



FIT FOR FLYING



FIT FOR FLYING IS A PRODUCTION OF THE DDR PROGRAM OF THE CIVIL AIR PATROL. THE GOAL IS TO EDUCATE CAP MEMBERS IN MATTERS CONCERNING THE HUMAN ELEMENT IN FLYING.





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PART ONE **THE AIRWORTHY HUMAN**



This part emphasizes the importance of the FAA's physical examination to a pilot's career. The medical certificate is as important as the pilot's license (now known as a certificate). Depending upon the class of medical, a pilot must continually be re-examined over a lifetime of flying.



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For this part, the medical advisor is one of the FAA's top Aviation Medical Examiners (AME). He is a doctor who specializes in pilot physical examinations. He is also a pilot and holds an Airline Transport Pilot Certificate as well as Certificated Flight Instructor Instrument (CFII) rating. He and eight other physicians were recently called, by the FAA, to its CAMI Headquarters in Oklahoma City, Oklahoma, to help solve some of their most difficult cases. Dr. Sancetta resides in Boulder, CO.

Civil Air Patrol is truly honored to have a physician of his caliber on the *FIT FOR FLYING* project.



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**Dr. Sancetta was known as Captain Sancetta of a Gemini Air Cargo *DC-10*.
He is type rated in the Gulfstream *G-4*, the Hawker *800* and the
Beechcraft *King Air*.**





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Cadet Hannah Schuele is preparing to get her Third Class Medical for a summer flight encampment from Dr. Sancetta. There are three types of medical examinations: First Class, Second Class, and Third Class.





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THERE ARE THREE MEDICAL CERTIFICATES. DR. SANCETTA EXPLAINS:

Third Class: Duration is 5 years if issued before 40, 2 years if issued at age 40, or older. Applies to private pilots and even flight instructors.

Second Class: Duration is one year always; Some airline copilots, not captain, (in mainly domestic ops) and corporate ops (some charter, but private corporate ops), and those crop dusting and towing gliders.

First Class: Duration is one year if under 40, 6 months if age 40 or older. This applies to Airline ops (captain, copilot on most international routes these days, and corporate charter in turbine equipment).

Blanket statement: First or second can be used for the duration of any lower class of medical if appropriate (first can be used therefore for full year if only really needed the second, then up to 2-5 years for third class depending on the age of the pilot).



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In Part One, A Synopsis of the basic FAA Medical **Standards** are given:

Distant Vision: (Class 1 & 2) 20/20 or better in each eye separately, with or without correction. (Class 3) 20/40 or better in each eye separately, (Snellen Eye Chart) with or without correction.

Near Vision: (all three) 20/40 or better in each eye separately (Snellen equivalent) with or without correction as measured at 16 inches.

Intermediate Vision: (Class 1 & 2) 20/40 or better in each eye separately (Snellen equivalent) with or without correction at age 50 and over, as measured at 32 inches. There is no requirement for Class 3.

Color Vision: (All Classes) Ability to perceive those colors necessary for safe performance of airman duties.

Hearing: (All classes) Demonstrate hearing of an average conversational voice in a quiet room, using both ears at 6 feet, with the back turned to the examiner or pass one of the audiometric tests below.

Audiology: Audiometric speech discrimination test: Score at least 70% reception in one ear. Pure tone audiometric test. Unaided, with thresholds no worse than:

Better ear (at 500 Hz) 35 dB; (at 1,000 Hz) 30 dB; (at 2,000 Hz) 30dB; and (at 3,000Hz) 40 dB

Worst ear (at 500 Hz) 35 dB; (at 1,000 Hz) 50 dB; (at 2,000 Hz) 50 dB; and (at 3,000Hz) 60 dB



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THE FAA SYNOPSIS OF MEDICAL STANDARDS CONTINUES:

Ear, Nose, Throat (ENT): (All classes) No ear disease or condition manifested by, or that may reasonably be expected to be maintained by, vertigo or a disturbance of speech or equilibrium.

PULSE: (All classes) Not disqualifying per se; used to determine cardiac system status and responsiveness (must explain if less than 50 or greater than 100).

Blood Pressure: (All classes) No specified values state in the standards. The current guideline maximum value is 155/95.

Electrocardiogram (ECG): (First Class only) At age 35 and annually after age 40. (Second & Third Class) Not routinely required.

Mental: (All Classes) No diagnosis of psychosis, or bipolar disorder, or severe personality disorders.

SUBSTANCE DEPENDENCE AND SUBSTANCE ABUSE: (All classes) A diagnosis or medical history of substance dependence is disqualifying unless there is established clinical evidence, satisfactory to the Federal Air Surgeon, of recovery, including sustained total abstinence from substance(s) for not less than the preceding 2 years. A history of substance abuse within the preceding 2 years is disqualifying. Substances include alcohol and other drugs (i.e., PCP, sedatives and hypnotics, anxiolytics, marijuana, cocaine, opioids, amphetamines, hallucinogens, and other psychoactive drugs or chemicals).



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THE FIFTEEN DISQUALIFYING CONDITIONS

Unless otherwise directed by the FAA, the AME must deny or defer if the applicant has a history of the following:

- 1. Diabetes Mellitus requiring hypoglycemic medication**
- 2. Angina pectoris**
- 3. Coronary heart disease that has been treated or, if untreated, that has been symptomatic or clinically significant**
- 4. Myocardial infarction**
- 5. Cardiac valve replacement**
- 6. Permanent cardiac pacemaker**
- 7. Heart replacement**
- 8. Psychosis**
- 9. Bipolar disorder**
- 10. Personality disorder that is severe enough to have repeatedly manifested itself by overt acts**
- 11. Substance dependence**
- 12. Substance abuse**
- 13. Epilepsy**
- 14. Disturbance of consciousness and without satisfactory explanation of cause**
- 15. Transient loss of control of nervous system function(s) without satisfactory explanation of cause**



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In his *Professional Philosophy*, Dr. Sancetta says, “I would advise that if a pilot wants to get a medical certificate, he/she should be honest about everything on the 8500-8 form. I tell my pilots that as long as they are alive, I can help them. In the vast majority of cases where a pilot is grounded and loses his/her medical certificate, I can usually help them get it back.”



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PART TWO

THE FLYING ENVIRONMENT





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PLANET EARTH IS APPROXIMATELY 75% WATER AND 25% LAND.

THE AVERAGE TEMPERATURE, AT MEAN SEA LEVEL, IS 59 °F, or 15°C.

A SAMPLE, ONE SQUARE INCH BY 53 NAUTICAL MILES TALL, IS 14.7 PSI.

THE STANDARD SEA LEVEL PRESSURE IS 29.92 INCHES or 1013.2 MILLIBARS.

THE COMPOSITION OF AIR IS APPROXIMATELY 79% NITROGEN, 19% OXYGEN, THE OTHER 2% IS MIXED GASES.

UNDER STANDARD CONDITIONS, THE TEMPERATURE DROPS ABOUT 3.5 °F (2.0°C) FOR EVERY 1000 FEET GAINED IN ALTITUDE. THIS IS KNOWN AS THE LAPSE RATE.

THE PRESSURE DROPS APPROXIMATELY 1 INCH/1000 FEET OF ALTITUDE.



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THE PHYSICAL DIVISIONS OF THE ATMOSPHERE HAVE MANY DIFFERENT CHARACTERISTICS:

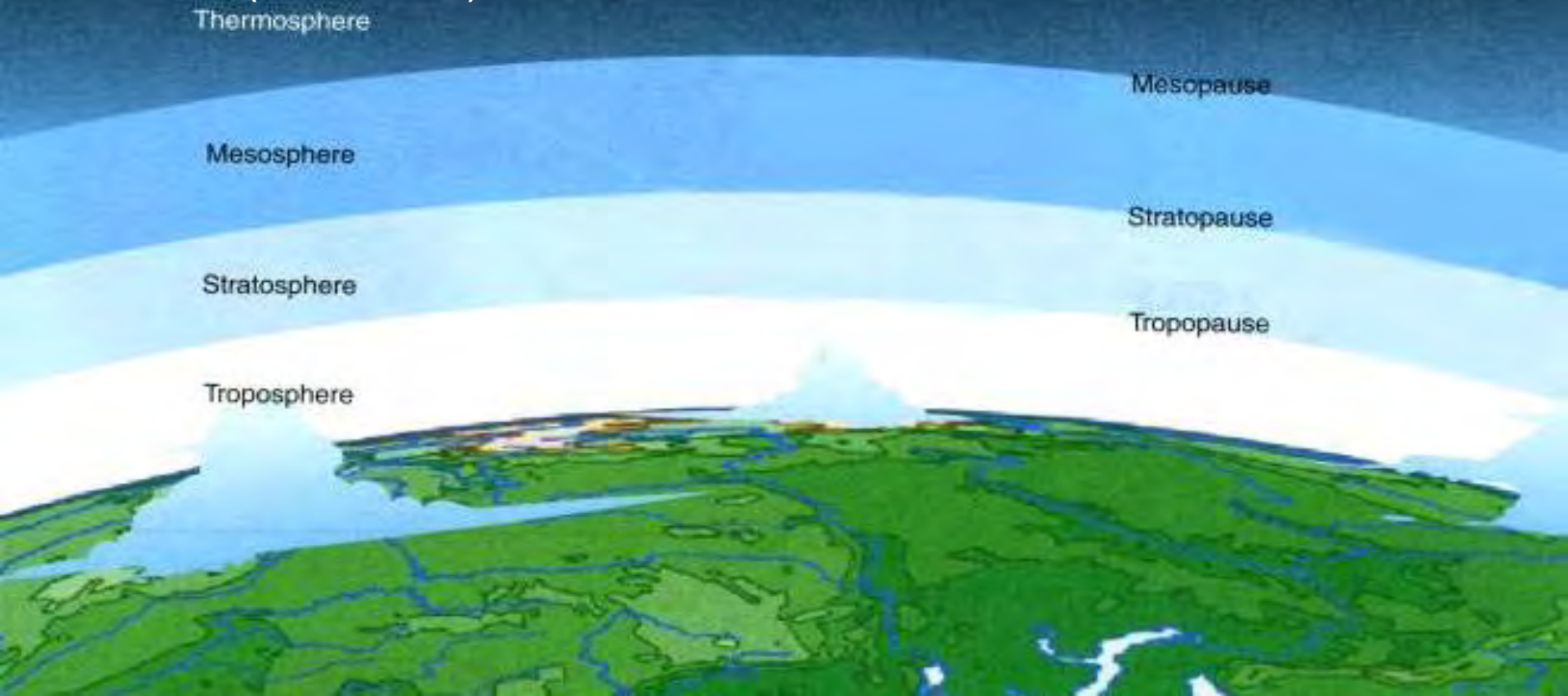
TROPOSPHERE--(0-50,000 FEET) VARIABLE TEMP., WATER VAPOR, TURBULENCE, STORMS, **WEATHER** AND A NEAR CONSTANT LAPSE RATE.

