# How High?
## Pilots Train in Low-Pressure Chambers That Simulate High Altitudes

San Antonio, (Brooks City-Base)—The Air Force is keeping pilots safe by testing equipment and conducting trainings in low-pressure environments that simulate high altitudes. As altitude increases, air pressure decreases meaning there is less available oxygen. At very high altitudes, hypoxia may occur unless the pilot is using a pressurized suit, oxygen mask, and other technologies.

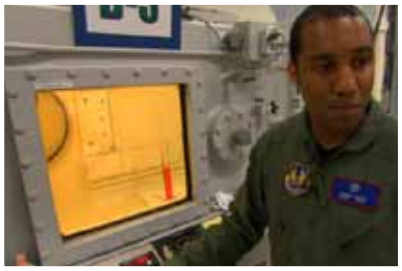
*"The higher the altitude the less pressure, which makes it harder for oxygen to exchange in the blood."*
**Alexander Hoang, aerospace physiology technician**

| Framework | Standards |
|---|---|
| Middle School | NSES - C.iii.2 ➤ Organisms regulate their internal environment.<br>NSES - D.i.8 ➤ The atmosphere is a mixture of gases.<br>NSES - F.iv.2 ➤ Understand the risks associated with social hazards.<br>STL - 3.F ➤ Knowledge from other fields has an effect on development of technology.<br>STL - 4.D ➤ Technology affects safety. |

## Content Illustrated

- Oxygen density changes with altitude.

## Content



**Life Science**

- The oxygen exchange in blood is affected by pressure. Low pressure can cause hypoxia (low oxygen concentration in the bloodstream) in humans.
- Decompression sickness can also occur when the pilot comes down from a high altitude.

**Physical Science**

- Water can boil at body temperature if the pressure is low enough.

**Earth & Space Science**

- Air pressure changes with altitude. The pressure at sea level is 760 mm Hg (14.7 PSI); it is 237 mm Hg at the height of Mount Everest, and 88 mm of Hg at 50,000 feet.

**Technology**

- Using a vacuum system, hypobaric chambers create low-pressure environments that simulate high altitudes.
- Pressurized cabins for commercial flights are adjusted to make humans safe.
- Pressurized suits and oxygen masks are used by pilots in the Air Force for high-altitude flight (> 10,000 feet).

## Guiding Questions

*To think about as you watch:*

- Why does pressure change with increasing altitude?
- Why is less oxygen available at higher altitudes?
- Why are commercial airplane cabins pressurized?

## Suggested Activities

- Use this webisode to introduce a lesson on layers of the atmosphere.
- Bring in pilots to talk with the class.
- Investigate how cooking is affected by high altitudes (such as changing the boiling point).

## Keywords

air pressure, altitude, Armstrong Line, atmosphere, decompression sickness, density, hypobaric chamber, hypoxia, nitrogen, oxygen exchange, pressurized cabin, pressurized suit, vacuum system

- *How High?* can be found online at www.ndep.us/How-High. Visit www.ndep.us/LabTV for a list of process skills modeled in webisodes.