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ISAM NEWSLETTER 2023

FROM THE PRESIDENT'S DESK

It is with great pleasure and a profound sense of responsibility that I address you from the President's desk in the latest edition of the ISAM Newsletter - 2023. As President of our distinguished society, I am deeply honored to lead a community of professionals dedicated to advancing the field of aerospace medicine in India.

The Indian Society of Aerospace Medicine has a rich history of promoting excellence in the field, and we have continuously strived to ensure the safety and well-being of those who explore the skies and beyond. In the current year, we



remained committed to building upon the strong foundation of our organization, embracing new challenges, and shaping the future of aerospace medicine in our nation.

Society members have contributed effectively to further the progress of the specialty in India and Abroad. The contribution of the society members in the challenging Human Space Program for maintenance of the health, periodic evaluation, and training of the Astronaut Designates is praiseworthy. The Society has been successful in its endeavors to establish a global presence and the same has been acknowledged by the international community of Aerospace Medicine during ASMA held at USA and ICASM held at Abu Dhabi this year.

I convey my sincere gratitude to all the Society members for the support rendered and wish everyone a very Happy 62nd Annual Conference of the Society this year.

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SALIENT ACTIVITIES OF THE SOCIETY

<u>EX-OFFICIO ANNUAL MEMBERSHIP OF AsMA</u>

Allied annual AsMA membership has been taken in respect of Commandant IAM and Secretary ISAM (Ex-Officio) for subscription of 'Aerospace Medicine & Human Performance' since 2021. The same has been renewed this year.

INDIAN JOURNAL OF AEROSPACE MEDICINE (IJASM)

The IJASM is in the process of getting indexed. Towards this, the Journal has become online and last edition was published in Jun 2023. To improve the quality of Journal, comprehensive guidelines and Model Code of Conduct have been formulated. In addition, a policy towards ensuring robust plagiarism check has been formulated and implemented. The Editorial Board and Reviewer Panel will be expanded. All these activities will help in stepping forward for indexing of the Journal.



<u>CONTINUING AEROSPACE MEDICINE EDUCATION</u> <u>ONLINE (CAMEO)</u>

CAMEO (Continuing Aerospace Medicine Education Online) is being conducted once a month on virtual platform (CISCO-WEBEX). It has proven its effectivity as a platform for Interactions, sharing of thoughts and experiences by Aerospace Medicine Specialists from different sectors (civil/ military or serving/ veterans) for the benefit of the entire fraternity. The platform will be extended further for invited Guest Lectures by experienced veterans of the specialty.

1 & 2 AMTC AS NMC RECOGNIZED TRAINING FACILITY IN AEROSPACE MEDICINE

The Post Graduate Medical Education Board of National Medical Commission (NMC) approved the proposal of considering No 1 and No 2 Aeromedical Training Centres (AMTC) as a part of Institute of Aerospace Medicine, Bengaluru (IAM IAF) and postgraduate training centres.

The faculty posted at these two centres are eligible to be considered as Post Graduate teachers. The PG Residents are being attached to AMTCs for six weeks duration on rotation.





During this duration, the PG Residents gets familiarized to the working of a flying base, undergo extensive hands-on training and exposure to various aeromedical such as Spatial Disorientation Simulator (DISO) and Ejection Procedure Simulator (EPS), handling of Night Vision Goggles and imparting aeromedical training to the aircrew on the same. Hands-on training on motion sickness desensitization is also imparted. They also undergo familiarization visit to Air India A 320 Virtual Simulator at Hyderabad to understand nuances of flying civil aircraft. PG residents are also encouraged to conduct short duration aeromedical research during their tenure at the AMTCs. Their performance is strictly monitored through a weekly written report and a log book.

<u>AIR MSHL PM SUNDARAM TRAVELLING FELLOWSHIP: SPREADING AWARENESS ON</u> <u>AEROSPACE MEDICINE</u>

Col KN Rao (Retd), Travelling Fellow of ISAM, conducted three guest lectures at Vizag & Bangalore on 12, 13 & 21 Jul 23. Lectures were delivered to **MBBS Students of Medical Colleges** that included Andhra Medical College, Gitam Medical College & MS Ramaiah Medical College. The participating students were to join internship soon and would be appearing for PG subsequently. The lectures were well received and quarries were cleared as they arose.





