LESSON MEDICAL FACTORS STUDENT _____ DATE _____

OBJECTIVE

TO ACQUAINT THE STUDENT WITH THE MEDICAL FACTORS RELATED TO FLIGHT.

ELEMENTS

1. **Medical factors related to flight.**
   a. Fatigue.
   b. Hypoxia.
   c. Hyperventilation.
   d. Alcohol.
   e. Drugs.
   f. Disorientation (Vertigo).
   g. Carbon monoxide.
   h. Scuba Diving.
   I. Motion Sickness.
   j. Middle Ear and / or Sinus Problems.

2. **Medical certificates.**

SCHEDULE **Total Time 1:30**

EQUIPMENT **Handout.**

INSTRUCTOR'S ACTIONS

ORAL DISCUSSION OF THE ELEMENTS:

1. **How to obtain an appropriate medical certificate.**
2. **How to obtain a medical certificate in the event of a possible medical deficiency.**
3. **Hypoxia, its symptoms, effects, and corrective action.**
4. **Hyperventilation, its symptoms, effects, & corrective action.**
5. **Middle Ear and Sinus Problems, their causes, effects, and corrective action.**
6. **Spatial disorientation, its causes, effects, and corrective action.**
7. **Motion Sickness, its causes, effects, and corrective action.**
8. **Effects of Alcohol and Drugs, and their relationship to flight safety.**
9. **Carbon Monoxide Poisoning, its symptoms, effects, and corrective action.**
0. **Effect of Nitrogen Excesses during Scuba Dives and how this affects pilots and passengers during flight.**
1. **Fatigue, its effects and corrective action.**

STUDENT'S ACTIONS

Listen, Ask Questions, and Take Notes.

COMPLETION STANDARDS

THE LESSON WILL HAVE BEEN SUCCESSFULLY COMPLETED WHEN, BY AN ORAL TEST, THE STUDENT DISPLAYS KNOWLEDGE OF THE MEDICAL FACTORS RELATED TO FLIGHT.

❑ PHYSIOLOGICAL FACTORS

you need to visit an AME as soon as possible to avoid unnecessary Expenses should you not meet the medical standards.

1. HOW TO OBTAIN AN APPROPRIATE MEDICAL CERTIFICATE.

BY USING FORM 8500-8, "APPLICATION FOR AIRMAN MEDICAL CERTIFICATE OR AIRMAN MEDICAL AND STUDENT PILOT CERTIFICATE." THIS FOR IS FILLED OUT BY THE STUDENT AND THE AVIATION MEDICAL EXAMINE (AME). A LIST OF AMES IS AVAILABLE AT MOST FLIGHT STANDARD DISTRICT OFFICES.

2. HOW TO OBTAIN A MEDICAL CERTIFICATE IN THE EVENT OF A POSSIBLE MEDICAL DEFICIENCY.

ANY PERSON WHO IS DENIED A MEDICAL CERTIFICATE BY AN AVIATION MEDICAL EXAMINER MAY, WITHIN 30 DAYS AFTER THE DATE OF DENIAL, APPLY IN WRITING AND IN DUPLICATE TO THE FEDERAL AIR SURGEON FOR RECONSIDERATION OF THAT DENIAL. AVIATION MEDICAL EXAMINERS (AME) CAN ISSUE A MEDICAL CERTIFICATE WITH CERTAIN LIMITATIONS ON FLYING ACTIVITIES DUE TO MEDICAL CONDITIONS THAT EXIST. (FAR 67.401)

THE FLIGHT INSTRUCTOR SHOULD ENCOURAGE A PERSON CONSIDERING FLIGHT TRAINING TO OBTAIN AN APPROPRIATE MEDICAL CERTIFICATE FROM AN AVIATION MEDICAL EXAMINER BEFORE TRAINING IS STARTED. IN THE EVENT A PERSON'S ELIGIBILITY TO HOLD A MEDICAL CERTIFICATE IS QUESTIONABLE, THE FLIGHT INSTRUCTOR SHOULD BE AWARE THAT SOME PHYSICAL HANDICAPS DO NOT ALWAYS PROHIBIT THE ACTIVITY AS PILOT OF AN AIRCRAFT. THE FLIGHT INSTRUCTOR SHOULD ADVISE SUCH A PERSON THAT ASSISTANCE IN OBTAINING A MEDICAL CERTIFICATE IS AVAILABLE THROUGH THE COOPERATION OF THE MEDICAL EXAMINER AND THE LOCAL FAA FLIGHT STANDARDS DISTRICT OFFICE. HOWEVER, THIS ASSISTANCE IS AVAILABLE ONLY WHEN REQUESTED SPECIFICALLY BY THE PERSON SEEKING THE MEDICAL CERTIFICATE.