STRATOSPHERE--(50,000-50 MILES) RELATIVELY CONSTANT TEMPERATURE, LITTLE WATER VAPOR, JET STREAMS AND VERY LITTLE TURBULENCE.

IONOSPHERE--(50-90 MILES) PROVIDES PROTECTION FROM UV RAYS, NAMED FOR THE IONIZED GAS

THERMOSPHERE--(90-120 MILES) DUE TO INTENSE SOLAR RADIATION AND LACK OF GASEOUS MOLECULES, THE TEMPERATURE CAN SOAR TO OVER 1000 DEGREES CELSIUS

EXOSPHERE--(120-1000 MILES) GRADUALLY BECOMES THE VACUUM OF SPACE.





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THERE ARE THREE PHYSIOLOGICAL ZONES. THE FIRST IS KNOWN AS THE PHYSIOLOGICAL EFFICIENT ZONE. IT GOES FROM SEA LEVEL TO 12,500 FEET. GENERALLY THE BODY HAS ADAPTED TO OPERATE IN THE LOWER REGIONS OF THIS ZONE. MINOR TRAPPED GAS PROBLEMS (EARS, SINUS, AND GI TRACT) OCCUR IN THE LOWER REGION OF THIS ZONE; WHILE SHORTNESS OF BREATH, DIZZINESS, HEADACHES & FATIGUE OCCUR IN THE UPPER REGION IF EXPOSED FOR TOO LONG.

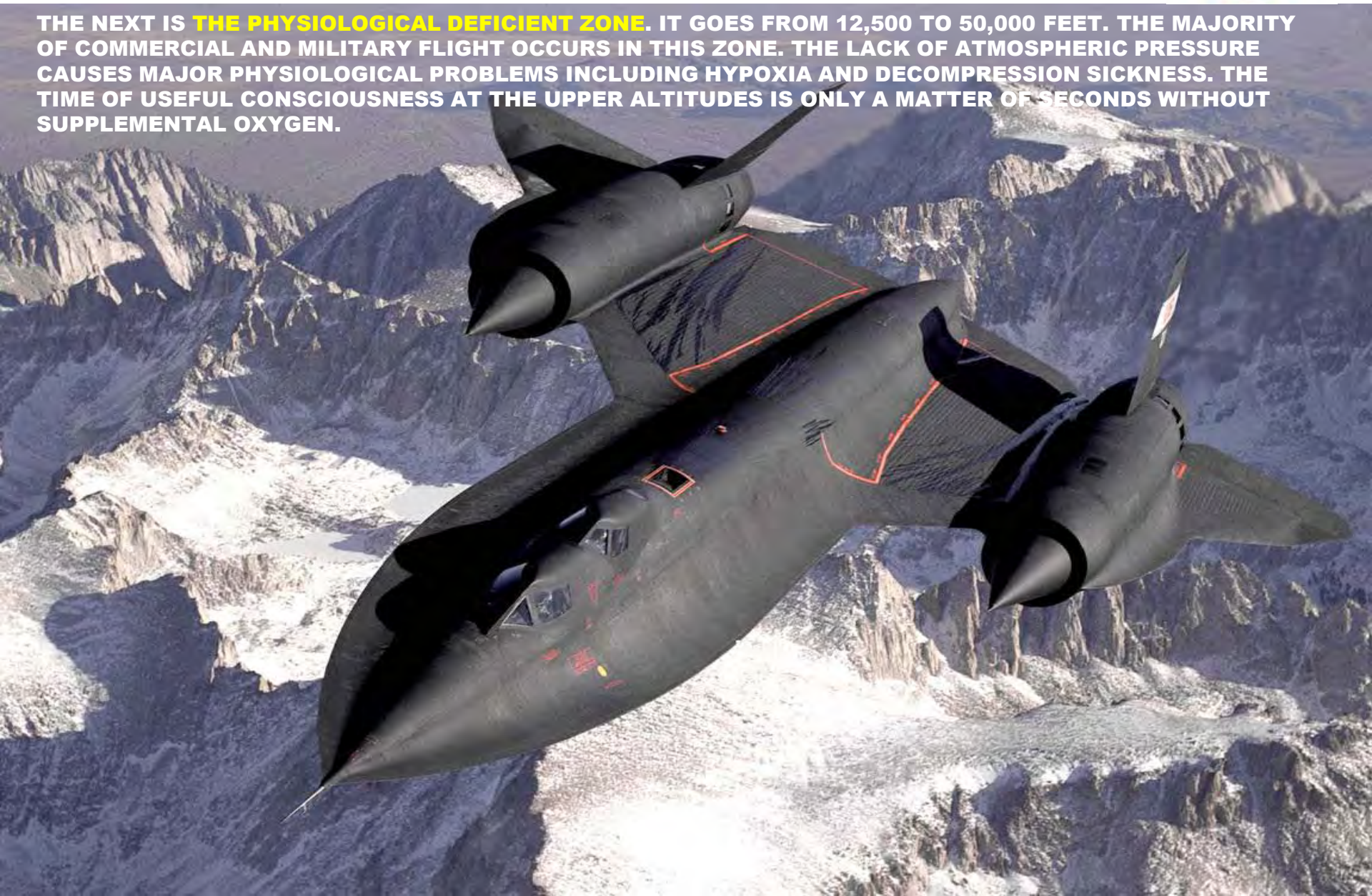




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THE NEXT IS **THE PHYSIOLOGICAL DEFICIENT ZONE**. IT GOES FROM 12,500 TO 50,000 FEET. THE MAJORITY OF COMMERCIAL AND MILITARY FLIGHT OCCURS IN THIS ZONE. THE LACK OF ATMOSPHERIC PRESSURE CAUSES MAJOR PHYSIOLOGICAL PROBLEMS INCLUDING HYPOXIA AND DECOMPRESSION SICKNESS. THE TIME OF USEFUL CONSCIOUSNESS AT THE UPPER ALTITUDES IS ONLY A MATTER OF SECONDS WITHOUT SUPPLEMENTAL OXYGEN.





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THE THIRD IS THE **SPACE EQUIVALENT ZONE**. THIS RANGES FROM 50,000 FEET TO 1000 MILES. THIS ENVIRONMENT IS VERY HOSTILE TO HUMANS. THE "ARMSTRONG'S LINE" IS AT 63,000 FEET AND ANY UNPROTECTED EXPOSURE ABOVE THIS LEVEL CAUSES BODY FLUIDS TO BOIL. THERE IS A NEED FOR A SEALED CABIN AND THRUSTERS ON AEROSPACE CRAFT.