Gp Capt YS Dahiya, Travelling Fellow of ISAM for the year 2022-23, visited Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences, Rohtak (Haryana) on 20 Oct 23 during the ARMSCON 2023 of the Institute. **ARMSCON** is the 'Annual Rohtak Medical Students Conference', which brings together the largest number of undergraduate medical students in North India to this academic and cultural event.



He delivered a talk on the topic 'Aerospace Medicine – What's it!'. The talk was followed by Q&A session. The presentation appeared to fulfil its objectives as was evident by the nature of queries and clarifications sought by the UG students on 'how to join IAF and MD Aerospace Medicine'. Overall, the visit to Pt BDS PGIMS, Rohtak was a success and hopefully did justice to the Travelling Fellow's mandated task.



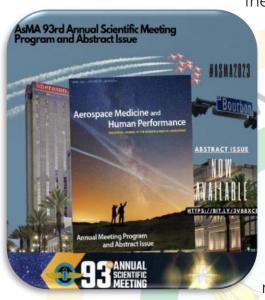
Gp Capt SS Mohapatra, Travelling Fellow of ISAM for the year 2022-23, conducted guest lectures at AIIMS, Mangalgiri Andhra Pradesh on 06 Sep 23 and Andaman Nicobar Institute of Medical Science (ANIMS), Port Blair on 30 Sep 23. The mandate of the travelling fellow is to spread the word about the speciality of Aerospace Medicine amongst the newer generation of doctors and undergraduate medical students. All institutions welcomed his enthusiastic work, and he sparked a great deal of interest among students looking for additional guidance for their post-graduation studies in aerospace medicine. These lectures were attended by a large number of undergraduate students. Many doubts regarding Aerosp Med as well as the procedure to join AFMS were clarified.





INTERNATIONAL PRESENCE BY ISAM MEMBERS

The 93rd Annual Scientific conference of Aerospace Medical Association (ASMA) was held at the New Orleans, Louisiana, USA from 21 to 25 May 2023. The theme of



the conference was "Aerospace and the Next Generation". Approximately 1560 participants from the United States and more than 500 participants from all over the world attended the meeting. The conference mainly focused on the following six major categories: Aerospace Medicine, Space Medicine, Medical Standards, FAA Medicals, Human Performance and Accident Investigations. There were a total 80 sessions in this conference. There were a total of 511 presentations including slide and poster presentations.

Two official delegates from Indian Air Force also made podium presentations during ASMA-2023. Both the presenters delivered their talks in the highest

professional manner and were highly appreciated by the attendees. The details of the presentations are as follows: -

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Gp Capt Ranjan Sarkar presented on "Software Assisted Fatigue Avoidance Initiative in Indian Naval Aircrew" This was one of the presentations in the session on 'Operational Issues in Fatigue Management' Scheduled from 0830-1000 h at Napoleon Hall on 24 May 23.





Sqn Ldr Anitha T presented on "A Comparative study between an Indigenously developed psychometric test battery 'pSuMEDhA' and CogScreen- AE". This presentation was included in the session on "Clinical Practice Guideline – Aeromedical Risk Analysis". scheduled from 1030-1200 h at Napoleon Hall on 24 May 23.



The 69th International Congress on Aviation & Space Medicine (ICASM) was held at Abu Dhabi, UAE on 26-29 Oct 2023.

Approximately 300 participants from about 50 countries participated in the event.

The participants consisted of speakers from the USAF, US Navy, US Army, NASA, European Space Agency, Space X, FAA, international military organisation and civil aviation industries.

There were nine scientific sessions spanned for three days. The topics of various scientific sessions were Space Medicine, Aviation Medicine: Regulations, Travel & Safety, Aviation Medicine: Mental Health, Space: The Space Medicine Physician, Aviation



Medicine: Human Performance, Aviation Medicine: Continued Human Performance and Ophthalmology, Space Medicine, Aviation Medicine, Aviation Medicine Medical Specialties.



A delegation team consisting of one ISAM sponsored delegate and two official delegates participated in the Congress and presented their scientific research. All three presentations generated significant enthusiasm and interest among the audience.





Gp Capt Stuti Mishra presented on "Effect of 24-hour Dry Supine Immersion on Intraocular Pressure Changes and its Correlation with Cardiac Output". This presentation was slotted in the session on 'Aviation Medicine: Continued Human Performance and Ophthalmology' scheduled from 0830-0930 h on 29 Oct 23. The session was chaired Dr. Robert Orford and Dr. Valerie Martindale.

