Bypass in The Treatment of Ischaemic Heart Diseases.
11.	1990	Padmashri Dr S Kameshwaran	Vertigo: Recent Advances
12.	1992	Dr MS Devanandan	Peripheral Organization of Movements of The Hand
13.	1995	Dr CA Varghese	Perspectives of Aeromedical Research
14.	1996	Air Mshl MS Boparai AVSM (Retd)	Horizons of Visual Performance and Aviation
15.	1997	Dr Kenneth N Ackles	Ultimate Air Combat Protection of Pilot

Sl No	Year	Orator	Topic
16.	1998	Dr SK Sikka	On Indian Explosions 11-13, 1998
17.	1999	Padmashri Dr Naresh Trehan	New Frontiers in The Management of Cardiac and Cardiovascular Disorders
18.	2000	Dr K Kasturirangan	Space Medicine and Exobiology: Emerging Scenario
19.	2002	Padma Bhushan Dr VK Atre	Aeronautics Technologies – Present and Future1
20.	2002	Prof DouglaWeigmann	A Human Factors: Accident Analysis andPrevention
21.	2003	Dr Ulf L Baldin	How Important Is Scientific Research and Testing of Life Support Equipment for High Performance Aircraft?
22.	2004	Mr. MB Varma	Ergonomic Design of Cockpit of An Advanced Combat Aircraft
23.	2005	Dr Devi Shetty	Converting Atom into Bytes
24.	2006	Shri G Madhavan Nair	Indian Space Programme
25.	2007	Capt GR Gopinath	Integrating Civil Aviation and India's Economic Growth: A Vision andPerspective
26.	2008	Dr K Radhakrishnan	Human Presence in Solar System Director, VSSC
27.	2009	Dr SNA Zaidi	Challenges &Opportunities in Civil Aviation Sector
28.	2010	Wg Cdr Rakesh Sharma AC (Retd)	Space Exploration: Where Do We Go from Here?
29.	2011	Dr AK Gupta	Role of Interventional Radiology in Present Day Medicine
30.	2012	Bharath Ratna Dr APJ Abdul Kalam	Aerospace System: A Possible Profile
31.	2013	Dr AK Chaturvedi	Aerospace Toxicology: An Emerging Multidisciplinary Field of Medical Sciences
32.	2014	Dr Prabhat Kumar, IAS, DGCA	How to Keep Indian Skies Safe

Sl No	Year	Orator	Topic
33.	2015	Ms Shika Sharma MD & CEO Axis Bank	Beyond Glass Ceilings: Challenges and Opportunities for Women In 21st Century
34.	2016	Sr Soumya Swaminathan	The Relevance of Making Data Relevant Translational Research in Medicine
35.	2017	Air Cmde Harish Malik (Retd)	Civil Aerospace Medicine in India
36.	2018	Air Mshl NB Amaresh VSM(Retd)	The Pilot Physician – What Has Been and What Can Be!
37	2019	Prof K Vijay Raghavan	The Role of Science & Technology - From India – Forthe Future of Our planet
38	2020	Dr Scott Shappell	Developing Novel Intervention Strategies Using Human Factors Intervention Matrix (HFIX)
39	2021	Dr Quay Snyder	Pilot Physician's Evolution to Human Intervention Motivational Study (HIMS)
40	2022	Dr Gary Kay	Analysis and Evaluation of the Cognitive Demands of Flying
41	2023	Padmashri Dr Syed Mujtaba Hussain Kirmani	Playing International Sports for Two Decades – What it takes!
42	2024	Dr. VR Lalithaambika	The Next Giant Leap: My Reflections on India's Human Spaceflight Programme

AIR MSHL SUBROTO MUKERJEE MEMORIAL ORATION

BIODATA OF THE SPEAKER

Dr. VR Lalithaambika

Dr. VR Lalithaambika is a distinguished aerospace engineer and a trailblazer in Indian space exploration. Currently a Professor of Practice in Aerospace Engineering at IIT Madras, she brings decades of experience and expertise to academia. She joined the Indian Space Research Organisation (ISRO) in 1988 after completing her B.Tech in Electrical Engineering and M.Tech in Control Systems, earning a Ph.D. during her illustrious career at ISRO.

In her tenure spanning over three decades, Dr. Lalithaambika contributed significantly to India's space program, culminating in her role as the first Director of the Directorate of Human Space Programme, where she defined the strategic direction for Indian human spaceflight. Her visionary leadership was instrumental in shaping the Gaganyaan Mission, India's ambitious endeavor in human space exploration.

Previously, as the Deputy Director of Vikram Sarabhai Space Centre, she spearheaded guidance and control design, mission analysis, and simulation for ISRO's flagship projects, including PSLV, GSLV, LVM3, and the RLV-TD, India's first winged re-entry vehicle.

Her stellar contributions have earned her numerous accolades, including Knight in the National order of the Legion of Honour (Chevalier de l'Ordre National de la Legion d'Honneur) from the French Republic in 2023, INAE Woman Engineer of the Year 2020, ISRO performance excellence award 2013, ISRO merit award 2010 and Astronautical Society of India Space Gold Medal

2001. A passionate advocate for innovation and excellence, Dr. Lalithaambika continues to inspire generations with her remarkable journey in advancing India’s aerospace capabilities.

ABSTRACT

The Next Giant Leap: My Reflections on India's Human Spaceflight Programme

As India is poised to enter the elite group of nations with human spaceflight capability, the indigenous technological capabilities which have been developed over the years in the field of launch vehicle technology, mission design, re entry and recovery etc, are outlined first, drawing upon the speaker's three decades of experience in the field. These capabilities have made the nation and ISRO ready to undertake the demonstration of human spaceflight capability through the Gaganyaan programme. The next part of the oration touches upon the key features of this national programme, its human centric nature and the roles of the national players other than ISRO, including the Armed Forces, the national academic and research institutions, and Indian industry, with special reference to the key role played by the Indian Air Force and especially the Institute of Aerospace Medicine.

Once the challenges posed by this first phase of Indian human space flight are successfully overcome, the nation will be well equipped to take on extended duration missions in low Earth orbit, followed by exploratory missions beyond the vicinity of our planet. Several technological and human related capabilities need to be built up within the country to enable long duration human spaceflight. A few of these are : heavy lift launch vehicles , a low weight, high strength space module with sufficient habitable volume, technologies for rendezvous and docking, space situational awareness, protection from radiation and space debris, regenerative life support systems, ability to inspect and repair the exterior of the habitable module through EVAs and robotic means , maintenance of crew health and efficiency through appropriate diet and exercise, efficient communication systems for flight beyond LEO, space agriculture etc to name a few. The talk further addresses the challenges of long duration spaceflight and the enabling national capabilities that need to be built up to successfully tackle these challenges.

Air Vice Marshal MM Srinagesh Memorial Oration

Air Vice Marshal MM Srinagesh

Air Vice Marshal MM Srinagesh PVSM AVSM VSM was born on 02 Oct 1912. As a young Lieutenant, Madhukar Mallanah Srinagesh was among the first Medical Officers of the IAF who volunteered to join the IAF Medical Service in 1940while serving in the Indian Medical Service (IMS). He was the first Medical Officer to be posted as Deputy Principal Medical Officer (DPMO) IAF with the creation of this post on the RAF PMO's staff at Air HQ. He was promoted to the rank of Squadron Leader, to fill this appointment, in 1943. Subsequently, in 1945, Sqn Ldr MM Srinagesh was promoted to the rank of Wing Commander to fill the same appointment. On 15Aug 1947, he was appointed PMO Air HQ in the rank of Gp Capt and he later became DMS (Air) with the same rank. He retired from IAF at the rank of Air Vice Marshal on 10 Sep 1971.

Trained in Aviation Medicine in USA, AVM MM Srinagesh was keen practitioner of the then fledgling specialty of Aerospace Medicine. He contributed enormously to the progress and advancement of this area of expertise in India. The fruits of his labour are being reaped even by the present generation of Aviation Medicine specialists. He was truly the father of Aviation Medicine in India.

As a gesture of our thankfulness and gratitude, the Indian Society of Aerospace Medicine (ISAM) instituted an Oration in his name in 2007. The Oration is delivered during the Annual Conference of the ISAM. A memento is also presented to the eminent personality who delivers this oration.

Air Vice Marshal MM Srinagesh Memorial Orations

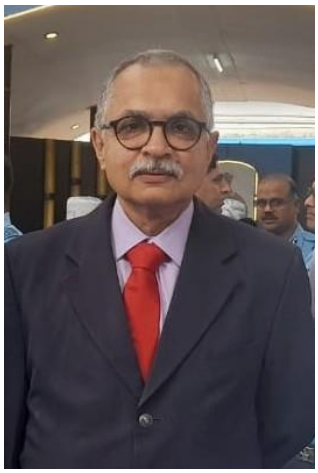
2007-2024

Sl no.	Year	Orator	Topic
1.	2007	Dr CA Vargheese	50 Years of Aeromedical R&D in India: A Ring Side View
2.	2008	Mr M Madhavan Nambiyar	Civil Aviation In India In 2020
3.	2009	Dr Ashok Seth	Coronary Intervention – Is the Interventionalist a Threat to The Cardiac Surgeon
4.	2010	Dr PD Navathe (Retd)	From Srinagesh To Srinagesh: The Journey from Operation Aviation Medicine to Clinical Aviation Medicine
5.	2011	Dr Jeffery R Davis	An Earthling to An Astronaut: Medical Challenges
6.	2012	Prof Stephen DR Harridge	Skeletal Muscle in Aviation Medicine
7.	2013	Dr Manas K Mandal	The Cognitive Science of Uncertain and Unknown Environment
8.	2014	Dr Jarnail Singh	Fatigue Risk Management in Airlines Operations
9.	2015	AVM G Gomez VSM (Retd)	“The Earthlings Are Coming” Mission Mars Challenges
10.	2017	AVM P Kharbanda VSM (Retd)	Stress and Fatigue In Aviation
11	2018	AVM Pankaj Tyagi VSM (Retd)	Indian Space Program: Past, Present, Future
12	2019	AVM JS Kulkarni (Retd)	Aeromedical Research in India: Past, Present and Future
13	2020	Wg Cdr SN Sharma (Retd)	Coronary Artery Disease: Pathophysiology & its Therapeutic implications
14	2021	Steve Roberts	Head & Neck Protection – the Evolving Science

15	2022	Dr James Vanderploeg	Private Human Space Flight: Opening Space for All
16	2023	Patient Safety: Drawing Lessons from Aviation Safety	Air Marshal Pawan Kapoor, AVSM VSM and BAR (Retd)
17	2024	Effective Healthcare Strategies For Low Resource Settings Learnings From IAF	Wg (Dr) Kartik Kalyanram (Retd)

Air Vice Marshal MM Srinagesh Oration: Speaker

BIO-DATA OF THE SPEAKER



Wg (Dr) Kartik Kalyanram (Retd)

Dr. Kartik Kalyanram is a distinguished physician and public health leader with an illustrious career spanning over four decades. He graduated from prestigious Armed Forces Medical College in 1982. He did postgraduation in Aviation Medicine from prestigious Institute of Aerospace Medicine, Bengaluru, in 1989 and awarded with gold medal for standing first. He further underwent Advanced Aerospace Medicine training at U.S. Air Force School of Aerospace Medicine in 1990. His academic journey reflects a commitment to excellence, underscored by a Fellowship in Diabetology from CMC, Vellore in 2011.

Dr. Kalyanram's professional journey began with Indian Air Force, where he served from 1982 to 1999. He was awarded with Chief of Air Staff Commendation in 1987 for his exemplary service.

After bidding adieu to IAF in 1999, he transitioned to community healthcare service provider, founding and leading the 'Rishi Valley Rural Health Centre'. Under his leadership, the centre has become a vital healthcare resource to underserved and needy rural population, offering primary healthcare solutions. His vision has been to bridge the gap between urban and rural healthcare through holistic and sustainable interventions.

A prolific researcher, Dr. Kalyanram has been instrumental in numerous groundbreaking projects. The Rishi Valley Vascular Diseases Project, supported by ICMR and Monash University, stands out as a landmark initiative addressing vascular health challenges in rural India. His work has delved into controlling hypertension, gender-specific health disparities, and the role of socioeconomic factors in cardiovascular health. Collaborating with the Global Alliance for Chronic Diseases, he has led innovative community health interventions, including the deployment of ASHA-led education programs to manage hypertension.

Dr. Kalyanram's contributions to academia are reflected in his 18 peer-reviewed publications. His works explore diverse topics, including the effects of dietary habits on hypertension, novel methodologies for dietary assessments in low-literacy populations, and scalable models for rural healthcare interventions. Notable papers include studies on the relationship between salt intake and hypertension, the socioeconomic determinants of cardiovascular health, and the implementation of community-based healthcare solutions. These publications have significantly advanced the understanding of rural healthcare dynamics in low-resource settings.

Dr. Kalyanram is a life member of esteemed professional organizations such as the Indian Society of Aerospace Medicine, the Indian Medical Association, and the Krishnamurti Foundation India. His contributions to public health, both in research and practice, have made him a respected figure in medicine. Through his leadership at the Rishi Valley Rural Health Centre and his impactful research, Dr. Kalyanram continues to champion equitable healthcare access and improved health outcomes for marginalized communities in India.

Abstract

Effective Healthcare Strategies For Low Resource Settings Learnings From IAF

An Overview of the presentation

Below Poverty Line Rural populations have minimal or no access to quality healthcare. The poor are often exposed to greater personal and environmental health risk factors, and have limited lifestyle-related choices.

The Rishi Valley Rural Health Centre (RHC) was started by Dr Kartik, in Aug 1999. The RHC provides outpatient-based health care to rural BPL population. Good Diagnostic facilities, are the backbone for accurate health assessments. A fully equipped laboratory, microbiology, X Ray, PFT provides this essential service. The RHC is known for its holistic and comprehensive care of Non-Communicable Diseases. The centre has been associated with epidemiological research on Hypertension. Research on Mental Health amongst the young is ongoing.

Experience gained in the IAF has helped in providing comprehensive management of health (just as is done in SSQs), the setting up of systems, record keeping, training of staff, reporting.

The oration outlines the speakers views on the Healthcare scenario in India, the need for Patient Centric comprehensive health care and keeping clinical skills alive. The speakers journey through the IAF culminating in the present rural health work shows that quality health care is possible in low resource settings.

Air Vice Marshal JHF Manekshaw Panel

Air Vice Marshal JHF Manekshaw

Born on 28 Oct 1916, Air Vice Marshal Jemi Harmusji Framji Manekshaw, PVSM, AVSM joined Air Force as a doctor after doing MBBS from Punjab University on 22 Jul 1943. He became an Aviation Medical Specialist and served the Armed Forces Medical Services (AFMS) with distinction. He was associated with the School of Aviation Medicine (later Institute of Aviation Medicine) while the transformational changes in the form of advanced simulators were commissioned. He was instrumental in establishing the first Hyperbaric Oxygen Therapy (HBOT) facility at the Institute of Aviation Medicine (IAM).

He commanded the Institute of Aerospace Medicine from 29 Sep 1959 to 05 Sep 1960 and 14 Apr 1967 to 28 Feb 1973 as a Sqn Ldr, Wg Cdr, Gp Capt& Air Cmde. After this he was posted at the office of DGAFMS as the DMS (Medical Research) as an AVM. The Unit Crest with 'Nabahsi Arogyam' was given by the then President of India Shri VV Giri during his command of the Institute of Aviation Medicine. He was awarded the AVSM in 1971 and PVSM in 1976 by the President of India. Field Marshal Sam Hormusji Framji Jamshedji Manekshaw, MC, the Chief of Army Staff was his brother.

In the field of Aerospace Medicine, JHF Manekshaw achieved heights no lesser that his brother, whom the nation reveres.In the memory of this exceptional professional in the speciality of Aerospace Medicine, the Indian Society of Aerospace Medicine, in its 57th Annual Conference has decided to start a Panel on Emerging Trends in Aerospace Medicine dedicated to the memory of JHF Manekshaw.

In the Panel of 57th ISAM Conference in 2019, Dr Girish S Deodhare, Director CA & ADA delivered a talk on *Challenges in Development of Modern Fighter Aircraft* and Dr Unnikrishnan Nair, Director HSFC delivered a talk on *Human Space Programme*.

Air Vice Marshal JHF Manekshaw Panel Orations

2018-2021

Sl no.	Year	Orator	Topic
1.	2018	Dr S Somnath Dr Kotesh TM	Human Space Programme Emerging Trends in Flying Clothing
2.	2019	Dr Gireesh S Deodhare Dr Unni Krishnan Nair S	Challenges in development of modern fighter aircraft Human Space Programme
3.	2020	DR. VR Lalithambika DR. Taslimarif Saiyed	Human Space Missions: Design Challenges and Strategies Building Cutting-Edge Healthcare Innovations:Discussion on Efforts Towards a Point-of-Care Test for Detection of Sleep Deprivation
4	2021	DR. AK Ghosh Dr Pratima Murthy	Human Interface in 5^{+} Generation Fighter Aircraft Mind Matters in Modernity
5	2022	Mr Maneesh Kumar Ms. Nandini Harinath	Risk Based Approach to Management of Safety in India Glimpses of ISROs inspiring missions
6	2023	Air Vice Marshal Deepak Gaur AVSM (Retd) Dr. Srikanth Kondapalli, Ph.D.	OPTRAM – THE EVOLUTION OF A REVOLUTION PSYCHOLOGICAL WARFARE OF CHINA
7	2024	Dr. SL Vaya Dr Hanamantray Baluragi	Behavioural Forensic Clues: Way Forward to Connect the Dots Collaborative Research: Opportunities & Challenges

JHF MANEKSHAW PANEL
BIODATA

Dr. SL Vaya

Dr. SL Vaya is a Rehabilitation Council of India (RCI) registered professional Clinical Psychologist who pioneered Forensic Psychology and Neuro-Criminology in India. By innovation, she is a Clinical-Forensic Psychologist and by experience, a Forensic Specialist.

Professor Vaya is the Project Head of Security and Scientific Technical Research Association (SASTRA) at Rashtriya Raksha University (RRU). She was conferred with Life Time Professorship at RRU on this Teacher's Day celebration in September 2024. She was working as Chief Mentor and Emeritus Resource Faculty of School of Criminology & Behavioral Sciences at RRU. She is the first NABL Accredited Forensic Psychologist in India for Polygraph Examination, Brain Signature Profiling. NABL appointed her as technical expert for onsite assessment of lie detector unit to State FSL, Andhra Pradesh, CFSL, CBI, New Delhi, and Forensic Science Laboratory, Madhuban, Haryana. She worked as professional Clinical Psychologist for eight years at Mental Health Institutes and Medical Colleges. She was a member of search cum selection committee of National Council for Allied Health care professions (NCAHP) and also a member of Interim Commission for Allied Health care professions.

She focused on developing psycho-social care services for the Reformation, Rehabilitation and Reintegration of prisoners of Sabarmati central prison. She is a liaison officer for De-radicalization project.

She has examined nearly 5000 cases and reported cases for RAW, CID-crime, CBI, IB, Revenue, and ATS from Kerala, Karnataka, Tamil Nadu, Goa, Maharashtra, Rajasthan, Andhra Pradesh, M.P, U.P, Manipur, Port Blair, Kolkata, Jammu and Kashmir in addition to Gujarat. She has appeared as expert witness in criminal trials in various sessions' courts of Gujarat, Kerala, Hyderabad, Ghaziabad, Indore, Ajmer, Chandigarh, and Ranchi including CBI courts. Few high-profile cases reported are Madhumita Shukla case, Gutka case, Nithari serial killing, Aarushi-Hemraj double murder, Ujjain

serial killing, Ranchi multiple murder, fake stamp scam, lion poaching in Gujarat. Cases reported from Raksha Shakti University include Bihar midday meal tragedy.
She has worked as consultant to vice media for NETFLIX crime documentary the "Butcher of Delhi" and the "Beast of Bengaluru" and for Rattapallax Magazine, USA on “Karma Killings".
For comprehensive forensic analysis of the suspect’s behavior, she used forensic statement analysis, crime scene profiling, behavior profiling, forensic psychological assessment, polygraph examination, Narcoanalysis, Brain signature profiling, brain fingerprinting, suspect detection system and Layered Voice Analysis and reported both criminal and civil cases. She worked on new domains like Neuro-criminology, Forensic Assessment Interviews, Dermatoglyphics personality profiling, validation study of Farwell’s brain fingerprinting technology and many smaller projects.
She started PhD program at RRU on document examination, fingerprint analysis, forensic toxicology, cyber security, digital forensics, forensic psychology and police science. Dr. Vaya established Forensic Psychology division at FSL, Ahmedabad in 1988 and is the pioneer of Forensic Psychology in India.
She has numerous awards and lifetime achievements to her credit and was conferred with Iconic Award by Indian Academy of Health Psychology at Varanasi in Nov 24.

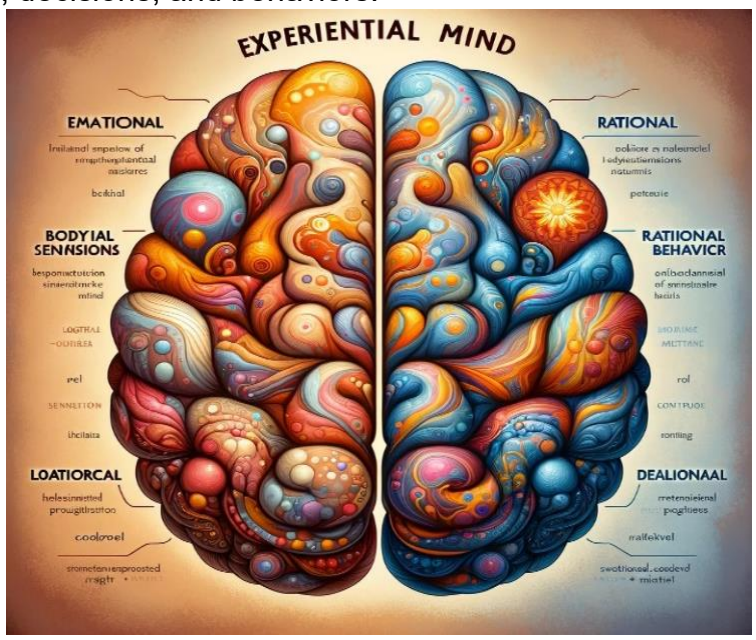
Behavioural Forensic Clues: Way Forward to Connect the Dots

Abstract

Dr SL Vaya

The human experience is shaped by the dynamic interplay between two interconnected yet distinct “minds” within one brain. Neuroscientist (Epstein,1999) refer to one body and one brain but at least two information processing systems described as two neural systems, or two "minds" that are differentially responsible for automatic and controlled social cognition.