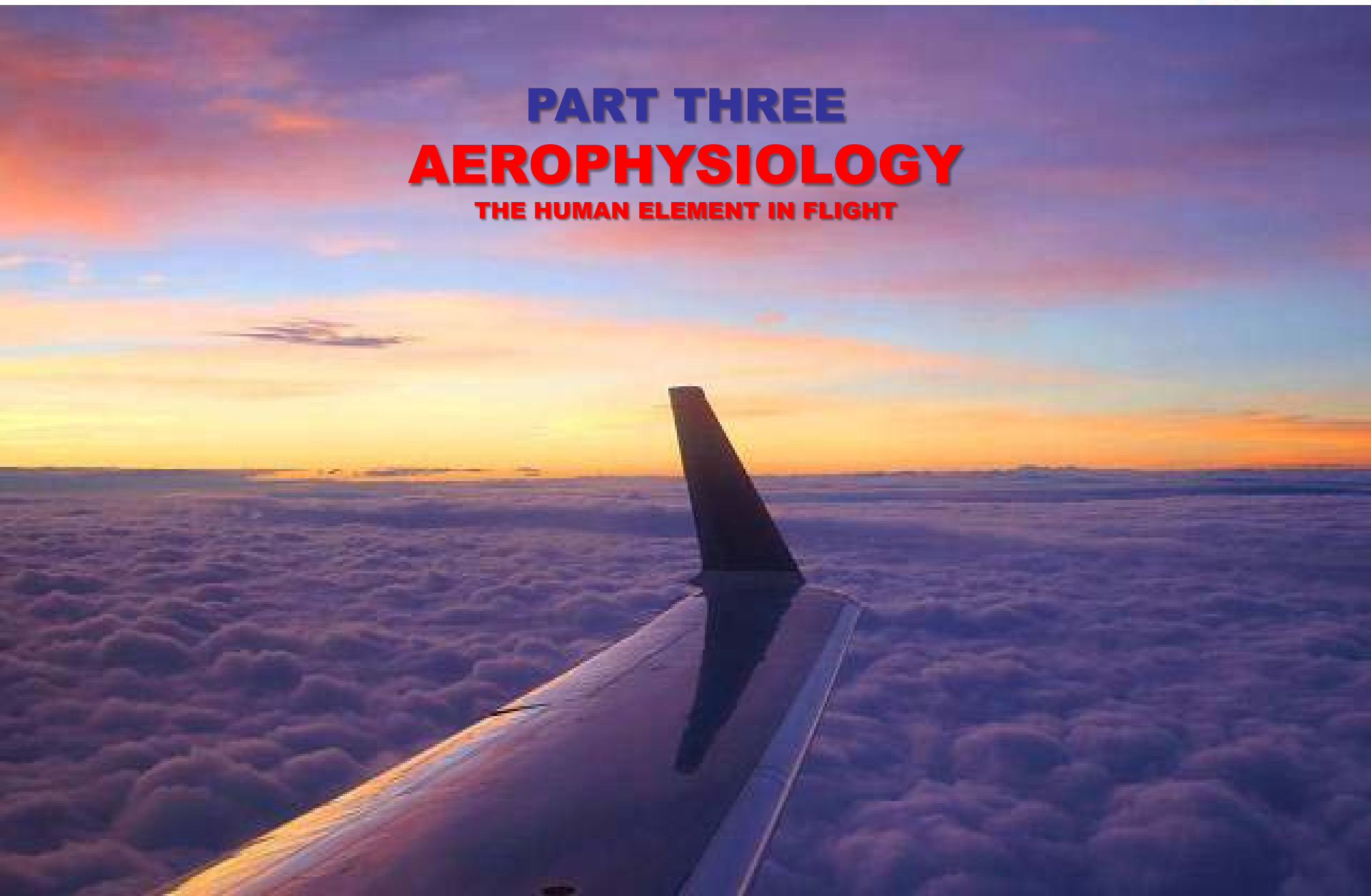




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PART THREE **AEROPHYSIOLOGY** **THE HUMAN ELEMENT IN FLIGHT**





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AS TECHNOLOGY ADVANCES IN THE SCIENCE OF AEROSPACE, IT HAS BECOME A HIGH PRIORITY OF THE FAA TO MAKE PILOTS MORE AWARE OF THE PHYSIOLOGICAL DANGERS OF HYPOXIA, STRESS, HYPERVENTILATION, SPATIAL DISORIENTATION, CARBON MONOXIDE AND THE TIMES OF USEFUL CONSCIOUSNESS.





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PILOTS WHO ARE KNOWLEDGEABLE ABOUT PHYSIOLOGICAL PHENOMENA ENCOUNTERED IN THE AVIATION ENVIRONMENT ARE BETTER PREPARED TO DEAL WITH SUCH POTENTIALLY FATAL INFLIGHT EVENTS SUCH AS:

- **LOSS OF CABIN PRESSURE**
- **HYPOXIA**
- **SPATIAL DISORIENTATION**
- **TRAPPED GAS PROBLEMS**
- **DECOMPRESSION SICKNESS**
- **ACCELERATION FORCES LEADING TO GRAY-OUT, BLACK-OUT, OR EVEN UNCONSCIOUSNESS**
- **NOISE, VIBRATION AND THERMAL STRESS**
- **SELF-IMPOSED STRESSES THAT CAN MAGNIFY ANY OF THE ABOVE PHYSIOLOGICAL EVENTS**

THESE COURSES ARE OFFERED AT:

Andrews AFB, MD	Brooks AFB, TX
Beale AFB, CA	Columbus AFB, MS
Fairchild AFB, WA	Ft. Rucker, AL
Holloman AFB, NM	Langley AFB, VA
Peterson AFB, CO	Randolph AFB, TX
Shaw AFB, SC	Sheppard AFB, TX
Tyndall AFB, FL	Vance AFB, OK

TO FIND OUT MORE ABOUT THESE COURSES, THE FAA RECOMMENDS VISITING THE WEB SITE:

www.faa.gov/pilots/training/airman_educational/



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CAPTAIN CORY VON PINNON TOOK ONE OF THE FAA'S AVIATION PHYSIOLOGY WORKSHOPS AT PETERSON AFB IN COLORADO SPRINGS, COLORADO. THE COURSE CONSISTED OF A SERIES OF LECTURES; A "FLIGHT" IN AN ALTITUDE CHAMBER; AND VERTIGO AND NIGHT VISION DEMONSTRATIONS. HE FLIES A PIAGGIO *P180* FOR AVANTAIR AND SAID THAT THE COURSE GAVE HIM A MUCH GREATER UNDERSTANDING OF THE PHYSIOLOGICAL ASPECTS OF HIGH ALTITUDE FLIGHT OPERATIONS.



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FAA AVIATION PHYSIOLOGY COURSES—HIGHLY RECOMMENDED



CORY AND HIS WIFE, ANN MARIE, ARE BOTH PROFESSIONAL PILOTS. HE FLIES FOR AVANTAIR AND SHE FLIES FOR CONTINENTAL EXPRESS. THEY ARE SHOWN HERE IN THE ALTITUDE CHAMBER AT PETERSON AIR FORCE BASE IN COLORADO SPRINGS, COLORADO. IN AN INTERVIEW WITH CORY, HE SAID, “IN THE ALTITUDE CHAMBER, WE HAD THE OPPORTUNITY TO EXPERIENCE HYPOXIA. ALTHOUGH MY FINGERNAILS DID NOT TURN BLUE, I DID FEEL A TINGLING SENSATION. I KNEW THAT I WAS EXPERIENCING SOME CONFUSION AND, GIVEN MORE TIME, I WOULD HAVE HAD TROUBLE MAKING DECISIONS.”

www.faa.gov/pilots/training/airman_education/aerospace_physiology/index.cfm



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**PUTTING THE FAA AVIATION PHYSIOLOGY COURSE TRAINING
INTO THE REAL WORLD OF PROFESSIONAL AVIATION**



**CAPT. VON PINNON GOES
THROUGH THE OXYGEN
SYSTEM PRE-FLIGHT
CHECKLIST. THE PIAGGIO
IS BEING PREPARED FOR
A FLIGHT FROM DENVER
TO TULSA, OKLAHOMA.**



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POSSIBLE PHYSIOLOGICAL DANGERS IN FLYING

HYPOXIA

Hypoxia means "reduced oxygen." There are four types of hypoxia:

1. Hypoxic Hypoxia-This is the result of not enough oxygen available to the lungs.
2. Hypemic Hypoxia-This occurs when the blood is not able to take up and transport a sufficient amount of oxygen to the cells of the body.
3. Stagnant Hypoxia-This results when the oxygen-rich blood in the lungs isn't moving to the tissues that need it.
4. Histotoxic Hypoxia- This is the inability of the cells to effectively use the oxygen.

THE SYMPTOMS OF HYPOXIA ARE:

1. Blue fingernails and lips
2. Headache
3. Decreased reaction time
4. Euphoria
5. Drowsiness
6. Lightheaded or dizziness
7. Tingling in the fingers and toes
8. Numbness



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POSSIBLE PHYSIOLOGICAL DANGERS IN FLYING CARBON MONOXIDE POISONING

CARBON MONOXIDE IS A COLORLESS AND ODORLESS GAS PRODUCED BY ALL INTERNAL COMBUSTION ENGINES. CARBON MONOXIDE (CO) ATTACHES ITSELF TO THE HEMOGLOBIN IN THE BLOOD ABOUT 200 TIMES EASIER THAN OXYGEN. CARBON MONOXIDE PREVENTS THE HEMOGLOBIN FROM CARRYING OXYGEN TO THE CELLS RESULTING IN HYPEMIC HYPOXIA

EFFECTS ARE:

**HEADACHE
BLURRED VISION
DIZZINESS
DROWSINESS
LOSS OF MUSCLE POWER**

PRECAUTIONS & ACTIONS:

**TURNING OFF HEATER
OPEN FRESH AIR VENTS
OPENING WINDOWS
GOING ON OXYGEN**



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POSSIBLE PHYSIOLOGICAL DANGERS IN FLYING

HYPERVENTILATION

SINCE MANY OF THE SYMPTOMS OF HYPERVENTILATION ARE SIMILAR TO THOSE OF **HYPOXIA, IT IS IMPORTANT TO CORRECTLY DIAGNOSE THE CONDITION. WHEN USING SUPPLEMENTAL OXYGEN, A PILOT SHOULD CHECK THE EQUIPMENT AND FLOW RATE TO ENSURE THE SYMPTOMS ARE NOT HYPOXIA-RELATED. THE COMMON SYMPTOMS ARE:**

