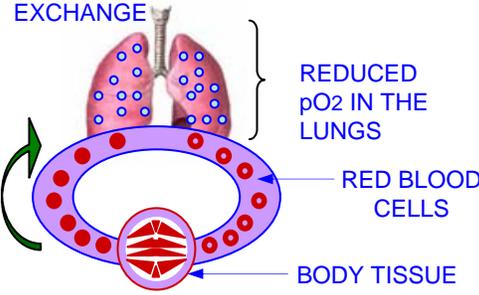
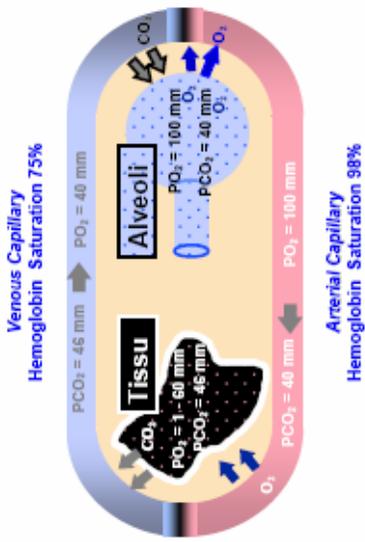
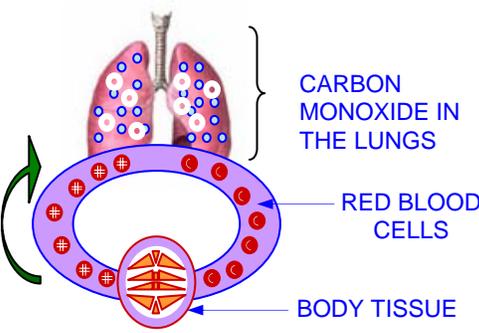
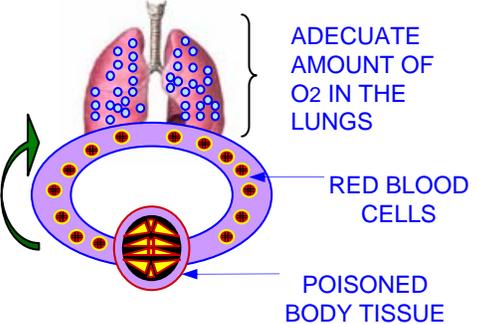
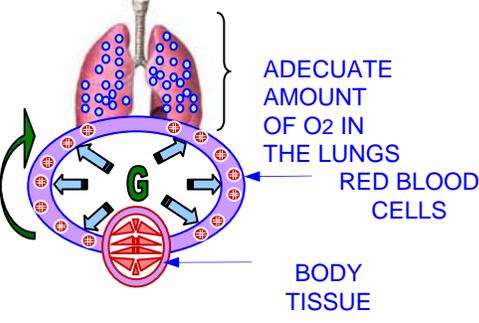