The experiential mind operates preconsciously, guided by emotions, sensations, and instinctive responses. It is the realm of the subconscious, where feelings and intuition dominate. In contrast, the rational mind is conscious, deliberate, and logical, relying on analytical thought and controlled reasoning. Together, these dual systems shape our perceptions, decisions, and behaviors.



In parallel, technological advancements in deception detection and behavioral forensics have revolutionized how we uncover the hidden workings of the mind.

Portable instruments became handy tools for detection of deception. Slowly mechanical “Lie Detectors” changed to “all electronic Fact Finders", computerized polygraphs with automated results & Digital technology transformed it further to eye detect automated polygraphs.

The evolution from traditional mechanical "lie detectors" to advanced digital and AI-powered tools marks a new era in understanding human behavior. Sophisticated systems like SDS (Behavior Pattern Recognition Technology) integrate psycho-physiological indicators—galvanic skin responses, thermal changes, and neural activity for screening suspects that could identify malice & deception with remarkable precision. These tools not only screen suspects but also reveal insights into behavioral intent.

Layered Voice Analysis (LVA), the microscope for behavioural forensics could trace the true sensations & feelings behind the pronounced loud vocal that we hear to

evaluate the state of mind & emotional reaction capable of identifying the “Deceptive circuit “; the moment in time one realizes that the truth will not serve and the decision to lie is made. Meanwhile, the technologies like BEOS, BFP & iCognative are advancements in electrophysiology introduced for retrieval of the stored information from the Brain-body realm.

All these technologies if used wisely as tools in the hands of a good clinician, they can function as google maps, Bio-Neurofeedback tools in aligning the brain-body-behaviour to heal psycho-somatic illnesses. They are used in forensic set up as preventive & detective tools that discourages deviant behaviours.

They also enhance self-awareness, empowering individuals to understand their own behavior patterns and emotional responses. Beyond forensic applications, these innovations hold promise in clinical and therapeutic contexts.

By marrying the insights of neuroscience with the precision of technology, we are not only advancing behavioral forensics but also unlocking new potential for healing, understanding, and self-discovery.

BIODATA

Dr Hanamantray Baluragi

Dr. Hanamantray Baluragi is a distinguished scientist and engineer who has been a part of the Indian Space Research Organisation (ISRO) since 1999. With expertise in **Aerospace Manufacturing**, Dr. Baluragi has significantly contributed to the realization of systems for **PSLV, GSLV, LVM3**, and **Reusable Launch Vehicles (RLV)**.

One of his notable achievements includes developing **manufacturing technologies for thermal protection tiles** used in the Crew Module and RLV. His expertise has been instrumental in the advancement of India's launch vehicle programs and the successful approval of follow-on missions for **Gaganyaan**, India's human spaceflight program.

Dr. Baluragi holds **three patents** and has authored or co-authored **10 technical papers** published in prestigious conferences and journals. He is also a co-author of a chapter in the **Handbook of Space Security**, published by Springer Nature.

In recognition of his contributions, Dr. Baluragi has received numerous awards, including:

- The **ISRO Young Scientist Merit Award**,
- The **YUVA Anveshak Award** from the Society of Aerospace Manufacturing Engineers, and
- The **BINANI Gold Medal** from the Indian Institute of Metals.

Dr. Baluragi's work continues to elevate India's stature in space exploration and advanced manufacturing technologies.

Collaborative Research: Opportunities & Challenges

Abstract

Hanamantray Baluragi

Collaborative research is a powerful paradigm that brings together diverse expertise, perspectives, and resources to tackle complex challenges and advance knowledge. This approach has yielded numerous groundbreaking achievements, such as the discovery of the Higgs Boson particle, the mapping of the human genome, and the exploration of Mars and Saturn. India's space programme has been marked by successful collaborative research efforts with national and international partners. The launch of the first sounding rocket from Thumba in 1963 marked the beginning of the Indian Space Programme, a milestone achieved through successful collaborative efforts. These initial international collaborations played a pivotal role in advancing India's space capabilities. The experience gained from these collaborations enabled India to develop its own sounding rockets, paving the way for the development of more complex launch vehicles.

The Gaganyaan Programme, India's ambitious human spaceflight endeavor, is a shining example of collaboration and cooperation. India has partnered with Russia and France for spacesuit supply and training of astronauts and ground staff. National organizations, research institutions and academia are collaborating to develop crew-centric products, critical technologies, and recovery systems. As India pursues ambitious space goals, such as the development and operationalization of the Bharatiya Antariksh Station and Crew lunar landing missions, national and international collaborations will remain vital to its space strategy.

While collaborative research has the power to accelerate scientific progress, drive innovation, and improve daily lives, it also presents challenges and opportunities. Effective mitigation of these challenges, including the need for common goals, shared resources, and effective communication, is crucial for successful collaborative research outcomes.

ABSTRACTS:
PODIUM PRESENTATIONS

Session-I

Vascular injury in an aircrew: Aereomedical decision making for re-flighting

Ranjan Sarkar

Introduction: Aeromedical decision-making is a complex and critical process when assessing the fitness of military personnel to resume flying duties after a medical condition. The brachial artery plays a crucial role in blood supply to the arm and most injuries to the artery is associated with median nerve injury.

Case Summary: 40 year old serving F(P) from transport stream, reported to SMC of a large transport base with alleged history of fall within premises of Officers Mess during a social get together. The officer reported with pain, swelling and difficulty in movement of right elbow. On local examination there was no sign of any external injury or lacerated wound. There was swelling and mild ecchymosis in the right elbow. It was tender to palpation, and active range of motion was severely limited, with increasing peripheral numbness with feeble radial and ulnar pulse. Capillary refill was delayed, and the hand was cool to touch. The patient had significant motor deficit, with an inability to flex or extend the fingers. Sensory deficits were present, with diminished sensation in the median nerve distribution. On X ray there was no dislocation or fracture, however severe oedema with compartment syndrome was noticed. The patient was referred to a higher centre for management wherein in on doppler no flow was detected in the brachial artery distal to the elbow, suggesting a complete arterial occlusion. The patient was diagnosed with a traumatic rupture of the brachial artery at the elbow, with associated neurovascular compromise. Given the severity of the injury and the potential for limb ischemia, the patient was taken to the operating room for urgent vascular repair. Intraoperative exploration of the elbow revealed a complete rupture of the brachial artery with proximal and distal ends retracted. A segment of the brachial vein was harvested and used for an inter-positional graft with end to end anastomosis to restore arterial continuity. The repair was successful with good distal flow re-established and limb perfusion restored. Thereafter, the patient was admitted for 10 days to review graft patency and subsequently sent on sick leave to review after 10 days.

Aeromedical Decision Making: ADM in such cases will depend on functional recovery, limb assessment, vascular integrity, long term graft viability, risk of complications, physical therapy outcomes. The primary concern is evaluating the functional recovery of the pilot's arm, particularly strength, range of motion, and sensory function. The long-term patency and integrity of the venous graft must be evaluated. The risk of complications like graft thrombosis, aneurysms, or restenosis over time can impact the pilot's fitness for duty. The potential for complications such as delayed ischemia, nerve damage, or even reinjury is a critical consideration. The pilot's operational role must be reviewed to determine if there is an elevated risk of exposing the affected limb to conditions that could jeopardize the graft (e.g., extreme temperatures, high G-forces, or prolonged vibration). Beyond physical recovery, psychological readiness and cognitive function are key aspects of aeromedical decision-making.

Conclusion: The F(P) in this case needs to be observed on ground for a prolonged period to observe for any physical deficiency as a result of the injury. A detailed human engineering assessment focussing on the above mentioned factors need to be carefully weighed against the operational role of the aircrew and stresses involved. The aircrew being from transport stream can be reconsidered for re-flighting, if the above conditions are satisfied without compromising flight safety.

Prevalence of tolerance to coriolis stimulus at 25 rpm Among non-airsick flight cadets

Ajay Kumar

Introduction: The Airsickness Desensitization Protocol of the Indian Air Force is well-established and used at the No. 2 Aeromedical Training Centre at the Institute of Aerospace Medicine Indian Air Force for treating Airsickness among Flight Cadets and other aircrew. The Air Fox DISO simulator is used for the repeated exposure of Flt Cdts to the Coriolis Illusion at incremental rpm from 5 to 25 in both clockwise and anticlockwise directions. The genesis of the 25 rpm as qualifying criteria is not well understood. However, most of the Air Forces use either 25 RPM or 30 RPM as a qualifying rpm during the ASDT. One of the reasons could be the capability of the system (Barany Chair and Air Fox DISO) itself used for the ASDT. Both the Barany Chair and Air Fox DISO could generate rotation in the yaw axis up to 25 rpm only. The prevalence of tolerance to this rpm among Flt Cdts who could complete stage-I flying training without presenting with the symptoms of severe airsickness has not been reported. The study was conceived to understand the prevalence of tolerance of Coriolis stimulus at 25 rpm among Flt Cdts completing the flying training. Written informed consent was taken before the study from all the participants.
Methodology: The ASDT protocol in the DISO was used at 25 rpm in the clockwise direction with eight sets of head movements. The Flt Cdts who completed all eight sets of head movements without vomiting were considered successful. Their Motion Sickness Rating Score (MSRS), Vestibular Adaptation Time (VAT) and Coriolis Time Interval (CTI) were noted as per the protocol of the ASDT. The MSRS, VAT and CTI were compared between the successful and unsuccessful groups using appropriate statistical tools.
Results: 114 Flt Cdts participated in this study. 54 Cadets completed the ASDT protocol successfully. Rest failed to complete the protocol at various sets.
Discussion: The motion sickness is known to be peculiar to a particular motion environment and desensitization involves gradual exposure to increasing stimulus strength of the same motion environment. The best desensitization protocol for Air Sickness could be repeated exposure to flying with increasing manoeuvres gradually. However, this is not only unsafe but also impractical and financially unsustainable. Further, classical conditioning due to Air Sickness may permanently rule out return to the cockpit for many trainees. The ASDT protocol of IAF is a comprehensive package which has been in use for the last two decades with a high success rate. Any loss of a trainee due to Airsickness is unacceptable due to its operational and financial implications. A better understanding of tolerance to ASDT protocol may allow the development of an objective screening tool for Air Sickness.

Is 24-hour ambulatory bp monitoring (ABPM) a useful tool for screening of latent hypertension among obese air warriors?

NK Tripathy

Introduction: Prevalence of hypertension in overweight and obese personnel is higher than in the normal population. It is possible that a single clinical BP reading, as being practiced currently in the IAF, may not be able to establish the hypertensive status among these personnel. The present study was conducted to examine whether at higher BMIs, 24-hour ABPM would serve as a better tool for detecting latent hypertension vis-à-vis clinic BP recording.
Material & Methods: 230 healthy IAF male, clinically normotensive (BP<140/90 mmHg) between 20-40 years of age participated in this study. 50 participants with normal BMI (<25 kg/m^2),120 participants in overweight group (BMI 25-29.99 kg/m^2) and 60 participants in obese group (BMI ≥30 kg/m^2) were included. Each participant underwent BMI measurement using Digital Height-Weight-BMI measurement equipment, clinic BP recording by standard mercury sphygmomanometer apparatus and 24-hour ABPM using 'Oscar2 AccuWinpro' apparatus. Correlation analysis, ANOVA and chi-square tests were used for statistical analysis of the data.
Results: A statistically significant positive correlation was observed between MAP and BMI. 24-h ABPM revealed a significant effect of BMI on MAP, which was not observed in clinic BP measurement. The hypertensive response shown by ABPM was statistically significant between obese and normal BMI as well as obese and overweight groups. Such a response was not statistically significant between normal BMI and overweight groups. ABPM also revealed a consistent statistically significant blunting of nocturnal dip response with increasing BMI.
Discussion: 24-hour ABPM was found to be a useful tool for screening of hypertension in individuals with higher BMIs specifically in obese (BMI≥30 kg/m^2). It is recommended that 24-hour ABPM may be used as an assessment tool for screening of hypertension in medical evaluation of obese IAF personnel.

A retrospective analysis of motion sickness desensitization therapy at institute of aerospace medicine and way forward

Karthikeyan S

The main cause of motion sickness is when a person is subjected to apparent or real motion stimuli that they are not accustomed to or familiar with. Another form of motion sickness is called airsickness (AS). As per previous studies, between 30% to 40% of IAF trainee pilots have AS on their first flight; but incidence lowered by their third or fourth sortie. However, 9% do not adjust to this new environment due to persistent AS. We conducted a retrospective analysis of Air sickness cases reporting to Institute of Aerospace Medicine (IAM) for desensitization therapy (DT) between Jul 2018 to Aug 2024. The present protocol for DT comprises of Physical Exercise Therapy, Progressive Muscle Relaxation and exposure to motion stimuli in Coriolis mode at AirFox DISO

Simulator both at 2 AMTC and IAM. 49 subjects reported for DT comprising 46 male and 3 female. Out of these, 17 (35%) subjects cleared DT successfully and 32 (65%) subjects did not clear DT. After successful completion of ground-based DT at IAM, the subjects have to clear in-flight DT in trainer aircraft. Only 7 subjects (14%) successfully completed in-flight DT and continued their flying training. The subjects who haven't cleared ground & in-flight DT were re-streamed to ground duty branches. The success rate post ground-based DT and overall was only 41% and 14% respectively. As per previous study (Jan 09 – May 14 data) and data from Jun 14 to Jun 18, the cumulative success rate for DT at IAM was 62%. Before Jun 18, cadets were exposed to Barany's chair for DT at 2 AMTC and DISO simulator at IAM. This might be reason for reduced success rate in the present study. Intractable airsickness represents a large economic loss, as large amount of money is being lost in training hours and supervisor's time. The international practices for AS includes progressive relaxation techniques couples with incremental exposure to Coriolis stimulation (in Barany's chair), bio-feedback relaxation therapy, pharmacological management with tab cinnarizine, in-flight socpo/dex patch, intranasal scopolamine etc. Hence, there is a need for relook at the DT protocol followed at IAF to increase the success rate of DT for MS.

Session-II

Aeromedical decision making in case of lead splatter injury following ejection

Bhavana KJ

Introduction: Ejection from a fighter aircraft is the last resort for a pilot to save oneself and abandon the aircraft in the event of an irrecoverable aircraft emergency. Among the various injuries that can be sustained during an ejection, lead splatter injuries are unique. These injuries are caused by the lead in the MDC which has the potential of injuring the pilot during canopy fragmentation. Lead lodged in the human body due to such splatter injuries can cause lead toxicity. This report discusses the case of two pilots who ejected and sustained lead splatter injuries.

Case details: A 32 year old instructor pilot and a 23 year old student pilot ejected from a jet trainer aircraft, sustaining superficial abrasions on the forearms and hands. These injuries were initially managed with antiseptic dressing alone. During aeromedical evaluation prior to reflighting, the abrasions were suspected to be due to lead splatter injury. The aircrew underwent radiography of the affected limbs, which revealed multiple radio-opaque densities in the subcutaneous tissues; likely to be metallic pellets. Though neither aircrew had any symptoms or showed any signs of acute lead toxicity, they underwent serum lead assay in view of the possibility of developing chronic lead poisoning. The blood lead levels (BLL) of the aircrew required periodic monitoring in accordance with the WHO guidelines on

lead exposure. The aircrew were returned to flight status with the advice to monitor serum lead levels periodically to rule out the possibility of chronic lead toxicity.
Discussion: This case report discusses aeromedical decision making & long term risk stratification for the consequences of lead poisoning. These include cognitive & behavioural changes, peripheral neuropathy, anemia and hypertension. The report also proposes a periodic monitoring regime for a case of lead splatter injury following an ejection.

Fitness for Commercial Airlines Flying in a resolved case of Non Hodgkin Lymphoma: Aeromedical Risk Assessment & Disposal

Jeya Karthik

Introduction: Non-Hodgkin Lymphoma (NHL) is a group of malignant neoplasms originating from the lymphoid tissues, mainly the lymph nodes. Diffuse Large B-Cell Lymphoma is the most common histologic subtype of NHL. The clinical manifestation varies depending on the site, stage and extent of disease and managed with Chemo-immunotherapy.
Case Report: A 39 year old civil aircrew diagnosed as a case of Diffuse Large B cell Lymphoma (DLBCL), managed with R-CHOP regimen of chemo-immunotherapy with complete remission and drug free status for 25 months duration reported to IAF Boarding centre for Aeromedical evaluation and disposal.
Discussion: The survival rate post treatment for DLBCL is 94 % as per International Prognostic Index (IPI). However, the recurrence rate is 30-40% in first 1-2 years. Aeromedical concerns include treatment efficacy, recurrence/relapse, post chemotherapeutic effects, aviation risk on disability, prognosis and follow up duration and investigations to be carried out. The risk assessment matrix was carried out in this case using 5-year prognosis survival and risk of incapacitation was falling between 0.1 and 1%. The fitness for flying was considered on basis of incapacitation risk of <1% and upgraded to restricted flying category.
Conclusion: The certification assessment for malignancy can be based on survival rate post treatment due to lack of evidence in risk of recurrence. Hence, the certification for aircrew with any malignancy can be assessed by treatment efficacy, risk of recurrence and risk of incapacitation. The survival curve can be used as a tool for calculating risk of recurrence matrix and risk of incapacitation.

A rare case of “congenital anomaly of kidney and urinary tract” in an aviator: An approach to aeromedical disposition – a case report

Harsha MR

Introduction: Bilateral malrotated kidneys with one sided supernumerary kidney is one of the rarest congenital anomalies of kidney and urinary tract (CAKUT) with less than 100

cases reported in literature & the first case detected in serving aviator. It poses unique challenges in aeromedical decision making and disposition of aircrew.

Case Details: We are reporting the case of a 26-year-old asymptomatic male pilot from the fighter stream who was reported to have CAKUT on routine ultrasound examination. On further evaluation using CT urogram he was found to have bilateral malrotated kidneys with left supernumerary kidney. He was normotensive, his renal function tests and estimated GFR (eGFR) were within normal limits. 99m-Tc DMSA renal cortical imaging did not reveal any abnormalities. However, 99m-Tc DTPA dynamic urogram revealed normal split function and reduction of measured GFR (mGFR) using Gate's method. On literature review, it was found that mGFR using 99m-Tc DTPA Gate's method reported to have a large variability when compared to the inulin clearance method. The aircrew is currently being observed in temporary non-flying category with recommendation to be reviewed with 99m-Tc DTPA mGFR using plasma sampling technique. Evidence-based long term risk stratification for End Stage Renal Disease (ESRD), cardiovascular disease, stasis and obstructive complications will be carried out post confirmation of renal function status.

Discussion: This case study discusses our approach in aeromedical decision making along with long term risk stratification in aircrew with CAKUT.

Aeromedical Decision Making in Cases of Thumb Amputation

Harshitha TA

Background: A normal thumb makes a major contribution to the hand function, and its dysfunction is not compensated for easily. The thumb plays vital role in essential functions like adequate power grip, three point pinch grip, key grip, rapid skilled precise movements & normal sensation. In aviation environment, the thumb holds aeromedical significance in operating various controls and in executing emergency procedures. Amputation of thumb either partial or complete render aircrew unable to operate controls and execute necessary emergency procedures. Assessment of necessary fine movements of thumb should be part of aeromedical decision making in thumb amputation cases.

Case Details: We present two cases of traumatic amputation of thumb one with complete and other with partial thumb amputation. A 31 year old male commercial pilot sustained accidental complete amputation of left thumb on 04 May 24. He was initially treated conservatively but due to wound infection revision amputation was performed on 15 May 24. His post op recovery was satisfactory. During his review at IAM after 3 months of injury, he was symptomatic with difficulty in grasping objects with his left hand, decreased grip strength & difficulty in carrying out routine activities. On examination the stump of Left proximal phalanx was well healed. Functional evaluation of left hand revealed inadequate thumb grip, inability to oppose thumb with both tip & base of little finger, decreased hand grip strength, decreased Sollerman hand function test score. The functional capacity of the aircrew was considered inadequate for safe performance of aviation duties, including emergency procedures. He is currently assessed as

Temporarily medically unfit (TMU) for flying duties and asked to review with performance report in simulator on his ability to acuate all hand operated controls to confirm the findings of functional evaluation.

A 52yr old male commercial pilot sustained avulsion injury of right thumb causing partial thumb amputation on 22 Jan 23. He underwent debridement and moberg flap cover on 22 Jan 23 followed by uneventful postop recovery. During his review at IAM After 3 months, he was asymptomatic and was able to perform all routine activities. On examination there was well healed stump of right thumb. Functional evaluation revealed adequate right thumb grip, right hand grip and range of movements of right thumb was satisfactory. He was observed in TMU and was asked for performance report in simulator. His ability to do preflight checks optimally, actuate all hand operated controls and undertake emergency egress on ground was complimentary. Thus, he was upgraded to full flying status.
Discussion: Aircrew with thumb amputation would face difficulty to actuate hand operated controls (control stick operation, flipping of switches, operating thumb wheels, turning knobs for providing input to flight computers & changing radiofrequencies). This case report discusses the approach, aeromedical decision making and disposal in cases of aircrew reporting with thumb amputation to ensure their ability to perform tasks safely and reliably.