- 1. Headache**
- 2. Decreased reaction time**
- 3. Impaired judgment**
- 4. Euphoria**
- 5. Visual impairment**
- 6. Drowsiness**
- 7. Lightheaded or dizzy sensations**
- 8. Numbness**
- 9. Muscle spasms**
- 10. Pale appearance**



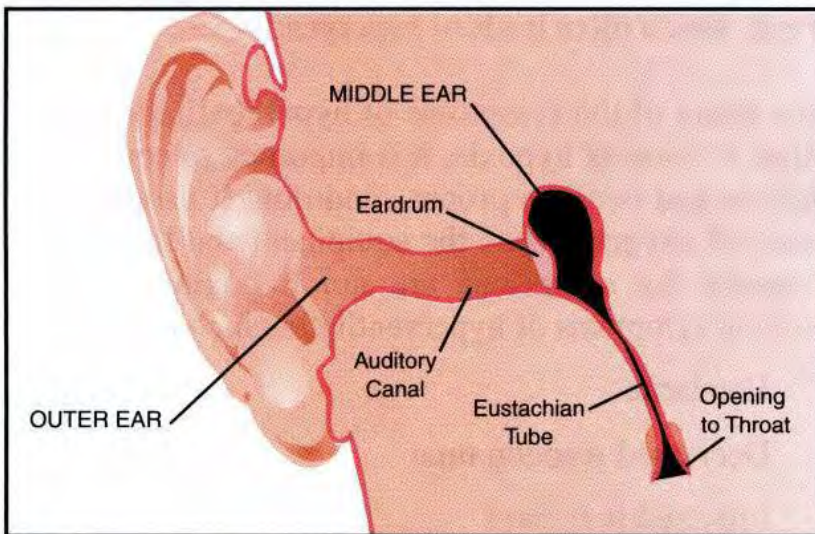
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POSSIBLE PHYSIOLOGICAL DANGERS IN FLYING

MIDDLE EAR AND SINUS-RELATED PROBLEMS

CLIMBING AND DESCENDING CAN SOMETIMES CAUSE EAR OR SINUS PROBLEMS AND A TEMPORARY REDUCTION IN HEARING. THE PHYSIOLOGICAL EXPLANATION FOR THIS IS A DIFFERENCE BETWEEN THE PRESSURE OF THE AIR OUTSIDE OF THE BODY AND THAT OF THE AIR INSIDE THE MIDDLE EAR AND NASAL SINUSES. NORMALLY, PRESSURE DIFFERENCES BETWEEN THE MIDDLE EAR AND THE OUTSIDE WORLD ARE EQUALIZED BY THE EUSTACHIAN TUBE. THESE TUBES ARE USUALLY CLOSED; HOWEVER THEY CAN BE OPENED DURING CHEWING, YAWNING OR SWALLOWING TO EQUALIZE THE PRESSURE. IF CLIMBS AND DESCENTS ARE IN ANY WAY PAINFUL TO THE OUTER, MIDDLE, INNER EAR OR EUSTACHIAN TUBE, IT IS RECOMMENDED THAT THE PILOT SEEK IMMEDIATE AME MEDICAL ATTENTION.

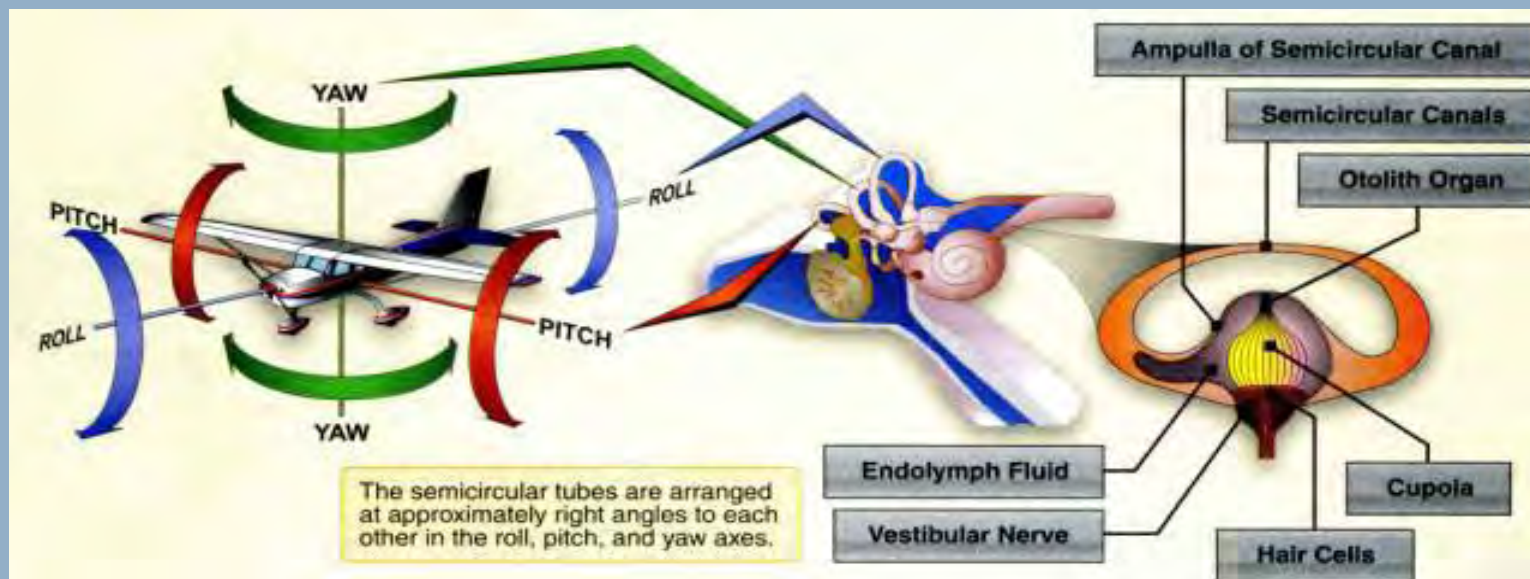




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POSSIBLE PHYSIOLOGICAL DANGERS IN FLYING SPATIAL DISORIENTATION



SPATIAL DISORIENTATION REFERS TO THE LACK OF ORIENTATION REGARDING THE POSITION, ATTITUDE OR MOVEMENT OF THE AIRPLANE IN FLIGHT. THE BODY USES THREE SYSTEMS WORKING TOGETHER TO GIVE INFORMATION ON ORIENTATION AND MOVEMENT:

- 1. Vestibular system—organs found in the inner ear that sense position by the way we are balanced.**
- 2. Somatosensory system—nerves in the skin, muscles, and joints, which, along with hearing, sense position based on gravity, feeling and sound.**
- 3. Visual system – eye, which senses position based on what is seen.**

All of this information comes together in the brain and most of the time the 3 streams of information agree giving a clear idea of where and how the body is moving. Flying can sometimes cause these systems to supply conflicting information to the brain; which can lead to disorientation, especially during poor visual meteorological conditions. When visual cues, such as the horizon, are removed, false sensations can cause a pilot to quickly become disoriented.



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DEMONSTRATED DISORIENTATION ON THE GROUND—IN A CHAIR!



UNDER NORMAL CONDITIONS, WHEN THERE IS A VISUAL REFERENCE TO THE HORIZON AND TO THE GROUND; THE SENSORY SYSTEM IN THE INNER EAR HELPS TO IDENTIFY PITCH, ROLL AND YAW MOVEMENTS OF THE AIRCRAFT. WHEN VISUAL REFERENCES ARE LOST, THE VESTIBULAR SYSTEM BECOMES UNRELIABLE. WITHOUT VISUAL REFERENCES. THERE ARE MANY SITUATIONS IN WHICH COMBINATIONS OF NORMAL MOTIONS AND FORCES CREATE CONVINCING ILLUSIONS THAT ARE DIFFICULT TO OVERCOME. THIS CAN BE DEMONSTRATED USING A BARANY CHAIR. THE "PILOT" IS BLIND-FOLDED AND GIVEN A JOYSTICK. THE CHAIR IS SLOWLY ROTATED. NOTE ABOVE: AT THE "START OF TURN." THE FLUID DEFLECTS THE HAIRS. ONCE A CONSTANT RATE IS ESTABLISHED, THE FLUID ACCELERATES TO THE SAME SPEED AS THE TUBE WALL. THE PILOT WILL MOVE THE JOYSTICK TO THE DIRECTION OF ROTATION. THE HAIRS STAND STRAIGHT UP. WHEN THE CHAIR IS SLOWLY STOPPED, THE HAIRS WILL THEN INDICATE A MOVEMENT IN THE OPPOSITE DIRECTION. ALTHOUGH THE CHAIR IS STOPPED, THE PILOT WILL MOVE THE STICK IN THE OPPOSITE DIRECTION. THE BLINDFOLD IS REMOVED! SURPRISE!