Lt Col Binu Sekhar M presented on "NVG flying: Time to Visual Adaptation after De-Goggling to Various Illumination Conditions". This paper was in the session on 'Aviation Medicine: Continued Human Performance and Ophthalmology' scheduled from 0830-0930h on 29 Oct 23. The session was chaired Dr. Robert Orford and Dr. Valerie Martindale





Ldr Rahul Dev presented San on "Objective Assessment of Functional **Recovery Following Exercise Intervention** Aircrew with **Musculoskeletal** in Injuries". This presentation was included in the session on 'Lunch Symposium: Musculoskeletal' scheduled from 1115-1230h on 29 Oct 23. The session was chaired Dr. Reino Peiterse and Prof. Erik Hohmann.



PARTICIPATION OF ISAM MEMBERS AT ICAO EVENT

Col (Dr) Nageshwar Rao K (as organizer) & Dr Punita Masrani (as speaker) participated in the Air Navigation World (ANW) event organized by ICAO at Montreal from 29 – 31 Aug 23. Medical Provision Study Group (MPSG) meetings were also held on the side-lines of ANW. MPSG is the apex body that decides on Av Med policies and consists of 33 members from different countries. In these events, there were four medical panels during the event on the topics of Upper Age Limits for Commercial Pilots, Mental Health Issues, Evolution of Medical Certificates and Patient Transport and Air Ambulance Operations. It was attended by Regulators, Govt and Industry reps from 83 countries.



<u>ACHIEVEMENTS BY AEROSPACE MEDICINE SPECIALISTS</u>

ACADEMICIAN AWARD : INTERNATIONAL ACADEMY OF AVIATON AND SPACE MEDICINE (IAASM)



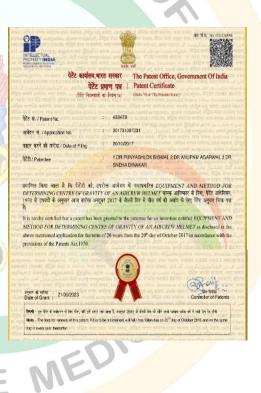
Wg Cdr MD Sharma and **Wg Cdr Ajay Kumar** were conferred with the status of academicians of the IAASM at the ICASM held at Dubai in Oct 2023. IAASM selects its academicians on the basis of their experience, academic achievements and their contribution to the field of Aerospace Medicine. The medallions and certificates recognising them as academicians were received by Sqn Ldr Rahul Dev on behalf of the recipients. It was a proud moment for the ISAM when two of its life members received this recognition in an international forum.



PATENT FOR INDIGENOUSLY DESIGNED EQUIPMENT TO DETERMINE CENTRE OF GRAVITY OF AN AIRCREW HELMET

Based on the Principle of Moments, an equipment was designed such that it consisted of a platform mounted wireframe to hold the helmet, placed on four weighing scales. The vertical force acting at the four corners of the platform of known dimensions is measured. A mathematical derivation of the equilibrium of moments gives the centroid, which is the CoG of the mounted load, be it the helmet alone, with the mask or other helmet mounted devices. This unique concept was designed by **Gp Capt Punyashlok Biswal**, **AVM Anupam Agarwal VSM**, **Wg Cdr Sneha Dinakar** and the innovation was granted patent by the Patent Office, Government of India on 21 Sep 23.





RACE ACROSS AMERICA (RAAM) 2023

Wg Cdr Srinivas G, Aerospace Medicine Specialist, finishes 7th in the World's toughest bicycling race, Race Across America (RAAM) 2023. RAAM is an ultra-distance cycling race held across the United States and ais counted as one of the toughest annual endurance competitions in the world.



This transcontinental event is from the West Coast of America to its East Coast, covering around 5000 kms across various terrains of the United States. It passes



through 12 states, crosses three time zones and four mountain passes. Over its length, RAAM exposes the cyclist to high mountains, arid lands, prairies, cold, heat, windy conditions and thunder storms. Insufficient sleep leads to fatigue and hallucination. Gradients and weather phenomena take a toll on mind and body.

At the recently concluded RAAM 2023 (solo segment), Srinivas timed 11 days and 6 hours to cross the finish line of the 5000 kms endurance event, and stood at **7th position**, with his average speed being 11.25 miles per hour. It may be noted that Srinivas was the first Indian to successfully complete RAAM in 2017. He received the coveted Armed Forces Cup physically on speed post from RAAM for finishing the 2023 race successfully while serving the Indian Armed Forces.