'Hypertension in young' in military aircrew: A case series with aeromedical deliberations

Dr Gaurav Garg

Introduction: Hypertension is the leading modifiable risk factor for cardiovascular diseases. The definition of 'Hypertension in young' varies in different guidelines between 50, 40 and 30 years of age. However, Hypertension detected before 30 years of age requires more stringent clinical management. The prevalence of Hypertension in the USAF, US Navy & IAF is around 11%, 9% & 4.5% respectively. It is showing a rising trend, even in the younger military population, because of modern lifestyle habits. The military aircrew are also not immune to it and add an extra concern of flight safety. This paper presents four military aircrew with 'Hypertension in young' (<30 years) and discusses the aeromedical deliberations for flight certification, thereof.
Case Details: Four military aircrew (three males and one female) were incidentally detected with Hypertension before age of 30 years during evaluation for other conditions. After thorough investigations ruling out secondary causes, they were advised anti-hypertensives and lifestyle modification. After a period of ground observation and achieving adequate blood pressure control with permissible medications without any adverse effects, three of them were gradually certified for flying. However, one male aircrew, with evidence of other concomitant lifestyle diseases and poor control of blood pressure even with combination anti-hypertensives, was assessed as permanently unfit for flying duties.

Discussion: The four cases bring out crucial flight safety concerns which are deliberated during the process of flight certification. 'Hypertension in young' not only becomes a long-term risk factor for cardiovascular diseases, but also imposes lifelong operational restrictions due to the nature of the disease when exposed to aerospace/ environmental stressors.
Conclusion: Flight certification is a dynamic process. The four cases discussed underline the fact that aeromedical decision-making necessitates incorporation of the knowledge of clinical diseases and their complications, the impact of aerospace stressors and the operational considerations.

Session-III

Hb electrophoresis for screening of haemoglobinopathies in military aircrew at IAM, IAF

Anubhav Upadhyay

Introduction: Thalassaemia & Sickle Cell Disease are the commonest hemoglobinopathies which are genetically inherited and characterized by reduced or absent synthesis of one or more of the globin chains that make up haemoglobin, which can lead to anaemia of varying severity. The prevalence of carrier states i.e. Thalassemia minor or trait, have been reported in various studies as 3%–18%, and 1.3% in Northern & southern states of the country respectively, with certain communities reporting a much higher prevalence. National guidelines advocate use of low cost tests with high NPV as screening measures for Hemoglobinopathies followed by confirmatory tests in those individuals who screen positive. Occupational screening for thalassemia using Hb Electrophoresis is presently being undertaken for all aircrew aspirants at Selection centres (IAF Boarding Centres). This paper is an attempt to review the available data and propose recommendations for cost-effective & efficient screening of aircrew aspirants and their subsequent aeromedical disposal.

Results: Retrospective data of 02 years (01 Jul 22 – 31 Aug 24) from an IAF boarding centre was reviewed. A total of 1080 aspirants underwent initial medical evaluation in the ibid period wherein 55 individuals were found to have an abnormal Hb Electrophoresis report. 41 Screen-positive individuals had normal haemoglobin & RBC indices whereas 14 were anaemic (based on criteria mentioned in IAP 4303 6th edition i.e.). As per present policy in vogue, such individuals are deemed unfit for military service.
Discussion: Military aviation presents unique stressors e.g. hypoxia, that can exacerbate anaemia symptoms, imposing a risk to flight safety. Carrier states of hemoglobinopathies, often asymptomatic, are only detectable through screening. This analysis found that most aircrew aspirants with carrier states had normal

haemoglobin and RBC indices. National guidelines promulgated by NHM for prevention & control of hemoglobinopathies in India, recommend using low-cost, high-negative predictive value tests for initial screening, followed by confirmatory tests for those who screen positive. It is proposed that similar validated screening protocols be adopted for aircrew aspirants during their selection, to reduce costs and retain asymptomatic carriers in service if they meet other applicable aeromedical standards.

Post LASIK criteria dilemma: Mydriatic eye drops and corneal thickness changes in aspirational candidates

Atul Kumar Singh

Background: The cornea plays an important role in the perception of clear vision. Numerous factors influence the biomechanics of the cornea, including instillation of various topical eye drops. Understanding the impact of dilating eye drops on corneal parameters is crucial for individuals who are planning refractive surgeries. Moreover, corneal changes might affect visual outcomes in these patients. This paper tries to explore the potential effects of dilating eye drops on corneal parameters.
Method: This, cross-sectional analytical study included 55 young healthy individuals (age less than 25 years) reporting to a boarding centre for the medical examinations of different streams from June 2023 to August 2023. All candidates underwent detailed ophthalmological examination. The corneal topography values were measured using Sirius (CSO Florence, Italy) machine under dim light pre and post dilatation.
Result: On the evaluation of pre and post-mydriatic values, it was observed that the CCT (min) and HOA (2mm^3) increased significantly post-mydriasis (p value <0.001 and 0.02 respectively). The effect of the mydriatic on corneal volume and HOA (3mm^3) was not found to be significantly different among pre- and post-mydriatic values.
Conclusion: This study emphasises the role of dilating eye drops in increasing the corneal thickness and corneal aberrations significantly as measured by Sirius tomogram. This study also highlights the need to educate the service ophthalmologist about the different corneal thickness readings in the POST LASIK candidates after dilation and also to stimulate policy makers to give direction to take only pre dilatation values for POST LASIK fitness.

Correlation study of ocular axial parameters with height among emmetropic candidates appearing for medical evaluation

Sridhara Reddy

Introduction: The refractive status of the eye is maintained by the dynamic interplay of various ocular biometric parameters. The axial biometric parameters

include axial length (AXL), anterior chamber depth (ACD), lens thickness (LT) and vitreous chamber depth (VCD). Evaluation of these parameters is important before offering any refractive or surgical corrections for individuals with refractive errors. The axial biometric parameters significantly contribute to visual outcome in such individuals and their subsequent fitness for selection in various branches in armed forces.

Aim: The aim of our study is to determine the correlation between age, height and three ocular biometric variables, namely, pachymetry, axial length, anterior chamber depth in candidates appearing for medical evaluation.

Methods: This was a cross-sectional, observational study conducted among the candidates reporting to a medical evaluation center of the Indian Air Force (IAF) for selection to military duties. A total of 724 emmetropic eyes of 362 candidates in the age group of 16–30 years were studied. All candidates were evaluated for AXL, ACD, CCT, and height was measured. The data was analyzed by inferential statistics like unpaired t-test and Kruskal–Wallis test, followed by testing of Pearson's correlation coefficient r.

Results: A total of 334 males and 28 females were enlisted in this study. The mean height of males and females was 174.45 ±6.510 and 159.04 ±3.837 cm, respectively. The mean AXL (23.73 vs 23.14 mm, p<0.001) and CCT (512.88 vs 504.98 µ, p<0.841) were significantly greater in male candidates and ACD (3.60 vs 3.68 mm, p < 0.229) was more in female candidates. Mann–Whitney U test showed that there were no significant mean difference between CCT and gender (p- 0.841). The mean AXL in males and females was 23.73 ±0.678, and 23.14 ± 0.353 mm, respectively, and there was a significant mean difference between AXL and gender (p - 0.001). There was a statistically significant positive correlation noted between AXL and height of the candidates.

Emergence of lifestyle diseases in aircrew post initial non-related medical evaluations at iaf boarding centre: Retrospective analysis

Snehangsh Dash

Introduction: This retrospective study analyses the prevalence and implications of lifestyle diseases identified subsequent to initial medical boards for non-lifestyle disease-related conditions in aircrews undergoing medical assessments at an Indian Air Force Boarding Centre. The study focuses on the health profiles of aircrews and explores the interplay between other non-lifestyle related disabilities, lifestyle factors and the emergence of lifestyle diseases.

Methods: By scrutinizing medical records from year 2017 to year 2023, any aircrew who came for board proceedings during the mentioned period & who is diagnosed to have any one of the five major Lifestyle Diseases namely Diabetes, Hypertension, Obesity, Dyslipidaemia, and Non-Alcoholic Steatohepatitis (NASH)

along with some other non-related disabilities with prior onset, were included in this study and a comprehensive evaluation was done.

Results: In our study musculoskeletal injuries or degenerative joint diseases along with cardiovascular conditions are being commonly associated with emergence of lifestyle diseases in subsequent follow up. Diabetes, Dyslipidaemia and Hypertension contribute to 85% of lifestyle diseases accumulated in individuals. Advancing age is a significant risk factor for the development of lifestyle diseases. In this study we found that around 40% individuals have clustering of lifestyle diseases which can lead to more complex health challenges.

Conclusion: This research sheds light on the multifaceted health challenges faced by aircrews after initial medical board and the importance of ongoing medical surveillance to ensure their overall well-being. Due to stringent regular reviews and assessment of health parameters during subsequent medical board proceedings lifestyle diseases are recognised at much early stages. These findings offer insights into the complex dynamics of healthcare within this specialized demographic population and emerging lifestyle-related health issues.

Session-IV

Mental health evaluation – An AME'S perspective"

Punita Masrani

Anxiety, depression and suicidal tendencies are real and have been reported in aviation worldwide. Unlike physical abnormalities, these are relatively difficult to identify unless the affected crew or ATCO is forthcoming. Healthcare avoidance behavior is common among aviation personnel for fear of consequences and that makes the evaluation and management of mental health conditions more challenging, especially in the early stages. Aviation Medical Examiners (AME) have a unique role to play in that they have various opportunities to interact with crew and ATCOs from early stages of their careers. Initial and periodic aviation medical examinations are an opportunity to build trust and create a non-threatening environment that allows the personnel to share concerns as well as openly respond to questions by the examiner. Early assessment and mitigation by the AME, often in liaison with specialists, airline doctors, peer support groups and the regulator can aid in identification, diagnosis, treatment and successful return to flying. Those who pose a risk to flight safety can be counselled and guided to the next steps, while maintaining confidentiality at all times.

Indian perspective on pilot peer support group and safety initiatives in airline operations

Rohit R Kochhar

Post the German wings aircraft accident, recommendations from regulatory authorities wanted corrective measures to be put in place for enhancing safety in the skies. The Peer support group was one such measure. Peer Support Group: When faced with mental health issues, the need to reach out for 'help' is the most important thing. Sharing experiences could help peers to connect, as it presupposes the possibility of having experienced similar situations or, at least, of being understood from an 'insider' standpoint. It gives a safe and secure space for the pilots to discuss their issues when impacted with psychological problems. It requires a proactive approach and cultural change for safety critical industrial members. This paper Highlights various elements, legality, confidentiality, training and supervision needed to achieve the desired result. Peer support groups promote a 'just culture' and presently it is in a nascent stage, in the Indian ecosystem. The data and experience with the pilot peer support group is encouraging and looks a step in the right direction.

Setting up benchmark process and procedure in safety regulation: Challenges and considerations of reinstating a commercial trainee pilot after cannabis use

Archana Rebbapragada Ghai

This paper examines the process of reinstating a trainee pilot who has tested positive for cannabis, highlighting the associated industry challenges and regulatory frameworks. It provides an overview of the concerns surrounding substance use in aviation and the impact on performance. It details cannabis use, differentiating between habitual and recreational users, and discusses the specific risks it poses to aviation safety, including impaired cognitive and motor skills, as well as the regulatory responses to these issues. The regulatory framework, including testing protocols and the role of the Directorate General of Civil Aviation (DGCA), is outlined, emphasizing the rigorous procedures for grounding, rehabilitation, and return-to-duty evaluations. Further, it explores the distinctions in treatment and monitoring for habitual versus recreational users, and the comprehensive aftercare processes established for each. The conclusion reflects on the ongoing debate between permanent revocation versus rehabilitative approaches, proposing a structured occupational substance misuse treatment program as a balanced solution. The program aims to address the challenges of substance use in aviation, ensuring that pilots are both rehabilitated and capable of safely resuming their duties.

Session-V

Preliminary assessment for aviation personnel for understanding of fatigue onset through neuropsychological cognitive assessment and biomedical signal analysis

Dr Viren Sardana

Introduction: Fatigue plays critical role in Military Aviation. Alertness and Cognition are responsible for decision-making ability, attention/vigilance, and working memory. Due to extended duty periods, early morning shifts or frequently changing schedules, aviators experience stress and fatigue that results in decrease in the cognitive performance during flight operations. Fatigue often disrupts sleep patterns and circadian rhythms that leads to unwanted mishaps. This study aims at monitoring neuro-psychophysiological aspects of military aviation personnel after mental and physical fatigue.

Material and Methods: This preliminary study was conducted to understand the psycho-physiological responses of airforce personnel while performing cognitive tasks integrating EEG, HRV, and GSR acquisition after 24 hour wakefulness and sleep deprivation cycle. Seven participants aged between 30-55 years were enrolled in a blinded manner to conduct a series of cognitive tasks designed for eliciting different levels of cognitive load and related stress. EEG measured brain activity, HRV measured cardiac responses, and GSR measured skin conductance as an index of emotional arousal, stress response and onset of fatigue. Data were collected in a laboratory environment (for 24 hrs) in which participants engaged in working memory, executive functioning and sustained/divided attention tasks. Vienna Test System and E-prime designed batteries were utilized for cognitive testing, while Powerlab (AD Instruments) and Actichamp (Brainproducts) were utilized for biomedical signal capture.

Result and Discussion: Preliminary results demonstrated that the fatigue was associated with alterations in EEG power spectral density especially alpha and delta band, while HRV indices in the frequency domain LF/HF ratio also demonstrated agreement with literature on fatigue assessment in majority of the subjects. The findings provide basic insights into further research on cognitive processing and stress responses, supporting the utility of a multimodal approach in cognitive studies and increasing further sample size for better delineation.

Continuous wakefulness study to identify potential biomarkers of sleep deprivation

Dr Santhosh SR

Introduction: Self-inflicted sleep loss is a global health disorder which has become prevalent amongst the Aviators of the Indian Air Force due to the rampant use of social media and access to multiple streaming platforms. At present no reliable objective assessment for sleep deprivation is available which could screen sleep deprived pilots before they commence a sortie. The need for quick, easy and accurate objective methods to diagnose sleep deprivation is especially important in the Indian Air Force where individuals are inclined not to report truthfully either their amount of sleep or their level of fatigue.
Materials & Methods: A novel study was designed towards achieving the final aim of developing a Point of Care Test (POCT) device which would enable 'On the spot' identification of sleep deprived pilots by testing biological samples like urine or saliva in a noninvasive manner. In this direction the 1st phase i.e. 40-hour Continuous wakefulness study was successfully completed on 25 healthy male subjects at sleep lab facility, IAM. During the study, the subjects were monitored for wakefulness and short periods of intermittent sleep using Actigraphy device and were also assessed for set of physiological and cognitive parameters. The biological samples (urine and saliva) were collected every three hours for analyzing 15 potential biomarkers of sleep deprivation using different analytical platforms at C-CAMP, DBT Bangalore.
Results & Discussion: The results of this 1st phase 40hr continuous wakefulness study will be discussed in this paper/presentation.

A case series of three military aircraft accident investigations resulting in drowning

Kamlesh Kumar Singh

Background*:* This article examines a series of three aviation accidents involving Indian military aircraft, all of which tragically resulted in the drowning of aircrew members.
Method: The incidents, occurring in different operational contexts, highlight recurring factors such as mechanical failure, adverse weather conditions, and possible human error, as investigated based on injury pattern analysis, histological and toxological examination of different samples.
Results: The first accident involved a fighter jet that crashed into a river due to engine failure, while the second incident saw a helicopter drowned in a river during a routine exercise. The third event involved a helicopter that crashed into sea during a medical rescue operation. In each case, the aircrew either ejected or crashed into water bodies, ultimately drowning due to the failure of timely rescue

efforts. The article underscores the need for improved safety protocols, better training in water survival, and enhanced search and rescue capabilities to prevent future tragedies in similar circumstances.

"Overall" modification

U Bhattacharya

Introduction: Presently, the female aircrew 'fit' into the lower sizes of the available flying overall because there is no gender specific overall. With induction of female into fighter flying, the need for a better physiologically suited flying overall was realised. Currently, in order to undertake long duration flying, the female aircrew either decrease intake of water (dehydrate themselves) or hold on to full bladders; neither of the scenario is conducive in a combat sortie. Hence, the need is not physiological but for effective completion of combat missions.

Material & Method: A preliminary study was done at a single fighter squadron to identify the problem & arrive at a solution. It was realised that during ORP duties, it is impossible to evacuate the bladder and reach aircraft in time in case of an emergency. Hence, a concealed zip was introduced horizontally between the legs in the area where the flying overall was left uncovered by the Anti-G suit. Comments on the proposed design was sought from all Commands of IAF. The comments were encouraging, it also revealed that modification in the overall have been considered earlier. The earlier modifications were unacceptable because they could not fulfil the criteria of being gender neutral. Moving ahead 18 overalls were locally modified and distributed to various fighter squadrons. Aircrew from helicopter & transport squadron were also included for their specific comments. Both male & female aircrew of all streams were encouraged to wear the modified overall & give their feedback. It was proposed that the current design be used along with a stand & pee device by the female aircrew.

Results & Discussion: All 18 aircrew found the modified overall comfortable in terms of look, feel & comfort. Female aircrew from all streams found the design more hygienic compared to old design. Interestingly, male aircrew from fighter stream found it useful for quick evacuation of bladder specially when on ORP duties. Male aircrew from helicopter & transport stream did not feel the need for the concealed zip at all. Female aircrew from helicopter stream found it hygienic in, on ground scenario, however in view of pilots sitting next to each other, there was no scope of inflight use. Similarly the female transport aircrew found no use of the concealed zip during flight. However, female aircrew of C-17 fleet found the option of using the overall with stand & pee device in the onboard toilet more hygienic than the current scenario.

Conclusion: Currently only 18 overalls were modified and distributed in order to check for acceptance of design. Though the problem was identified for female

fighter aircrew, it has been accepted by male fighter aircrew as well. The design has also received acceptance for on ground comfort & ease of use in helicopter & transport streams by female aircrew. However, the current modification does not cater for airworthy zippers, so in flight use was not tested. There is a need to carry forward this modification using airworthy material for future use.

Session-VI

Physiological parameters as markers of acute stress during simulator flying -possible application to improve flying training

Srinivasa Bhattachar

A fighter pilot during a training sortie would experience physiological stressors (acceleration, thermal, hypoxia, vibration etc.) or psychological stress due to degree of difficulty in a sortie, maintaining spatial orientation, perceived un-favorable sortie outcomes, pressure from Instructor. A flying trainee is under observation and knows that his/ her performance is being judged by the QFI. It has been well established QFI monitored simulator sortie with proper hot debrief can be an important tool to improve the subsequent inflight performance. But this approach has limitations of lack of perspective regarding the physiological stress the trainee undergoes to achieve the visible performance. The present study is planned to evaluate physiological changes during simulator flying in trainees and generate data to identify markers for in-flight stress. The outcome of the simulator sortie should have implications on performance rating by the QFI so that there is a degree of stress towards improving performance. Number of syllabus sorties to be flown by the trainee aircrew is defined. Once the trainee has cleared the mandatory simulator sorties, he/ she graduates to fly the aircraft. The flying instructor during the simulator sortie will note the errors and stressful moments. In the simulator, portable physiological recording devices with data logger facility will be worn by the trainee aircrew. At the end of the simulator sortie the QFI will note and hand over the exact time of error/ stressful moments in the sortie to the Investigator who will milk the data from the physiological data logger and corroborate the physiological parameters against the errors/ stressful moments given by the QFI. Multiple sorties for a given trainee aircrew will be recorded to show a trend in the physiological parameters against the subjected stress, this will be useful to demonstrate good training inoculation/ improvement in flying skills.

A comparative study of postural stability between healthy iaf aircrew and groundcrew using computerized dynamic posturography (CDP)

YS Thakur

Background: Posture is the orientation of the body segments individually or collectively with respect to the pull of gravity resulting in the maintenance of an upright position. Any injury affecting the somatosensory, visual, vestibular

component or their integration at higher centers may affect postural stability & reaction time. This is of immense importance when returning an aircrew back into the cockpit post an injury. Postural control is also adversely affected during exposure to microgravity. In order to study postural stability changes post space flights as in future Human Space Programs, we also need to have our own aircrew specific normative data. CDP can be used to assess & quantify postural stability. The objective of this study was to determine whether postural stability differs amongst healthy aircrew & groundcrew of IAF using CDP and to find the feasibility of representing the result of the study as normative data for IAF aircrew.

Materials & Method: 51 healthy aircrew & ground crew each underwent CDP evaluation in form of sensory organization test (SOT), motor control test (MCT) & adaptation test (ADT). The tests were carried out using NeuroEquilibrium™ CDP equipment. The collected data was statistically compared using non-parametric Mann Whitney U test between aircrew & ground crew.

Result: In SOT, equilibrium scores in dynamic conditions C4,C5 & C6 & vestibular ratio of sensory analysis was found to be significantly higher in aircrew than ground crew. Since the difference in postural stability between aircrew & groundcrew was statistically proven during the study, normative data was devised for SOT in Indian Aircrew using CDP. For MCT, weight symmetry in all three displacements of small, medium & large for both forward & backward translations showed significant difference in aircrew & groundcrew. Sway energy score in ADT for both aircrew & groundcrew didn't show any significant difference.

Discussion & Conclusion: Higher equilibrium scores in all three dynamic conditions of SOT indicates a better postural control in aircrew. The higher vestibular ratio during SOT indicates better functioning, adaptation & utilization of Vestibular system in aircrew. The weight symmetry scores of MCT, though found to be significantly different in aircrew & groundcrew, study group with the better scores could not be commented upon. During ADT, the Sway energy scores didn't show any significant difference among the two study groups signifying the similar ability to minimize sway in both aircrew & groundcrew. IAF aircrew demonstrated better postural stability than the groundcrew, which can possibly be attributed to the routine working flying environment & training. Hence, normative standards for the evaluation of aircrew for SOT should be different from the general population, as given in the present study.