I Illness
M medication
S Stress
A Alcohol
F Fatigue
E Emotions - Get home Idess

HYPOXIA

THE BODY'S REACTION TO A LACK OF OXYGEN

HEALTHY PILOTS ARE USUALLY NOT EFFECTED BELOW 12,000' MSL

FROM 12,000' TO 15,000' MSL

THE EARLIEST EFFECT IS IMPAIRMENT OF JUDGMENT

BEHAVIORAL CHANGES (E.G., A SENSE OF EUPHORIA

DISCOLORATION AT THE FINGERNAIL BEDS AND LIPS

INCREASED BREATHING RATE, HEADACHE, SLEEPINESS, OR FATIGUE

LIGHT-HEADEDNESS OR DIZZY SENSATIONS AND LISTLESSNESS

POOR COORDINATION

SWEATING

LOSS / DETERIORATION OF VISION

TINGLING OR WARM SENSATIONS

THE ALTITUDE AT WHICH THE EFFECTS OF HYPOXIA CAN OCCUR CAN BE LOWERED BY A NUMBER OF FACTORS. MANY DRUGS, ALCOHOL, & HEAVY SMOKING WILL EITHER DIMINISH THE BLOOD'S ABILITY TO ABSORB OXYGEN OR THE ABILITY OF THE BRAIN TO TOLERATE HYPOXIA.

DIFFICULT TO RECOGNIZE BEFORE THE PILOT'S REACTIONS ARE AFFECTED

USE TWO-PILOT OPERATIONS

DESCEND TO A LOWER ALTITUDE

USE SUPPLEMENTAL OXYGEN

RECOMMENDED

ABOVE 10,000' MSL DURING THE DAY & ABOVE 5,000' MSL AT NIGHT

THE FAA ENCOURAGES YOU TO GO THROUGH THE PHYSIOLOGICAL TRAINING PROGRAM, IF YOU CAN REACH A MILITARY BASE WITH AN ALTITUDE CHAMBER BECAUSE IT WILL HELP YOU LEARN TO RECOGNIZE YOUR OWN SYMPTOMS IN A CONTROLLED ENVIRONMENT.

Edwards AIR force Base

HYPERVENTILATION

WHEN
HUMANS GET EXCITED, STRESSED OR FRIGHTENED

THEY TEND TO

BREATH TOO FAST AND TOO DEEP

CAUSING

A LACK OF CARBON DIOXIDE IN THE BODY

DIZZINESS

TINGLING FINGERS / TOES

HOT / COLD SENSATION

RAPID HEART RATE

VISION BLURRED

MUSCLE SPASM

UNCONSCIOUSNESS

PERFORMANCE

JUDGMENT

COORDINATION

ALERTNESS

A PERSON NEEDS TO CONSCIOUSLY SLOW BREATHING DOWN BY

TALKING OR SINGING OUT LOUD

BREATHING SLOWLY INTO A PAPER BAG

CARBON MONOXIDE POISONING

TASTELESS, COLORLESS, ODORLESS GAS CONTAINED IN EXHAUST FUMES

FEEL DROWSY?

EXHAUST ODORS?

FINGER TIPS TINGLE?

HEADACHE?

DON'T IGNORE CO SYMPTOMS !!

MENTAL CONFUSION

DIZZINESS

UNEASINESS

IF YOU SMELL EXHAUST FUMES IN THE CABIN WHILE USING THE HEATER

OPEN VENTS

TURN OFF THE HEATER

LAND AS SOON AS POSSIBLE

SCUBA DIVING

People who scuba dive need to be particularly careful if they plan to fly afterwards because he/she may experience the bends at altitudes less than 10,000'.

This allows the body enough time to get rid of any excess nitrogen.

	DIVES NOT REQUIRING CONTROLLED ASCENT	DIVES REQUIRING CONTROLLED ASCENT
FLIGHT AT/ BELOW 8,000' MSL	WAIT AT LEAST 12 HOURS	WAIT AT LEAST 24 HOURS
FLIGHT ABOVE 8,000' MSL	WAIT AT LEAST 24 HOURS	WAIT AT LEAST 24 HOURS

ALCOHOL:

IS BAD NEWS IF YOU'RE FLYING.

DID YOU KNOW ALCOHOL MAKES YOU MORE SUSCEPTIBLE TO HYPOXIA. YOU SEE ALCOHOL DOES ITS DAMAGE BY DEPRIVING THE BRAIN OF OXYGEN ANY AMOUNT WILL IMPAIR FLYING SKILLS.