61⁵ ANNUAL CONFERENCE OF THE ISAM

The Indian Society of Aerospace Medicine organised its **61**st Annual Conference at IAM IAF, Bangalore from 03 to 05 Nov 22 on a hybrid platform. The 61st Annual Conference of ISAM played a pivotal role in promoting collaboration, knowledge exchange, and innovation within the aerospace medicine field. The **hybrid online-offline platform** of the Conference not only facilitated discussions on cutting-edge research and technologies but also helped to strengthen the network of professionals working towards enhancing safety and well-being in aviation and space exploration. The conference was attended physically by 164 members and online by around 88 representatives inclusive of Armed Forces Medical Officers, IAF Aircrew, representatives from DRDO, ISRO & Aviation Industry and the past Presidents of the Society. A total of eight sessions were held. A total of fifty-eight scientific papers including scientific posters, speaking posters, panel discussions and closed-door sessions were presented during these scientific sessions.



THE CONFERENCE THEME AND THE LOGO

The theme of the 61st Annual Conference of the ISAM was 'Aerospace Medicine: Opportunities and Applications'. Description of the logo and its individual components is as under:

The logo for the Conference was designed to depict the all-encompassing facets of

Aerospace Medicine. The Flight Surgeon Badge and E: OPPORTUNIT ISAM logo formed the epicentre where all aeromedical activities carried out in India could 'Fixed wing' & 'Rotary wing' connect. variant aerodynamic the two represented operations and depicted the different challenges to the aircrew and the support rendered by the Aerospace Medicine fraternity. The three axes in the background depicted the pivotal role speciality have been playing in providing solutions RENCE OF INDIAN SOCIETY OF and training to prevent mismatch in the orientation mechanism and the effects of G forces in different axis. The and Spacecraft capsule highlighted the contribution to India's maiden Human Space Flight Programme - Gaganyaan. The colour combination of the logo depicted the immense contribution of this society to IAF and its sister organisations.

PLENARY SESSION OF THE 61st ANNUAL CONFERENCE



The Conference was inaugurated on 03 Nov 2022 at 1130 h by Air Chief Marshal VR Chaudhari PVSM **AVSM VM ADC**, the Chief of the Air Staff and Chief Patron of the Society. Air Marshal Manavendra Singh PVSM AVSM VrC VSM ADC, AOC-in-C Training Command IAF, senior Air Officers of HQ TC and local units, Ex-Comdts IAM and senior veteran Aerosp Med Spls were some of the important dignitaries who graced the occasion. The session started with an audio-visual presentation on the history and achievements of the ISAM. Following Welcome Address by Comdt IAM, Air Mshl Prashant Bharadwaj AVSM VSM & BAR PHS, then DGMS (Air) & President

Orbit



ISAM delivered the Presidential Address. This was followed by the Inaugural Address by the CAS.

AIR MARSHAL SUBROTO MUKERJEE MEMORIAL ORATION



The Air Marshal Subroto Mukerjee Memorial Oration was delivered by **Dr** Gary G Kay, PhD. Director. Neuropsychology Division, Department of Neurology, Georgetown University School of Medicine, USA. The topic was 'Analysis and Evaluation of the Cognitive Demands of Flying'. His talk addressed determination of the cognitive demands of flying, the factors that impact pilot cognitive functioning, and the assessment of pilot cognitive functioning. His talk provided an insight on which cognitive abilities are essential and the level of the cognitive ability

demanded to safely perform aviation operations.

AVM MM SRINAGESH MEMORIAL ORATION

The AVM MM Srinagesh memorial oration was delivered online by Dr. James Vanderploeg, Chief Medical Officer, Virgin Galactic on the topic, 'Private Human

Space Flight: Opening Space for All'. He is recently retired from Professor of Aerospace Medicine and Director of Clinical Preventive Medicine at the University of Texas Medical Branch in Galveston, Texas. His oration include the following - development and status of medical acceptance criteria and medical standards for Space Flight Participants, the process for evaluating and mitigating medical risk, Overall, it was an excellent oration enriched with information on future and the challenges that lay ahead to open space travel for all.