# AEROMEDICAL FACTORS

CONDITION	TYPES	DEFINITION
<p style="text-align: center; color: green; font-weight: bold;">HYPOXIA</p> <p>Hypoxia results when the body lacks oxygen. Hypoxia tends to be associated with flights at altitudes. However, many other factors such as alcohol abuse, heavy smoking, &amp; various medications interfere with the blood's ability to carry oxygen.</p>	<p style="text-align: center; color: red; font-weight: bold;">HYPOXIC</p> <p style="color: blue;">A DEFICIENCY IN ALVEOLAR OXIGEN EXCHANGE</p>  <p style="color: blue;">REDUCED pO<sub>2</sub> IN THE LUNGS</p> <p style="color: blue;">RED BLOOD CELLS</p> <p style="color: blue;">BODY TISSUE</p>	<p>Occurs when not enough O<sub>2</sub> is in the air or when decreasing atmospheric pressures prevent the diffusion of O<sub>2</sub> from the lungs to the bloodstream. Typically, Occurs at higher altitudes.</p>
<p style="color: green; font-weight: bold;">BLOOD GAS EXCHANGE</p>  <p style="color: blue;">VENOUS CAPILLARY HEMOGLOBIN SATURATION 75%</p> <p style="color: blue;">ALVEOLI: PO<sub>2</sub> = 100 mm, PCO<sub>2</sub> = 40 mm</p> <p style="color: blue;">TISSU: PO<sub>2</sub> = 1 - 60 mm, PCO<sub>2</sub> = 45 mm</p> <p style="color: blue;">ARTERIAL CAPILLARY HEMOGLOBIN SATURATION 98%</p> <p style="color: blue;">PO<sub>2</sub> = 100 mm, PCO<sub>2</sub> = 40 mm</p>	<p style="text-align: center; color: red; font-weight: bold;">HYPEMIC</p> <p style="color: blue;">REDUCTION IN THE O<sub>2</sub> CARRYING CAPACITY OF THE BLOOD</p>  <p style="color: blue;">CARBON MONOXIDE IN THE LUNGS</p> <p style="color: blue;">RED BLOOD CELLS</p> <p style="color: blue;">BODY TISSUE</p>	<p>Also known as anemic hypoxia is caused by a reduction in the O<sub>2</sub> carrying capacity of the blood. Anemia &amp; blood loss are the most common causes. CO, nitrites, &amp; sulfa drugs also cause this by forming compounds with hemoglobin &amp; reducing the hemoglobin that is available to combine with O<sub>2</sub>.</p>
	<p style="text-align: center; color: red; font-weight: bold;">HISTOTOXIC</p> <p style="color: blue;">INABILITY OF BLOOD CELL TO ACCEPT OR CARRY O<sub>2</sub></p>  <p style="color: blue;">ADEQUATE AMOUNT OF O<sub>2</sub> IN THE LUNGS</p> <p style="color: blue;">RED BLOOD CELLS</p> <p style="color: blue;">POISONED BODY TISSUE</p>	<p>O<sub>2</sub> carrying capacity of the blood is adequate, but circulation is inadequate. Conditions as heart failure, arterial spasm, &amp; occlusion of a blood vessel predispose the individuals to stagnant hypoxia. More often, a crew member experiences extreme gravitational forces, causing the blood to be stagnant.</p>

# AEROMEDICAL FACTORS

CONDITION	TYPES	DEFINITION
<p><b>HYPOXIA</b></p>	<p><b>STAGNANT</b></p> <p>REDUCED BLOOD FLOW DUE TO G-FORCES</p>  <p>ADECUATE AMOUNT OF O<sub>2</sub> IN THE LUNGS</p> <p>RED BLOOD CELLS</p> <p>BODY TISSUE</p>	<p>O<sub>2</sub> carrying capacity of the blood is adequate, but circulation is inadequate. Conditions as heart failure, arterial spasm, and occlusion of a blood vessel predispose the individuals to stagnant hypoxia. More often, a crew member experiences extreme gravitational forces, causing the blood to be stagnant.</p>
STAGE	ALTITUDE	SIMPTOMS
<p><b>INDIFERENT</b></p>	<p>0 - 10,000 feet</p>	<p>Night vision deteriorates at about 4000 feet. When approaching 10,000 feet visual acuity begins to decrease.</p>
<p><b>COMPENSATORY</b></p> <p>The pulse rate, systolic blood pressure, circulation rate, and cardiac output increase. Respiration increases in depth and sometimes in rate.</p>	<p>10,000 – 15,000 feet</p>	<p>At 12,000 to 15,000 feet the effects of hypoxia on the nervous system become increasingly apparent. After 10-15 minutes, impaired efficiency is obvious. Crew members may become drowsy and make frequent errors in judgment. May become difficult to do even simple task. Easy to overlook these symptoms.</p>
<p><b>DISTURBANCE</b></p> <p>The physiological responses can no longer compensate for the O<sub>2</sub> deficiency.</p>	<p>15,000 – 20,000 feet</p>	<p>Subjective symptoms include fatigue, sleepiness, dizziness, headache, breathlessness, and euphoria.</p> <p>Objective symptoms include senses, mental processes, personality traits, psychomotor functions, and cyanosis (the skin becomes bluish in color. This effect is caused by O<sub>2</sub> molecules failing to attach to hemoglobin molecules).</p> <p>IMPARED FUNCTIONS: Flight control, handwriting, speech, vision, intellectual functions, judgment.</p> <p>DECREASED FUNCTIONS: Coordination, pain, sensation, memory.</p>
<p><b>CRITICAL</b></p>	<p>20,000 feet and Above</p>	<p>Within 3 to 5 minutes, judgment and coordination usually deteriorate. Circulatory failure, CNS failure, Convulsions, Cardiovascular collapse, death.</p>