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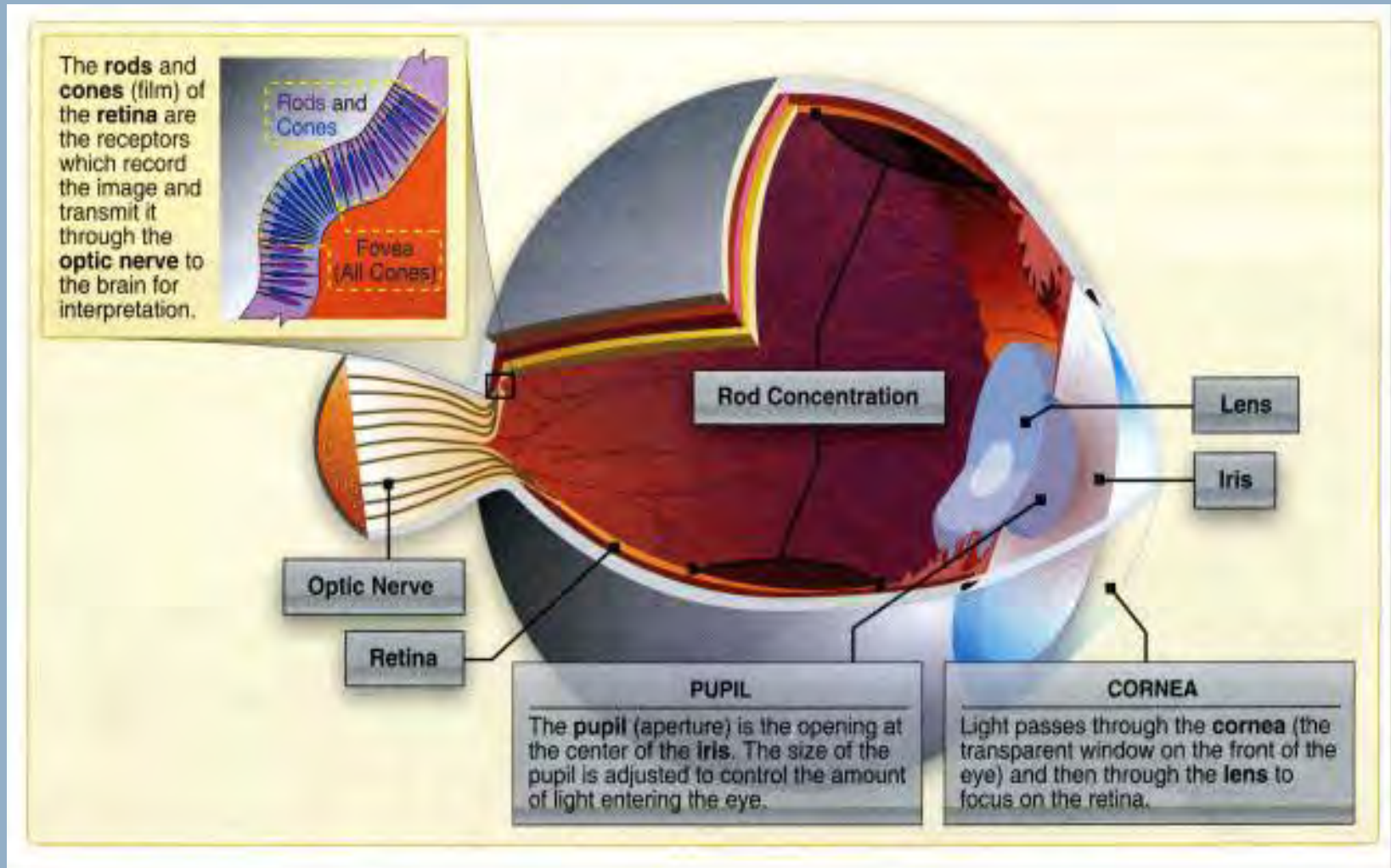
COPING WITH SPATIAL DISORIENTATION

To prevent illusions and their potentially disastrous consequences, pilots can:

- 1. Understand the causes of these illusions and remain constantly alert for them. Take the opportunity to experience spatial disorientation illusions in a device such as a Barany Chair or a Virtual Reality Spatial Disorientation Demonstrator.**
- 2. Always obtain and understand preflight weather briefings.**
- 3. Before flying in marginal visibility (less than 3 miles) or where a visible horizon is not evident, such as flight over open water during the night; it is recommended that a pilot obtain training and maintain proficiency in airplane control by reference to instruments.**
- 4. Do not continue flight into adverse weather conditions or into dusk or darkness unless proficient in the use of flight instruments. If intending to fly at night, maintain night -flight currency and proficiency. Include cross-country and local operations at various airfields.**
- 5. Ensure that when outside visual references are used that they are reliable, fixed points on the Earth's surface.**
- 6. Avoid sudden head movement, particularly during takeoffs, turns, and approaches to landing.**
- 7. Remember that illness, medications, alcohol, fatigue, sleep loss and mild hypoxia are likely to increase susceptibility to spatial disorientation.**
- 8. Most importantly, become proficient in the use of flight instruments and rely upon them. Trust the instruments and disregard your sensory perceptions.**

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VISION IS BY FAR THE MOST IMPORTANT SENSE FOR A PILOT.





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THE HUMAN EYE & HOW IT FUNCTIONS

THE EYE FUNCTIONS MUCH LIKE A CAMERA. ITS STRUCTURE INCLUDES AN APERTURE, A LENS, A MECHANISM FOR FOCUSING AND A SURFACE FOR REGISTERING IMAGES. LIGHT ENTERS THROUGH THE CORNEA AT THE FRONT OF THE EYEBALL; TRAVELS THROUGH THE LENS; AND FALLS ON THE RETINA. THE RETINA CONTAINS LIGHT SENSITIVE CELLS THAT CONVERT LIGHT ENERGY INTO ELECTRICAL IMPULSES THAT TRAVEL THROUGH NERVES TO THE BRAIN. THE BRAIN INTERPRETS THE ELECTRICAL SIGNALS TO FORM IMAGES. THERE ARE TWO KINDS OF LIGHT-SENSITIVE CELLS IN THE EYES: CONES AND RODS.

THE CONES ARE RESPONSIBLE FOR ALL COLOR VISION. CONES ARE PRESENT THROUGHOUT THE RETINA AND ARE CONCENTRATED TOWARD THE CENTER OF THE FIELD OF VISION AT THE BACK OF THE RETINA. THERE IS A SMALL PIT CALLED THE FOVEA WHERE MOST ALL THE LIGHT SENSING CELLS ARE CONES. THIS IS THE AREA WHERE MOST “LOOKING” OCCURS.

THE RODS, ON THE OTHER HAND, ARE BETTER ABLE TO DETECT MOVEMENT AND PROVIDE “DIM LIGHT” VISION. THE RODS ARE UNABLE TO DISCERN COLOR BUT ARE VERY SENSITIVE AT LOW LIGHT. THE TROUBLE WITH RODS IS THAT A LARGE AMOUNT OF LIGHT CAN OVERWHELM THEM. THE RODS TAKE A LONG TIME TO “RESET” AND ADAPT TO THE DARK AGAIN.

IT IS ESTIMATED THAT ONCE FULLY ADAPTED TO DARKNESS, THE RODS ARE 10,000 TIMES MORE SENSITIVE TO LIGHT THAN THE CONES, MAKING THEM THE PRIMARY RECEPTORS FOR NIGHT VISION. THE RODS ARE ALSO RESPONSIBLE FOR MUCH OF OUR PERIPHERAL VISION.



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OTHER SERIOUS PHYSIOLOGICAL ISSUES FOR PILOTS

STRESS - Stress is the body's response to physical and psychological demands placed upon it. Stress falls into two broad categories: acute (short term) and chronic (long term). Acute stress involves an immediate threat that can be perceived as danger. Chronic stress is a type that presents an intolerable burden; exceeds the ability of an individual to cope; and causes their performance to fall sharply. Pilots experiencing high levels of stress are not considered to be safe and should not be flying. The FAA recommends that pilots who suspect they are suffering from chronic stress should consult a physician.

FATIGUE - Fatigue is frequently associated with pilot error. Some of the effects of fatigue include: degradation of attention and concentration, impaired coordination, and decreased ability to communicate. These factors seriously influence the ability to make effective decisions. Like stress, fatigue can be acute or chronic. Rest after exertion and 8 hours of sound sleep ordinarily cure this condition. Acute fatigue can be prevented by proper diet and adequate rest and sleep. A well-balanced diet prevents the body from needing to consume its own tissues as an energy source. Adequate rest maintains the body store of vital energy. Chronic fatigue is not relieved by proper diet and adequate rest. If a pilot suspects he/she is suffering from chronic fatigue, he/she should immediately consult a physician.



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PART FOUR NOT FIT TO FLY

THE OBJECTIVE OF *PART FOUR* IS TO RAISE THE AWARENESS OF CERTAIN SUSTANCES THAT CAN POSSIBLY COMPROMISE THE PILOT'S PERFORMANCE DURING THE OPERATION OF AN AIRCRAFT.



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PILOTS AND RACE CAR DRIVERS HIGH PERFORMANCE HUMANS—HIGH PERFORMANCE MACHINES



IN RACES SUCH AS *NASCAR*, *FORMULA ONE*, AND ENDURANCE RACES LIKE *LEMANS*, SPEEDS OFTEN EXCEED 150-250 MILES PER HOUR. IN AVIATION, SPEEDS LIKE THIS ARE COMMONPLACE. FROM A HUMAN STANDPOINT, BOTH A RACE CAR DRIVER AND A PILOT MUST BE AT THE PEAK OF HIS/HER PHYSICAL AND MENTAL PERFORMANCE.

PILOTS GO ONE STEP FURTHER BECAUSE THEY OPERATE IN A THREE-DIMENSIONAL ENVIRONMENT IN WHICH THERE IS LESS OXYGEN AND LESS PRESSURE.

