The Legacy of the Wright State University Aerospace Medicine Residency Program

Charles R. Doarn; Kazuhito Shimada; Marc Shepanek

INTRODUCTION: In the mid-1970s, NASA required a robust training program for physicians responsible for the medical needs of the Shuttle astronauts. Personnel at NASA worked closely with academicians and subject matter experts at Wright State University (WSU) to develop and establish a residency program in aerospace medicine. This academic training program was initiated in 1978 and closed in 2018. The objective of this historical piece is to catalog, for posterity, the impact this training program has had on national and international human spaceflight and aviation.

METHODS: A thorough review of all available historical documents and oral histories provided by contemporaries were reviewed in detail, including a search of every available resident's thesis and all available historical documents and reports at WSU and NASA Headquarters.

RESULTS: Over the past 40 yr, WSU has graduated 172 individuals with an M.S. degree focused on aerospace medicine, of which 84 were residents. Nearly 50% of these residents have worked closely with NASA. Many others became integrated into academia, the aviation industry, or international space programs.

DISCUSSION: With the growth in interest for government and commercial spaceflight, the field of aerospace medicine is poised to grow. Although it is not well known outside of the Aerospace Medicine community, the legacy of this pioneering, 40-yr civilian-based program is of significant value. If not recorded in an easily locatable and accessible manner, many of the challenges and outcomes from this residency could be lost until future generations have to spend the money, time, and effort to relearn them.

KEYWORDS: aerospace medicine, academic training, NASA, space medicine.

Doarn CR, Shimada K, Shepanek M. *The legacy of the Wright State University Aerospace Medicine Residency program*. Aerosp Med Hum Perform. 2021; 92(9):744–750.

"Space medicine is still an infant science—but no other frontier of medicine is more exciting. In determining the need and role of various human parts, their creation, and their possible substitution, you shall be probing the origins of life itself."

President John F. Kennedy
Aerospace Medical Center
San Antonio, TX, 1963

In 2018, we celebrated the 100th anniversary of aviation medicine. From 1903 to 1918, there was little data and much speculation about how the human body would react to powered flight. To address the clear future need, in 1918, Theodore C. Lyster helped establish the U.S. Army Air School of Aviation at Hazelhurst Field as the Air Service Medical Research Laboratory.[10,17] From that day forward, aviation medicine grew along with military aviation, commercial aviation, and now, human spaceflight. As interest in spaceflight grew after World War II, aviation medicine expanded to aerospace medicine, both in practice and training.[4,7]

From the Department of Environmental and Public Health Sciences, University of Cincinnati, Cincinnati, OH, USA; the Office of the Chief Health and Medical Officer, NASA Headquarters, Washington, DC, USA; and JAXA, Tsukuba, Japan.

This manuscript was received for review in October 2020. It was accepted for publication in May 2021.

Address correspondence to: Charles R. Doarn, MBA, FATA, FAsMA, Professor, Public Health Sciences, M.P.H. Program Director, Department of Environmental and Public Health Sciences, College of Medicine, Director, Space Research Institute for Discovery and Exploration, Office of Research, University of Cincinnati, 160 Panzeca Way, ML: 0056, Cincinnati, OH 45267-0056; charles.doarn@uc.edu.

https://doi.org/10.3357/AMHP.5813.2021.

Doarn and Mohler reported on the early academic programs at Harvard University (1954–1972) and at The Ohio State University (1959–1977), how those programs developed, and the role they played.[6] Aerospace medicine training has occurred worldwide in support of national interests and efforts. In 2005, Ducatman et al. presented a discussion on residency training in preventive medicine.[7] Mohler reported on the training of aerospace medicine physicians at Wright State University in 1985.[13] Howard reported on training in the United Kingdom.[9] Tokarev et al. reported on physician training in the Union of Soviet Socialist Republics and the United States.[16] Billings discussed the training program at The Ohio State University, which was initially an aviation training program and later evolved into an aerospace medicine training program.[3] This program provided 51 trained physicians, 12 of whom worked at NASA in some capacity. Grenon et al. discussed the challenges of aerospace education for Canadian physicians.[8] And, while each of these programs has matriculated significant numbers to the field, it is the Wright State University program that produced the most graduates and has had the most significant educational impact for those four decades.