Hypoxia Hangover Following Exposure to Simulated Hypobaric Hypoxia

Deepan Rai

Introduction: The term "hypoxia hangover" refers to the effects of hypoxia that may persist and linger even after exposure to hypoxia has ended and oxygen

saturation levels have returned to normal. This study assesses the time duration of hypoxia hangover after exposure to simulated hypobaric hypoxia.

Material and Methods: This study was conducted in the Department of High Altitude Physiology and Hyperbaric Medicine, Institute of Aerospace Medicine, Bengaluru. A total of 30 healthy volunteers (25 male and 05 female) aged between 20 to 40 years participated in this study. All subjects were educated to perform the Psychomotor Vigilance Task in PVT -192. Baseline PVT was recorded and subjects were exposed to simulated hypobaric hypoxia at 25,000 ft for 05 mins and PVT was administered during exposure, after reaching the ground, and every hour for another 05 hrs.

Results: The median RT recorded maximum during exposure to hypoxia 286±58 ms from the baseline and then declined at 0+9 mins to 243 ±32. Later minimal variation is observed at different time points varying between 225 to 243 ms. The total error recorded maximum is 2.7 during exposure to hypoxia and started declining in subsequent time points. Minimal variation is observed at different time points varying between 1 to 1.53. At 5^{th} hrs of the total error recorded was 1±1.29. The maximum lapses were also observed during exposure to hypoxia and declined gradually. Later at 4^{th} hrs sudden peak is observed

Discussion: The reaction time measured in fixed intervals by PVT was found to be impaired until 04 hours of exposure. There is an unexplainable peak of total errors and lapses>500ms at 4h of post-exposure. In this study lingering effect of hypoxia was found to be present until 4 hours post-exposure to hypoxia.

Conclusion: This study has objectively demonstrated the lingering effects of hypoxia after cessation of hypoxia and restoration of oxygen saturation to normal also termed as ‘hypoxia hangover’.

Determinants of vitamin d levels in healthy aircrew visiting a medical evaluation facility: the influence of diet, latitude, physical activity and gender

Neha Gupta

Introduction: Vitamin D, crucial for calcium homeostasis, is synthesized in the skin via UVB radiation and obtained from certain foods. The American Association of Clinical Endocrinologists defines deficiency as levels below 20 ng/ml. High prevalence of deficiency in Indian populations has prompted this study on factors influencing vitamin D levels in healthy Indian aircrew.

Materials and Method: A cross-sectional study from January to March 2020 included healthy individuals aged 20-50 years. Data on age, body mass index, diet, physical exercise, and residence latitude were collected, excluding those with chronic illnesses or on medications. Vitamin D levels were measured from fasting blood samples. Statistical analyses involved correlation, independent T-test, and linear regression. A p value less than 0.05 was considered significant.

Results: Among 270 participants, 84.8% had vitamin D levels below 20 ng/ml, with a mean level of 14.07 ± 6.24 ng/ml. Vegetarians constituted 65.6% (n = 177) of the subjects. A significant inverse correlation was found between vitamin D levels and latitude ($\rho = -0.293$, $p < 0.001$). Males (14.91 ± 6.3 ng/ml) and non-vegetarians (16.08 ± 7.2 ng/ml) had significantly higher vitamin D levels than females (11.71 ± 5.4 ng/ml) {$t(136.8) = 4.082$, $p < 0.001$} and vegetarians (13.04 ± 5.4 ng/ml) {$t(146.5) = -3.567$, $p < 0.001$}, respectively. Higher physical activity was associated with increased vitamin D levels {$t(37.72) = -2.97$, $p = 0.003$}.Linear regression revealed that a reduction in latitude by one degree leads to an increase in vitamin D levels by 0.277 units ($p < 0.001$).

Conclusion: The study highlights a high prevalence of vitamin D deficiency in Indian aircrew, influenced by diet, physical activity, and latitude. These findings suggest the need for population-specific guidelines and interventions like dietary fortification and lifestyle modifications.

Session-VII

Trait anxiety: neural correlates and possible implications in aviation

Shilpi Modi

Introduction: Trait anxiety is a personality dimension present within the normal population and is characterized by harm avoidance behaviour such as worrying, irritability, difficulty to relax, or by predisposition to interpret ambiguous situations as threatening. It is assessed by measures such as the Spielberger's State-Trait Anxiety Inventory (STAI). Anxiety disrupts attentional control and is therefore an essential dimension to be studied in aviation. Higher class rank in U.S. Air Force pilot training was found to be associated with lower levels of anxiety. The present study attempted to identify preliminary imaging-based markers of sub-clinical trait anxiety by using multi-parametric MR Imaging.

Material and Methods: The study was performed using 3 Tesla whole body MRI system. Structural, task/rest functional MRI (fMRI), tractography and MRS data was acquired from one hundred and two right-handed, healthy and educated (graduates/ post graduates) participants. The fMRI data was processed using Statistical Parametric Mapping (SPM8) and FSL (FMRIB's Software Library). For

tractography, a JAVA-based software was used to generate and quantify major white matter fibre tracts. MR spectra obtained from the anterior cingulate cortex (ACC) and hippocampus were processed using LCModel software.
Results: A reduced performance efficiency, altered resting state functional connectivity, metabolism in ACC, morphology in hypothalamus and strength of two major fibers of the limbic system namely, uncinate fasciculus and fornix were found to be associated with trait anxiety.
Discussion and Conclusion: The current study utilized a multi-parametric MR approach to explore the underlying neural correlates associated with sub-clinical anxiety. High anxiety trait being a precursor to anxiety disorders and depression, the observed findings further support the need for preventive interventions in otherwise healthy individuals. The importance of studying trait anxiety in association with training and performance in aviation is also discussed.

Echoing Personality through Paralanguage: An Exploratory Study

Sibin Raj K

Introduction: Personality traits are critical human factors in stressful environments like fighter flying. Despite the central role of personality in pilot selection and training, the systematic tracking of personality facets and impact on different aviation roles remains largely underexplored. The effects are scrutinized in post-accident analyses, overlooking the benefits of longitudinal impact. Paralanguage encompassing vocal elements may reflect underlying personality traits and provide valuable insights into crew dynamics and flight safety. This paper explored the association of personality evaluation through paralanguage analysis using a voice analysis platform (Layered Voice Analysis-i).
Methodology: Correlational method using standardised big five personality based interview protocol and 18 para-lingual voice parameters were studied. The data was analysed segment wise using LVAi platform. The sample (N=113) consisted of graduates (59 M & 54 F, Mean Age= 23± 1.5) proficient in English knowledge.
Results: Para-lingual voice parameters (Emotional, Energy, Passion, Confidence, Anger, & Joy) have significant relationship with big five traits such as Extraversion (r=0.191*, p=0.05), Agreeableness (r=.309**, p=0.01) and Conscientiousness (r=0. 194*, p=0.05).
Discussion & Conclusion: This research demonstrates the potential benefit of no-techs which are as crucial as flying among the aircrew specially QFIs at FTEs. The findings can benefit the aircrew with timely course correction and specific interventions. Moreover para-lingual cues can enhance human factors analysis post-accident, offering a deeper appreciation of personality influencing communication, behaviour patterns, flight safety and performance.

Prevalence of tolerance to coriolis stimulus at 25 rpm among non-airsick flight cadets

Ajay Kumar

Introduction: The Airsickness Desensitization Protocol of the Indian Air Force is well-established and used at the No. 2 Aeromedical Training Centre at the Institute of Aerospace Medicine Indian Air Force for treating Airsickness among Flight Cadets and other aircrew. The Air Fox DISO simulator is used for the repeated exposure of Flt Cdts to the Coriolis Illusion at incremental rpm from 5 to 25 in both clockwise and anticlockwise directions. The genesis of the 25 rpm as qualifying criteria is not well understood. However, most of the Air Forces use either 25 RPM or 30 RPM as a qualifying rpm during the ASDT. One of the reasons could be the capability of the system (Barany Chair and Air Fox DISO) itself used for the ASDT. Both the Barany Chair and Air Fox DISO could generate rotation in the yaw axis up to 25 rpm only. The prevalence of tolerance to this rpm among Flt Cdts who could complete stage-I flying training without presenting with the symptoms of severe airsickness has not been reported. The study was conceived to understand the prevalence of tolerance of Coriolis stimulus at 25 rpm among Flt Cdts completing the flying training. Written informed consent was taken before the study from all the participants.

Methodology: The ASDT protocol in the DISO was used at 25 rpm in the clockwise direction with eight sets of head movements. The Flt Cdts who completed all eight sets of head movements without vomiting were considered successful. Their Motion Sickness Rating Score (MSRS), Vestibular Adaptation Time (VAT) and Coriolis Time Interval (CTI) were noted as per the protocol of the ASDT. The MSRS, VAT and CTI were compared between the successful and unsuccessful groups using appropriate statistical tools.

Results: 114 Flt Cdts participated in this study. 54 Cadets completed the ASDT protocol successfully. Rest failed to complete the protocol at various sets.

Discussion: The motion sickness is known to be peculiar to a particular motion environment and desensitization involves gradual exposure to increasing stimulus strength of the same motion environment. The best desensitization protocol for Air Sickness could be repeated exposure to flying with increasing manoeuvres gradually. However, this is not only unsafe but also impractical and financially unsustainable. Further, classical conditioning due to Air Sickness may permanently rule out return to the cockpit for many trainees. The ASDT protocol of IAF is a comprehensive package which has been in use for the last two decades with a high success rate. Any loss of a trainee due to Airsickness is unacceptable due to its operational and financial implications. A better understanding of tolerance to ASDT protocol may allow the development of an objective screening tool for Air Sickness.

Session-VIII

Effectiveness of ai based large language model-chat gpt 4o in aeromedical decision-making vis-à-vis clinical decision-making

Gokul Harish M

Background: The utilization of large language models (LLMs) such as GPT-4o in the medical field represents a significant step forward in healthcare delivery and decision-making. These artificial intelligence (AI) tools are designed to enhance effective decision-making and to assist in providing better healthcare. This study aims to evaluate the effectiveness of LLMs in providing support in aeromedical decision-making compared to traditional clinical decision-making.

Methods: Data for this study were collected from the "Journal of Aerospace Medicine and Human Performance," under the article series "You're the Flight Surgeon," from 2011-2020. It is a descriptive analytical study, comprising a dataset of 716 questions, divided into 461 clinical questions and 255 aeromedical questions. The performance of the LLM was evaluated based on its ability to provide correct responses to these questions. The accuracy of the responses was quantified, and performance was compared across the two domains: clinical and aeromedical decision-making.

Results: The analysis revealed that the LLM achieved a correct response rate of 80.91% for clinical questions and 77.64% for aeromedical questions. This shows relatively a good level of accuracy in both domains, with slightly superior performance observed in clinical decision-making scenarios. The lower accuracy in aeromedical contexts suggests unique challenges in this specialized field since the data requirements for decision-making can be more complex and specific.

Conclusion: The study concludes that LLMs like GPT-4o can serve as effective supplementary tools in medical decision-making. While their ability to accurately evaluate and respond to clinical data is shown, their slightly lower performance in aeromedical decision-making indicates opportunities for improvement. These findings suggest a need for more specialized training of LLMs using domain-specific datasets to enhance their utility in aerospace medicine. Overall, the use of LLMs in healthcare settings shows promise for enhancing decision-making processes and results.

Effectiveness of ai based large language model-chat GPT 4o in clinical medical decision making in comparison to older model chat GPT 3.5 (MEDFLIX)

Dr Kahalekar S

Background: The application of artificial intelligence (ai) into healthcare has the potential to greatly improve medical decision-making processes. Large language models (llms), such as openai's chatgpt 4o, are a potential invention that can help medical professionals in various domains, particularly in medical decision-making. This study evaluates the effectiveness of chatgpt 4o compared to medflix, another established ai tool, in providing clinical decision support. The principal aim of this study is to evaluate and compare the effectiveness of these two ai models in assisting flight surgeons with clinical and aeromedical decision-making tasks, with an emphasis on accuracy, relevance, coherence, and user satisfaction.
Methodology: To meet the study's objective, a descriptive analysis was conducted on a dataset of 716 questions collected from the you're a flight surgeon articles published in the journal of aerospace medicine and human performance over the last ten years. This dataset includes a diverse range of clinical and aeromedical scenarios, ensuring it reflects the complexities of clinical decision-making faced by flight surgeons. A descriptive statistical approach was employed to evaluate the performance of both chatgpt 4o and medflix. Responses from both ai models were evaluated in simulated conversational exchanges, and user feedback was gathered to determine overall experience and effectiveness.
Results: The results indicated significant differences in effectiveness between the two models. Chatgpt 4o outperformed medflix, achieving an outstanding accuracy rate of 79.9% compared to medflix, which delivered a lower accuracy rate of 65%. These findings highlight a significant advantage offered by chatgpt 4o in assisting flight surgeons with critical clinical and aeromedical decisions. This study compared responses from chatgpt 4o and medflix, of which 89 were similar out of 716 questions that differed from the original answers. This suggests that chatgpt's database may have limitations in aeromedical data and restricted access to specific guidelines. Furthermore, the discrepancy with chatgpt might be due to the utilization of newer guidelines compared to those referenced in the original article.
Conclusion: In conclusion, the findings indicate that chatgpt 4.0 is a more effective ai tool for assisting flight surgeons in medical decision-making than medflix. Its higher accuracy, relevance, coherence, and user satisfaction indicate its potential to enhance decision-making processes in clinical practice. As the healthcare landscape evolves and the role of ai becomes more important, continual enhancement and modifications of advanced llms like chatgpt 4.0 should be prioritized. Future research should explore the real-world applications of such models and their long-term impact on healthcare outcomes, particularly in high-risk settings like aviation medicine. By integrating advanced ai systems into clinical workflows, the goal is to improve the quality of patient care, empowering

healthcare providers to make informed decisions, which can eventually lead to better health outcomes for patients.

Analysis of MRI findings in post ejection cases: A retrospective study

U Bansal

Introduction: Ejection is one the most stressful and hazardous event an aviator has to undergo during their flying career. Ejection takes a toll on physical and mental well being of the individual. Among the numerous physical injuries to which an aircrew is susceptible to during an ejection, spinal injuries are most common and have the most serious after-effects. Early detection and proper management of spinal injuries is important to avoid serious long-term consequences. MRI scans are the gold standard for this. In this study we compared MRI scans done at different time intervals of 11 post ejection cases that had reported to IAM within the last two years for review/ recategorization.
Aim: Primary objective of the study was to identify any variations in findings of MRI done at different time intervals.
Materials and Methods: A retrospective observational cross sectional study was carried out at Dept of Human Engineering, IAM during which records of aircrew who had reported for review/recat from 2022 to 2024 as cases of post ejection were analysed. MRI findings in each case were analysed for pattern of injuries sustained.
Results and Discussion: 11 aircrew had reported for review during the period. A total of 23 MRI reports were found and analysed. The MRI scans showed a wide range of findings in different cases. 36% (n=4) cases showed compression fractures at different levels, 9% (n=1) had displaced fracture of bilateral lamina in cervical region, 45% (n=5) were reported to have disc bulge of various grades and 9% (n=1) was reported to have only degenerative changes. MRI was found to be the most accurate in diagnosing of spinal injuries. Differences in awareness of radiologists reporting the MRI regarding impact of ejection were also noted. Serial scans showed either progression or resolution of various injuries sustained by the aircrew.
Conclusion: Single MRI scan done within two days of injury is most accurate to diagnose any injuries that might have occurred due to ejection. Second MRI is warranted before upgrading the aircrew to check for any progression of lesions reported in the first MRI.

Polytrauma in military aircrew: Aeromedical decision making during reflighting

Y Varun

Background: Polytrauma cases amongst military aircrew require a multidisciplinary approach to ensure that all aeromedical aspects are considered before re-flighting. Residual disabilities in aircrew after recovery might pose a challenge when evaluating their return to flying duties.

Case report: We report on two such cases with polytrauma, sustained during RTA.

Case-1. A 23 years old fighter aircrew in stage III flying training, sustained polytrauma. He underwent ORIF for fracture mandible. Fracture bilateral multiple ribs, hepatic & pulmonary contusion, fracture transverse process of vertebra C6 & D11 were managed conservatively. Pneumothorax was managed with bilateral ICD and prolonged monitoring at ICU. During his review at an IAF boarding centre after 09 months, he was asymptomatic, radiological and clinical evaluation by Pulmonologist, OMFS, CTVS, Neurosurgeon were satisfactory. He tolerated simulated aviation stressors well. He was upgraded to restricted flying category in view of optimal functional status.

Case 2. A 44 years old serving helicopter aircrew sustained Left side 4^{th} - 8^{th} rib fractures with pulmonary contusion, fracture shaft of left clavicle and bilateral mild pleural effusion. He was managed with ORIF for fracture clavicle and conservatively for fracture ribs. During his review at an IAF boarding centre after 12 months, he was asymptomatic, radiological and clinical evaluation by Pulmonologist and Orthopaedic surgeon were satisfactory. He was upgraded to full flying category in view of optimal functional status.

Discussion: Aeromedical disposition of these cases highlights the importance of evidence based approach to ensure radiological recovery, clinical finality and optimal functional status, with due consideration of the flying environment of individual's type aircraft. Post clinical recovery, aeromedical decision making (ADM) in 1^{st} case focussed on pulmonary function, phonation, functional status of jaw, ability to carry out anti G straining manoeuver, ability to withstand axial spinal loading; whereas, ADM in 2^{nd} case focussed on pulmonary function and upper extremity functional status. Absence of severe complications in these cases facilitated a quicker return to flight duties.

Conclusion: An effort has been made to bring out importance of detailed radiological, clinical, functional evaluation and aeromedical concerns in disposition of polytrauma cases to assess an aircrew safely back to flying without compromising flight safety.

Session-IX

Comparison and standardisation of measurement protocol in 3d-laser whole body scanner for antropometric parameters with potential application in cockpit ergonomics

Binu Sekhar M

Introduction: Standardization of measurement protocol for 3D Laser Whole Body scanner is essential to ensure accurate measurements of anthropometric parameters crucial for cockpit workspace design**.**
Methodology: 410 healthy volunteers, aged 18 to 56 years (mean ± SD: 32.7 ± 10.2 years), participated in this study. Thirty-two anthropometric parameters relevant to the ergonomic design of aircraft cockpits were measured according to standard protocol of manual method and newly formulated protocol of 3D laser scanner method. Manual measurements were conducted using the IAM Portable Manual Anthropometer, while 3D laser scanning was performed using the VITUS® 3D Laser Whole Body Scanner and ANTHROSCAN™ software from M/s Human Solutions GmbH. Statistical comparisons were made for each parameter to assess differences in means, correlation, and agreement between the two measurement methods.
Results: Significant differences in means were found for 27 parameters. Percentage differences in means were below 1% for 10 parameters, between 1% and 10% for 19 parameters, and exceeding 10% for 3 parameters. Seven parameters exhibited good correlation, 24 showed moderate correlation, and one parameter showed poor correlation. The agreement analysis showed that the maximum bias for 95% confidence interval, represented in percentage of average of both means, was less than 5% for five parameters, between 5% and 10% for 13 parameters, and exceeding 10% for 14 parameters.
Conclusion: Analysis, considering percentage differences in means, strength of correlation, and agreement bias, indicated that out of the 32 anthropometric parameters, five were well comparable, 13 were moderately comparable, and the remaining 14 were weakly comparable. The study brought out the way forward for utilizing 3D-Laser scanner for anthropometric measurements related to cockpit workspace design.

Comparative analysis of critical anthropometric parameters from the anthropometric data of 10 year duration (2015 – 24)

BN Vasudev

The anthropometric data of the user population plays vital input in off-the shelf aircraft procurement, indigenous aircraft and aircrew equipment assembly design and development to achieve the aircrew-aircraft compatibility and hence to optimize the effective operational utilization of aircraft and aircrew equipment assembly. The IAF

aircrew anthropometric survey 2013 was conducted a decade back and the survey data of 57 anthropometric parameters is being used by all the agencies involved in aircraft and aircrew equipment assembly design and development. The comparative analysis between the erstwhile anthropometric data (AR&DB 317 study conducted in 1987) and 2013 survey revealed an increase in the percentile values of all selection parameters. The secular trend is a known entity over the period of time in human physical growth. With the significant thrust towards indigenization of aircraft and aircrew equipment assembly, it is necessary to analyse the critical anthropometric parameters for any change in trend. The department of human engineering conducts the anthropometric assessment of all the aircrew candidates before entry into flying duties and serving aircrew on requirement basis. The critical anthropometric data of aircrew candidates available at the department of human engineering from 2015 – 24 were listed out and descriptive analysis and percentile range for each parameter was calculated. The comparison between 1st, 3rd, 50th, 97th and 99th percentile of each parameter between AR&DB 317 study, 2013 IAF aircrew anthropometric survey and present study was deliberated and same will be discussed.

Changes in anthropometric parameters causing rejection of aircrew to fly trainer aircraft

A Anchan

Introduction: The anthropometric selection criterion is meant to ensure aircrew-aircraft compatibility during training and later, without compromising individual comfort and safety. So, it is necessary that the right man fits into the right machine. It is known that anthropometric parameters change to an extent that an aircrew who had once flown an aircraft may in due course outgrow to fly in the same aircraft. Aircrew who is flying in an operational fleet comes back to train cadets in a trainer aircraft as a Qualified Flying Instructor (QFI). In view of the above, all aircrew mandatorily undergo assessment of anthropometric parameters to check for the compatibility of trainer aircraft before being detailed for the QFI Course. The change in the anthropometric parameter may lead to incompatibility with the trainer aircraft (Kiran Mk-I and Pilatus) leading to rejection of aircrew for the QFI course. The major anthropometric factors that lead to such rejections, need to be studied to understand the pattern and possible reason for the same.
Aim: To determine the changes in anthropometric parameters causing rejection of aircrew fly trainer aircraft.
Material and Methods: A retrospective study of the anthropometric measurements of pilots available at No 02 Aero Medical Training Centre, the data was collected from January 2019 to June 2024 and statistical analysis was done using Microsoft excel software. All the anthropometric measurements were taken in IAM Anthropometric platform.