PILOTS ARE REQUIRED BY FEDERAL LAW TO PASS A MEDICAL EXAMINATION THAT HAS A DURATION RANGING FROM 6 MONTHS TO 5 YEARS DEPENDING UPON THE “CLASS” OF THE CERTIFICATE. **THE FAA HAS AN OBJECTIVE THAT STATES:** “TO ENSURE THAT ONLY THOSE PILOTS WHO ARE PHYSICALLY AND MENTALLY FIT WILL BE AUTHORIZED TO OPERATE AIRCRAFT, THEREBY ENHANCING AVIATION SAFETY BY ELIMINATING THE MEDICAL FACTOR AS A CAUSE OF AIRCRAFT ACCIDENTS.”



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**NATURAL, OVER-THE-COUNTER, NON-
PRESCRIPTION AND ORGANIC SUBSTANCES
ARE SAFE, RIGHT?**

NOT ALWAYS

SOMETHING TO CONSIDER: MANY OTCs, VITAMINS, HERBS, SUPPLEMENTS AND WEIGHT-LOSS SUBSTANCES HAVE NEVER BEEN TESTED UNDER FLIGHT CONDITIONS.

SOMETHING ELSE TO CONSIDER: IN FLIGHT, THERE IS LESS OXYGEN, LESS PRESSURE AND POSSIBLY AN ELEMENT OF STRESS INVOLVED. ANY MEDICATION THAT DEPRESSES THE NERVOUS SYSTEM (SUCH AS A “PM” NIGHT TIME SEDATIVE, A TRANQUILIZER, COLD OR FLU SUBSTANCE, OR AN ANTIHISTAMINE) MAY HAVE NEGATIVE PRIMARY & SECONDARY EFFECTS. THESE MEDICATIONS MAY IMPAIR JUDGMENT, MEMORY ALERTNESS, COORDINATION, VISION AND THE ABILITY TO MAKE IMPORTANT DECISIONS.



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TYLENOL IS A MILD MEDICATION FOR PAIN. THE "PM" IS AN ANTIHISTAMINE AND CAN CAUSE DROWSINESS. THIS MEDICATION CAN COMPROMISE PILOT PERFORMANCE.





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ALTHOUGH MOST PHARMACISTS MAY NOT BE PILOTS, THEY DO KNOW THE PRIMARY AND SECONDARY SIDE - EFFECTS OF BOTH NON-PRESCRIPTION OVER-THE-COUNTER DRUGS AND PRESCRIPTION MEDICATIONS. IF THERE IS ANY DOUBT IN A PILOT'S MIND ABOUT THE SIDE-EFFECTS AS THEY RELATE TO THE OPERATION OF AN AIRCRAFT; IT IS HIGHLY RECOMMENDED THAT AN AVIATION MEDICAL EXAMINER BE CONSULTED. WHEN TAKING ANY MEDICATION, CONSIDER WHAT COULD HAPPEN TO THE BODY WHEN THERE IS LESS OXYGEN AND A LOWER PRESSURE.

ASK THE PROFESSIONALS BEFORE FLYING





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ALCOHOL - JUST SAY, "NO WAY!"



ALCOHOL IS A DRUG THAT ACTS AS AN ANTI-DEPRESSANT. CELL METABOLISM IS DEPRESSED, ESPECIALLY IN THE BRAIN. BECAUSE THE CELL METABOLISM IN THE BRAIN IS IMPAIRED, SO TOO IS THE UTILIZATION OF OXYGEN BEING DELIVERED TO THE BODY CELLS. HERE IS A LIST OF FLIGHT PERFORMANCE ISSUES DEGRADED BY THE USE OF ALCOHOL:

- **JUDGEMENT**
- **DECREASED SPEED OF REFLEXES**
- **DECREASED INHIBITIONS**
- **DECREASED COMPREHENSION**
- **REDUCED HEARING**
- **LOWERED SENSE OF RESPONSIBILITY**
- **MEMORY IMPAIRMENT**
- **ABILITY TO REASON IS IMPAIRED**
- **ALTERED PRECEPTIONS OF SITUATIONS.**



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ALCOHOL IS ONE OF AMERICA'S GREATEST KILLERS

FACT: IN THE USA, OVER 100,000 DEATHS ARE CAUSED DIRECTLY OR INDIRECTLY EVERY YEAR BY EXCESSIVE ALCOHOL CONSUMPTION. THIS INCLUDES DEATHS DUE TO DRUNK DRIVING, LIVER FAILURE, AND STROKES.

FACT: AUTOMOTIVE CRASHES ARE THE GREATEST SINGLE CAUSE OF DEATH FOR AMERICANS BETWEEN THE AGES OF 6 AND 33. APPROXIMATELY 45% OF THESE DEATHS ARE ALCOHOL-RELATED.

FACT: A NATIONAL STUDY FOUND THAT UNDERAGE DRINKING COSTS THE AMERICAN TAXPAYER MORE THAN \$58 BILLION ANNUALLY.

FACT: ALCOHOL KILLS SIX TIMES MORE YOUTH THAN ALL OTHER ILLICIT DRUGS COMBINED.



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HARD TO BELIEVE?



IT'S AMAZING WHAT SOME PEOPLE WILL DO WHEN IT COMES TO ADDICTIONS. LISTERINE™ AND PURELL™ ARE TWO VERY INNOCENT PRODUCTS THAT CAN BE FOUND IN DRUG STORES AND SUPERMARKETS ACROSS THE COUNTRY. THEY CAN ALSO BE FOUND AT PARTIES AND IN THE SHOPPING CARTS OF CONSUMERS WHO ARE ADDICTED TO ALCOHOL. PURELL™ HAS 62% ETHYL ALCOHOL. LISTERINE™ HAS 21.9%. THEY ARE EASY-TO-GET, EASY-TO-MIX AND CAN BE ADDICTIVE.



FIT FOR FLYING



COMMON SIDE-EFFECTS OF FREQUENTLY USED MEDICATIONS

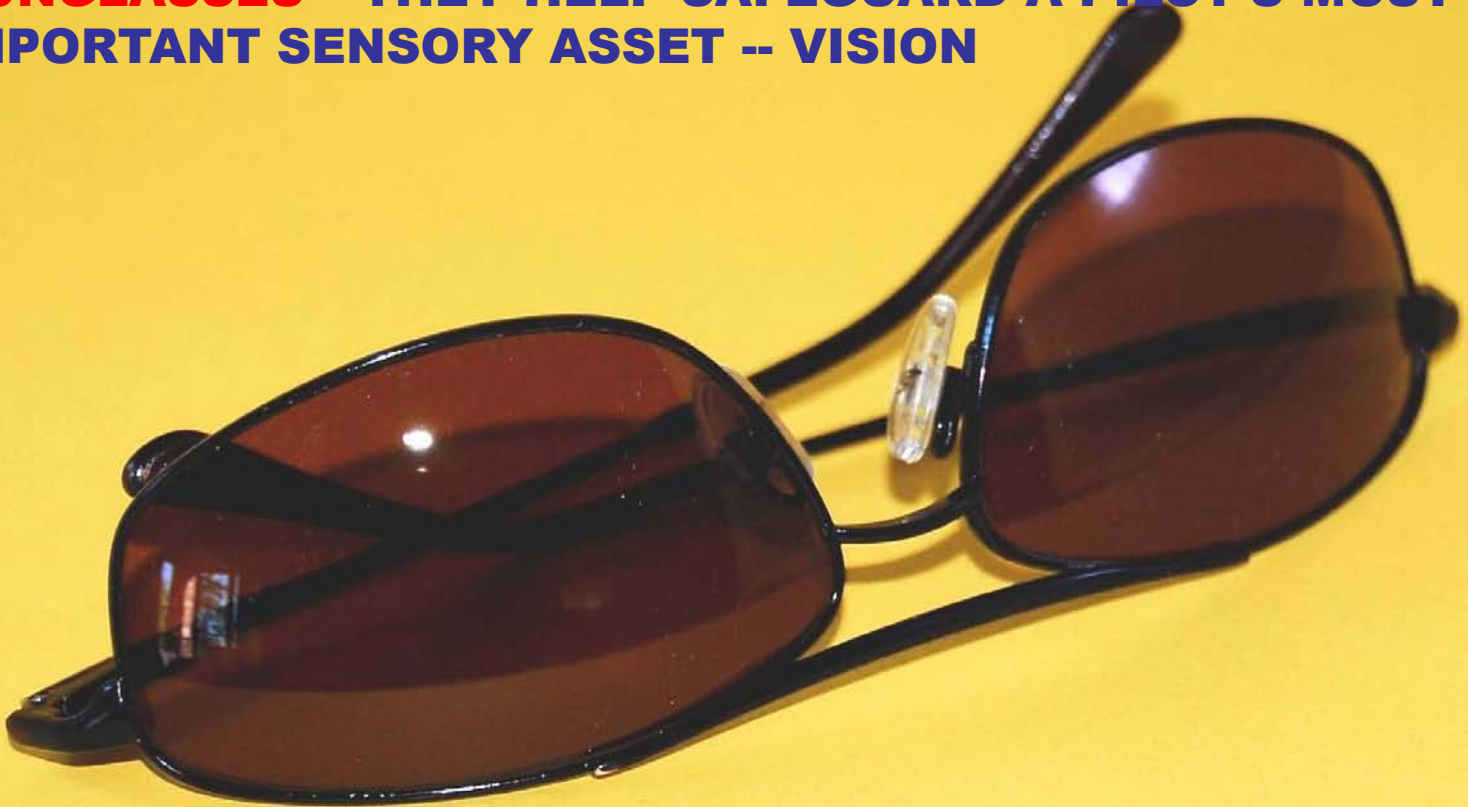
Problem	Type of Medication	Example	Potential side effects
Colds, congestion, and allergies	- Decongestant - Antihistamine	Pseudoephedrine (Sudaphed®) Diphenhydramine Benadryl®)	Palpitations, jitteriness, anxiety, drowsiness
Cough	- Cough suppressant	Dextromethorphan (Robitussin DM®)	Dizziness, drowsiness
Fever	- Antipyretic	Aspirin	Ringing in ears, upset stomach
Pain	- Analgesic	Ibuprofen (Motrin®)	Dizziness, upset stomach
Nausea / Vomiting	- Antinauseant	Dimenhydranate (Dramamine®)	Drowsiness
Diarrhea	- Antidiarrheal	Loperamide (Imodium®)	Drowsiness
Acid reflux	- Antacid	Ranitidine (Zantac®)	Headache, nausea
Constipation	- Laxative	Various	Abdominal cramping, diarrhea
Overweight	- Diet pill	Ephedrine (Ephedra)	Palpitations, jitteriness, anxiety, heart attack, stroke
Insomnia	- Sleeping pills	Diphenhydramine (Tylenol PM®)	Prolonged drowsiness and impairment of reaction times