METHODS

To understand the contribution and legacy that the Wright State Residency Program had on the field of aerospace medicine, a thorough review of all available material was conducted. The source material included personal communications with Dr. Mohler in the years before his death and discussions with the Wright State University archivist (William Stoltz). In addition, all existing materials at Wright State University, including files, department/college newsletters and reports, residency newsletters and NASA Headquarters archived proposals, and annual reports from Wright State University. Much of the historical record is no longer available due to it being lost as a result of moves or destroyed.

Transition in Training Opportunities and a Growing Need

The Apollo Program ran from 1961–1975 with the last lunar landing mission, Apollo 17, occurring in late 1972. The Apollo Applications Program, which consisted of three Skylab missions and a joint USSR/U.S. docking mission, Apollo-Soyuz Test Project, ran through 1975. The Space Shuttle Program began in 1969, was formally initiated in 1972, and had its first launch (STS-1) in 1981. As the Apollo program wound down, it seemed to some that the need for aerospace medicine trained physicians was diminishing. The Harvard and Ohio State programs were terminated.[6]

In 1977, it was clear to senior NASA medical personnel that there was a need to establish a new training program to prepare physicians to support human crews of the new, upcoming Space Shuttle program. Thought was given to establishing such a training capability at Wright State University as Wright-Patterson Air Force Base (WPAFB) was not only close by, but had outstanding academic and research opportunities for a new Master's degree and residency program in Aerospace Medicine. In addition, WPAFB had a long and distinguished role in human spaceflight going back to the late 1950s with Dr. Stanley White and others. Dr. White was stationed at WPAFB before being assigned to NASA's Manned Spacecraft Center in Houston.[20] Many of the medical efforts, technologies, and life support systems for the early space program came out of WPAFB's Aerospace Medical Research Laboratory.[19]

To address the high operational tempo and multiple flight requirements of the upcoming Space Shuttle program, Drs. Sam Pool and Arnauld Nicogossian, and others, initiated new crew medical and selection standards and established the foundations of medical policy to support this program.[5] The type of astronauts required to support the Space Shuttle Program and the operational tempo required to support multiple planned missions were different from the Apollo era. Early Shuttle program estimates included the possibility of flying 50 missions per year. This tempo would require a large number of highly trained and experience Aerospace Medicine physicians.

Dr. Nicogossian (an Ohio State University residency graduate) was an early advocate of establishing a new aerospace medicine residency to address the unique needs and requirements of the Space Shuttle well in advance of using the new vehicle to send humans into space.[16] As Doarn and Mohler have reported, discussions were held with Dr. Charles Billings about developing a program in California in association with NASA Ames Research Center and Stanford University and with Dr. Stanley Mohler about Wright State University, which was adjacent to WPAFB in Dayton, OH.[6] In 1978, a multiyear, civilian residency program was initiated at Wright State University with Dr. Mohler as its first director. The first residents were admitted in 1979.[13]

NASA's Partnership with Wright State University

As the NASA-funded program at Wright State University began, two individuals were selected to receive a NASA stipend. These individuals most often then matriculated to a NASA field center, usually Kennedy Space Center (KSC) or Johnson Space Center (JSC). Non-NASA-funded residents were part of the program and were funded either with their own resources or sponsored by another organization, including aviation companies and militaries from around the world. During the course history, there were years when WPAFB denied entry of certain nationalities. When that was the case, the student skipped classes at WPAFB or did thesis work outside of WPAFB at other appropriate settings. This cadre of physicians enhanced the training program with reflections of both space medicine and aviation medicine.