Results: The sample population included 258 pilots (both genders) for whom anthropometric measurements were done. Out of this total 06 aircrew were found unfit as per the parameters for both the trainer aircraft. Eight aircrew were found fit after the cockpit trials (06 x fit for both Pilatus and Kiran aircraft, 02 x fit only for Kiran).
Discussion: Sitting height and leg length are important parameters that led to rejection of aircrew for the trainer aircraft. Possibly, these parameters were affected due to the change in body fat distribution in comparison to the entry level. The implications of the same has been discussed.

Social media engagement and well-being among military aviators

Iyer Srihari

Introduction: Military aviators operating in field areas heavily rely on Internet for communication and recreation purposes. Social media like Facebook, WhatsApp, Twitter etc are used for this purpose. These platforms are rapidly permeating into the daily lives of this population and becoming a major influence on their well-being. Social media engagement measures the public shares, likes and comments for an online business' social media efforts. Engagement has historically been a common metric for evaluating social media performance. User engagement consists of a portion of user experience, a psychological state and user behaviour. Social media users feel glad to receive positive reinforcement for their updates in the form of “likes” and “comments,” which motivates them to engage and update more in social networking sites. This keeps them eagerly waiting for the responses from their network. Social media can thus, contribute to increase in overall smartphone use, which has been associated with negative outcomes such as impaired social interactions, social isolation, as well as both somatic and mental health problems, including anxiety, depression and stress. Therefore, this study tries to understand the effect of social media engagement on military aviators’ well-being.
Material and Methods: The study is of a descriptive nature, with a cross-sectional design. Two standardized questionnaires were used- Social Media Engagement Questionnaire (SMEQ) and WHO-5 Well-being Index, on military aviators (n=175). The SMEQ measures the extent to which people’s key daily activities tend to involve social media. It consists of five items on a scale with response choices ranging from “Never” to “Seven” per week. The WHO-5 is a widely used questionnaires assessing subjective psychological well-being consisting of 5 simple and non-invasive questions, which tap into the subjective well-being of the respondents. To understand the effect of social media engagement and well-being among military aviators, descriptive statistics and ANOVA was used.

Results: A total of 175 responses were obtained electronically from military helicopter pilots. The mean age of the participants was 31.6yrs ± 4.63(SD) with flying experience ranging between 200-4,500hrs. All the participants were males. Pearson Correlation showed a moderate significant negative correlation between Social Media Engagement and Psychological Well Being (r = -0.424, p=0.01). 17% of variability Psychological Well Being can be accounted for Social Media Engagement. There is a linear relationship between the variables. The regression model statistically significant predicts the outcome variable of Psychological Well Being and is a good fit. The coefficient of Social Media Engagement (-.263) is statistically significant as its p value of 0.002 is less than 0.05.

Conclusion: The result of the present study demonstrates that reduced social media engagement leads to more psychological well-being. The key is to create a well-balanced social media engagement and satisfaction which will enhance the psychological well-being and improve flight safety.

Session-X

Decompression chamber test for aircrew: need for customised standardisation

DK Khukhar

Background/ Introduction: Evaluation of aircrew/ paratroopers to ascertain capability to withstand sudden/ anticipated pressure changes without adverse effects (barotraumas) is carried out in human rated Decompression Chambers. As per prevailing protocols, ear clearance run in a decompression chamber/ decompression chamber test is mandatory for undergoing indoctrination/ training in Hypobaric Decompression Chamber and also for aeromedical clearance to resume flying as aircrew after treatment of diseases/ injuries involving air filled cavities. There appears to be need to have standardised protocols across all aeromedical centres, customised to the type of disability and profile of the aircrew rather than having one single clearance decompression chamber run for all.

Methodology: Decompression Chamber test protocols followed at Institute of Aerospace Medicine, Bengaluru for various training/ indoctrination activities, clinical aeromedical disposition and aeromedical research were analysed. Data of decompression chamber tests and ear clearance runs for the period starting January 2019 till July 2024 was collated and analysed. Pressure changes anticipated as per profiles considered.

Findings/ Results: Decompression Chamber Test with rate of ascent as well as descent of 3000 feet/minute from ground level to 10000 feet simulated pressure altitude, is the sole criteria of chamber test. All healthy aircrew who were exposed to ear clearance run during the period as pre-requisite clearance for higher

altitudes training / indoctrination cleared the ear clearance run without exhibiting any symptoms/ signs of barotrauma. In the same period a total of 84 individuals were subjected for decompression chamber test for assessing their fitness to fly as aircrew after completion of their treatment for diseases. 14 out of 84 aircrew failed Decompression Chamber test as they could not clear the rate of ascent and descent of 3000 feet per minute.

Discussion: The paper discusses the absolute pressure changes and rate of change of pressure which are experienced in various types of aerial platforms manned by aircrew and which experienced by paratroopers during free fall. 'One Size Fits All' approach by putting a benchmark of one single rate i.e. 3000 feet per minute ascent and descent by changing pressure altitude denies clearance and fitness to fly to such aircrew who as per type of their aircraft may never be required to face such pressure changes routinely or even in emergencies related to their aircraft. Therefore, customised aircrew type specific Decompression Chamber tests and clearance criteria are proposed. After vetting through stake holders, these customised profiles may be standardised for all three aeromedical centres where such Decompression Chamber tests are conducted for aeromedical decision making.

Conclusion: Only one benchmark for clearing Decompression Chamber test is restrictive and there is need to customise Decompression Chamber test profiles to be applied in all military aeromedical centres.

To study the physiological changes and effect of intermittent mild normobaric hypoxia exposure on acclimation to high altitude

G Harshavardhan

Introduction: At present, troops take 06 days for Acclimatisation above 9,000 ft and 4 days each for acclimatization above 12,000 ft and 15,000 ft. However, operational scenario may not allow this much duration for acclimatisation. Shorter period for acclimatisation or acclimation in a simulated mild hypoxia environment may facilitate deployment of troops for detachment to High Altitude Areas faster, which would immensely help in operations. Exposure to intermittent hypoxia in low lands for a certain period of time could accelerate the process of acclimatisation. In view of the above, a need was felt to carry out a study to determine the effect of intermittent normobaric hypoxia exposure simulating medium altitude (equivalent to 7000 ft) on acclimation to high altitude.

Method: Exposure of participants to Intermittent Hypoxia in the form of Normobaric hypoxia equivalent to medium altitude (equivalent to 7000 ft) for 14 days and periodic assessment for their acclimation status was carried out in Hypobaric Decompression Chamber at 15,000 ft. Participants were exposed to intermittent mild hypoxia in two ways; one group participants were given mild hypoxia exposure in Normobaric Hypoxia Enclosure and other group participants through Reduced Oxygen Breathing Hoods. Physiological parameters, exercise tolerance, biochemical markers and cognitive

performance were recorded at baseline and subsequently periodically till 14 days of exposure to intermittent mild hypoxia.
Results: Changes in the physiological parameters, exercise tolerance, biochemical markers and cognitive performance from baseline are analysed and compared using appropriate statistical method.
Discussion: This study discusses the changes in the above mentioned parameters on exposure to intermittent normobaric hypoxia, thereby indicating acclimation status of the participant to high altitude.

Accelerated Altitude Acclimatization and Hypobaric Hypoxia: A Proof-of-Concept Study from Rats to Humans

Yasmin Ahmad

Introduction: High-altitude environments, characterized by low atmospheric pressure and reduced oxygen levels, pose significant challenges across various domains, including geopolitical security, aerospace operations, sports, adventure travel, and recreational medicine. The process of acclimatizing to high altitudes involves the body establishing physiological and molecular equilibrium in response to hypobaric hypoxia, a condition where reduced oxygen availability leads to various physiological stresses. Traditionally, acclimatization entails a gradual ascent, allowing the body to adjust over several days before moving to higher altitudes or returning to lower elevations. However, the accelerated pace of modern life necessitates more efficient acclimatization methods, particularly for military personnel, astronauts, and high-altitude tourists with limited time but enhanced logistical support for high-altitude or aerospace travel. The primary challenge in such endeavors is the human body's capacity to adapt quickly to hypobaric hypoxia.
Material and Method: Our study presents a proof-of-concept for an accelerated acclimatization approach, observed in SD rats and partially confirmed in humans at high altitudes. By leveraging advanced techniques such as high-throughput proteo-bioinformatics and classic ELISA, we explored the underlying mechanisms facilitating rapid acclimatization.
Result: Our findings indicate that the interplay between STAT3, RXR, and Nrf2 proteins triggers a systemic proteomic response that enhances the body's ability to adapt to extreme hypobaric conditions encountered in high altitude environment. Furthermore, we introduce a panel of proteins capable of objectively assessing an individual's acclimatization status.
Conclusion: In conclusion, our study offers a pioneering approach for rapid acclimatization to high-altitude environment, introducing a potential protein panel for evaluating acclimatization readiness. This research has significant implications for high-altitude activities, potentially revolutionizing how we approach safety and efficiency in expeditions and missions involving extreme environmental conditions

Nine step tympanometry: screening tool for eustachian tube dysfunctions

Neha Rao

Background and Objectives: Eustachian tube dysfunction (ETD) is a commonly diagnosed disorder of Eustachian tube (ET) opening and closure, which may be associated with severe symptoms and middle ear disease. Presently, the Ear Clearance Run (ECR) in the Decompression Chamber (DC) is used to assess their ET patency and functioning. Individuals with ETD when subjected to high descent rates like in the ECR, are at an increased risk to develop barotrauma. Hence, a need was felt for a relatively safe test for evaluating ET function in aircrew / paratroopers.

Methods: 105 combat free fall (CFF) trainees participated in the study. Following an initial ENT examination, 9-step tympanometry was done. In the test 04 tympanograms, which included a baseline tympanogram, tympanogram after positive pressure (+200 mm H_2O), tympanogram after negative pressure (-200 mm H2O) and a final tympanogram after releasing the pressures were recorded for each ear. The participants were then subjected to the ECR in the DC chamber where they were subjected to an altitude of 10,000' with an ascent and descent rate of 3000fpm. Post run ENT examination was done. The differential peak compliance pressures from the baseline in the 9-step tympanometry were calculated for predicting ETD and were analyzed in comparison to the barotrauma cases in the ECR in the EDC.

Results: Results showed the 9-step tympanometry had a high sensitivity of 90.91% but a very low specificity 7.45% when compared with the ECR in the EDC. On analyzing the data, it was also observed that a difference between peak compliance pressure if reduced from 20 mm H_2O it would give better sensitivity as well as specificity.

Interpretation and conclusion: The results of the study indicated a fairly reasonable possibility of barotrauma in cases who were found to be positive on 9-step tympanometry. Therefore, as an interim measure, ETD cases requiring ECR prior to upgradation, local assessment with 9-step tympanometry prior to referral to IAM may be considered. CFF trainees who have cleared DC run in the past may not be detailed again and cleared for a new course with 9-step tympanometry.

Session-XI

Roadmap for 'IAM spaceflight aeromedical certification standards (ISACS)' and a comparison with existing global practices

Dr Gaurab Ghosh

Introduction: Spaceflight medical standards lay down the aeromedical requirements for selection, crew health certification and mission authorisation. Global space agencies have adopted medical standards which vary between different countries. These standards have evolved over time in light of mission parameters, biomedical advancement and progressive knowledge of in-flight medical events. The standards of countries with advanced human spaceflight programmes are not directly applicable to the fledgling programme of India. Hence, it is pertinent to develop indigenous aeromedical certification standards based on prevalent medical conditions and mission requirements. This paper presents the roadmap for developing medical standards for Indian astronauts. The proposed standards are also compared with NASA Spaceflight Medical Selection, Recertification and Mission Evaluation Standards.

Method: A review was carried out of the medical requirements of erstwhile human space missions of 1960s and their evolution till date. The Indian spaceflight selection processes in 1984 (for Indo-Soviet Space Mission) and 2019 (for Gaganyaan Mission) were audited, along with the longitudinal data of medical and psychological events in the Gaganyaan mission between 2020-2024. Additionally, the current Russian and American standards for flight certification were compared.

Results: A document was formulated laying down the protocols and standards of aeromedical certification of Indian astronauts. It covered the processes of astronaut selection, periodic evaluation, mission authorisation, pre-launch isolation and post-flight re-certification at the Institute of Aerospace Medicine (IAM).

Discussion: The IAM Spaceflight Aeromedical Certification Standards (ISACS) is a comprehensive document stipulating protocols for fitness and temporary/ permanent unfitness of Indian astronauts during various phases of the programme from selection to post flight re-certification. It also provides the mechanism for medical appeal and revision of the current standards to keep pace with the changing aeromedical knowledge and mission requirements.

Conclusion: Health assessment and risk stratification are dynamic processes. Hence, medical standards like the ISACS are required, which facilitate protocolised aeromedical decision-making.

Astronaut health stabilization programme: Roadmap for Gaganyaan mission

Polash Sannigrahi

Introduction: The success of a crewed spaceflight mission depends a lot on the preventive measures implemented to protect crew health. Such prevention is achieved by health stabilisation during pre-flight isolation. Health Stabilization Programme (HSP) has evolved over decades of human space missions to minimize crew exposure to infectious disease before spaceflight. The HSP employed in the ISS program is specific for the USA/ NASA health standards and hence, not directly applicable to an indigenous one, where the prevalent communicable diseases and mission timelines are different. Hence, it is imperative to have a customised health stabilisation programme in place for the upcoming Gaganyaan Mission. This paper presents a roadmap for HSP in an indigenous pre-launch isolation facility. It also compares the proposed guidelines with existing international standards.
Method: A review was carried out of the global Health Stabilisation Programmes employed in the 1960s and their evolution till the ISS missions. The standards were compared with that of other health quarantine facilities, like Operation Theatres and COVID-19 quarantine facilities. Finally, inputs were obtained from subject matter experts in advanced human spaceflight programmes.
Results: A document was formulated laying down the guidelines for pre-launch Health Stabilisation of Indian Astronauts. It included protocols for setting up of an isolation facility, the aeromedical activities planned during isolation to ensure disease prevention without compromising on crew's preparation for launch and finally, an overview of the procedures for pre-launch astronaut contiguity.
Discussion: The Pre-flight Health Stabilisation Programme for Indian Astronauts is a comprehensive document stipulating the aeromedical requirements in environmental control, food handling and establishment of contacts to ensure astronauts' health stabilisation.
Conclusion: The Health Stabilisation Programme is a crucial step in mission accomplishment for human spaceflight programmes of any duration.

Dynamics of carotid arterial blood flow during simulated microgravity and lunar gravity

Gain S

Introduction: The carotid arteries are critical in maintaining cerebral perfusion. Previous studies have investigated the effects of microgravity on cerebral blood flow, but there is limited research on the specific dynamics of carotid arterial blood

flow during simulated microgravity and lunar gravity. The aim of this study is to investigate the dynamics of carotid arterial blood flow during simulated microgravity and lunar gravity.

Material and methods: Thirty healthy male volunteers in the age range of 20-35 years participated in a repeated measure experimental design to simulated microgravity and lunar gravity. Microgravity was simulated by -6° Head-down tilt and lunar gravity by 10° Head-up tilt. A 4 MHz doppler probe was used to measure the extracranial blood flow in the carotid artery. The Peak velocity, Mean Velocity, Diastolic velocity, Pulsatility Index (PI), Resistive Index (RI), Systolic-Diastolic ratio (S/D), Systolic Rise Time and Heart rate were measured at left and right carotid arteries at Baseline in supine position, -6° HDT and 10° HUT following six hours of simulation.

Results: Peak velocity reduced significantly in the left carotid artery during microgravity (51.4±10.61 cm/s) and lunar gravity (52.8± 12.78 cm/s) from baseline (62.0 ± 16.59 cm/s) as well as in the right carotid artery from baseline of 64.2 ± 17.95 cm/s to 53.9 ± 18.22 cm/s during microgravity and 54.7±14.42 cm/s during lunar gravity. Mean Velocity, Diastolic Velocity and Pulse Interval reduced significantly during simulated microgravity and lunar gravity.

Discussion: In microgravity or lunar gravity, the lack of gravitational pull causes fluids in the body to shift from the lower extremities to the upper body and head. This cephalad fluid shift can increase intracranial pressure and lead to alterations in cerebral blood flow regulation, ultimately reducing carotid arterial blood flow velocity. The changes in sympathetic and parasympathetic balance can lead to reduced vasoconstriction or altered heart rate responses, which may decrease blood flow velocity in the carotid arteries. Altered Baroreceptor Function may also contribute to increased vascular resistance leading to reduced blood flow velocity.

Conclusion: The study highlights that simulated microgravity and lunar gravity significantly reduce carotid arterial blood flow velocity. The reductions in peak, mean, and diastolic velocities, along with changes in pulsatility and resistive indices, suggest that both microgravity and lunar gravity induce substantial alterations in cerebral hemodynamics.

Changes in the isokinetic muscle strength of the knee after 24 hrs simulated microgravity and efficacy of a standardized exercise protocol

George SO

Introduction: Exposure to simulated microgravity, especially during Dry Supine Immersion (DSI) led to body deconditioning, characterized by effects mainly on cardiovascular, respiratory, and neuromuscular systems and milder yet significant effects on other systems. The effect on the muscle strength of the lower limb

muscle during short duration spaceflight needs to be explored as India is gearing up for future space missions.

Material & Methods: 12 healthy male volunteers between the age of 20 – 40 years participated in a repeated measure study. The volunteers were exposed to simulated microgravity in the DSI Facility for 24 hrs before (Phase I) and after (Phase-III) 8 weeks of core muscle strengthening exercise intervention. Isokinetic strength testing of muscles at knee was tested before and after DSI, before and after standardized exercise protocol.

Results: Repeated measures ANOVA was used to compare the changes in muscle strength before and after exposure to DSI and that following the exercise protocol. The Muscle strength and power reduced post DSI in Phase I and Phase III, however, there was a significant increase in muscle strength and power post standardized exercise regime.

Discussion: The simulated microgravity (DSI) leads to decrement in muscle strength and power due to unloading of muscles and immobilization. However, the countermeasure like standardized exercise regime has prevented in attenuation of muscle strength.

Conclusion: Early changes in muscle strength was seen even with 24 hours exposure. Accordingly, specific structured exercises can be planned depending on the mission duration.

Session-XII

Effect of selected anti-hypertensive agents on baroreflex sensitivity and relaxed +Gz tolerance in aircrew

Biplab Bhowmick

Background: Hypertension is currently one of the most common ailments which afflicts not only the general population but also aircrew. Hypertension is a major risk factor for cardiovascular and cerebrovascular incidents. Demanding nature of Military flying subjects an aircrew to various aeromedical stressors during mission. The cardiovascular risk factors increase by manifold if an aircrew develops hypertension. Aviators with hypertension should resort to lifestyle modifications to enable optimal control of blood pressure. If lifestyle modifications failed to provide desired result, pharmacotherapy needs to instituted. Scanty literature available on effect of anti-hypertensive drugs on relaxed +Gz tolerance and baroreceptor sensitivity. With an aim to study the effect of antihypertensive medications on +Gz tolerance and cardiovascular responses to orthostatic stress in healthy Indian males, the present study was undertaken.

Material & Methods: 13 aircrew diagnosed to have hypertension and on prescribed medications for control of blood pressure were selected in the study. The participants were divided into three groups. The first group comprised of six

aircrew taking Angiotensin Converting Enzyme inhibitors (Ramipril/ Enalapril). The second group was constituted by six aircrew who were on Angiotensin Receptor Blockers (Losartan/Telmisartan) and the last group with only one aircrew taking Thiazide Diuretics (Natrilix-SR).

Results: Relaxed +Gz tolerance, though did not differ significantly among different groups, it was observed to be highest in ACEI group. Heart rate at resting supine in control and drug treated groups were comparable. Heart rate increase was attenuated during orthostatic stress in all three drug groups suggesting a sympathoinhibitory effect of drugs on heart rate. Baroreflex sensitivity at resting supine was significantly lower in drug treated groups as compared to control group. The sensitivity of baroreflex reduces further in all groups during orthostatic stress. Reduced baroreflex sensitivity is an indication of sympathoexcitation. Peripheral resistance and arterial compliance at resting supine were significantly higher and lower in drug groups respectively when compared to control group. Peripheral resistance increases further during orthostatic stress. Largest increase in peripheral resistance during orthostatic stress was observed in ARB group. This suggests an enhanced sympathoexcitation in them.

Conclusion: ACEI group had fared better than ARB group as far as resting heart rate and systolic blood pressure were considered. When other cardiovascular parameters were considered, ARB group fared better in ten different counts from their ACEI counterpart.

High G training program with "push-pull" elements: A review of IAF experience

Avinash BK

Introduction: Pilots of fighter aircraft are often exposed to manoeuvres that produce negative acceleration (−Gz) immediately followed by positive acceleration (+Gz). This sequence has been found to reduce tolerance to +Gz, a phenomenon known as the "push-pull" effect (PPE). In IAF, trainee pilots are exposed to simulated push pull manoeuvre in Dynamic Flight Simulator during Operational Training in Aerospace Medicine (OPTRAM) to demonstrate the deleterious effects of PPE. Current study aimed at evaluating the efficacy and utility in PPE component during OPTRAM.