FIT FOR FLYING



SUNGLASSES – THEY HELP SAFEGUARD A PILOT’S MOST IMPORTANT SENSORY ASSET -- VISION



THESE SUNGLASSES ARE MADE BY SERENGETI [™] AND ARE KNOWN AS THE *COUPES*. THEY ARE POPULAR BUT HAVE ONE FEATURE NOT RECOMMENDED BY THE FAA: THE LENSES ARE POLARIZED. ALTHOUGH USEFUL FOR BLOCKING REFLECTED LIGHT FROM HORIZONTAL SURFACES, POLARIZATION CAN REDUCE, OR ELIMINATE, THE VISIBILITY OF INSTRUMENTS THAT INCORPORATE ANTI-GLARE FILTERS. THE LENSES ARE KNOWN TO INTERFERE WITH VISIBILITY AND MASK THE SPARKLE OF LIGHT THAT REFLECTS OFF SHINY SURFACES SUCH AS ANOTHER AIRCRAFT’S WING OR WINDSCREEN. THIS CAN REDUCE THE TIME A PILOT HAS TO “SEE-AND-AVOID” TRAFFIC SITUATIONS. THE FAA RECOMMENDS THAT PILOTS CONSULT AN EYECARE PRACTITIONER FOR THE MOST EFFECTIVE ALTERNATIVES CURRENTLY AVAILABLE.



FIT FOR FLYING



THE FAA'S DOWNLOADABLE AVIATION PHYSIOLOGY VIDEOS

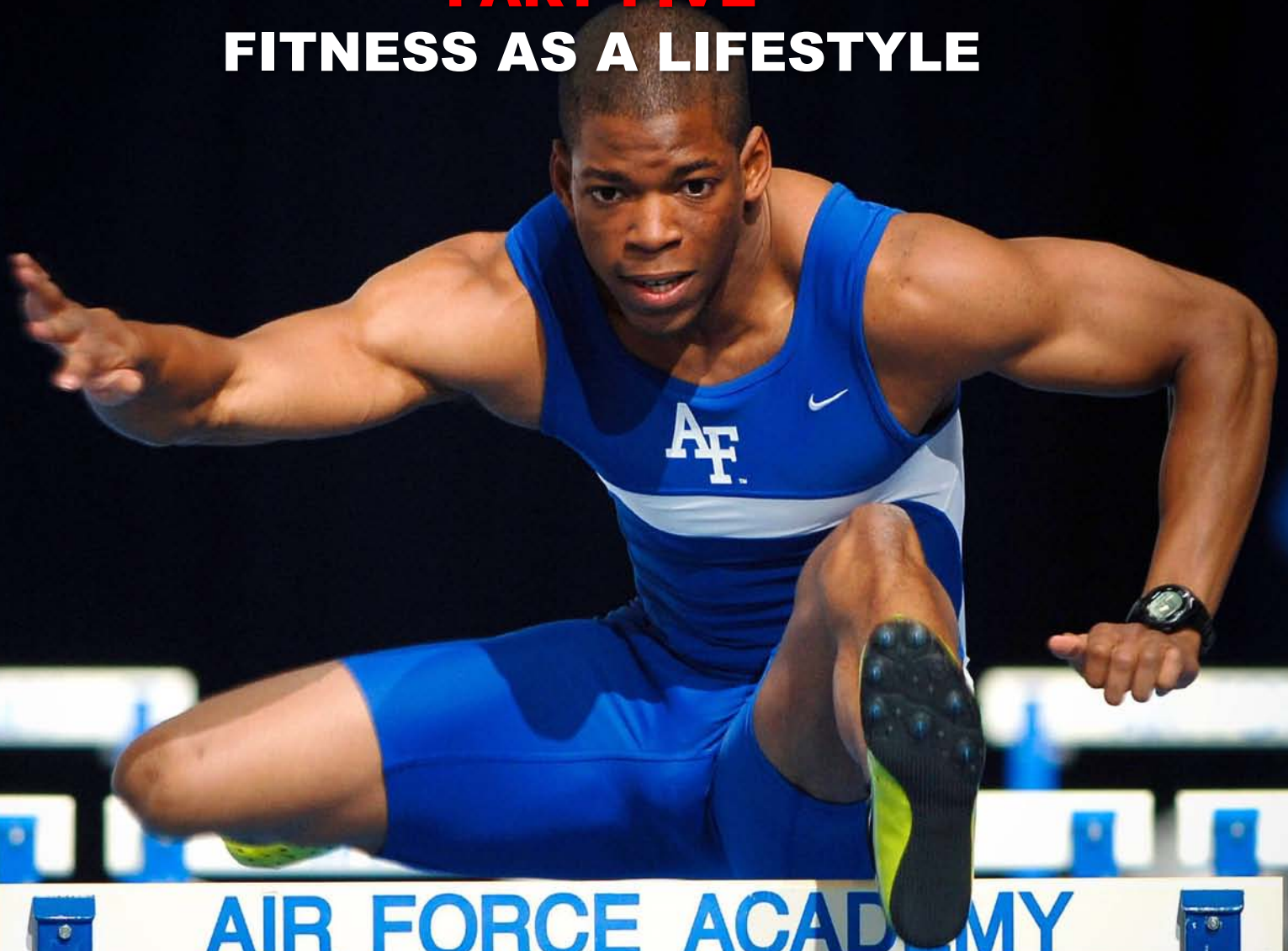
- **ACCELERATION IN AVIATION (WMV, 23:47 min)**
- **ALTITUDE-INDUCED DECOMPRESSION SICKNESS (WMV, 11:14 min)**
- **FATIGUE IN AVIATION (WMV, 16:22 min)**
- **FIT FOR FLIGHT (WMV, 12:26 min)**
- **FLYING AND HYPOXIA (WMV, 15:21 min)**
- **HEAT EXPOSURE IN AVIATION (WMV, 16:27 min)**
- **HYPERVENTILATION – WHEN FLYING TAKES YOUR BREATH AWAY (WMV, 7:33 min)**
- **MOTION SICKNESS IN AVIATION (WMV, 7:52 min)**
- **NOISE AND VIBRATION IN AVIATION (WMV, 13:46 min)**
- **PHYSICS OF THE ATMOSPHERE (WMV, 10:39 min)**
- **RESPIRATION AND CIRCULATION (WMV, 13:01 min)**
- **SELF-IMPOSED STRESS IN AVIATION (WMV, 18:16 min)**
- **SPATIAL DISORIENTATION, PART 1 (WMV, 17:10 min)**
- **SPATIAL DISORIENTATION, PART 2 (WMV, 15:49 min)**
- **THE UPS AND DOWNS OF CABIN PRESSURIZATION (WMV, 11:14 min)**
- **TRAPPED GAS (WMV, 10:05 min)**
- **UNDERSTANDING AVIATION OXYGEN EQUIPMENT (WMV, 17:11 min)**
- **VISION IN AVIATION --- TO SEE OR NOT TO SEE (WMV, 15:54 min)**



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PART FIVE **FITNESS AS A LIFESTYLE**





FIT FOR FLYING



**THE FAA HAS A RECOMMENDED A FITNESS PROGRAM FOR PILOTS.
THE FIRST STEP IS TO GET A PHYSICAL EXAMINATION.**





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THE NEXT STEP IS TO ESTABLISH A WORKOUT PROGRAM EITHER AT HOME OR AT A FITNESS CENTER. A PROFESSIONAL FITNESS INSTRUCTOR CAN HELP YOU SET UP A PROGRAM THAT IS TAILORED TO YOUR PERSONAL NEEDS. THE FAA RECOMMENDS STARTING SLOWLY. THEIR PROGRAM BEGINS WITH A **WARM UP AND STRETCH SESSION. WARMING YOUR MUSCLES GIVES THE BODY A CHANCE TO DELIVER PLENTY OF NUTRIENT-RICH BLOOD TO THE AREAS ABOUT TO BE EXERCISED AND LUBRICATES THE JOINTS. STRETCHING INCREASES AND MAINTAINS MUSCLE FLEXIBILITY BY INCREASING BLOOD FLOW TO THE MUSCLES. STRETCHING ALSO DECREASES THE RISK OF INJURY.**





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ANOTHER PHASE IN THE FAA FITNESS PROGRAM IS AEROBIC OR CARDIOVASCULAR CONDITIONING

YOUR WORKOUT SHOULD INVOLVE AEROBIC ACTIVITIES. AEROBIC EXERCISE IS ANY ACTIVITY THAT USES LARGE MUSCLE GROUPS, CAN BE MAINTAINED CONTINUOUSLY, AND IS RHYTHMIC IN NATURE. THE EXERCISE TASKS THE HEART AND LUNGS, CAUSING THEM TO WORK HARDER THAN WHEN RESTING.