Academics and Decadienal Review

In its earliest days (c. 1980), the Wright State University program consisted of 2 yr of academic work and was recognized as a residency period by the Accreditation Council for Graduate Medical Education (ACGME), and as a master's course in Aerospace Medicine by the university. Later it was modified to be a residency course.[14,21]

The first year was the academic year, which fulfilled class requirements. It was possible to graduate as a master's student if a thesis was completed. The second year was a practicum year and the final year was the residency. The third year, a practice year, fulfilled a 3-yr requirement to sit for the American Board of Preventive Medicine Aerospace Medicine subspecialty exam.

Over the 40-yr program, there were several directors. The founding and initial director was Stanley R. Mohler, M.D. (1979–2004), followed by Robin Dodge, M.D., M.S. (2004–2011), Farhad Sahiar, M.D., M.S. (2011–2013), Dean Olson, M.D., M.S., M.S. (2013–2017), and Thomas F. Jarnot, M.D., M.S. (2017–2018). Aside from Dr. Mohler, the other directors were all graduates of the residency program.

This ACGME-approved residency included a wide variety of courses and each student was required to complete a thesis. Over the years, the curriculum evolved to: 1) meet standards set by the ACGME; and 2) keep pace with the medical training needs of the evolving Shuttle flights to a fully operational International Space Station. Courses were taught by a variety of scholars and subject matter experts in aerospace and aviation medicine and life sciences, including Drs. Stanley Mohler, Ken Beers, Robin Dodge, Richard Garrison, and Mary Anne Frey. In addition, a wide number of guest lecturers also shared their knowledge and experience. Students did their research both at WPAFB and in the community. Students also rotated to Federal Aviation Administration (FAA) sites, the Civil Aerospace Medical Institute (CAMI), and NASA's KSC and JSC.

Not every student who was accepted into the program completed the requirements or submitted a thesis. In 2006, the thesis requirement became optional and many students did not complete one. **Table I** is a list of every available thesis written by each resident in fulfillment of the degree requirements. Each thesis has contributed to both human spaceflight and aviation. This comprehensive list covers a wide variety of subjects and will serve as an excellent reference source for understanding the many challenges in human spaceflight and

Table I. Wright State University Graduates Theses.

NAME	YEAR OF GRADUATION	THESIS TITLE
Eric Donalson	1981	Preliminary investigation of variation in some dark adaptation aspects of possible relevance to military helicopter aircrew
James S. Logan*	1981	Noninvasive assessment of cardiac function at various seatback angles with and without anti-G suit inflation
Irene D. Long*	1981	Sickle cell trait and aviation