VISION
HEARING
MEMORY
DECISION-MAKING
COORDINATION

B. CAUSES RECKLESSNESS WHEN YOU THINK YOU ARE DOING WELL, AND GETS WORSE W/ ALTITUDE.

2. REGULATIONS:
   A. 8 HOURS BETWEEN CONSUMPTION AND FLIGHT.
   B. .04% BLOOD ALCOHOL (SO IT MAY TAKE MORE THAN 8 HOURS

FATIGUE (TIREDNESS)

A DEPLETION OF BODY ENERGY RESERVE, LEADING TO BELOW-PAR PERFORMANCE

ACUTE

INTENSE MENTAL /PHYSICAL ACTIVITY AT A SINGLE TASK.

FLYING IFR IN TURBULENCE FOR SEVERAL HOURS.

CURED BY REST

CHRONIC

CAUSED OVER TIME BY LACK OF SLEEP, JET LAG, & STRESS

TAKES A LONG TIME TO OVERCOME AFTER THE ROOT CAUSES ARE ELIMINATED.

FATIGUE = PILOT ERROR

DEGRADES ATTENTION

CONCENTRATION

COORDINATION

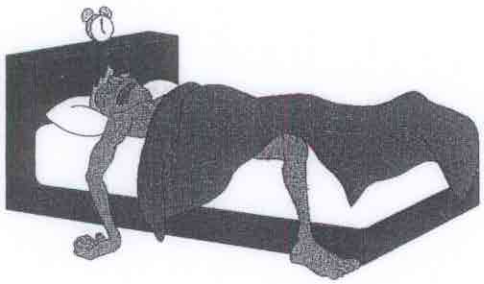
PATIENCE

LOWERS YOUR ABILITY TO HANDLE MULTIPLE TASKS

ALWAYS BE WELL RESTED BEFORE FLYING

GIVE YOURSELF TIME TO RELAX AND TO PREPARE FOR THE FLIGHT

IF IN FLIGHT AND YOUR TIRED, THEN STOP AND REST



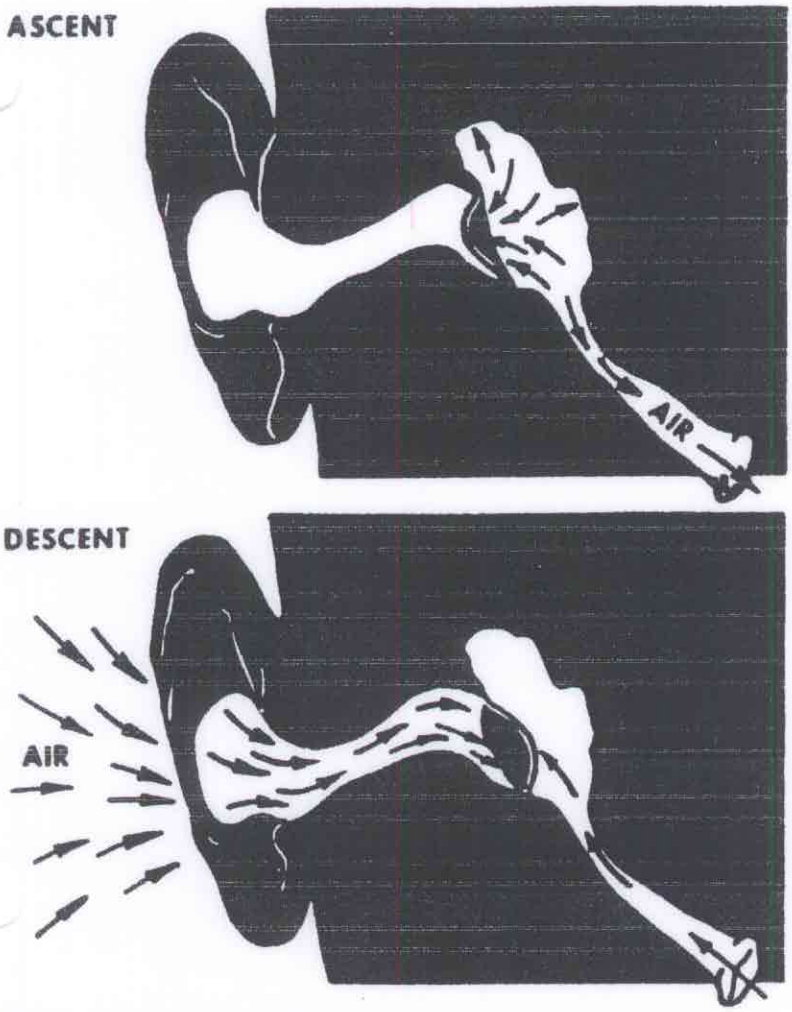


Figure 1–7 The Effect of Pressure on the Inner Ear

MIDDLE EAR

AND

SINUS PROBLEMS

DURING A CLIMB, AS CABIN PRESSURE DECREASES, THE EXPANDING AIR IN THE MIDDLE EAR PUSHES THE EUSTACHIAN TUBE OPEN AND, BY ESCAPING DOWN IT TO THE NASAL PASSAGES, EQUALIZES IN PRESSURE WITH THE CABIN PRESSURE.