# AEROMEDICAL FACTORS

ALTITUDE	TYPES	EXPLANATION
<b>INDIVIDUAL PHYSIOLOGICAL ALTITUDE</b>	<b>DRUGS</b>	Many medications have an unexpected effect when combined with high altitudes. Never self-medicate, even with over the counter drugs.
	<b>ALCOHOL</b>	1 ounce of alcohol can give the body a physiological altitude up to 2000 feet.
	<b>SMOKING</b>	The hemoglobin molecule of RBCs has a 200-300 times greater affinity for CO than for O <sub>2</sub> . Smoking 3 cigarettes in rapid succession or 20 to 30 cigarettes within a 24-hour period gives a physiological altitude of 4000 feet at sea level and a 20% reduction of night vision.
HYPERVENTILATION	TYPES	EXPLANATION
An excessive rate and depth of respiration leading to abnormal loss of CO <sub>2</sub> from the blood. Condition occurs more often among aviators than generally recognized. The human body reacts under conditions of stress and anxiety. Often, a marked increase in breathing occurs. This leads to a significant decrease in the CO <sub>2</sub> content of the body and a change in the acid-base balance.	<b>Dizziness, muscle spasms, unconsciousness, visual impairment, tingling sensations, and hot/cold sensations.</b>	The most effective method is reduction in the affected individuals rate of respiration. However, an extremely apprehensive person may not respond to directions to breathe more slowly. The normal rate is 12 to 16 breaths per minute. Treat by controlling breathing and go to 100% O <sub>2</sub> . If symptoms continue and conscious control of respiration is not possible, the individual should talk or sing. It is physiologically impossible to talk and hyperventilate at the same time.
GAS DISORDERS	TYPES	DEFINITION
<b>TRAPPED GAS</b>  Free gas normally present in various body cavities expands. If escape of the expanded volume is impeded, pressure builds up and pain is experience. Greater pressure changes occur from 15,000 ft down to 0 ft PA, especially 5,000 to 0 ft PA.	<b>Gastrointestinal</b>	Gas expansion in digestive track. Serious at altitudes of 25,000 ft.
	<b>Middle Ear Discomfort</b>	The Eustachian tube normally allows air to pass outward from the middle ear. However, with an increase in pressure during descent, the pressure of the external ear is higher than the pressure in the middle ear and the ear drum is forced inward. Ear drum can rupture if the pressure is not equalized.
	<b>Sinus Pain</b>	Sinus openings may become obstructed when the mucous membrane lining swells as a result of an infection or allergic reaction. Change of altitude produces a pressure differential between the inside and the outside of the cavity, causing severe pain.

# AEROMEDICAL FACTORS

GAS DISORDERS	TYPE	DEFINITION
<p style="text-align: center;"><b>EVOLVED GAS</b></p> <p>Occurs in-flight as a direct result of a reduction of atmospheric pressure. Also known as decompression sickness. Typically at pressure altitudes of 18,000 ft.</p> <p><b>Henry's Law</b> states that the amount of gas dissolved in a solution is directly proportional to the pressure of the gas over the solution.</p>	<b>Bends</b>	At the onset, pain in the joints and related tissues may be mild, but it can become deep, gnawing, penetrating, and eventually intolerable. The pain is progressive and gets worse if ascent is continued.
	<b>Chokes</b>	Symptoms occurring in the thorax are caused by innumerable small bubbles that block the smaller pulmonary vessels. At first, a burning sensation is cited under the sternum. As the condition progresses, the pain becomes stabbing and inhalation is markedly deeper. There is almost uncontrollable desire to cough. Finally, there is a sensation of suffocation; breathing becomes more shallow and the skin bluish. An immediate descent is imperative.
	<b>Paresthesia</b>	Tingling, itching, cold, and warm sensations that are believed to be caused by bubbles formed locally or in the CNS where they involve nerve tracks leading to the affected areas in the skin.
	<b>CNS</b>	In rare cases when aircrew members are exposed to high altitude, symptoms may indicate the brain or the spinal cord is affected by nitrogen bubble formation. The most common symptoms are visual disturbances such as the perception of lights flashing or flickering when they are actually steady.
STRESS	TYPE	EXPLANATION
<p>A nonspecific response of the body to any demand placed upon it. A physiological phenomenon involving actual changes in the body's chemistry and function. Stress involves some perceived or actual demand for action.</p>	<b>Psychosocial</b>	Events may trigger adaptation or change in one's lifestyle, career, interaction with others.
	<b>Environmental</b>	Those things found in our everyday job. Stress resulting from the flight environment.
	<b>Physiological</b>	Self-imposed stressors or maladaptive behaviors that are potentially threatening aviation safety.
	<b>Cognitive</b>	How one perceives a given situation or problem, and the reaction to it. Pessimism, obsession, failure to focus on the present, low self-confidence can create a self-fulfilling prophecy that will ensure a negative outcome.
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# AEROMEDICAL FACTORS