Patrick S. Harsha*	1981	Auditory brain stem response and a study of the effects of Coriolis stimulation on it
Robin E. Dodge†	1981	A discrimination between circadian rhythm and fatigue related changes in performance
Earl G. Wolf, Jr‡	1982	Neurophysiologic aspects of hypoxia
Ralph J. Luciani‡	1982	Quantification of neck muscle fatigue due to lateral acceleration by surface electromyographic analysis
James R. Popplow	1982	Human performance and cardiopulmonary effects of combined lateral and vertical acceleration
Victor M. Rico-Jaime	1983	Aeromedical evacuation: potential use in Mexico
David A. Tipton *	1983	The effects of G_x, G_y, and G_z forces on cone mesopic vision
Donald F. Stewart *	1983	The physiological and performance effects of sequential G_y/G_z accelerations
Jeffrey R. Davis*	1983	Pilot performance and physiology during $+G_x$ acceleration (MX missile robot profile)
Chiharu Sekiguchi**	1984	Aircrew protection for positive G_z acceleration
Walter D. Davis***	1984	Validation of a postulated $+G_z$ fatigue tolerance equation for multiple sequential exposures
Mavis D. Fujii*	1985	Steady-state evoked potentials in response to pseudorandom stimulation
Bernard J. Burns	1985	Pulmonary ventilation modeling using a nonlinear multicompartmental approach
Brenton E. Haskell	1985	The subjective perception of workload in low-time private pilots
Jerome J. Furst*	1985	Human response to restraint configuration in horizontal impact
Jose F. Flores, Jr.*	1985	Electrically induced isometric exercise as a means of preventing muscle atrophy and bone demineralization
James K. Goodrum‡	1985	Correlates between Antarctic stations, space stations, and a lunar base
Joey B. Boyce*	1986	Effect of hypobaric exposure on platelet count: aspirin prophylaxis
Philip C. Stepaniak*	1986	Physiologic signs during loss of consciousness in $+G_z$ acceleration
Jeffrey K. Myers*	1986	Calcium metabolism in whole-body vibration
Lih Ouyang	1986	Modification of the vestibulo-ocular reflex and self-motion perception by exposure to sensory rearrangement in a preflight adaptation trainer
Debra Duncan†	1987	Radial keratotomy: a review of U.S. literature with recommendations for FAR pilot qualifications
Melchor Antunano***	1987	The use of portable refreezable head coolers to increase heat tolerance of personnel working in hot environments
Jose Pinto Ferreira	1987	Certification of hypertensive pilots: a normative approach
Dan Woodard*	1987	Modification of the phase relationship between a vestibular stimulus and eye movement
Robert Forest	1987	Basic critical care and anesthesiology for long-duration space missions: orbital stations to planetary expeditions
Timothy J. Ungs	1987	Simulator induced syndrome in Coast Guard Aviators
Richard T. Jennings*	1987	Comparison of tolerance differences between standard and sequentially inflating G-suits during $+G_z$ acceleration
Larry J. Pepper *	1988	The effects of two histamine H1-receptor antagonists (terfenadine and diphenhydramine) on human performance