BUT DURING DESCENT, ONE MUST PERIODICALLY OPEN THE EUSTACHIAN TUBE TO EQUALIZE PRESSURE.
EITHER AN UPPER RESPIRATORY INFECTION SUCH AS A COLD OR SORE THROAT, OR A NASAL ALLERGIC CONDITION CAN PRODUCE ENOUGH CONGESTION AROUND THE EUSTACHIAN TUBE TO MAKE EQUALIZATION DIFFICULT.

CONSEQUENTLY, THE DIFFERENCE IN PRESSURE BETWEEN THE MIDDLE EAR AND A/C CABIN CAN BUILD TO A LEVEL THAT WILL HOLD THE EUSTACHIAN TUBE CLOSED, MAKING EQUALIZATION DIFFICULT IF NOT IMPOSSIBLE. AN EAR BLOCK PRODUCES SEVER PAIN AND LOSS OF HEARING THAT CAN LAST FROM SEVERAL HOURS TO SEVERAL DAYS.

SWALLOWING, YAWNING, TENSING MUSCLES IN THE THROAT OR , IF THESE DO NOT WORK, BY THE COMBINATION OF CLOSING THE MOUTH, PINCHING THE NOSE CLOSED AND ATTEMPTING TO BLOW THROUGH THE NOSTRILS.

Slow Decent Pipe down

SPATIAL DISORIENTATION

ANOTHER NAME FOR THIS IS VERTIGO. IT'S WHEN YOU CAN'T TELL RIGHT-SIDE-UP FOR UPSIDE DOWN. IT'S A STATE OF TEMPORARY CONFUSION THAT RESULTS FROM MISLEADING INFORMATION BEING SENT TO THE BRAIN BY VARIOUS SENSORY ORGANS.

EXAMPLE....IF A PILOT WERE FLYING OVER THE CLOUDS, AT NIGHT, AND THE CLOUD DECK STARTED TO SLOPE WITHOUT THE PILOT BEING AWARE OF IT, HE/SHE MAY TRY TO KEEP THE WINGS PARALLEL TO THE CLOUDS. HE MAY "THINK" HE'S LEVEL, BUT THE INSTRUMENTS IN THE COCKPIT WILL TELL A DIFFERENT STORY. THE INSTRUMENTS WILL SHOW A BANK TO THE LEFT.

IF YOU LOSE YOUR OUTSIDE HORIZON REFERENCE AND FEEL DISORIENTED, YOU ARE PROBABLE EXPERIENCING SPATIAL DISORIENTATION, THE BEST WAY TO PREVENT OR OVERCOME SPATIAL DISORIENTATION IS TO RELY ENTIRELY ON THE INDICATIONS OF THE FLIGHT INSTRUMENTS.

EVEN TRAINED INSTRUMENT PILOTS ARE NOT IMMUNE TO SPATIAL DISORIENTATION. A SUDDEN TURN OF THE HEAD OR PERSISTENT TURBULENCE CAN CAUSE THIS CONDITION. IT IS CURED ALMOST IMMEDIATELY BY CONCENTRATION ON AND BELIEVING THE INSTRUMENTS.

1. DO NOT TRUST YOUR SENSES.
2. BELIEVE YOUR INSTRUMENTS.
3. BE AWARE OF SITUATIONS MOST LIKELY TO CAUSE DISORIENTATION:

DISTRACTION	MEDICATION / ALCOHOL
A COLD	RAPID HEAD MOVEMENT
DISORIENTATION IN FOG	LOW CEILINGS
HAZE	AT NIGHT.

PRACTICE INSTRUMENT FLIGHT (IN CASE OF INADVERTENT ENTRY INTO IFR TYPES CONDITIONS.

WITHOUT VISUAL AID, POSTURAL SENSES FROM MUSCULAR CONTRACTION / EXPANSION OFTEN CAUSES PILOT TO INTERPRET CENTRIFUGAL FORCE AS A SENSATION OF RISING OR FALLING.

Motion Sickness

MOTION SICKNESS IS CAUSED BY CONSTANT STIMULATION OF THE TINY PORTION OF THE INNER EAR WHICH CONTROLS THE PILOT'S SENSE OF BALANCE.

DESIRE FOR FOOD IS LOST
SWEATING
NAUSEA
DISORIENTED

IF YOU SUSPECT IT, MAKE SURE THEY AVOID UNNECESSARY HEAD MOVEMENTS AND HAVE THEM KEEP EYES ON A POINT OUTSIDE THE AIRCRAFT. PLUS, OPEN UP THE VENTS TO BRING IN FRESH AIR.