The U.S. Army Aeromedical Research Laboratory

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This is the second President's Page to focus on an aerospace medical research laboratory. This month's focus will be on the U.S. Army Aeromedical Research Laboratory (USAARL). Many thanks to Brigadier General Michael J. Talley and the U.S. Army Medical Research and Development Command (USAMRDC) for their submission.

The USAARL is one of six research laboratories within the USAMRDC, which is headquartered at Fort Detrick, MD. The USAMRDC leads the advancement of military medicine in support of the future Army. The unique missions of the six USAMRDC laboratories collectively underlie the Command-wide mission to responsibly create, develop, acquire, and deliver capabilities for the soldier. The USAARL is the USAMRDC's lead for merging the sciences of aviation and medicine.

The USAARL is appropriately co-located at Fort Rucker, AL, home of Army Aviation, with other key aviation and aeromedical units. This juxtaposition, at the heart of the world's largest military rotary-wing training center, ensures aeromedical research is responsive to aviation's requirements and operational problems. The enduring partnership of trust and ingenuity forged between the USAARL, the U.S. Army Aviation Center of Excellence (USAACE), and its tenant organizations drives the requirements and research behind aircraft design, identifies and successfully addresses critical aviation and aeromedical operational knowledge gaps, and prepares the modern force to competently and confidently compete at an elite level in multi-domain operations.

The USAARL, originally established in 1962 as the U.S. Army Aeromedical Research Unit (USAARU) by MG (then COL) Spurgeon Neel and MG Earnest Esterbrook, has long provided the Army with direct aviation medical research support to quickly solve real, operational aeromedical problems experienced by aviators performing in the demanding aviation environment. COL Neel recognized that an expanding Army aviation community needed specialized medical and physiological support to help close the gap between combat aviation needs and human capabilities, and to protect aviators from altitude, climate, noise, acceleration, impact, and other stressors. Technical evaluation of aircraft and personal equipment, and aeromedical in-flight characteristics and field problems analysis were part of the Unit's early research program. In 1969, as USAARU's air mobility research grew, the Unit was re-designated the USAARL. Since its early years, the USAARL has been involved in field studies throughout the Army, from assessing hazards of military systems and operations to evaluating the biomedical means of enhancing soldier selection, performance, and protection.

Today, the USAARL's expertise and data-driven solutions advance the Army's modernization priorities and enhance the performance and safety of soldiers operating complex Army systems. The Laboratory's efforts focus on optimal workload management; virtual reality-based training; degraded visual states; cognitive and multi-sensory function; fatigue countermeasures; head, neck, and spine protection; aviation life support equipment; medical equipment and technology; and en route and prolonged field care. The USAARL stands out as a world-leading expert in rotary-wing aerospace medicine and serves leadership roles on many international panels focused on rotary-wing and unmanned system aeromedical solutions and problems.

The Laboratory's most important asset is a highly skilled workforce of medical professionals, doctoral and masters level researchers, research technicians, and engineers organized into the Enroute Care Group, the Injury Biomechanics and Protection Group, and the Warfighter Performance Group. Critical operational support is provided by rated aviators and management professionals who make up the Flight Systems Branch and Research Operations Group/Special Staff, respectively. To ensure the long-term sustainment of this workforce, the Laboratory's science, technology, engineering, and mathematics programs have mentored and educated hundreds of recent college graduates and students at all levels of education since the early 2000s.

The USAARL's collection of state-of-the-art research platforms position the Laboratory as the Army's only aviation medicine research asset. The Laboratory's many platforms include: a research helicopter, full-motion flight simulator, Cockpit Academic Procedural Tool, configurable cockpit simulator, vertical acceleration testing center, man-rated multi-axis ride simulator, vestibular testing laboratory, unmanned aerial system simulators, electro-optical/night vision laboratory, hearing booths with anechoic and reverberation chambers, virtual reality platforms, shock tubes for blast testing, full testing facilities for airworthiness certification of medical equipment in rotary wing aircraft, and an aeromedical research library.

The USAARL is deeply involved in collaborating with academic, industry, and fellow government partners to solve problems and to deliver solutions in support of the Army Futures

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Command (AFC), Future Vertical Lift (FVL) program. The USAARL's rich history in rotary wing aviation and deep involvement in operational research make the Laboratory a perfect partner for the FVL Cross Function Team to ensure the human is at the heart of the future of vertical lift. USAARL's four lines of effort – Individual Medical Readiness, Human Capability-Tolerant System Design, Human Operator State Monitoring and Scalable Autonomy, and Occupant Protection – will aid in building the requirements for future aircraft and in mitigating and responding to the effects of novel flight applications on humans in aviation.

The USAARL stands ready and eager to support Army aviation with its direct approach to solving aeromedical operational problems for the next generation Army aviator. Together, with its partners, the USAARL will merge operational and research-based information to transform the way the Army trains and fights in all environments.

SPACEX

On Saturday May 30, 2020, history was made when a Falcon 9 rocket, built and operated by SpaceX, lifted off, making it the first piloted flight launched into orbit by a privately owned and operated company. Nineteen hours later the capsule caught up with the International Space Station and proceeded with a problem-free docking. The flight, piloted by astronauts Robert Behnken and Douglas Hurley, was the first launch of NASA astronauts from the United States since the 2011 retirement of the space shuttle program and, if all goes well, SpaceX could begin ferrying astronauts to and from the Space Station later this year.

COVID19 AND AVIATION: A LOOK AT THE POSITIVE

While the numbers for airline operations are not encouraging, the statistics for other types of operations are more promising. The number of U.S. airline flights per day declined precipitously from March 16th through April 10th and has remained very low since. However, the number of cargo flights has remained basically unaffected, following a schedule which varies regularly depending on the day of the week. In addition, although the number of general aviation flights dropped from March 12th through March 29th, it has steadily increased since then.

Bambu Global is developing a new test that could detect coronavirus in a patient's saliva in as quickly as a few seconds to a minute using a chemical solution that changes color in the presence of the coronavirus. It is currently undergoing FDA evaluation for approval under Emergency Use Authorization and could be available later this summer or early fall. The assay detects the presence of two proteases that are uniquely present in the SARS-CoV-2 virus, which results in the color change. The assay appears to have a sensitivity of 95% and specificity of 90%. This could be a game changer in allowing for rapid detection of COVID-19 at airports prior to boarding flights.