NAME	YEAR OF GRADUATION	THESIS TITLE
Denise L. Baisden*	1988	Exercise characteristics and injuries in flying and nonflying populations
John W. Gosbee*	1988	The effects of heat stress on cognitive and psychomotor performance, with and without head cooling
Christian G. LeRoux	1988	The development of a performance battery for mental and neurological screening in the aviation medical examiner's office
Mary Ann T. Orzech‡	1988	Evaluation of the human psychological response to prolonged motionless suspension in three types of fall protection harnesses
Bradley Beck*	1989	Use of lower body negative pressure as a countermeasure to negative G_z acceleration
Andrew Seter	1989	The determination of human strength characteristics in a simulated zero gravity environment
Barbara Stegman	1989	Considerations for the survival of embolism
John Darwood*	1989	Mass discrimination under G stress
Sangkun Park	1989	Modification of attitude perception as a function of head position and G
Wen-Yaw Chiou	1989	A stress test to evaluate the physical capacity of performing L-1 anti-G straining maneuvers
Chin-Ming Li	1989	Postural effects of $+G_z$ impact on the spinal column
Akira Miyamoto**	1989	Mapping of evoked magnetic field with visual stimulation: a secondary projection and processing area
Pai-Feng Tsai	1989	Cardiovascular responses to the "stand test" by male subjects in two hydration states
Yong-Ho Lee	1989	A statistical comparison of medical attributes and flight hours in aircrews of differing size aircraft
James Gravees	1989	NA
Laurie A. Aten*	1990	The effects of prelaunch position on cardiovascular responses with gender comparisons
Cornelius J. Botha	1990	The effects of low-dose scopolamine on selective cognitive functions
Barbara F. Lujan*	1990	Human Psychology in Space: an educational model for America
Sei Yumikura**	1990	Effects of head-out water immersion on the mechanisms of the cardiovascular responses to orthostasis in women and men
Stephen Veronneau***	1990	Effect upon feature detection and recognition viewing digitized radiographs on a video display terminal
Steve Schwedemann*	1991	Restraints in civil single engine fixed wing aircraft less than 12,500 pounds gross weight
Michael R. Barratt*	1991	A nonanthropomorphic enclosure for orbital extravehicular activity: theoretical benefits and human factors considerations
Samir Y Zurekikat	1991	Subjective evaluation of an assisted positive pressure breathing (APPB) system for sustained acceleration protection
Patrick McGinnis*	1991	Prophylaxis of decompression sickness in the rat by use of an intravenous perfluorocarbon emulsion
David F. Ward*	1991	The effects of lypressin on hemodynamic responses to head-down tilt and orthostatic stress
Edward Powers*	1991	Measurement of bone density changes in simulated microgravity using an enhanced gamma computed tomography device
Richard Garrison†	1991	An analysis of inflight illness in business aircraft
Klaush Lohn	1991	Disuse osteoporosis: changes in biochemical parameters during and following simulated microgravity
Thais Russomano	1991	Gender differences in subjective evaluation of cognitive performance changes during sleep deprivation
Samir Zureikat	1991	Subjective evaluation of an assisted positive pressure breathing (APPB) system for sustained acceleration protection
Steven D. Harper	1991	Comparison of the training transfer of a personal computer-based simulator and a FAA approved simulator in a general aviation aircraft
Kenneth Leopold Fong	1992	Maximizing $+G_z$ tolerance in pilots of high-performance combat aircraft
Gene L. Dowell*	1992	The effects of a retrograde inflation anti-G suit on human performance
Tadashi Murai**	1992	Mathematical simulation of hemodynamic changes during peri-launch period /
Rainer K. Effenhauser*	1992	Pulse waveform and transcranial doppler analysis during lower body negative pressure
Annette L. Sobel‡	1992	Evaluation of a man-machine interface for crew-aided, automatic target acquisition systems
Smith L. Johnston, III*	1992	An investigation of middle cerebral artery blood flow velocity and arterial oxygen saturation under sustained positive G_z
Gaylen S. Johnson*	1993	A survey of pilots' safety attitudes
Philip J. Scarpa*	1993	The effects of ergotamine on the cardiovascular responses to orthostatic stress
Warren C. Jensen	1993	Evaluation of computer-based cognitive function testing in detecting diphenhydramine-induced cognitive deficits and correlation with flight simulator performance in pilots
Farhad Sahiar†	1993	Reproduction in the space environment: implications for human spaceflight
Chris Salvino	1993	Critical care and emergency surgery: concepts from earth orbital and interplanetary space missions
Wei Li	1993	Physiological comparisons between subjects in the forward leaning and upright postures during high G_z centrifuge tests
Thomas C. Hankins‡	1994	Inflight physiologic and subjective monitoring of general aviation pilot workload by flight segment
Arthur A. Arnold, Jr.	1994	Performance effects of decreased cerebral tissue oxygen saturation induced by various levels of mixed oxygen/nitrogen
Alice D. Friedman	1994	Effect of sensor integration on subjective workload
Ali Obaid A. M. Mohamed	1994	Injuries associated with ejection seat use
Mark Edwards	1994	Effect of Entex LA and Seldane on cognitive function
Chyrsoula Kourtidou	1995	Brain mapping at high altitudes and time of performance recovery
Hussain Ali Khna Pervaiz	1995	Civil Airline Decompression Considerations in the Prevention of Passenger Hypoxic Injury

