
News Release

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High altitude hypoxia can be detected before symptoms are apparent, Mayo Clinic study finds

SCOTTSDALE, Ariz. – A team of [Mayo Clinic](#) researchers have found that hypoxia can be detected prior to incapacitating physical symptoms which can be a safety threat at high altitudes. The findings were published as the lead article in the October issue of *Aviation, Space, and Environmental Medicine*.

“This study opens the door for objective assessments of hypoxia and additional safeguards for military and commercial pilots and others working in high altitudes,” says [Jan Stepanek, M.D.](#), the Aerospace Medicine Program Director and Co-Director of the [Aerospace Medicine & Vestibular Research Laboratory](#).

Hypoxia is a lower than normal level of oxygen in your blood. To function properly, your body needs a certain level of oxygen circulating in the blood to cells and tissues. When this level of oxygen falls below a certain amount, hypoxia can cause a variety of symptoms including shortness of breath, impaired speech, slowed reaction time and passing out.

Historically, the most common way to detect hypoxia is by physical signs and individual symptoms and one of the most commonly studied effects of hypoxia is reaction time. The Mayo Clinic study team used the King-Devick neurocognitive performance test, which is commonly used to identify cognitive changes related to sports-related concussions, and to assess cognitive function under conditions of low oxygen-simulating altitude. The King-Devick test assesses the time in viewing, identifying and reading aloud a series of numbers on three consecutive test cards. Based on test times of 25 participants, the study concluded that the King-Devick test is an effective tool to detect “impairment of cognitive performance at a presymptomatic stage of hypoxia.”

“This study provides an objective indication of hypoxia that is involuntary, reliable and repeatable,” Dr. Stepanek says. “This means that people can be tested for cognitive declines before having symptoms, because often people won’t have symptoms until it is too late.”



This study is the latest in a long line of contributions from the Mayo Clinic Aerospace Medicine efforts since the inception of this line of work in Rochester in the 1930s. Mayo Clinic physiologists and altitude scientists developed several life support systems and strategies vital to military pilot safety in the World War II era and that are in use until today. Prior to pressurized aircraft cabins for commercial airline passenger flights, aircraft flew at relatively low altitudes to avoid hypoxic (low oxygen) conditions. Mayo scientists developed an oxygen mask for pilots and passengers to wear during flights, allowing travel at higher altitudes above turbulent weather conditions, making flights smoother and more tolerable to travelers.

Today, a team of Mayo physicians and scientists are continuing to investigate problems related to altitude, spatial disorientation and acceleration protection in dedicated laboratories at Mayo Clinic in Arizona.

Clinical care and consultation for pilots and passengers with Aerospace Medicine related conditions are treated by board-certified specialists in Aerospace Medicine at all three Mayo Clinic campuses in Arizona, Florida and Rochester.

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