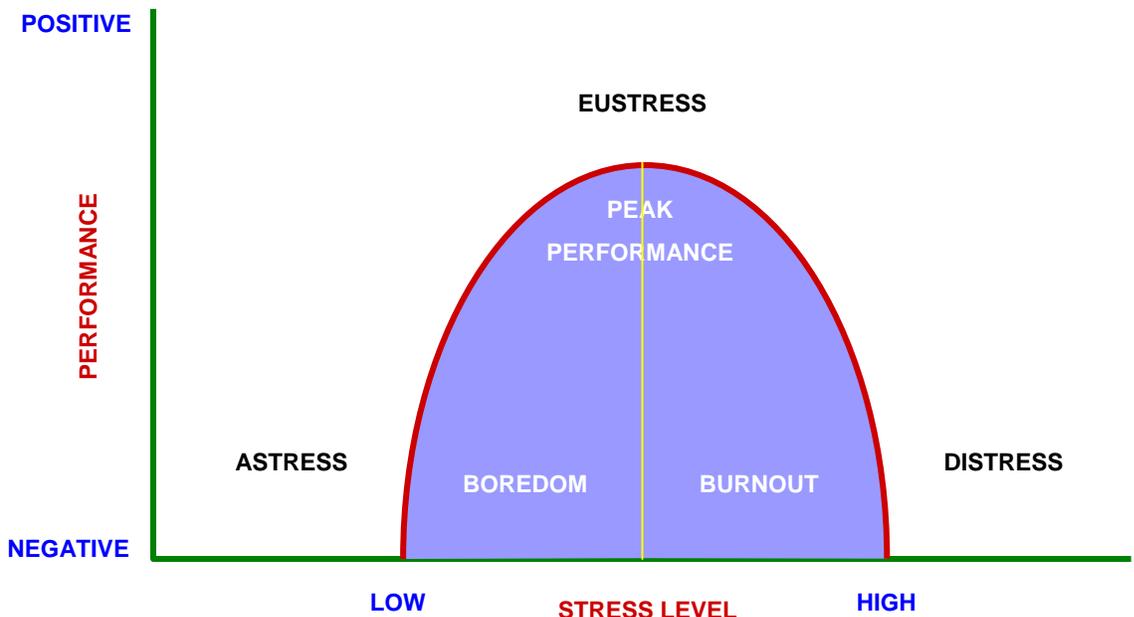
STRESS	TYPE	EXPLANATION
<b>PSYCHOSOCIAL</b>	<b>Job</b>	Low morale, unit cohesion, boredom, fatigue, over-tasking, poorly defined responsibilities.
	<b>Illness</b>	Stress resulting from diseases/fatigue.
	<b>Family Issues</b>	Separation due to deployments, family commitments/spousal relationships.
<b>ENVIRONMENTAL</b>	<b>Altitude</b>	Below 5,000 ft due to the greatest amount of atmospheric changes. Susceptibility to trapped gas disorders causing ear or sinus problems.
	<b>Aircraft Design</b>	Cockpit illumination, instrument location, seat comfort, heating-ventilation systems, visibility, and noise level.
	<b>Airframe Characteristics</b>	Rotary Wing aircraft require constant attention and control. Vibration levels are higher than those encountered in Fixed Wing aircraft.
	<b>Hot or Cold</b>	Operational environments can cause stress that lessens with adaptation. Use proper clothing/equipment.
	<b>Speed</b>	Flight speeds are a different environment than the earthbound environment. Speeds greater than those experienced in every day life cause a higher degree of alertness and concentration over long periods.
	<b>IMC Conditions</b>	Limited visual references required more accuracy in reading, following, and monitoring flight instruments.
	<b>PHYSIOLOGICAL</b>	<b>Drugs</b>
<b>Exhaustion</b>	Lack of rest and poor sleep. Lack of exercise impairs circulatory efficiency, reduces endurance, and increases likelihood of illness.	
<b>Alcohol</b>	Affects of alcohol depend on: the amount of alcohol consumed, the rate of absorption from the stomach and small intestines, the body's rate of metabolism, 1 oz every 3 hrs.	
<b>Tobacco</b>	Use of any tobacco product is detrimental.	
<b>Hypoglycemia</b>	Maintain a well-balanced diet to avoid low blood sugar, which could cause weakness or fainting, fatigue, and inefficiency.	