NAME	YEAR OF GRADUATION	THESIS TITLE
Kazhuito Shimada**	1995	Head alignment of the general aviation pilot during flight
Harry W. Young, Jr.	1995	Comparison of subjective data versus brain, cardiac, blink, and respiratory measures of workload during various phases of simulated C-130 flight
Atuso Kikuchi	1996	Echocardiographic monitoring of diastolic function in centrifuge subjects
Donato J. Borrillo	1996	Effect of hyperbaric exposure on Tumor Necrosis Factor
Sajjad A. Savul	1996	Gender differences in cerebral and arterial oxygenation after exposure to high G_z forces
Joseph A. La Rocca	1996	Emergency descent profiles from 70,000 feet msl for the high-speed civil transport with commentary on physiological implications for occupants
Richard A. Schuering*	1996	The role of spatial disorientation in fatal general aviation accidents
John Simanonok	1996	Intravenous perfluorocarbon emulsion vs. hyperbaric oxygen for the treatment of acute decompression sickness
Richard A. McCluskey*	1997	Effects of weightlessness on eye-hand tracking
Michael S. Stephens	1998	Electro-neurophysiologic diagnosis of aircraft pilot spatial disorientation
Hamad J. Al-Saey	1996	Study the changes in the blood pressure and the heart rate secondary to exposure to sustained acceleration
Manaswee Kovitaya	1996	Middle cerebral artery blood flow velocity after exposure to sustained + G_z
Li-Min Zhang	1998	The cognitive performance and physiologic responses with different G-suit during high G load on the DES
Robert Haddon*	2000	Airborne microbe exposure in the normal operation of a hyperbaric chamber
Terrance A. Taddeo*	2000	The cognitive effects of two antihistamines: loratadine and acrivastine
Ki-Young Chung	2000	Effects of $+3G_z$, $+2G_z$, and $-1G_z$ on intraocular pressure
Leonid Katkovsky	2000	Managing cross cultural differences in future international space station missions
Nasser H. Al-Nuaimi	2000	Helmet pointing performance differences between males and females during high sustained acceleration
Daniel Bejarano	2001	Color perception study at high G: edges as critical to perception of hue
Nidel El-Rimawi	2001	Development of an Audio-Visual Tool for Medical Training at Kennedy Space Center
Kevin Templar	2001	The bradycardic response in humans during negative G_z exposure
Talal O. Kamal	2001	The effect of 'G' induced loss of consciousness on cerebral tissue oxygen saturation and cerebral hemoglobin volume
Yu Koike**	2002	A mission to Mars: the effects of heavy ion exposure in galactic cosmic rays on the nigrostriatal dopaminergic system
Alex M. Wolbrink	2002	Demographics of in-flight medical emergencies
Richard B. Villata	2003	The effect of $+G_z$ and the resultant biomechanical force on bone mineral density in males and females
Kevin McKee	2004	The effects of hyperbaric oxygen vs. room air on mildly elevated carbon monoxide levels
Tamarack R. Czarnik	2004	An analysis of three approaches to exercise countermeasures in long-duration spaceflight
Akiko Matsumoto**	2005	An investigation of factors associated with loss of body weight in astronauts during spaceflight
Arnold A. Angelici, Jr.***	2006	Partial validation of the fatigue avoidance scheduling tool (FAST)
Nidal El Rimawi	2006	Development of an Audio-Visual Tool for Medical Training at the Kennedy Space Center
Peter Dempsey	2006	Driver licenses as medical clearance for light aircraft pilots
Marvin Jackson***	2006	Neuro waiver guide for NASA
Mansi Amin	2007	Ophthalmological wavier guide for NASA
Grant Shirley	2007	Lunar dust
Charles Shurlow	2008	Cancer rates in USAF fighter pilots
Marcos Avila	2009	In-flight Medical Events
Thomas Jarnot[†]	2009	Exercise protocols for enhancements of G-tolerance in high performance aircraft
Jeong-Ku Lim	2009	A safety helmet for aircraft passengers
Carlos Salicrup	2009	Fatigue in 777 pilots of international airlines
Chan Kim	2010	The appropriateness of hindlimb unloading rodent model for predicting skeletal changes during spaceflight
Johnson D. Swanson	2010	Potential Sleep Strategies for Spaceflight
Kevin R. Van Valkenburg	2014	Musculoskeletal symptoms in Fighter Pilots Flying High- G Aircraft in Military Training Programs and Military Operations
Mustafa Alaziz	2015	Cirrus Airframe Parachute System: Study Analysis
Ali Alhammad	2015	Infectious Disease and Air Travel
Emmanuel Urqueita		Left Ventricular Atrophy after Spaceflight: Is it a Significant Concern?
Christopher Liensch	NA	The Use of Home Cervical Traction to Reduce Neck Pain in Fighter Pilots