AVM JHF MANEKSHAW PANEL

The JHF Manekshaw Panel was delivered by two eminent speakers; **Mr Maneesh Kumar, JDG, DGCA & Mrs Nandini Harinath, Sr Scientist, ISTRAC, ISRO.**





Mr Maneesh Kumar spoke on the topic, 'Risk Based Approach to Management of Safety in India'. His talk emphasised on the effectiveness of actions taken to manage the safety risks and safety issues, Safety Performance Indicators have been developed at state level and at service provider level which are measured with respect to agreed targets periodically.

Mrs Nandini Harinath spoke on the topic, 'Glimpses of ISROs Inspiring

Missions'. The speaker took through the journey of some of ISRO's important missions like the "Mangalyaan". A firsthand account of the challenges faced in the mission and how the teams overcame them. Overall, a sneak preview into the design and analysis of some the inspiring missions by ISRO.



TECHNICAL MINI SERIES (TMS) ON 'AEROMEDICAL SIMULATORS, AEROMEDICAL/ RESEARCH TOOLS & PROTOCOLS'

Technical Mini Series in Aerospace Medicine First Edition

Aeromedical Simulators, Aeromedical/ Research Tools & Protocols



Indian Society of Aerospace Medicine

The Technical Mini-Series (TMS) titled, 'Aeromedical Simulators, Aeromedical/ Research Tools & Protocols' was released by Chief of the Air Staff during the plenary session of the 61st ISAM Conference on 03 Nov 22.

Aeromedical/ Aeromedical Simulators, Research Tools & Protocols are the of aeromedical cornerstone training, research & evaluation. The simulators provide a near analogous ground-based platform for simulation of various aeromedical stressors. The diagnostic and evaluation tools aid evaluation in aeromedical decision making. These tools/ modalities equipment are necessary ensuring optimal aircrew fitness and performance. In addition, these tools are also essential research aids in recreating the



aviation environment. The contents of the TMS provide basic concepts on aeromedical simulators, their working philosophy, and applications in Aerospace Medicine. They give a brief description on the technical aspect as well as their operating regimes. This TMS intended to help Aerospace Medicine practitioners to develop a basic understanding of the importance of various simulators and their appropriate applications.

GENERAL BODY MEETING OF ISAM-2022

The General Body Meeting (GBM) of ISAM was conducted on a Hybrid platform at 1600 h on 04 Nov 22 from during the 61st ISAM Conference held at IAM IAF. This was attended by approx. 100 members physically and 30 members virtually. The GBM was chaired by **Air Marshal Prashant Bharadwaj AVSM VSM & BAR PHS**, then DGMS (Air) and President of the Society and the proceedings



were conducted by **Gp Capt NK Tripathy**, Secy ISAM. The approved minutes of the GBM have been made available on the Society website. Fellowship and life membership were conferred during the GBM by the President, ISAM.

<u>NEW FELLOWS AND ASSOCIATE FELLOWS OF THE SOCIETY</u>

AVM PS Sodhi (Retd) and Gp Capt NK Tripathy were conferred as 'Fellow' and Wg Cdr Juhi Borgohain, Wg Cdr Stuti Mishra, Wg Cdr Biplab Bhowmick, Dr Ajith Kumar, Wg Cdr Sneha Dinakar and San Ldr BN Vasudev were conferred Associate Fellowship of the Indian Society of Aerospace Medicine during the General Body Meeting. Gp Capt SS Mohapatra and Gp Capt YS Dahiya were selected as 'Travelling Fellows' for the year 2022-2023.

<u>NEW LIFE MEMBERS OF THE SOCIETY</u>

Life membership was given to following 24 applicants by the President ISAM during the GBM: -



Lt Col Srinivas Bhattachar Sqn Ldr Sourav Gain Surg Lt Cdr Shireen Deepti S Sqn Ldr Anubhav Upadhyay Sqn Ldr Avishek Sharma Sqn Ldr SP Singh Sqn Ldr Biswajit Bhowmick Maj Jeya Karthik Dr Ruchika Rana Dr Preethi R Dr Harshini H Maj Sunil Kumar Maj Arjun Anchan Surg Lt Cdr Harsha MR Maj Gaurav Garg Surg Lt Cdr Y Varun Maj Shivaling Maj Uday Bansal Dr Shawn James Dr Bhavana KJ Dr Harsitha TA Dr Md. M Sani Dr K I K Sherwani Dr H M Reddy

AWARDS AND TROPHIES

THE CHIEF OF THE AIR STAFF TROPHY FOR STANDING FIRST IN PAMC

The Chief of the Air Staff Trophy was awarded to the officer who scores the highest marks in all the Primary Aviation Medicine Courses (PAMC) held during the year. For the academic year 2022-2023, the trophy was awarded to **FIt Lt Santanu Khanna**. The trophy was presented to the officer by the CAS during the plenary session of the Conference.