# AEROMEDICAL FACTORS

STRESS	TYPE	EXPLANATION
<b>COGNITIVE</b>	<b>Musts &amp; Should</b>	Lack of flexibility in thinking causes problems when reality does not accommodate one's wishes. Failure to accept the possibility that things may happen contrary to one's wishes leaves one unprepared, frustrated, and dysfunctional.
	<b>Choice or No Choice</b>	Unhappy, unhealthy, or pessimistic people tend to see the world as the cause of their problems. They will not make choices because they do not like or want the foreseeable outcome. Inability in making decision making not only leads to stress but can make an unsafe flight environment.
	<b>Failure to Focus on the Here &amp; Now</b>	Living in the past or future and overemphasizing what should have been or what could be, can increase one's overall stress.
STRESS RESPONSE	EXPLANATION	
<b>BEHAVIORAL</b>	High stress can adversely affect one's work performance, decrease motivation, and increase the likelihood of conflict, insubordination, and violence in the workplace. Some individuals become socially isolated. Others may abuse drugs or alcohol.	
<b>EMOTIONAL</b>	Ranges from increased anxiety, irritability, or hostility to depressed mood, loss of ones self-esteem, hopelessness, and inability to enjoy life.	
<b>COGNITIVE</b>	<p>Stress can significantly affect one's thought processes. It can decrease attention and concentration, interfere with judgment and problem solving, and impair memory.</p> <p><b>Simplification Heuristic:</b> under high stress conditions, people tend to oversimplify problem solving and ignore important relevant information, taking the easy way out.</p> <p><b>Stress-Related Regression:</b> individuals under high-stress conditions will forget learned procedures and skills and revert to bad habits.</p> <p><b>Perceptual Tunneling:</b> individual or an entire crew under high stress becomes focused on one stimulus, and neglects to attend to other important task/information such as flying the aircraft. A similar situation may occur when an aviator realizes during flight that he or she overlooked some aspect of flight such as missing a radio call. The stressed aviator may then over attend to rectifying this problem/become emotionally and mentally fixated on the error and fall "behind the aircraft."</p>	
<b>PHYSICAL</b>	<p>Involves overall heightened arousal of the body. Increased heart rate, increased blood pressure, more rapid breathing, tensing of the muscles, and the release of sugars and fats into circulation to provide fuel for "fight or flight."</p> <p><b>Prolonged stress &amp; its continuous effects:</b> muscle tension and pain, headaches, high blood pressure, decreased immunity to infectious diseases.</p>	
<b>STRESS UNDERLOAD</b>	Too little stress may be dysfunctional as having too much stress. A lack of challenges: complacency, boredom, and impulsive risk taking.	

# AEROMEDICAL FACTORS

STRESS & PERFORMANCE	EXPLANATION
<b>Physical Characteristics of the Individual</b>	Differences in strength, endurance, & physical health effects stress performance.
<b>Psychological Makeup of the Individual</b>	Individuals with good coping, problem solving, & social skills will cope more efficiently.
<b>Mental Skills Required by the Task or Situation</b>	Attention, concentration, memory, problem-solving, or spatial disorientation will influence the extent to which stress will degrade performance.
<b>Stress Characteristics of the Individual</b>	Taking a stressful, timed problem-solving test in a quiet comfortable room is much easier and will result in fewer errors than taking the same test in a hot, noisy room.
STRESS MANAGEMENT	EXPLANATION
<b>Avoiding Stressors</b>	Most powerful mechanism. Avoid with good planning, foresight, realistic training, good time management, and effective problem-solving. Stay physically fit and eat right. Good crew coordination and communication.
<b>Changing Your Thinking</b>	Practice positive self-talk, taking responsibility for your actions, avoiding perfectionism and inflexibility in thinking, focusing on the here and now rather than the past or future.
<b>Learning to relax</b>	Use breathing exercises, meditation, or regularly engaging in a quiet hobby, greatly reduces stress.