*Worked with NASA at some point; [†]Wright State University faculty; [‡]U.S. Air Force, **NASDA/JAXA; ***FAA.

aviation medicine, especially among researchers and developers. They remain relevant today.

RESULTS

Once the residency was up and running, a significant number of graduates from 1980 through the 1990s became employed by NASA. This pipeline to NASA began to wane in the late 1990s with only a few joining NASA from 2000 on. An academic program of this nature has many outcomes. These include many highly trained individuals and the faculty who remain our contemporaries today, influencing both aviation and human spaceflight. Residents came from around the world to train at Wright State University. A significant number continued gaining knowledge at NASA, international space programs, the FAA, CAMI, and other national and international airlines. The training provided an excellent foundation for career development and helped foster the growth of the program.[1]

In addition to graduates assuming significant management roles at NASA in operational medicine and life science, the program added Michael R. Barratt, M.D., who graduated in 1991 and became a NASA flight surgeon and then a NASA astronaut. His spaceflight experience both on the Space Shuttle and International Space Station as well as his experience in Russia in support of the Shuttle/Mir Program added great value to the NASA flight surgeon community. He and many others not only used their academic experience to build meaningful careers, but also contribute to the field of aerospace medicine. Barratt's experience also laid the foundation for two scholarly texts on clinical medicine in space.[2]

The nearly 172 graduates—residents (84) and Master of Science students (87)—included individuals from the United States and 29 countries (Australia, Bahrain, Brazil, Canada, China, Colombia, Congo, Ethiopia, Germany, Ghana, Greece, India, Iraq, Iran, Israel, Japan, Jordan, Kuwait, Mexico, Pakistan, Portugal, Qatar, Saudi Arabia, Singapore, South Africa, South Korea, Sudan, Taiwan, Thailand, Unites Arab Emirates). This cadre included civilian and military physicians.

Over the life of the program, 195 students enrolled in the program with over 170 graduating. Of those who were residents, the majority were certified by the America Board of Preventive Medicine. The program also initiated the Stanley R. Mohler lecture series presented at the Experimental Aircraft Association AirVenture in Oshkosh, WI, USA.

Decline and Closure

On April 26, 2017, the Division of Aerospace Medicine within the Wright State University's Department of Population and Public Health Sciences announced the closure of the residency due to a variety of issues within the university. Several students matriculated to the Aerospace Medicine Residency Program at the University of Texas Medical Branch (UTMB) to complete their degree requirements. While the residency and Master degree programs were closed down, a certificate in Aerospace Medicine was established to further promulgate training, albeit at a reduced level and intensity.

While Wright State University Aerospace Medicine Residency had been a key pipeline for aerospace medicine-trained physicians for nearly 20 yr, the perceived need at NASA JSC led to the development of a training program at the UTMB in Galveston with a focus more on space medicine. This program became a full fledge accredited residency in 1997 and its residents spend significantly more time at the NASA JSC due to its proximity to the Center and its focus on space medicine.[6]

While the field of aerospace medicine training has its roots in aviation training,[11,18] it continues to grow, as reported by McGinnis et al. in 1998.[12] This growth will continue to lead graduates into numerous career paths.[1] While the training for the past 40 yr has principally been focused on the space part of aerospace, the Wright State University residency helped make a significant impact. The importance, scope, and breadth of the scholarly contributions that the residents made, solely based on their thesis titles, has been of importance and will continue to be a source of information and knowledge for the next generation of aerospace medicine physicians and perhaps even researchers.

Conclusion

As national and international efforts to develop commercial space endeavors move forward, the need for properly trained physicians to fill the ranks must be met with academic and scholarly vigor. As commercial programs move forward, highly trained aerospace medicine physicians, some of whom obtained their training at Wright State University, will contribute to this rapidly emerging paradigm. Sirek et al. reports on Canada's efforts in this regard.[15] Residencies, fellowships, and training programs have arisen in preparation for a growing need, but it is the legacy of the Wright State University Aerospace Medicine Residency and its contributions that have made an indelible contribution to this field. It has made a foundation these new programs can build on.

While the program itself ran its course for nearly four decades, it is the knowledge acquired by those who willing sacrificed their time and energy to learn this field and lead space and aviation medicine to where it is today. We remember the outstanding faculty for their commitment to education and to the students who took the knowledge and met the challenge of aviation and human spaceflight head on.