Methods: The profile for assessing G tolerance at gradual onset rates(GOR) involves Gz build up from baseline of 1.4Gz at a rate of 0.1G/s. The level of +Gz at which peripheral light loss (PLL) was reported during GOR is considered as level of G tolerance. The profile for PPE involves exposure to -2Gz from baseline of +1.4Gz. After 10 secs at -2Gz, the centrifugal force builds up at the rate of 1.5G/s upto baseline. This is followed by gradual build-up of +Gz at the rate of 0.1G/s. The level of +Gz at which PLL was reported is calculated as G tolerance

post PPE. The G tolerance after PPE was compared with G tolerance at GOR for any statistically significant variation.

Results: Data of 141 aircrew were analysed retrospectively, Mean age 26.78±0.3, Height 174.94±0.44, Weight 72.30±0.65, Flying hours 400.44 ±24.97. The Mean G tolerance with R-GOR was 4.66± 0.07. Mean G tolerance after PPE at -2G for 10 seconds was 4.52±0.56. T test reported that Mean R-GOR tolerance and G tolerance post PPE with p value of 0.02. However, the reduction of G tolerance was noticed only in 55%(n=78) cases, no change in 11%(n=15) and increase in G tolerance was noted post PPE in 34% cases(n=48).

Conclusion: The PPE has been implicated as an important cause of G-LOC, ranging from 29–31% in different studies. Thus, simulation of PPE during High G training is essential. If the intended objective is not being achieved effectively, a relook at method of PPE simulation may be considered.

Centrifuge evaluation of cases of suspected low G-tolerance (2008-2024): an IAM experience

Kumar S

Background: With the introduction of highly maneuverable and agile fighter aircraft, the task of the aircrew has become more challenging requiring high degree of physical and mental fitness. This also warrants ability to sustain repetitive exposure to positive Gz acceleration of moderate to high magnitude during combat flying. Aircrew with lower G tolerance is more likely to experience symptoms of G stress in flight which can be a concern for flight safety as well as to jeopardize the mission. All cases of in-flight LOC needs to be evaluated before labeling as low G-tolerance.

Case Details: A retrospective analysis of existing database at Dept of AP&SO, IAM was carried out from 2008 to 2024 to identify cases referred for evaluation of low G-tolerance or symptoms suggestive of grayout, blackout, Almost Loss of Consciousness (A-LOC) or G-induced Loss of Consciousness (G-LOC). A total of 05 cases were found that included under-trainee cadets and trained pilots as well, referred to IAM with symptoms varying from tunneling of vision, headache, greyout, blackout to frank G-LOC for few seconds to as long as 10s. All these cases were thoroughly evaluated at IAM to rule out any organic cause followed by HPHC evaluation. One was detected with focal cortical dysplasia involving Lt frontal operculum & insula on CEMRI which explained the cause of multiple episodes of LOC in-flight. One had cleared high sustained G after proper AGSM training and was subsequently advised physical conditioning. Three of them were recommended for re-streaming as there was no improvement in their G-tolerance despite significant improvement in their physical conditioning.

Conclusion: Low G-tolerance is the inability to tolerate 7Gz for 15 sec with anti-G suit and AGSM or 5Gz without G protection with a high onset rate of at least 3G/sec. All the reported pilots were young and despite proper physical conditioning 03 of them could not sustain high G and were subsequently re-streamed as they

posed high safety concern. One was repeatedly failing due to improper AGSM and after proper training he was able to successfully meet the goal. One of them was found to have an organic cause for his frequent in-flight LOC which was mistaken for G-LOC, this reiterates the need for thorough evaluation before labeling a case as low G-tolerance.

Operational centrifuge training of fighter aircrew: Two cases of G measles

James S

Introduction: Modern day aircrafts are capable of generating sustained acceleration resulting in much larger force of gravity acting on human body, which can induce certain physiological changes and G-measles is one such. These are small punctate bruises or petechiae arising from overwhelmed capillaries that rupture and resolve in several days without sequelae.
Case details: Two cases of G measles were identified between 2020-2024 while conducting High-G training in Dynamic Flight Simulator (DFS).
Case 1: A 28-year-old pilot of moderate built and medium complexion from fighter stream had C/o red coloured rashes over both upper limbs, after he had completed his high-G run as a part of OPTRAM course. O/E: Multiple petechiae were seen over both the arm and forearms (dependent areas).
Case 2: A 25-year-old pilot of moderate built and fair complexion from fighter stream had C/o irritation over both upper limbs, after he had completed his high-G run as a part of OPTRAM course. O/E: Multiple petechiae were seen over both the arm & forearms and also lower border of chin (dependent areas).
Discussion: These cases highlight the effects of increment in intravascular pressure on acute mechanical properties of the blood vessels. Skin capillaries also show certain effects on exposure to high G. The high vascular transmural pressure across the walls of the capillaries in the skin of dependent parts produced by exposure to increased +Gz gives rise to transudation of fluid and rupture of these vessels resulting in petechiae. G-measles/ Geasles refers to multiple petechiae on the foot, leg, buttocks and forearm after repeated or prolonged exposures to acceleration greater than about +6Gz. This condition being self-limiting and resolves spontaneously, no treatment is recommended or required.
Conclusion: Occurrence of G-measles is not a common entity in the aviation world. As per our experience in the institute, 02 cases of G-measles have reported in the past four years. This is a self-limiting entity not requiring any active management. Therefore, aircrew and Aerospace Medicine Spl Community should be aware of this condition and its disposal.

Session-XIII

Perception of oral health and oral health related quality of life (OHRQOL) assessment amongst aviators in armed forces

Col S K Kaushik

Introduction: Flying an aircraft requires immense concentration, coordination, and multitasking abilities. A dentally unfit symptomatic pilot is at a higher risk of making errors due to fatigue, reduced cognitive function, or physical limitations. Such impairments can lead to poor decision-making and potential safety hazards during flights. Poor oral health may lead to frequent pain and dental visit-related absences, affecting flight schedules and causing disruptions in an already dynamic and demanding combat aviation environment. Oral Health-Related Quality of Life (OHRQoL) is a multidimensional study construct that includes a subjective evaluation of the aviator's oral health, functional well-being, emotional well-being, expectations and satisfaction with care & sense of self.

Material & Methods: A cross sectional observational descriptive cohort study was undertaken based on a Likert scale online survey form disseminated amongst aviators across age groups and aircraft streams from the tricolored uniformed services to asses and quantify the impact of oral health as a quality of life indicator amongst military aviators in the armed forces through their perception of oral health in relation to the peculiarity of their profession. The survey form was analysed for the responses and derivations were concluded.

Results: A total of 417 aviators participated voluntarily in the survey with 32.4% of age group 41 and above, 29% being 25-30 age group, 24% 31-35 age group and 14.6% being of 36-40 age group. Aviators from fighters were 38.3%, helicopters were 41%, Transport were 17.3% and UAV/RPV were 4%. Responses with respect to number of flying hours clocked were equitable between 16-21% amongst various categories. Almost 68% of responders had visited the dentist for undergoing a procedure subsequent to clinical symptoms. 15% of the aviators reported positive for habitual non-productive clenching or grinding of teeth. 35% reported positive for smoking. 93% reported average and above satisfactory with respect to management of their ailment. Various reasons for difficulties in accessing dental care were distance from unit, limitations due to long and odd working hours, non-availability of specialists at peripheral centres and loss of manpower hours since certain dental procedures are lengthy and requires repeated sittings.

Conclusions: The study helped in getting insight of the perception and understanding the importance of oral health and the level of satisfaction of the quality and standard of care rendered amongst armed forces aviators.

Adjunctive use of hyperbaric oxygen therapy (HBOT) in non-healing wounds – a south indian experience

Ajith Kumar.S

Background: Hyperbaric oxygen therapy (HBOT) has been used as an effective adjunctive treatment for diabetic foot wounds/ infections. HBOT improves wound tissue hypoxia, enhancing perfusion, reducing edema, promoting fibroblast proliferation, collagen production, and angiogenesis make it a useful adjunct in the management of “problem wounds” such as diabetic foot ulcers.
Aim: To assess whether HBOT can be effectively used as a routine tool in non-healing wounds in patients. We will also discuss the main indications for which HBOT is used in civil hospitals and its clinical outcome.
Materials & Methods: Hospital based Observational study from September 2014 – January 2024. Number of Patients = N = 1380. Post HBOT follow up period for about 6 months – 1.5 years.
Inclusion criteria = All the patients are either referred or reported to us as not responding to the standard modalities of treatment for non-healing wounds due to various etiologies Response of HBOT is assessed with pre, post photos of wound and Tcpo2 value. Outcome of wound healing is classified as completely healed, partial healed and drop out cases.
Results: Analyzed as following, based on etiology of wounds, percentage of patients with diabetes, Previous H/O Amputation = 18.9%, Duration of DM (>10yrs) = 54 % POAD Cases = 33.5%, Wagner Ulcer staging adopted for diabetic foot ulcers. Recurrence of ulcer after HBOT was also assessed. Tcpo2 Pre HBOT = 36.8± 14.1. Tcpo2 Post HBOT = 58.3± 10. Average number of HBOT sessions was 20.2± 1.
Conclusion: HBOT shown to significantly improve the healing of non-healing ulcers, early initiation of HBOT is a viable option in enhancing amputation free survival in diabetes patients suffering with non-healing wounds.

Vestibular schwannoma and aviation safety: Guidelines for pilot with fitness to fly

Jagadeeswaran V U

Background: The pilots recruited in Indian aviation industry undergo stringent medical evaluation as per international civil aviation organization 2012 to ensure the safety of both the flight crew and its passengers. Among the various medical conditions that can affect a pilot's ability to safely operate an aircraft, acoustic schwannoma (also known as vestibular schwannoma) is of particular concern. Acoustic schwannoma is a slow growing benign tumor that develops on the vestibulocochlear nerve**.** Civil Aircrew on being referred to boarding center for fitness to fly, many other aspects are analyzed critically and scrutinized, given the

crucial role of flying an aircraft, given the condition Vestibular Schwannoma can impact an individual's fitness to fly as it impacts both hearing and balance.

Method: It was a Prospective observational study conducted between Jan 2022 to Dec 2023 at ENT Department, one of the boarding centers designated for medical examination of civil pilots in India.

Result: A total of 10 pilots were diagnosed to have vestibular schwannoma and appeared for ENT evaluation at IAF Medical Evaluation Centre, of which all were having unilateral hearing loss. Six pilots were on conservative management / observation. Three pilots have undergone Stereotactic radiotherapy and one pilot have undergone surgery. Other than the unilateral hearing loss none of the pilots gave history of tinnitus or vertigo. Vestibular evaluation was not done on all the 10 pilots as they gave no history of any vestibular symptoms. The history with regards to vestibular symptoms in these 10 pilots may be more biased as the pilots fear their license getting on hold or cancellation or reducing their professional role by placing in Pilot in Command and Qualified Experienced Pilot (PIC &QEC).10 pilots had severe unilateral hearing loss and they were made fit to fly- Pilot in command (PIC) based on speech discrimination score greater than 80 percent (3 pilots) or based on satisfactory executive report on flying (7 pilots).

Conclusion: A Pilot on being referred to boarding center with Vestibular Schwannoma, his or her fitness to fly should be determined by the size of the tumor, auditory status, and vestibular status. The complications that may arise while undergoing surgical or stereotactic radiotherapy treatment for Vestibular Schwannoma must also be considered.

All pilots with Vestibular Schwannoma should be reviewed 6 monthly at board center. They should mandatorily undergo imaging, hearing evaluation and vestibular evaluation. Serial Imaging is performed every 6 months to ensure track of tumor growth rate and help to decide initiating treatment like radiation oncology / microsurgery. Auditory assessment is performed by pure tone audiometry (PTA), speech discrimination score (SDS) and Brainstem evoked response audiometry (BERA). Vestibular evaluation is carried out for any spontaneous nystagmus recorded in Videonystagmography (VNG), No Postural deviation and Normal head shaking test. Considering that vestibular schwannoma can affect the balance at any given time all the pilots should be placed in Pilot in Command and Qualified Experienced Pilot (PIC&QEC) with a satisfactory executive report on flying or on simulator.

Guidelines related to Vestibular schwannoma are limited and not updated by international civil aviation organization ICAO (2012 edition). The management of vestibular schwannoma has evolved over years. Of late the focus is more on cranial nerve function preservation rather than solely pursuing complete surgical tumor removal. As per the latest changes in treatment goals and management plan of vestibular schwannoma the guidelines for flying fitness have to be revised by Directorate General of Civil Aviation (DGCA) and brought in in new Aeronautical Information circular (AIC).

A study on comparative efficacy of the three types of alcohol breath analyser machines at AF Stn Adampur

Parul Goel

Introduction: Breath Analyser testing for aircrew has become mandatory both in military and civil aviation. It is therefore essential to test the efficacy of BA machines, in effectively mirroring the Blood Alcohol Levels.

Aim: To test and compare efficacy of various types of alcohol BA machines currently in use at the base.

Objective. Test all the subjects with the three breath analyser models at periodic intervals and compare it with the Blood Alcohol Levels as specified in the study protocol.

Material and Methods: A total of 20 volunteer subjects were selected for the study (Test subjects n =16, control subjects n = 04). Three different types of BA machines based on Fuel cell sensor technology were utilized for the purpose of study. All the test subjects consumed 60 ml of measured alcohol. Breath Alcohol readings were taken in all the machines simultaneously at 15 min, 1 h, 2 h, 2h 30min, 3h, 3h 30min, 4h, 4h 30min, 5h and 5 h 30min till every subject tested negative in all the machines. Two blood samples were taken for correlation purposes.

Results: All test subjects, reported positive readings at 15min and at 1 hour. The results between all the machines were consistent. Alcohol was detected in blood even though the breath analyser showed NIL reading, in the first blood sample. The second blood sample taken 2.5 hrs after first sample tested negative for alcohol.

Conclusion: There are low levels of alcohol in the blood even when Breath Alcohol Concentration becomes 0.00, thus it's not negative. Thus, BA machine should be utilized as an adjunctive tool and they are not an absolute indicator of Blood Alcohol Concentrations

Recommendation: The low levels of alcohol existing in aircrew blood even when Breath Alcohol Concentration is 0.00 are detrimental to aerospace safety. The time tested discipline followed by the aircrew of maintaining 'Bottle to Throttle' time of 12 hours still holds good. Though BA check lends more objectivity to the existing visual Pre Flight Fitness check but it's not an absolute objective tool.

Session-XIV-Closed Door Session

Assessment of sleep and fatigue among aircrew and groundcrew during sustained operations

MS Nataraja

Introduction: Sustained operations lead to loss of sleep and disruption of circadian rhythm, thereby resulting in operational fatigue thus posing a significant risk to individual as well as aerospace safety. This study was undertaken to quantify the subjective fatigue and its effects, among the aircrew & ground duty personnel during a sustained Ops exercise.
Materials and Methods: PSQI (Pittsburgh Sleep Quality Index) questionnaire and SOAP (Sustained Operational Assessment Profile) questionnaire were used for data collection during a sustained Ops exercise. A total of 305 aircrew and 277 ground crew from frontline Air Force bases. PSQI was administered on Day-1 and SOAP questionnaire was filled by the participants every day for the next 10 days. The data was compiled and analysed by using appropriate statistical tool.
Result: A total of 5820 responses were analysed. PSQI revealed that 15% aircrew and 8.5% ground crew had poor quality of sleep at the beginning of the exercise. SOAP revealed significant increase in ratings of the three cardinal dimensions (Cognitive, Affective and Arousal) among all the air warriors. Fleet-wise analysis revealed the fighter pilots had higher fatigue scores compared to transport and helicopter aircrew. Among the ground crew, the Maintenance support group rated the subjective effects higher than Operation and Administrative support group.
Discussion & Conclusion: The study revealed significant increase in Arousal dimensions (such as Fatigue, Poor sleep, etc.) in Fighter pilots and personnel of Maintenance support group. The study also brought out that, practicing good quality of sleep and employing work-rest scheduling of the air warriors are effective in mitigating the effects of military fatigue during Sustained Ops.

Aircraft accident factors - fighter aircraft accident: HFACS-90 & lessons to learn

Dr Murtaza

Brief Narrative: A Fighter aircraft crashed shortly after take off from a forward base. Pilot ejected safely but sustained few injuries. Technical defect in terms of engine failure was found to be the main cause as Turbine Blades failed during. External evaluating agency opined breakage of one of the turbine blades due to fatigue fracture as primary cause which further led to secondary failure of other blades in the air. Exact answer to why blade failed in spite of well within shelf life could not be found as OEM failed to provide any concrete response. Few

possibilities were deliberated upon like design deficiencies, manufacturing defect, improper servicing procedures, operational reasons etc.
Human Factors and Classification System Analysis (HFACS): Though at first look it appeared as straight forward material failure, HFACS revealed active and latent failures. First time, newly introduced HFACS-90 was used as tool to analyse various factors responsible for the accident. 198 Nano-codes were analysed covering four levels of HFACS ie Unsafe acts, Preconditions of unsafe acts, Supervisory lapses and Organizational failures. Based on various factors identified which were primarily or secondarily responsible for the accident, HFIX was utilized to recommend appropriate intervention strategies.
Conclusion: This paper discusses how comprehensive use of improved version of HFACS in terms of HFACS-90 and HFIX can help in identifying loopholes in the system and at the same time can suggest target oriented intervention strategies. Together these tools can go long way in improving flight safety.

Ejection spinal injury pattern analysis: An evidence based explication

Sqn Ldr Devdeep Ghosh

Introduction: Injury pattern analysis helps to establish a possible causal association of various factors related to man - machine interface in an aircraft crash. Unusual aircraft attitude and suboptimal ejection posture remain to be significant contributory cause of high incidence of ejection spinal injuries.
Case Report: Inescapable circumstances led to execute planned ejection by two aircrew from a jet trainer aircraft during a training sortie. During ejection, the 1st ejectee from starboard side of cockpit sustained minimal spinal injury with short duration of hospital stay. On the contrary, 2nd ejectee although claimed to have ejected in wings level condition, sustained significant spinal fracture, prolonged hospital stay and instance of hypotension with bradycardia during post-ejection observation in hospital. The objective of the study is to analyse the pattern of ejection spinal injuries of both the aircrew, correlate the injuries with the circumstantial evidences and to bring out the possible factors which could have contributed to this significantly high extent of spinal injury in 2nd ejectee.
Discussion: Spinal injury of 1st ejectee was likely due to inherent injury potential of Martin Baker H4HA ejection seat with DRI value 18.4. Assuming optimal ejection posture might have reduced the extent of spinal injuries. Despite considering the fact that the ejection seat has higher injury potential, possible age related degenerative changes and extent of injury depends on anthropometry of an aircrew, the spinal injuries sustained by the 2nd ejectee may be attributed to initiation of ejection in quick succession after starboard side ejection, in suboptimal ejection posture from an aircraft not completely in wings-level condition.
Conclusion: This paper emphasizes the importance of the detailed spinal injury pattern analysis, which may be used to sensitize the fighter aircrew about various contributing factors of ejection spinal injury and importance of assuming proper

ejection posture if the need arises. Practical training in ejection procedure simulator is invariably recommended for all fighter aircrew.

ABSTRACTS:

POSTER PRESENTATIONS

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Poster Session I

Aeromedical challenges in flying exercises overseas

Sneha Dinakar

Introduction: The Indian Air Force (IAF) has been participating in transcontinental flying exercises for over two decades. This was sporadic earlier, however, in the last ten years IAF has participated in at least eight such exercises away from home. In all these exercises the Aerosp Med Specialist or a Medical Officer accompanied the contingent. The contingent consists of aircraft, the fighters (usually twin-engine jets), the refuellers and the cargo plane to carry men and material. The ferry-in takes about nine days (and upwards) depending on the country of exercise and the prevailing weather.
Objectives: The objectives of the current study are to compile the experience of the Aerosp Med Spl who have been part of such exercises, group the lessons learnt during these and suggest an algorithm for future exercises.
Methodology: Personal communication and debriefs from Officers who have participated in two Red Flag and two Pitch Black flying exercises (latest of the multinational exercises).
Discussion: Usually, the contingent size is about 150 (officers and men) across the serving age group. The planning for the exercise happens with at least a year or six months for flying. The Medical officer is usually the last to be involved (3-4 weeks before commencement of exercise). This paper is attempted to bring out the challenges faced by the Aerosp Med Specialist/ MO in participating and providing medical assistance to such international exercises of repute. Inputs from officers who have previously participated in such exercises have been taken to put forth the challenges faced, their approach in handling them and plan of action to improve upon them.

Field studies on heat stress in low-level high speed flying & pre take-off phase in modern fighter aircraft and fighter trainer aircraft: is 'FITS' the right guide?

Pallavi Goswami

Introduction: Cockpit WBGT(Wet Bulb Globe Temperature) is a widely accepted method of assessing thermal stress in military flying, but it is not possible to always carry equipment, heat stress monitor (HSM), on-board for its measurement. Also, its relationship to ambient WBGT and OAT has limitations. It may be possible to predict cockpit heat stress with the use of FITS (Fighter Index of Thermal Stress) in certain fighter aircraft. Validation in IAF fighter upgrade aircraft and modern fighter trainer aircraft requires real time measurement of WBGT in the cockpit. Applicability and veracity of FITS is studied in IAF fighter- upgrade aircraft, during the entire low level high speed sortie, and its various stages and in the pre take-off phase.

Methods: Present flying restrictions are based on OAT alone. A test on utility of FITS in predicting cockpit WBGT, is attempted, to assess the suitability of FITS in IAF. Instrumentation of aircraft with HSM in the cockpit requires permission/ sanction for a defined period and purpose of research.

Ambient WBGT measurement was compared with real time cockpit WBGT. FITS value was compared with the maximum values of cockpit WBGT measured during low-level high speed flying (200m AGL, 0.6 Mach), the entire sortie, various stages and also, pre-take off phase in IAF fighter upgrade aircraft and modern fighter trainer aircraft.