# AEROMEDICAL FACTORS

FATIGUE	TYPE	EXPLANATION
<p>The state of feeling tired, weary, or sleepy that results from prolonged mental or physical work, extended periods of anxiety, exposure to harsh environments, or loss of sleep.</p>	<b>Acute</b>	<p>Associated with physical or mental activity between two regular sleep periods. Loss of awareness of errors and coordination first to develop. Crew members feel this tiredness at night after being awake for 12-15 hours in a day. Typically, can be recovered after one sleep period.</p> <p><b>Characterized by:</b></p> <ul style="list-style-type: none"> <li><b>I</b>nattention</li> <li><b>D</b>istractibility</li> <li><b>N</b>eglect of secondary tasks</li> <li><b>E</b>rrors in timing</li> <li><b>L</b>oss of accuracy &amp; control</li> <li><b>L</b>ack of awareness of error accumulation</li> <li><b>I</b>rritability</li> </ul>
	<b>Chronic</b>	<p>Result of inadequate recovery from successive periods of acute fatigue. It may take several weeks of rest to completely eliminate chronic fatigue &amp; there may be underlying social causes, such as family or financial difficulties.</p> <p><b>Characterized by:</b></p> <ul style="list-style-type: none"> <li><b>I</b>nsomnia</li> <li><b>D</b>epressed mood</li> <li><b>I</b>rritability</li> <li><b>W</b>eight loss</li> <li><b>P</b>oor judgment</li> <li><b>L</b>oss of appetite</li> <li><b>S</b>lowed reaction time</li> <li><b>P</b>oor motivation and performance on the job</li> </ul>
	<b>Motivational Exhaustion (Burnout)</b>	<p>If chronic fatigue proceeds untreated for too long, the individual will eventually “shut down” and cease functioning occupationally and socially.</p>
<b>Diurnal (Circadian) Rhythms and Fatigue</b>	<p>We have an intrinsic biological clock with a cycle of roughly 24-25 hours, and many important bodily functions such as core body temperature, alertness, heart rate, and sleep cycle occur along these diurnal rhythms.</p> <p><b>Circadian Resynchronization (Jet Lag):</b> Rapid travel from one time zone to another causes the body to resynchronize its diurnal rhythms. Resynchronization occurs more rapidly when traveling west.</p>	
<b>Prevention of Fatigue</b>	<p>Control the sleep environment, adjust to shift work, maintain good health and physical fitness, practice good eating habits, practice moderate controlled use of alcohol and caffeine, plan/practice good time management, practice realistic planning, maintain optimal working conditions, and take naps.</p> <p><b>Treatment of Fatigue:</b> The most important action is to get rest and natural (not drug induced) sleep. Alcohol is the number one sleep aid in the U.S., but it suppresses REM sleep. When attempting to recover from 24-48 hours of sleep deprivation; do not sleep longer than 10 hours.</p>	

# AEROMEDICAL FACTORS

SPATIAL DISORIENTATION	TYPE	DEFINITION
<p>Spatial disorientation is an individual's inability to determine his position, attitude, and motion relative to the surface of the earth or significant objects, i.e. trees, poles, or buildings during a hover. When it occurs, pilots are unable to see, believe, interpret, or prove the information derived from their flight instruments.</p> <p><b>Sensory Illusion:</b> is a false perception of reality caused by a conflict of orientation information from one or more mechanisms of equilibrium. Sensory illusions are a major cause of Spatial Disorientation.</p> <p><b>Vertigo:</b> is a spinning sensation usually caused by a peripheral vestibular abnormality in the middle ear. Pilots often misuse the term vertigo, applying it generically to all forms of spatial disorientation.</p>	<p><b>I</b> <b>(Unrecognized)</b></p>	<p>A disoriented aviator does not perceive any indication of spatial disorientation, he does not think anything is wrong.</p> <p><b>THE MOST DANGEROUS TYPE:</b> the pilot fails to recognize or correct the disorientation, usually resulting in a crash.</p> <p><input type="checkbox"/> The SD would be height-depth perception illusion when the pilot descends into the ground or some obstacle because of lack of situational awareness.</p>
	<p><b>II</b> <b>(Recognized)</b></p>	<p>The pilot perceives a problem, but fails to recognize it as SD.</p> <p><input type="checkbox"/> The pilot may feel that a control is malfunctioning.</p> <p><input type="checkbox"/> The pilot may perceive an instrument failure as in a graveyard spiral.</p>
	<p><b>III</b> <b>(Incapacitating)</b></p>	<p>The pilot experiences such an overwhelming sensation of movement that he cannot orient himself by using visual cues or the aircraft instruments. Not fatal if pilot can gain control of the aircraft.</p>

## Equilibrium Maintenance

**Visual System:** The visual system is the most important in maintaining equilibrium and orientation. 80% of our orientation information comes from the visual system.

**Vestibular System:** Inner ear contains the vestibular system, which contains the motion and gravity detecting sense organs. Located in the temporal bone on each side of the head. Each vestibular consists of two distinct structures; semicircular canals and vestibule proper, which contain the otolith organs.