ACKNOWLEDGMENTS

Each author played a significant role. Drs. Shepanek and Shimada provided historical background and editorial input. Professor Doarn conducted the majority of the work, interacting with the Wright State University archivist and historian, as well as sifting the archives and libraries, and NASA's historical records.

Financial Disclosure Statement: The authors have no competing interests to declare.

Authors and Affiliations: Charles R. Doarn, MBA, Division of Public Health Sciences, Department of Environmental and Public Health Sciences, College of Medicine, University of Cincinnati, Cincinnati, OH, USA, and Office of the Chief Health and Medical Officer, NASA Headquarters, Washington, DC, USA; Marc Shepanek, Ph.D., Office of the Chief Health and Medical Officer, NASA Headquarters, Washington, DC, USA; and Kazuhito Shimada, M.D., Ph.D., M.S., Japanese Space Exploration Agency, Tskuba, Japan.

REFERENCES

1. Atzema C, Poirier V. Career options in aerospace and aviation medicine. Ann Emerg Med. 2004; 43(5):652–656.
2. Barratt MR, Baker ES, Pool SL, editors. Principles of clinical medicine for spaceflight, 2nd ed. New York: Springer; 2019.
3. Billings CE. Aviation medicine graduate training at Ohio State University, 1955–1977. Aviat Space Environ Med. 2010; 81(5):517–521.
4. Campbell MR, Mohler SR, Harsch VA, Baisden D. Hubertus Strughold. The Father of Space Medicine. Aviat Space Environ Med. 2007; 78(7): 716–719.

5. Doarn CR. Medical policy development for human spaceflight at NASA: an evolution. Aviat Space Environ Med. 2011; 82(11):1073–1077.
6. Doarn CR, Mohler SR. Physician training in aerospace medicine–an historical review in the United States. Aviat Space Environ Med. 2013; 84(2):158–162.
7. Ducatman AM, Vanderploeg JM, Johnson M, Rubin J, Harber P, et al. Residency training in preventive medicine: challenges and opportunities. Am J Prev Med. 2005; 28(4):403–412.
8. Grenon SM, Saary J. Challenges in aerospace medicine education. Aviat Space Environ Med. 2011; 82(11):1071–1072.
9. Howard P. Teaching and training in aviation medicine in the United Kingdom. J UOEH. 1985; 7(1):9–25.
10. Johnson ME. The history and development of aviation medicine. J Natl Med Assoc. 1943; 35(6):194–199.
11. Lackay RH. Training for the practice of aviation medicine. J Am Med Assoc. 1957; 164(13):1425–1431.
12. McGinnis PJ, Harris BA Jr. The re-emergence of space medicine as a distinct discipline. Aviat Space Environ Med. 1998; 69(11):1107–1111.
13. Mohler SR. Training of aerospace medicine physicians. J UOEH. 1985; 7(1):1–7.
14. Mork MR. Forum for leadership in preventive medicine: impact on the specialty of aerospace medicine. Aviat Space Environ Med. 1997; 68(6):542–544.
15. Sirek A, Samoil K, Harrison MF. Space medicine training in Canada. Aerosp Med Hum Perform. 2019; 90(8):725–729.
16. Tokarev VF, Razsolov NA, Mohler SR, Nicogossian AE. Training of aerospace medicine physicians in the Soviet Union and the United States of America. Aviat Space Environ Med. 1986; 57(4):376–380.
17. U.S. Air Force School of Aerospace Medicine celebrates 50th anniversary. Aerosp Med. 1968; 39(3):328–331.
18. White MS. Development of an aviation medicine residency program. J Aviat Med. 1956; 27(3):226–230.
19. White SC. The Aerospace Medical Research Laboratory: a leader in the development of life support. Aviat Space Environ Med. 1986; 57(10, Pt. 2):A44–A48.
20. White SC, Berry CA. Resume of present knowledge of man's ability to meet the space environment. Aerosp Med. 1964; 35(1):43–48.
21. Yasuhara TT, Dodge RE, Jennings RT, Valdez MR. Specialty competencies for residents in aerospace medicine. Aviat Space Environ Med. 1999; 70(6):609–611.