Results: A precise assessment of cockpit heat stress was obtained with automatic online computation of WBGT every minute, from the time the pilot enters the cockpit, starts up, closes canopy, taxies, warms up and takes off till landing roll. Study of cockpit heat stress and the FITS highlights the latter's inapplicability in IAF fighter upgrade aircraft and modern fighter trainer aircraft. However, there is a predictive value indicated in the FITS zone (caution and danger) to pace precautionary measures for flight safety, rather than a dependency for accuracy in predicted value of cockpit heat stress.

Discussion: Though the best measure of heat stress on aircrew is cockpit WBGT, exploring the possibility to derive conditions, with 'FITS guidance' appropriate to aircrew comfort, is justified. Ambient WBGT measurement is applicable for stationary situations and not mobile units. There is unacceptable heat stress in pre take-off phase in modern fighter upgrade aircraft where the ECS works only after take-off. The FITS value does not match cockpit heat stress in low-level fighter flying. FITS predicts the zone of precautions in pre-take off phase in IAF fighter-upgrade and fighter trainer aircraft.

Aeromedical concerns: dry eye disease and Prolonged flight hours in civil pilots

Atul Kumar Singh

Purpose: This study aimed to determine the prevalence of Dry Eye Disease (DED) among Indian commercial pilots and examine the association with prolonged flight hours. Emphasis was placed on using the Non-Invasive Average Break-Up Time (NIAvg-BUT) test for diagnosing DED, as opposed to the Schirmer test, highlighting the importance of objective diagnostic methods for this population.

Methods- The study was a prospective observational cohort study conducted between July and August 2023 at a boarding centre designated for the medical examination of civil pilots.A total of 100 civil pilots undergoing routine periodical medical examinations were included. Participants were screened for systemic diseases, ocular allergies, and the use of topical medications. They completed the Ocular Surface Disease Index (OSDI) questionnaire and underwent detailed ophthalmological examinations. NIAvg-BUT was measured using the Sirius™ corneal topography device. A cut-off value of NIAvg-BUT < 10 seconds was used for diagnosing DED.

Results: The prevalence of DED among the pilots was found to be 34%. The study revealed a statistically significant association between higher total flying hours and the presence of DED. Pilots with more flying hours had an increased risk of developing DED.

Conclusion: The study identified a high prevalence of DED among Indian commercial pilots, correlated with prolonged flight hours. It shows the need for objective diagnostic tests, such as NIAvg-BUT, over subjective methods like the Schirmer test. Further research is necessary to explore the impact of DED on the functional performance of pilots and the comfort of flight staff and passengers.

Disinfection & disinsection of IAF aircrafts: The need of an SOP

Mohin S Sakre

Introduction: The IAF aircrafts mainly transport aircrafts and helicopters are often deployed for various SAR operations and transport of passengers and goods in case of war and peace throughout the globe. Routine cleaning and disinfection are an important aspect of airport operations. In addition, aircraft disinfection procedures following transport of a suspected case of communicable disease and/ or deceased individuals is a particularly difficult issue that needs to be addressed by many stakeholders in a cooperative approach.

Disinsection of an aircraft is an important tool to kill invertebrates that may be present in the cabin at the time of disinsection and to also leave a minimal but effective amount of residue which is likely to kill invertebrates that may board between the time of disinsection and departure.

Additionally, in view of the plethora of the agents involved in disinfection and disinsection globally, it is important to narrow down the necessary ones that can be practically used in the IAF in terms of market availability, ease in procurement, economic viability, large scale implementation, logistical feasibility and simplicity in usage. Presently there is no SOP in place for the disinfection and disinsection of Aircrafts in the IAF.

Through this review of literature, the intention is to develop a standard operating protocol for Disinfection and Disinsection of an aircraft in the IAF setup.

Literature: This article considers relevant and reliable sources of literature such as ICAO (International Civil Aviation Organisation) guidelines, WHO (World Health Organisation), IHR (International Health Regulations), CDC (Centre for Disease control) and NCDC (National Centre for Disease Control) notes and other International and National government body regulations. Various aspects are discussed through the length of the paper such as relevant and economical agents of disinfection and disinsection, contributing factors such as contact time, method/ mode of application, PPE measures for the operating staff, volume required for effective application etc.

Conclusion: Especially in the wake of international regulations demanding so, it becomes furthermore imperative to ensure a standard practice of disinfection and disinsection of the aircrafts of the Indian Air Force. This document looks to bridge this lacuna and provide for a safe and practical method of implementation of the same.

Comparative study of functional outcome of usg guided single injection of platelet rich plasma v/s corticosteroid in treatment of supraspinatus tendinosis or partial supraspinatus tear

Mainak Chandra Das

Introduction: An estimated 0.9% to 2.5% of the general population reports shoulder area pain, showing trend of rapid increase in prevalence with increasing age and reaching as high as 6.7% to 66.7% over a lifetime. More than 50% of all shoulder pain are considered to be that related to tendinopathies of the Rotator Cuff (RC) with supraspinatus partial thickness tears and tendinosis in majority. General guidelines suggest that the initial treatment of rotator cuff tendinopathy should be non-operative with analgesics, physical rehabilitation, corticosteroid or PRP injections. Various study concluded corticosteroid to be effective modality but at the cost of complication like tendon rupture. The clinical application of PRP in rotator cuff repair has increased owing to its various growth factors claiming healing properties in tendinopathy. various randomized controlled trials (RCTs), however showed contradicting results as few studies found no difference between placebo controls and PRP or corticosteroids and few reporting more rapid benefits with PRP injections among patients.
Method: The present study, a prospective interventional randomized comparative study, was undertaken to compare effectiveness of PRP v/s Corticosteroid in terms of ROM and symptomatic and functional improvement on follow up using Visual Analogue Scale(VAS), Oxford Shoulder Score(OSS) and Constant Murley score(CMS).50 patients between 20-50yrs age group with clinic-radiological diagnosis of Supraspinatus tendinopathy/partial tear were randomised to receive USG guided either intra-articular corticosteroid or PRP injection during September 2020 to March 2022 period and followed up at 6 weeks,3 months, 6 months.
Results: Pre intervention, both the groups had insignificant difference in VAS scores (pain, activity and satisfaction), OSS and CM scores. Following intervention, the VAS pain score, OSS and CMS at 6 weeks and 3 months showed no significant difference between the groups. However, VAS pain, OSS and CMS at 6 months were significantly lower in PRP group than that of the CS group. The VAS activity and satisfaction scores showed similar improvements in both groups over time. No significant difference in flexion, abduction and external rotation among the two intervention groups at baseline (pre-injection), 6 weeks and 3 months was noted. However significant improvement in abduction noted at 6 months in PRP group.
Conclusion: Both corticosteroids and PRP group showed improvement in all the parameters compared to pre-injection status however the PRP group on 6 month follow up had

significant reduction of pain as evident by improved VAS score and functional and quality of life improvement as evident by OSS and CMS with significant improvement in abduction. PRP should therefore be considered as a great option to treat Supraspinatus tendinopathy /partial tear as it is low cost, readily available modality using patients own blood which is more acceptable to patient and also safe to individual where complications related to corticosteroids anticipated. Ultrasound guided procedure enhances the accuracy of injection.

Aftermath of introduction of drug testing policy in civil aviation: a case report

B Vinod

Background: The drug testing policy is civil aviation was released on Jan 2022, the policy was brought in place to deter the use of psychotropic substances, by random selection and testing of aircrew by the airline authorities. It laid down guidelines on procedure of sample collection, random selection of aircrew for testing, dispatch of samples, interpretation of results, management, and disposal of detected cases. With the introduction of such a policy, all airliners haVe committed to not compromise on flight safety, passenger safety by careful selection of pilots. Here we report a case report of a commercial pilot, suspected with drug abuse- challenges faced in disposal and way ahead.

Case Report: A young pilot was tested positive for barbiturates and benzodiazepines on a urine drug screen test, during pre-employment medical examination. The use of the drug Desvenlafaxine was confirmed by history taking in the light of a urine drug screen positivity and non-declaration in the declaration form. During the history taking, occurrence of a mental illness, in the past, after the last renewal medical examination was confirmed. The aircrew was sent for a special medical examination to IAM, IAF. Non availability of the confirmatory test report, ambiguity in history and investigation report, prompted the specialists to meticulously handle the case, by asking for specialized test reports, clearance from treating physician, a period of observation in non-flying category.

Discussion: The paper discusses the occurrence of a case of suspected abuse, the series of events leading her to undergo special medical examination, the diagnostic dilemma, disposal of the case by Aerospace Medical specialist.

Aeromedical to clinical perspectives: Is LCMS an enigma?

Kumar A

Introduction: Institute of Aerospace Medicine (IAM) is a nodal center for all fatal aircraft accidents all over India. All the toxicological analysis is being done at IAM including various drugs analysis in samples. LCMS is the backbone of any toxicology laboratories including IAM. However, in addition to Aeromedical perspectives, LCMS is being used routinely in different labs for Therapeutic drug monitoring (TDM) and Lipidomic studies.
Methods and materials: Protocols for toxicological analysis at IAM, various protocols for Therapeutic drug monitoring (TDM) and lipidomic study protocols data collected and analyzed under Aeromedical and Clinical heads.
Results: Analysis of various data as mentioned above done and it was found that LCMS is center point in all these studies. However, different protocols and software required in these studies.
Conclusion: There is a necessity of installing LCMS at different set ups like in Aeromedical or in Clinical set ups. It will not only help in aeromedical evaluations but also it will help in patient safety in timely evaluation of the samples. This system can also help in evaluation future lipidome in coronary artery disease patients.

Evaluation of night vision goggle fitted with indigenized image intensifier tube at 1 AMTC

Polash Sannigrahi

Background: The development of Night Vision Goggles (NVGs) has enhanced the capabilities of aircrew in night air operations. With the advancement of image intensification technology, the NVGs have steadily improved from those requiring an infrared illuminator (Gen 0) to those capable of operating in starlight condition today (Gen III). The Gen III NVGs being used in IAF aircrafts are of Russian or US origin. This paper deals with the subjective evaluation of a Gen III NVG fitted with indigenized Image Intensifier tube conducted at 1 AMTC, AFS Hindan.
Materials and Method: A total of 10 aircrew participated in the study. Performance characteristics of GEO NVG fitted with indigenized image intensifier tube (ref to as NVG 'A') was compared with GEO NVG fitted with OEM image intensifier tube (ref to as NVG 'B' & is of Russian make) and NVD-F4949 NVG (ref to as NVG 'C' & is of US make). Evaluation was conducted under different light conditions with variable illumination of Full Moon (0.1 Lux), Half Moon (0.07 Lux), Quarter Moon (0.03 Lux) and Star Light (0.001 Lux) in the NVG lab. Sliderman 3x3 wave chart and US Air Force 1951 Tribar Chart were used for assessment of visual acuity. This was followed by comparing the performance of all three NVGs in Air Fox DISO simulator. Response of aircrew was obtained on a 5 point Likert scale and analysed.
Result.: Best visual acuity was achieved with NVG C (20/30 in Sliderman chart & 20/45 in Tribar chart), followed by NVG A (20/50 in Sliderman chart & 20/90 in Tribar chart)

and NVG B (20/55 in Sliderman chart & 20/90 in Tribar chart). Terrain identification under different moon light conditions was best with NVG C, followed by NVG A and NVG B. Performance under infra-red and cultural lightings was best with NVG A, followed by NVG C and NVG B. Performance in DISO simulator was best with NVG C, followed by NVG A and NVG B.

Discussion and Conclusion: The evaluation suggested that the GEO NVG fitted with indigenised Image Intensifier tube was better than GEO NVG fitted with OEM Image Intensifier tube (Russian origin). However, NVD-F4949 NVG (USA origin) performed better than both the NVGs.

Poster Session II

Aerotoxic syndrome among aircrew in fighter stream of iaf

Mayuri Verma

Introduction. Aerotoxic syndrome is a constellation of symptoms experienced by aircrew following exposure to toxic fumes emanating from fuel, hydraulic fluid and engine oil which enter cockpit with circulated air which passes through the engine before being circulated in cockpit. The condition is frequently reported by aircrew and cabin crew of commercial aircrafts. Symptoms include nausea, giddiness, vertigo, light headedness and head ache which can last up days after exposure. Mild cognitive impairment is also reported. Symptoms of Aerotoxic Syndrome may mask symptoms of spatial disorientation and air sickness and can lead to fatal accidents. Hence this study was conducted to estimate prevalence of Aerotoxic Syndrome among aircrew in fighter stream of IAF.

Method. Exploratory study was conducted through retrospective symptom survey of 70 volunteer aircrew, including trainees from fighter and transport fleet of IAF.

Results. Incidence of symptoms associated with Aerotoxic Syndrome was 0.9 per 100 hrs in Trainee Pilots, 0.04 per 100 hrs of flying among transport pilots of AN32 pilots and 0.005 per 100 hrs in trained fighter pilots of Su 30. Jaguar pilots did not report any symptom in 7120 hrs of flying. 01 trainee pilot of Kiran and 03 transport pilots of AN 32 reported association of symptoms with incidence of leaks or unusual chemical smell.

Discussion. Similar studies among civil commercial aircrew have shown an incidence rate of 1 in 66 sorties to 1 in 5000 sorties. Reporting of symptoms associated with Aerotoxic Syndrome varied largely among military fighter and transport aircrew. Lesser incidence among fighter aircrew may be due to use of oxygen. Higher incidence among trainees may attributed to acclimatization.

Conclusion. Further studies to explore causation and implications of on operational flying are recommended.

Effect of lifestyle factors and genetic predisposition on development of HASH in armed forces personnel

Devdeep Ghosh

Introduction: High altitude deployment of Indian Armed Forces personnel is encountered with multiple medical issues including High Altitude Associated Systemic Hypertension (HASH). Specific guideline is in place to evaluate an air warrior for deployment in high altitude areas (HAA). It has been observed that a good number of air warriors are found unfit during deployment despite being fit in their High Altitude Medical Test (HAMT). The organization encounters a human resource issue due to non- availability of trained man power at the right time at the right place. Thus arises the need to analyse the causal association to find the possible way out.

Methods: Data of first half of 2023 of HAMT cleared 85 male with age 32.6±9 yrs from two IAF units of Eastern Air Command which have frequent deployment at HAA, was analyzed. Fitness during acclimatization and final deployment, types of disabilities, turn-down stage, previous history of HAA exposure, status of unfitness during previous deployment, family history of hypertension, smoking history, alcohol consumption status, metabolic comorbidities and post-deinduction clinical status had been analyzed. Comparative analysis was carried out between available HAA unfitness data of Indian Army and IAF data. Data were analysed using descriptive statistics and non-parametric test. Chi square test was applied to find out the association of categorical independent variables. Binary logistic regression analysis was used to examine the probability factors of categorical or continuous independent variable (s) with HASH.

Results: The study revealed that incidence of unfitness during deployment in individuals who have been declared fit in HAMT was 29-31%. Hypertension contributed to majority of these unfit individuals (68%). Out of total 85 HAMT fit IAF personnel, 20% developed HASH. Amongst detected HASH cases, 82% has family history of HTN to 1st degree relative, 12% are active regular smoker, 71% are moderate alcohol consumer, 94% has previous HAA deployment history, all of the HASH cases developed HTN during their previous HAA deployment, 94% carries out adequate physical exercises and 29% were continued with antihypertensive medication post de-induction. Statistically significant correlation of family history of HTN, previous history of HAA deployment and previous detection of HTN during HAA deployment ($p<0.05$) in respect of HASH was found.

Conclusion: Development of hypertension in high altitude deployment is attributable to service, that may lead to increased financial burden adversely affecting the man-hour requirement of the organization and human resource issue at HAA. The goal during HAMT should be to declare a person fit only if he can sustain the impending physiological stressors of HAA. In this way, associated cause for development of HTN may be predicted and mitigated.

Role of gynaecologists in combat medical care

Shahla Abraham

Introduction: The integration of women in active combat roles has necessitated specialized medical attention, particularly in gynaecological care. As societal perceptions evolve, enabling women to participate in rigorous military duties, it becomes critical to address their unique anatomical, physiological, and mental health challenges. This paper underscores the importance of tailored gynaecological care for female military personnel, exploring the physiological implications of intense military training and combat situations.

Discussion: The physiological disparities between men and women—such as higher fat mass, reduced skeletal volume, and distinct pelvic structures—present unique risks in combat environments. Female combatants face a higher incidence of menstrual dysfunction, urinary incontinence, pelvic injuries, and bone density loss. Military stress exacerbates these conditions, often leading to amenorrhea, hormonal imbalances, and chronic health issues. Combat zones introduce further complexities with exposure to infections, unintended pregnancies, and psychological challenges such as PTSD and military sexual trauma.

The integration of tailored physical training regimens, dietary planning, and advanced screening mechanisms is critical in addressing these challenges. Tools like the LEAF-Q questionnaire help assess menstrual dysfunction and injury patterns, aiding in individualized interventions. Gynaecological management strategies, including pelvic floor exercises, long-acting reversible contraceptives, and PAP smear screenings, are pivotal in improving operational readiness. The inclusion of mental health support and addressing conditions like bone density loss and hormonal imbalances remain key components of holistic care.

Conclusion: Ensuring the well-being of female combatants is paramount to achieving gender integration and enhancing military efficiency. Comprehensive gynaecological care not only promotes combat readiness but also fosters equality in active-duty roles. Continued research and proactive medical strategies are essential to address the holistic needs of female warriors, thus supporting their sustained contribution to national defence.

Use of Mefloquine for aircrew: An evaluation of efficacy and safety compared to alternative therapies

V Raghunandan

Background: Malaria remains a significant threat to aircrew operating in endemic regions, necessitating reliable prophylaxis. Mefloquine, known for its broad-spectrum antimalarial efficacy, is a commonly used prophylactic agent. However, concerns regarding its neuropsychiatric side effects have led to debates about its suitability for aircrew, who require optimal cognitive function. This study aims to evaluate whether mefloquine offers superior protection and practicality for aircrew compared to other available antimalarials.

Objective: To compare the efficacy, safety, and overall suitability of mefloquine versus other antimalarial drugs for use by aircrew, with a focus on maintaining cognitive and psychomotor performance essential for flight safety.

Material & Methods: A systematic review of the literature was conducted, encompassing clinical trials, meta-analyses, and observational studies comparing mefloquine with other antimalarials such as doxycycline, atovaquone-proguanil, and chloroquine. The review considered factors including efficacy in malaria prevention, incidence of adverse effects, impact on cognitive function, dosing regimens, and compliance. A retrospective audit of use of Mefloquine in the IAF population over the last decade was also carried out.

Results: Mefloquine demonstrated a high efficacy rate in preventing malaria, comparable to or exceeding that of other antimalarials. Its once-weekly dosing regimen is advantageous for aircrew, ensuring better compliance compared to daily alternatives like doxycycline or atovaquone-proguanil. While mefloquine is associated with neuropsychiatric side effects, evidence suggests that these are dose-dependent and generally occur in a small percentage of users. When properly screened and monitored, aircrew can safely use mefloquine with minimal risk to cognitive and psychomotor performance. In contrast, other antimalarials, while effective, have their own limitations: doxycycline's daily dosing increases the risk of non-compliance and atovaquone-proguanil is more expensive and less effective in certain regions.

Conclusion: Mefloquine presents a highly effective and practical option for malaria prophylaxis in aircrew, particularly in scenarios where long-term protection and compliance are critical. Despite the potential for neuropsychiatric side effects, these can be mitigated through careful pre-deployment screening and monitoring. Given its efficacy, ease of use and the low overall incidence of severe side effects when managed appropriately, mefloquine is recommended as a preferred antimalarial for aircrew, especially in high-risk malaria zones. Further research should continue to refine strategies to minimize side effects and ensure safe usage in this population.

Unexplained cerebellar stroke in a young aviator: Clinical presentation and aeromedical implications

Snehangsh Dash

Background: A cerebellar stroke in a young individual with no apparent risk factors presents a unique challenge, especially in professions demanding peak cognitive and physical performance, such as aviation. This case report examines the presentation, diagnosis, and management of a young aviator who experienced a cerebellar stroke, discussing the potential aeromedical implications and considerations for returning to flight duties.
Case Report: 30 yrs old serving helicopter pilot was initially presented with complaints of acute onset severe unilateral headache on right side followed by paraesthesia and hypoesthesia over left half of body and on right side of face. It was also associated with ataxia, giddiness and vomiting. His neuroimaging revealed hyperacute infarct involving right PICA territory. Patient was managed with DAPTs and other supportive measures. He was evaluated for stroke in young and no contributory investigation was found positive. His procoagulant workup was negative. His present recovery is satisfactory.
Conclusion: Cerebellar stroke in young individuals, though rare, can occur without traditional risk factors. In aviators, such an event has profound implications due to the high demands of their profession. Comprehensive evaluation and management, including stringent aeromedical certification processes, are crucial to ensure safety. This case highlights the importance of prompt recognition and management of cerebellar strokes in young individuals. It also emphasizes the need for detailed aeromedical assessments and cautious reintegration into flying duties to ensure the safety of the aviator, the public and the machine.

Aeromedicla decision making in a case of asymptomatic myocardial bridge: Stressors, challenges and approach

Manu N

The case discussed in this report was a 28-year-old helicopter aircrew who was asymptomatic and newly inducted to High altitude area. He was detected to have T wave inversions in I, II, III, aVF and V2-V6. The aircrew was grounded and Coronary Angiogram revealed a mid-LAD Myocardial bridge. TMT, 2D ECHO were normal. Stress MPI after Sick leave showed no evidence of inducible Ischemia and normal LV function systolic function. The aircrew was declared fit with no restrictions of duty by the treating cardiologist.