**Vestibule Proper:** The otolith organs are small sacs located in the vestibule. Sensory hairs project from each macula into the otolithic membrane, an overlying gelatinous membrane that contains chalklike crystals, called otoliths. They respond to gravity and linear accelerations/decelerations. Changes in position of the head, relative to the gravitational force, cause the otolithic membrane to shift position on the macula. The sensory hairs bend, signaling a change in head position.



**Semicircular Canals:** They sense changes in an angular acceleration. The canals will react to any changes in roll, pitch, or yaw attitude. The endolymph fluid in the canals moves with inertial torque resulting from angular acceleration in one of three planes. The motion of the fluid bends the cupula which moves the hairs of the hair cells situated beneath the cupula. This movement stimulates the vestibular nerve and these impulses are transmitted to the brain where they are interpreted as rotation of the head.

**Proprioceptive System:** The system reacts to the sensation resulting from pressures on joints, muscles, skin, and from slight changes in the position of internal organs. Forces act upon the seated pilot in flight.

# AEROMEDICAL FACTORS

## VESTIBULAR SYSTEM ILLUSIONS

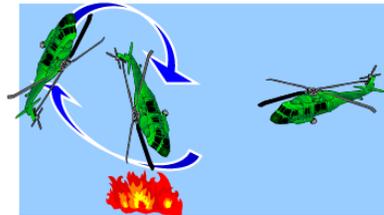
### SOMATOGYRAL

**Leans.** The most common form. The pilot fails to perceive angular motion. During continuous straight and level flight, the pilot will correctly perceive that he is straight and level. However, a pilot rolling into or out of bank may experience perceptions that disagree with the reading on the attitude indicator and other instruments. To counter the falsely perceived position, the pilot will lean his body until the false sensation leaves.



**Graveyard Spin.** Usually occurs in fixed-wing aircraft. If you enter a spin and remain in it for several seconds, the semicircular canals will reach equilibrium; no motion is perceived. Upon recovering from the spin, you undergo deceleration, which is sensed by the semicircular canals. You then have a strong sensation of being in a spin in the opposite direction even though the flight instruments contradict that perception. If deprived of external references, you may disregard the instruments and make control corrections against the falsely perceived spin. The aircraft will then enter a spin in the original direction.

**Coriolis Illusion.** The most dangerous of all, causing overwhelming disorientation. Occurs whenever a prolonged turn is initiated and the pilot makes a head motion in a different geometrical plane. When a pilot enters a turn and then remains in the turn, the semicircular canal corresponding to the yaw axis is equalized. The endolymph fluid no longer deviates, or bends, the cupula. If the pilot initiates a head movement in a geometrical plane other than that of a turn, the yaw axis semicircular canal is moved from the plane of rotation to a new plane of non-rotation. The fluid then slows in that canal, resulting in a sensation of a turn in the direction opposite that of the original turn. Simultaneously, the two other canals are brought within a plane of rotation. The fluid stimulates the other two other cupulas. The combined effect of the coupler deflection in all three canals creates the new perception of motion in three different planes of rotation: yaw, pitch, and roll. The Pilot experiences an overwhelming head over heels tumbling sensation.



### SOMATOGRAVIC

**Oculogravic.** Occurs when an aircraft is accelerated or decelerates in a forward direction. Inertia from linear acceleration causes the otolith organs to sense a nose-high altitude. A pilot correcting for this illusion without cross checking the instruments would most likely dive the aircraft, catastrophic during an approach. This illusion does not occur if adequate references are outside.

**Elevator Illusion.** This occurs during upward acceleration. Because of inertia, the pilot's eyes track downward as his body tries, through inputs supplied by the inner ear, to maintain visual fixation on the environment or instrument panel. With the eyes downward, the pilot senses that the nose of the aircraft is rising. Common for aviators flying aircraft that encounter updrafts.

**Oculoagravic Illusion.** Results from the downward motion of the aircraft. Because of inertia the pilot's eyes will track upward. This usually results in a sensation that the aircraft is in a nose-low attitude. This illusion is commonly encountered during autorotation.