<u>AVM MM SRINAGESH TROPHY</u>



The AVM MM Srinagesh trophy is awarded to the officer who scores the highest marks in the Advance Course in Aerospace Medicine. The trophy was awarded to **Sqn Ldr T Anitha** by the CAS during the plenary session of the Conference.

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<u>AOC-IN-C TRAINING COMMAND ROLLING TROPHY</u>

AOC-in-C Training Command Rolling Trophy is awarded for the best dissertation in MD Aerospace Medicine Course. Sqn Ldr T Anitha was awarded the trophy for her dissertation titled, 'A Comparative Study between Indigenously Developed Psychometric Test Battery 'pSumedha' and CogScreen – AE'. The trophy was awarded by the CAS plenary session of the Conference.



<u>PRESIDENT'S GOLD MEDAL</u>



The President's Gold medal is awarded to the student standing first in the MD Aerospace Medicine. The President's Gold medal was awarded to **Surg Lt Cdr Sachin Bharadwaj** by Air Marshal Prashant Bharadwaj AVSM VSM & BAR PHS, then DGMS (Air) and President, ISAM during the General Body Meeting held on 04 Nov 2022.

<u>AIR MARSHAL PM SUNDARAM TRAVELLING FELLOWSHIP</u>



AVM A Agarwal VSM and Gp Capt Rahul Pipraiya were awarded the Air Marshal PM Sundaram Travelling

Fellowship by DGMS (Air) & President ISAM for the year 2022-23. Col KN Rao (Retd), who was selected as Travelling Fellow could

not take lectures due to his permanent shift to ICAO, Montreal, Canada. The Travelling Fellowship would be



delivered to him on completion of lectures during 62nd ISAM conference, 2023.



BEST PAPERS: 61st ISAM CONFERENCE

Late Gp Capt GS Nayar award for the best scientific paper was awarded to Wg Cdr SS Khatua for the paper titled 'Manifestation of Ocular Muscle Imbalance after Flying Apache 64E Aircraft'. 2nd Best Paper was awarded to Mr Sabyasachi. San Ldr A Gowda received the award for the best poster for his paper titled 'Incidence of G-Induced Loss of Consciousness in the Indian Air Force: A Retrospective Study'. NDIAN SO

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OBITUARY

LATE AIR VICE MARSHAL KS SOODAN



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Late Air Vice Marshal Pradeep KS Soodan, was commissioned in the Indian Air Force on 13 May 1978. An empathetic doctor and an exceptional professional, he pursued Diploma in Aviation Medicine and later an MS in Otorhinolaryngology.

During his professional career in IAF, he held milestone appointments such as Commanding Officer of No 1 Aeromedical Training Centre (AMTC) from 06 Oct 1986 to 18 Jun 1989, Commandant of the prestigious Institute of Aerospace Medicine (IAM) from 26 Jun 2000 to 15 Oct 2002 and finally, as Dean of the premier Armed Forces Medical Establishment, Armed Forces Medical College (AFMC) prior to his superannuation on 31 Jan 2004.

He was an avid reader and an excellent mentor/ guide to his students. He is remembered for his quick decisions, professional approach to new challenges. He was an excellent teacher, guide to several MD residents in Aerospace Medicine, a PhD Guide at Pravara Institute of Health Sciences (Deemed University), MD examiner for Aerospace Medicine, editor of the Indian Journal of Aerospace Medicine and Pravara Medical Review.

He quietly breathed his last on 27 May 23. His legacy will endure in the memories of those who were touched by his teachings, leadership, and unwavering kindness.



ISAM EXECUTIVE COMMITTEE

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Secretary	: Gp Capt NK Tripathy
Seniormost Aerosp Med Spl	I: AVM A Agarwal VSM
Ex-Officio Members	: Air Cmde Vipin Sharma
	Air Cmde Mukul Bhatia
Elected Members	: Air Cmde Rajesh Kumar
	Gp Capt Mona Dahiya
	Wg Cdr Parul Goel
	Wg Cdr Biplab Bhowmick
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[This e-Bulletin has been compiled and edited by Wg Cdr B Bhowmick and Surg Lt Cdr Karthikeyan S]