The coronary arteries are normally located outside the myocardium. A segment of the coronary artery passes through the myocardium occasionally causing narrowing

of the coronary artery during systole and normalizes on diastole. Myocardial Bridge is a congenital coronary abnormality estimated to be present in 1 in 3 adults which causes tunnelling of the coronary artery. It was considered a benign condition owing to the fact that ~85% of coronary flow occurs during the diastolic phase of cardiac cycle. Recent studies have indicated a more complex interplay between the anatomic abnormality and physiology of the cardiac cycle leading to development of ischemic conditions. The length and depth of the cycle, heart rate and sympathetic tone acts as determinants in development of infarcts, ischemic symptoms and sudden cardiac death.

Flying being a considered a complex task is associated with sympathetic activation and increased cardiac function. Therefore, cases of Myocardial bridge need to be evaluated and placed under regular monitoring for early detection of plaque formation. It is recommended that aircrew detected with myocardial bridge may be considered as minimal coronary artery disease and evaluated as mentioned in IAP.

Poster Session III

Optimizing aeromedical disposal for hypertension in fighter aircrew: A comprehensive review

Krishnaveni

Background: Hypertension poses a significant challenge in aerospace medicine, impacting pilot performance and flight safety. Hypertension is a leading treatable risk factor for cardiovascular disease, demanding precise diagnosis and monitoring, especially in aircrew. This narrative review aims to provide an updated understanding of hypertension assessment and management in aviation.
Methods: The Google Scholar, Pub Med, Research Gate and Scopus Search engines with the following keywords Aerospace medicine, Fighter Aircrew, Aeromedical Disposal, Hypertension, Antihypertensive, Pharmacokinetics were searched along with USCG & US navy aeromedical policy letter and reference guide till December 2023.
Result: The narrative explores the importance of hypertension management in aircrew health, emphasizing its potential impact on performance, safety, and mission success. Uncontrolled hypertension may lead to target organ damage, complicating matters for those operating high-performance aircraft. The paper outlines guidelines for antihypertensive medications, categorizing permissible drugs for different aircrew categories. Specific guidelines for fighter stream aircrew are detailed, considering hypertension stages and co-morbidities.
Pharmacokinetic insights prompt a reevaluation of the conventional 12-week observation period for hypertension in aircrew. The paper suggests streamlining this period to 6 weeks, aligning with the time needed for therapeutic efficacy. International considerations from the USAF and US Navy policies are presented, emphasizing

lifestyle modifications and a balanced approach to manage hypertension. Proposed amendments advocate for revising the observation period to optimize protocols, balancing aircrew well-being and mission readiness.

Conclusion: The paper recommends for a reduction in the duration of the observation period for aeromedical disposal in hypertension, aiming to minimize operational disruptions and financial losses. The emphasis is on a balanced approach that prioritizes both operational needs and aircrew health and safety.

Aeromedical decision making of a military aircrew with tibial varus deformity after repeated stress factures

Shivaling

Introduction: Tibia Vara, a defect in the osteal growth of the tibia which causes the lower leg to angle inward, resembling a bowleg. Long-term repetitive stresses are common finding in young athletes and military personnel owing to the nature of their profession. However, these fractures heal without any residual post-consolidation deformity in most cases. This paper presents a unique case of a military helicopter aircrew detected with Tibial Varus Deformity, post repeated stress fractures, and managed by corrective surgical osteotomy. The aeromedical evaluation of the aircrew carried out at the Institute of Aerospace Medicine to assess flying fitness are underlined in this paper.
Case details: 27 yr old heptr pilot developed sudden onset pain and swelling of right leg during training. He was diagnosed as a case of stress fracture right tibia and was managed with above knee POP cast. After two years, he again presented with pain in the same limb. Radiological examination revealed undisplaced complete stress fracture distal 1/3rd tibia (rt) and he was managed conservatively. Following recovery, he was again upgraded to unrestricted flying category. After five years, he again reported with symptoms of pain in the leg during strenuous activities. X-ray showed consolidated fracture proximal and distal end of tibia with varus deformity proximal tibia and bowing of tibia for which He underwent corrective osteotomy. Post correction, aircrew recovered well and demonstrated adequate functional recovery. He was upgraded to restricted flying status to assess in inflight performance with a medical flight test.
Discussion: The varus deformity developed due to malunion in the aircrew is a risk factor for having inadequacies in actuating leg operated controls during flight and to execute emergency egress procedures. The case report discusses about aeromedical decision making in aircrew with Tibial Varus deformity.

Compressive visual field defect: A rare case of cavernoma in an aircrew

Dev R

Background: Cavernous malformations or Cavernomas are vascular aberrations which are often detected following a hemorrhagic insult in the brain or spinal tissue. These malformations are rare, with a reported incidence of 0.15-0.56 per 1,00,000 population per year. The lesions are mostly supratentorial with majority of them occurring in the posterior cranial fossa. Depending on the size and location of the lesion, the symptoms may vary and are of significant aeromedical risk and concern.
Case Presentation: A 26 years old serving fighter pilot presented with complains of loss of peripheral vision in right eye associated with headache and vomiting. He was found to have right homonymous inferior quadrantanopia and a left occipital lobe intra-parenchymal hematoma which was later classified as a left Occipital Lobe Cavernoma on MRI. He was managed conservatively with anti-seizure medications and serial imaging. Over a period of four months, the lesion showed reduction in size with spontaneous resolution.
Discussion. Cavernomas have aeromedical concerns due to the complications arising predominantly from hemorrhage and compression of the surrounding brain tissue. Treatment options include both conservative and surgery. This case report highlights the aeromedical decision making which may be considered prior to certifying an aircrew fit to fly.

Effectiveness of smartphone otoscope in management of ear ailments at primary healthcare level

Shikha Gianchand

Purpose: To work out efficacy of smartphone otoscope for managing ear ailments at primary healthcare level.
Methods: Prospective study carried out at a co-located primary care clinic and secondary referral facility. With this plan, the PHC was equipped with a smartphone otoscope for diagnosing common ear problems. The doctor then forwarded patient's ear imaging to the referring hospital's otolaryngologist. The otolaryngologist reviewed the history to make remote diagnosis before providing the PHC provider with recommendations for treatment. Information on patients' demographics, outpatient diagnoses, symptom durations, affected side, treatments received, and outcomes was collected. This information was used to determine whether or not a smartphone otoscope may be used to improve healthcare for patients suffering from common ear illnesses without sending them to more specialized facilities.
Results: 150 patients were enrolled; 53.3% were male and 46.7% female. Participants aged between 3 and 83 years, with a mean of 44.6. Eighty-two (48%) of the cases presented with left ear, sixty (40%) with right ear, and eighteen (12%) for both sides. The typical course of ear infection lasted 6.5 (2, 15) days. Out of 150

patients, 33 (22%) were deemed cured, 117 (78%) demonstrated improvement in symptoms. The technique was praised by primary care physicians, who said they learned more about otolaryngology.
Conclusions: The ability of primary care physicians to manage common and straightforward ear ailments is greatly enhanced by the use of smartphone otoscopes. Thus, improving patient satisfaction and the strain on medical facilities.

Arthropod vector surveillance using UAV technology: Early experiences frompilot project in desert terrain- Armed Forces setting

V.S.Srikanth

Introduction. Malaria is a major vector borne disease in several parts of the world.Elimination of vector breeding sites has been a significant problem in Malaria Elimination Program. The theme for WHO World Malaria Day 2022 was "Harness innovation to reduce malaria disease burden and save lives." With this in mind, we attempted use of Unmanned Aerial Vehicles (UAV) technology for effective surveillance of malaria vector mosquito breeding sites. This is first of its kind feasibilityproject where multimode surveillance was done using different types of UAV in a military station in Western India.
Materials and Methods – This observational study was conducted from Oct 2022 to Dec 2022. Mapping of areas/hotspot clusters from where more Malaria cases were reported was done manually on map. Thereafter, satellite images of locations were evaluatedfor gross landscape assessment. Based on these two inputs, UAVs were used for identification of breeding sites with the help of imagery systems like Forward LookingInfra-Red (FLIR) and Day mode camera.
Results. A total of 43 open overhead water tanks and 17 water logged sites were identified as potential breeding sites through UAV. On manual surveillance, 88% of them proved to be breeding sites for malarial vectors.
Conclusion – Malaria can possibly be effectively controlled using newer technologiesand with multi-sectorial collaboration. Use of different types of UAV like Medium Altitude long endurance (MALE) UAV and Quadcopter was effective in sourceidentification over a short time period with reasonable precision; while also helping save manpower. We were thus able to demonstrate feasibility of use of UAV towards vector control activities.

Lessons Learnt during a Pan India Exercise: Through the eyes of an Young Medical Officer

D Meera Madhav

Introduction: Gagan Shakti 2024 was a 10-day war like exercise which was conducted during the peak summer month of April 2024 with the aim of evaluating integrated war fighting tactics

of IAF in a two-front war. The IAF bases throughout the country participated actively and full-fledged with augmentation of manpower and mobilisation of assets to forward areas. This exercise involved participation of fighters, transport and helicopters along with the ground support services. This paper discusses about the first-hand experience of the author who was augmented at an operational base and brings out the lessons learnt about various aeromedical concerns involved in preparation prior to the mission and combating various aeromedical stressors during the exercise.

Discussion: The exercise not only tested the Op readiness of the Indian Airforce but also brought out various medical issues faced by the participants. It was an eye-opening experience for the author in terms of preparation, training, medical administration, aircrew care, CASEVAC and other policies being followed in such missions. Providing medical care at an operationally critical base 24x7 for ten days straight is a humongous task in itself. The major challenge involved providing medical care in mass casualty scenario with limited resources and evacuating the casualties. The most common aeromedical concern in such operations for sustained period is Fatigue and sleep deprivation. Fatigue monitoring along with its mitigation was undertaken during this exercise as per standard procedures in close co-ordination with Ops & Adm authorities. Getting oriented to different types of aircrafts and flying clothing, understanding pre and post flight issues of aircrew, interaction with aircrew and ground support personnel were some of the major learning.

Conclusion: It is essential to carry out mock drills of such nature to stay well prepared in the event of actual war like scenarios. Young Medical Officers should actively participate in such exercises as it increases their understanding and boosts confidence in handling unforeseen situations. Challenges faced and lessons learnt are valuable take home messages, all adding to improving skill levels especially of Young MOs.

Poster Session IV

Need for detailed medical policy for crew of remotely piloted aircraft system

Tushendra Singh Rana

Introduction: The Remotely Piloted Aircraft Systems (RPAS) are rapidly evolving as the most decisive force multiplier in present day battlefield.

Case details: Two RPAS crew in Low Medical Category for different impairments refused to fly RPAS, though they were in the acceptable medical category for their stream. The lack of a clear, detailed medical policy on RPAS crew from Army Aviation Directorate and IAP 4303, led to a prolonged period of uncertainty, as the administrative and medical authorities took additional time to reach a consensus on the status of the crew.

Discussion: In IAP 4303, the medical criteria for assessing fitness of RPAS crew is mentioned in one paragraph only. The policy on RPAS from Army Aviation Directorate mentions only the minimum medical category required for different streams of RPAS crew.

Conclusion: There is a need for a separate medical policy on crew of RPAS in detail, as RPAS are technologically sophisticated equipment which need greater

understanding on part of the crew along with refined psychomotor skills for their operation.
Learning Objective: The speed of growth of RPA system is much faster than that of the conventional aircraft industry. The aim of any policy should be to ensure safe, secure and efficient operations.

Aeromedical deliberations in reflighting an aircrew with recurrent shoulder dislocation

Saurav Chauhan

Shoulder dislocations represent 50 percent of all major joint dislocations, with anterior dislocation being most common. The shoulder is an unstable joint due to a shallow glenoid that only articulates with a small part of the humeral head. Studies have showed that the 1-year prevalence in fighter and helicopter pilots aged between 34 to 39 years accounts for 20% to 26% of all musculoskeletal disorders. In the aviation scenario the functional demands on the upper extremity in aircrew are high, and regular overhead activities require dexterity, strength, and endurance. Any pathology in the shoulder joint may result in reduced functional capacity. This case report highlights the aeromedical deliberations in reflighting a helicopter pilot with shoulder dislocation who underwent arthroscopic bankart's repair.

Cruising to success: Leveraging body composition analysis for aspiring airmen

Ketan Laxman Pakhale

Introduction: The physical efficiency of pilots is crucial for optimal flight performance, with ground preparation being a vital component. Achieving and maintaining medical fitness involves implementing appropriate nutritional and physical activity measures. Body composition assessment provides valuable insights into general health, nutritional adequacy, and physical development. Despite its significance as a predictor of wellness, body composition analysis is often overlooked as a standard metric in the fitness assessment of aspiring Airmen.
Aims:
• To evaluate body composition data from 466 candidates aspiring to be airmen.
• To compare Body Mass Index (BMI) with other body composition parameters to identify more accurate predictors of physical fitness.
• To propose metabolic age as a superior predictor of metabolic health compared to chronological age.
Methods: This study analyses body composition data, including parameters such as BMI, fat percentage, visceral fat, muscle mass, and metabolic age, from a cohort of 466 aspiring Airmen.

The goal is to identify key metrics that can better predict overall fitness levels and suggest improvements to current assessment.

Conclusion: Based on the data analysed, body composition analysis offers significant insights into the general fitness of pilot candidates. Incorporating these assessments into standard evaluation procedures could enhance the accuracy and effectiveness of medical fitness assessments for aspiring Airmen

Analytical cross sectional study of uv radiation related eye issues among personnel in an airforce station

Aman Arya

Introduction: The Indian Airforce operates in varying climatic conditions, terrain and altitude being exposed to peculiar occupational stressors. Exposure to high UV radiation specially at medium altitude stations for prolonged hours takes toll onto the ocular health of different occupational groups/trades working with aircrafts and other related equipment leading to various ocular problems like Pterygium, Photokeratitis, Pingecula etc. A cross-sectional study was done to find out the prevalence of UV Radiation related eye issues among personnel in an air force station.

Material & Methods: A basic eye examination was carried out for 176 personnel working on tarmac, 50 personnel working near tarmac areas examining eyelids, cornea and conjunctiva including assessment of Near vision and Distant vision acuity. A sample size of 200 was selected using cluster sampling from non-tarmac trades and data regarding symptomatology pertaining to UV Radiation was also collected.

Results: Only 49% of the tarmac working population had normal vision with nil complaints whereas this figure improved to 68% in Near tarmac trades and further to 90% in non-tarmac trades. Maximum 24 cases of Pterygium were found in Tarmac trades, 3 of them being of Pterygium Grade 2 and 3. Number of Pterygium cases in Near and Non tarmac trades were 10 and 4 respectively. Eye symptoms were also reported the highest from tarmac trades with maximum complaints being redness followed by itching.

Discussion: Our study shows the huge impact of UV radiation of sunlight on the ocular health of personnel. The tarmac working population is particularly affected, accounting for two-thirds of total Pterygium cases and almost 83% of the total load of Pinguecula at the station. Only 49% of personnel had normal vision without complaints, raising concerns about the poor ocular health among tarmac trades.

Conclusion: Occupational morbidity due to UV radiation exposure is higher than the comparison group among tarmac working population leading to various eye issues such as Pterygium, Photokeratitis and Pingecula and poses the threat of developing Cataract and Eye cancer in long run.

Learning Objectives: Periodic medical examination of high-risk trades needs to be more focused on occupational morbidity and adequate occupational history and examination should be carried out. UV blocking safety goggles meeting ANSI standards should be authorized for personnel working in tarmac trades.

Altitude decompression sickness: a systematic review

Syed Lateef

Background: Altitude Decompression Sickness (DCS) is caused by a rapid reduction in ambient pressure, frequently encountered by military pilots and aircrew during Altitude Chamber Training (ACT) or high-altitude flight. Despite advancements in aviation medicine, DCS remains a significant concern due to its potential neurological and physical manifestations. This systematic review aims to analyze studies from 2013 to 2023 to improve the identification and treatment of altitude-induced DCS, focusing on preventive measures, clinical outcomes, and therapeutic protocols.

Methods: A systematic search of PubMed and Medline databases was conducted, targeting studies on altitude DCS among pilots and aircrew. The inclusion criteria comprised case reports, case series, retrospective cohort studies, and cross-sectional studies published within the specified timeframe. Data extraction focused on DCS incidence, types (Type 1 or Neurological Type 2), associated risk factors, and treatment outcomes. A total of eight studies were included, involving 16 documented cases of DCS, primarily among military pilots.

Results: DCS was predominantly reported during ACT, with an incidence rate of approximately 0.25%. The condition was more common in pilots of high-performance aircraft, such as the F/A-18. Type 1 DCS symptoms, including joint pain and paraesthesia, were more prevalent than Neurological Type 2 DCS, which involved coordination and cognitive deficits. None of the reviewed studies reported fatalities or long-term disabilities. Treatment typically included hyperbaric oxygen therapy (HBOT), which demonstrated positive outcomes when administered promptly. Preventive strategies, such as extended pre-oxygenation, reduced ascent rates, and altitude limitations, effectively mitigated DCS risks.

Discussion: This review highlights the need for high vigilance in identifying DCS symptoms, especially during ACT and high-altitude operations. The risk of DCS is influenced by factors such as rapid decompression, altitude thresholds, and individual susceptibility. Neurological assessments using tools like the Montreal Cognitive Assessment (MoCA) demonstrated high sensitivity in diagnosing Type 2 DCS. Continued symptoms despite ground-level oxygen warrant immediate evacuation to recompression chambers for HBOT.

Conclusion/Recommendations: Altitude DCS presents a varied clinical profile with significant implications for flight safety. Early intervention with fluids, oxygen therapy, and HBOT is crucial. Preventive measures, including modified ascent protocols and extended pre-oxygenation, should be standardized. Further research is recommended to refine diagnostic criteria and enhance treatment outcomes, ensuring the health and operational readiness of aviation personnel.

Visionary warriors: Enhancing career opportunities through early ophthalmological evaluation

Robin Malik

Introduction: Joining Armed forces as an Officer is a dream to the aspirants. But selection into defence forces entails a thorough medical examination so as to be sure that the aspirant is medically fit to face various hardships offered due to varied terrain and extremes climatic conditions. Hence due to strict medical standards many of the aspirants get rejected. Among various causes of rejection one study has shown ophthalmological rejection as top most to be about 38%. Ophthalmological examination in particular is extremely important in certain branches such as aircrew, air traffic controllers where it may cost his/her life. Considering this, here we present the analysis of causes of Ophthalmological rejection during last four years.

Materials and methods

It is a retrospective analysis of data from dept of ophthalmology from a premiere air force institute from Delhi, which is involved in medical evaluation of the candidates. An analysis was made out of data from 01 Jan 20 to 31 Aug 24 which is tabulated and analysed.

Results: The analysis of data of 4012 candidates evaluated from 01 Jan 20 to 31 Aug 2024 showed that 3252 (81 %) were males and 762 (19%) females. Among these 4012 candidates 3458 (86.2%) candidates were declared Fit and 554 (13.8%) were rejected and declared Unfit. The tables show various causes of rejection.

PARAMETERS	**UNFIT %**	**% OF UNFIT**
SUBSTANDARD VISION	292(7.28%)	52.7
LATTICE DEGENERATION	91 (2.27%)	16.43
DEFECTIVE COLOUR PERCEPTION	55 (1.37%)	9.93
POST KERATOREFRACTIVE SURGERY	48 (1.12%)	8.66
MISCELLANEOUS (LENTICULAR OPACITY, SQUINT, RETINAL CONDITIONS ETC)	68 (1.69%)	12.27
	554	100

Discussion: This study emphasises the importances of early Ophthalmological examination and choosing appropriate career options other than armed forces if not meeting the prescribed ophthalmological medical standards. This evaluation should be done at high school or intermediate level so that necessary correction can be done

else the efforts could be shifted to alternate career options. Among the major causes of rejection, the most common is substandard vision which could be corrected by kerato-refractive procedures maintain the post kerato-refractive procedure parameters. Similarly, the second most common cause of rejection is lattice degeneration with or without hole which can be corrected by Barrage Laser in most of the candidates to be declared fit.

Conclusion: Among the causes of rejection, Ophthalmological rejection tops the list for aspiring candidates. Ophthalmological examination prior to choosing armed forces as a career option and treatment of the prevailing ocular condition would maximises their selection as an Officer into Armed forces.

Impact of Covid-19 pandemic on morbidity pattern of communicable diseases: a comparison of indian airforce and indian data

Avinash Kr Ray

Background: Novel corona virus (Covid-19) was first detected in Wuhan in Dec 2019 and it had affected millions of people all around the world. It was declared pandemic by WHO on 11th Mar 2020.To halt the transmission of the disease various preventive strategies were adopted all over the world such as travel restrictions, lockdowns, social distancing, compulsory use of face of face masks, hand hygiene etc. Most of the communicable diseases have contact, droplet or airborne mode of transmission. Following the outbreak of Covid various preventive measures which were directed for its prevention and control were also found to be effective in halting the transmission of various other communicable diseases. Thus, a study was undertaken to understand the impact of Covid on morbidity pattern of selected notifiable communicable diseases in Indian Airforce (IAF) as well as India and a comparative analysis was also undertaken to find out any difference.

Methods: It is a record based observational cross-sectional study. IAF data was collected and analysed from Annual Health Report (AHR). National data was collected from web portal of Integrated Disease Surveillance Program (IDSP).Incidence rates of diseases viz.-Malaria, dengue, Viral Hepatitis, Enteric Fever, TB were calculated and analysed. Difference in proportion of incidence rates were calculated and using Z-test and P-value<.05 were taken as significant.

Results: Communicable diseases such as Enteric fever, Dengue, Viral Hepatitis, TB showed a declining trend during Covid era when compared with incidence rates of preceding years and difference in rates were significant

Conclusion: The study shows an overall positive impact of preventive strategies adopted during Covid era in prevention and control of control of communicable diseases under study. Thus, preventive measures adopted during Covid to be followed for prevention and control of other communicable diseases too.

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