EXAMPLES:

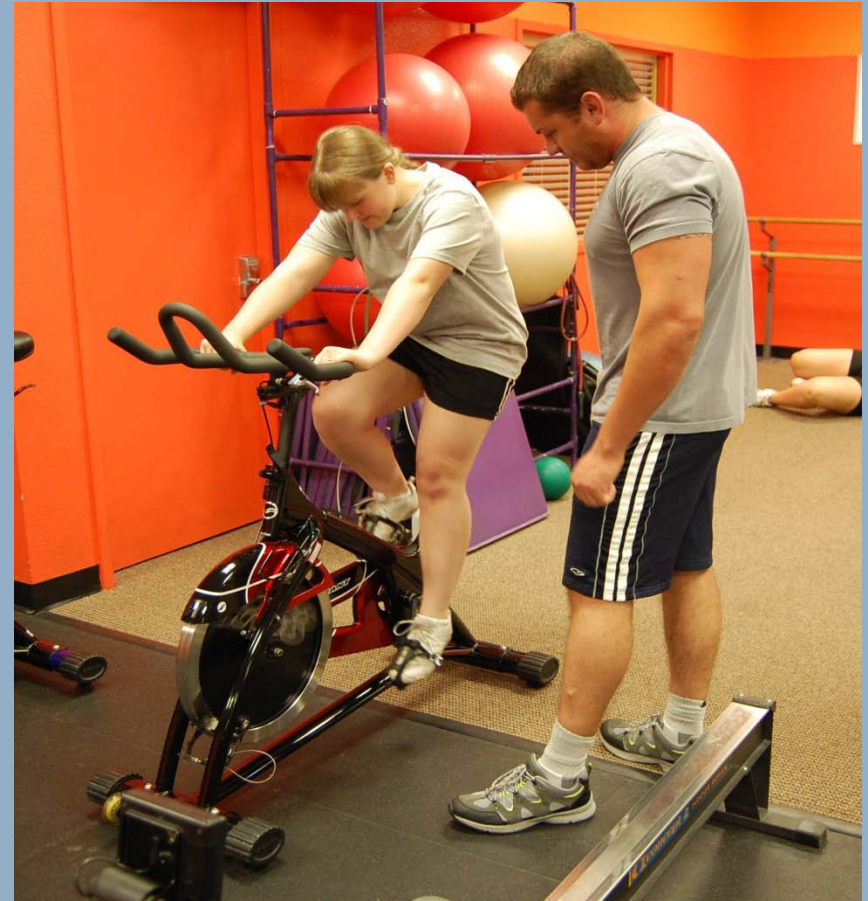
BICYCLING (INCLUDE STATIONARY)

TREADMILL

RUNNING OR JOGGING

STAIR CLIMBING

SPORTS SUCH AS SOFTBALL, VOLLEYBALL, RACQUETBALL, ETC.





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- **ANAEROBIC CONDITIONING IS NEXT. THIS TYPE OF TRAINING TASKS A PARTICULAR MUSCLE GROUP TO INCREASE ITS STRENGTH AND TONE. EXERCISES CAN BE DONE BY USING RESISTANCE MACHINES, FREE WEIGHTS, OR RESISTANCE BANDS. STUDIES HAVE SHOWN THAT FREE-WEIGHTS ARE THE MOST EFFECTIVE, BUT THEY ARE ALSO LESS SAFE. NO MATTER WHICH YOU CHOOSE, IT IS RECOMMENDED YOU CONSULT WITH A FITNESS PROFESSIONAL FOR A PROGRAM TAILORED TO YOUR PERSONAL CAPABILITIES**





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- **THE FINAL PHASE IS THE COOL DOWN AND STRETCHING. THIS IS THE FINISHING TOUCH TO YOUR WORKOUT. IT IS A VERY IMPORTANT PART OF AN OVERALL WORKOUT BECAUSE IT KEEPS THE BODY ACTIVE, PREVENTS THE BLOOD FROM POOLING IN YOUR EXTREMITIES, AND FLUSHES THE MUSCLES OF LACTIC ACID. THE COOL-DOWN SHOULD BE PERFORMED AT A LOW-INTENSITY OF EFFORT, STARTING WITH THE MAJOR MUSCLE GROUPS. SIMILAR TO THE START OF THE WORKOUT, THE COOL-DOWN PERIOD SHOULD ALSO INVOLVE STRETCHING.**





FIT FOR FLYING



THE EPIDEMIC OF OBESITY

LONG TIME AVIATION MEDICAL EXAMINER AND AUTHOR OF NUMEROUS ARTICLES IN THE "FEDERAL AIR SURGEON'S BULLETIN," RECENTLY WROTE:

- * " FORTY PERCENT OF OBESITY IS GENETIC (BUT STILL RESPONDS TO DIET AND EXERCISE).**
- * WE ARE FAT—AND GETTING FATTER—NOT FROM THE SUDDEN APPEARANCE OF A "FAT GENE;" BUT BECAUSE WE EAT HUGE PORTIONS, EAT CALORIE-LADEN FAST FOOD, AND SNACK CONSTANTLY...**
- * THERE IS NO KNOWN FOOD THAT MELTS FAT.**
- * THERE ARE NO LOOPHOLES TO LOSING WEIGHT. THE ONLY WAY TO LOSE BODY FAT IS TO CREATE A **CALORIE DEFICIT**. THIS CAN BE DONE BY EATING FEWER CALORIES OR EXERCISING MORE. MOST MEN WILL LOSE WEIGHT ON 1500 CALORIES A DAY AND MOST WOMEN WILL LOSE WEIGHT ON 1200 CALORIES A DAY."**
- * HE ENDS HIS ARTICLE BY SAYING,**
****"START THINKING ABOUT AN EATING PLAN INSTEAD OF A DIET."****



FIT FOR FLYING



IF YOU WANT TO FLY, START NOW WITH A COMMITMENT TO A LIFETIME OF GOOD HEALTH AND PHYSICAL FITNESS. JUST REMEMBER, THE FAA MEDICAL CERTIFICATE **IS AS IMPORTANT AS THE PILOT CERTIFICATE.**





FIT FOR FLYING



“I take my health seriously. As a professional pilot, I’m required to get an aviation physical every year. If for some reason I could not pass my physical, I would be unable to fly. That is the one thing I have worked very hard to achieve.” Capt. Cory Von Pinnon, Avantair, Piaggio *P180*.

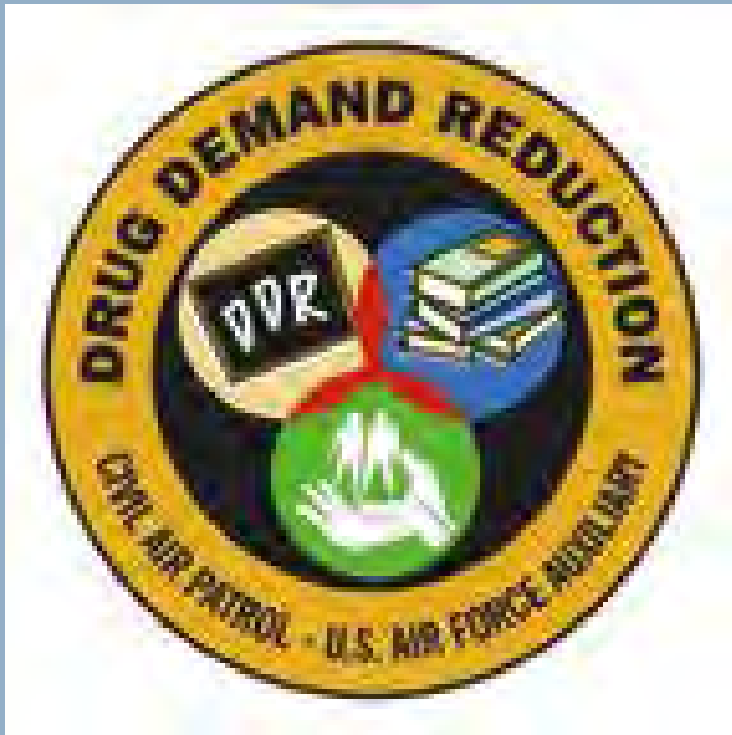




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THIS HAS BEEN A PRODUCTION OF THE DRUG DEMAND REDUCTION PROGRAM OF THE CIVIL AIR PATROL.





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Educational Programs Directorate Drug Demand Reduction Program

**Civil Air Patrol National Headquarters
105 South Hansell Street Bldg 714
Maxwell AFB, AL 36112**

capmembers.com/ddr