# AEROMEDICAL FACTORS

V I S U A L I L L U S I O N S	Acronym	TYPE	DEFINITION
	<b>F</b>	FALSE HORIZON	Confusing clouds formations or uneven ground with the horizon. This usually occurs when the aviator looks up after a prolonged period in the cockpit or from poor scanning techniques.
	<b>F</b>	FLICKER VERTIGO	A light flickering at a rate of 4-20 cycles per second can produce nausea, vomiting, and vertigo. It can be caused by sunlight flickering through the rotor blades or by an anti-collision light reflecting against an overcast sky at night.
	<b>F</b>	FIXATION FASCINATION	This occurs when crew members ignore orientation cues and fix their attention on a single goal or object without seeing the whole environment. May occur during times of task saturation or target fixation.
	<b>C</b>	CONFUSION GROUND-LIGHTS W/STARS	A common occurrence. A good cross check will prevent this illusion.
	<b>R</b>	RELATIVE MOTION	Mistaking the motion of another aircraft or object for that of your own. Could occur during formation flights, hover taxi, or hover over water or tall grass.
	<b>A</b>	AUTOKINESIS	When a static light is stared at in the dark for 6-12 seconds, the light appears to move up to 20 degrees in any direction.
	<b>S</b>	STRUCTURAL ILLUSION	The distortion of objects caused by heat waves, rain, snow or other factors that obscure vision.
	<b>H</b>	HEIGHT-DEPTH PERCEPTION	When flying over terrain lacking good contrast (water, desert, snow), crew members may think the aircraft is higher or lower than it actually is. This is due to the lack of visual references.
	<b>C</b>	CRATER ILLUSION	Occurs when aircrew members land at night, under NVG conditions, and the IR search light is directed too far under the nose of the aircraft. This will cause the illusion of landing with up-sloping terrain in any direction.
	<b>S</b>	SIZE-DISTANCE ILLUSION	Viewing a source of light that is increasing or decreasing in luminance. The aviator may incorrectly interpret the light as approaching or retreating. It also is the false perception of distance from an object or the ground. It occurs when visual cues such as a runway or trees are different size than expected.
	<b>A</b>	ALTERED PLANES OF REFERENCE	The pilot has an inaccurate sense of altitude, attitude, or flight path position in relation to an object so great in size that the object becomes the new plane of reference. When approaching a line of mountains or clouds, aviators may feel the need to climb even though their altitude is adequate.
	<b>R</b>	REVERSIBLE PERSPECTIVE	At night, an aircraft may appear to be going away when it is actually approaching. This illusion often occurs when an aircraft is flying a parallel course. Red on right returning.

# AEROMEDICAL FACTORS

M O N O C U S	Acronym	TYPE	DEFINITION
	<b>G</b>	GEOMETRIC PERSPECTIVE	An object may appear to have different shape when viewed at varying distances and from different angles.
	<b>R</b>	RETINAL IMAGE SIZE	The brain perceives the actual size of an object from the size of an image focused on the retina.
	<b>A</b>	AERIAL PERSPECTIVE	The clarity of an object and the shadow cast by it are perceived by the brain and are cues for estimating distances.
<b>M</b>	MOTION PARALLAX	This cue to depth perception is a means of judging distances under reduced illumination. Motion parallax refers to the apparent motion of stationary object as viewed by an observer moving across the landscape. When the crew member looks outside the aircraft, perpendicular to the direction of travel, near objects appear to move backward, past, or opposite the path of motion . Far objects seem to move in the direction of motion or remain fixed.	

CUES	TYPE	Acronym	DEFINITION
G E O M E T R I C P E R S P E C T I V E	Linear Perspective	<b>L</b>	Parallel lines tend to converge as distance from the observer increases.
	Apparent Foreshortening	<b>A</b>	The true shape of an object/terrain feature appears elliptical when viewed from a distance.
	Vertical Position in the Field	<b>V</b>	Objects or terrain features farther away from the observer appear higher on the horizon than closer to the observer.
R E T I N A L I M A G E S I Z E	Known Size of Objects	<b>K</b>	The nearer an object is to the observer, the larger its retinal image.
	Increasing or Decreasing Size of Objects	<b>I</b>	If the retinal image size of an object increases, the relative distance is decreasing. If the retinal image size decreases, the relative distance is increasing.
	Terrestrial Association	<b>T</b>	Comparing an object with an object of know size helps to determine the object's size and apparent distance from the observer.
	Overlapping Contours	<b>O</b>	When objects overlap, the overlapped object is farther away
A E R I A L P E R S P E C T I V E	Variation in Color or Shade	<b>V</b>	Subtle variations in color or shade are clearer the closer the observer is to an object.
	Lost of Detail or Texture	<b>L</b>	As a person gets farther from an object, discrete details become less apparent.
	Position of Light	<b>P</b>	Every object will cast a shadow from a light source. The direction in which the shadow is cast depends on the position of the light source.