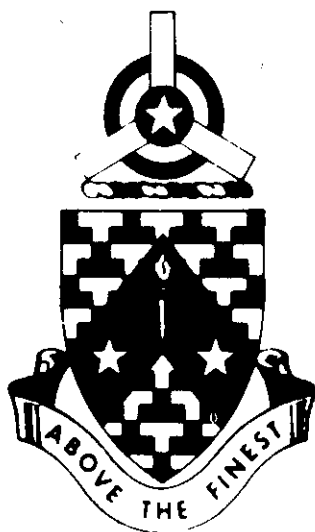


# PROGRAMED TEXT

PHYSIOLOGY

DIET, FATIGUE AND FLIGHT SURGEON

AM-47



March 1968

UNITED STATES ARMY  
PRIMARY HELICOPTER SCHOOL  
FORT WOLTERS, TEXAS

# PROGRAMED TEXT

## PROGRAM TEXT

**FILE NO:** AM-47

## PROGRAM TITLE

PHYSIOLOGY  
DIET, FATIGUE AND FLIGHT SURGEON

**POI SCOPE:** Effects of improper diet, fatigue and drugs on aviator's physical structure and flight surgeons responsibilities.

**INSTRUCTOR REFERENCES:** DA Pamphlet 95-3 Human Factors;  
DA Pamphlet 95-7 Flight Surgeon Sense; "Human Factors in Air Transportation" by McFarland (Library File No. 387-7).

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**DATE:**

July 1968

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PHYSIOLOGY - DIET, FATIGUE AND FLIGHT SURGEON

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## PREFACE

This programed text covers the effects of improper diet, fatigue, use of drugs and the Flight Surgeons responsibilities. You will need this information throughout your aviation career and it will be of daily assistance to you. Each mission must be accomplished safely by pilots who know their physical and mental requirements for peak efficiency at the controls of an aircraft.

Before turning to the next page, let me remind you to be persistent, work dilligently and if you do not understand a point in the program text, raise your hand for assistance. Complete the requirements on each page before proceeding to the next page.

## PERFORMANCE OBJECTIVES

Upon completion of this text you will be able to identify:

1. Types of fatigue and their definitions.
2. Three symptoms of fatigue.
3. Five causes of fatigue.
4. The cause of low blood sugar (hypoglycemia) and its effects.
5. Two causes of obesity.
6. Course of action effective in controlling low blood sugar (hypoglycemia).
7. Reason for not flying with a cold.
8. Reason for not taking self medication.
9. Course of action to be taken after having immunizations and having dental work.
10. Way in which the Flight Surgeon will assist you in performance of your duties.
11. Minimum time lapse between drinking alcohol and flying.

## INTRODUCTION

George is a typical student aviator. It is 0530 hours Monday morning. Ol' George was right out there with the best of 'em at the dirty bird last night. Boy, did he tie one on! Oh, well, that was last night and today is today. All he has to do is go up for an 01:30 this morning and then coast through class this afternoon. Breakfast sure doesn't excite our boy this morning. He'll probably just grab a glass of tomato juice, you know, just to settle the ol' stomach a little and then it's off to the flight line.

"George, you're a little behind in solo time," says the instructor, "take 839 and get three hours this morning." "Try to work out some of the problems you've been having, but stay away from the pinnacles."

"Humph," thinks George, "Who's he trying to kid. I'm the best pilot in the class and he knows it." On the way to the aircraft George stops by the water fountain and pops a cold tablet into his mouth; he's had a slight cold and, anyway, it might make him feel a little better.

And so George treads out to the aircraft, little knowing that already he has broken just about every rule of safe flying there is, and he hasn't even gotten to the aircraft . . . yet. Chances are that Ol' George won't last long. He'll be involved in one of those numerous accidents caused by - Pilot Error? When he has bad days, it'll be the aircraft or the wind or one of those hundred-and-one reasons only George can think of. Well, you'll know plenty of Georges in your flying career. Just don't be one of them.

## PART I

### FRAME 1.

There are three closely related types of fatigue. Match the type of fatigue with the statement that best describes it.

- |                     |   |
|---------------------|---|
| A. Skill Fatigue    | <u>B</u> 1. The normal mental and physical tiredness following hard work.   |
| B. Physical Fatigue | <u>C</u> 2. Is the result of adjusting to a life full of stresses and pressures.                                  |
| C. Chronic Fatigue  | <u>A</u> 3. The end result of fatigue of any kind that will affect your ability to fly or perform certain skills. |

ANSWER: 1 - B, 2 - C, 3 - A

FRAME 2.

Answer the following:

- (1) After playing 18 holes of golf the type of fatigue that you will most likely suffer from is: Physical.
- (2) Your wife just called - the baby is sick, - the washer isn't working and she just smashed a fender on your new T-Bird. On top of that, your instructor says that your flying is deteriorating and if you don't start improving.... By now you are most likely suffering from chronic fatigue.
- (3) You were out late last night and have been flying for a full period. On final approach a cross wind catches you and you are unable to correct for it. You are suffering from skill fatigue.

The type of fatigue most dangerous to an aviator is? skill fatigue

ANSWERS: 1. Physical fatigue  
2. Chronic fatigue  
3. Skill fatigue  
Skill fatigue is the type most dangerous to an aviator.

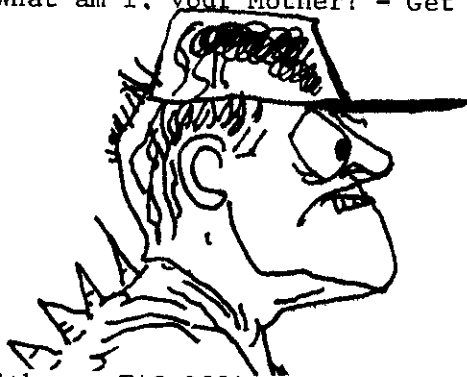
FRAME 3.

When you are tired you know you are suffering from fatigue. Now lets think of some symptoms that are not so apparent.

- A. Poor vision
- B. Forgetfulness
- ☒ C. Increased irritability
- D. Poor judgment

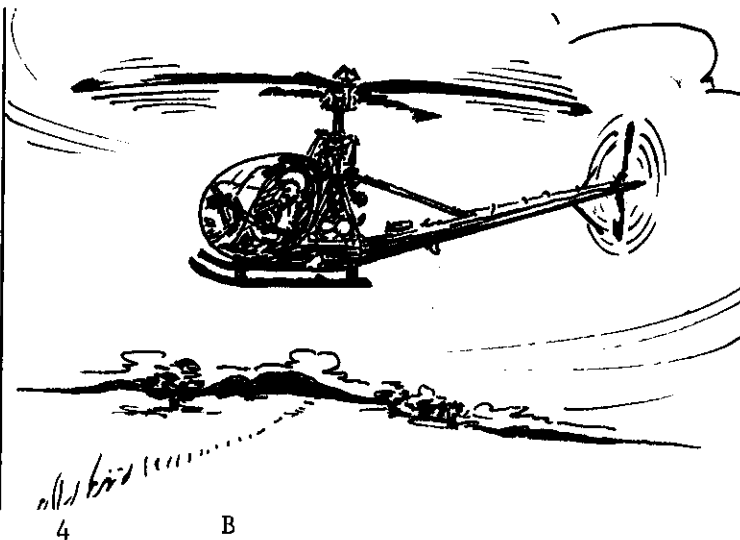
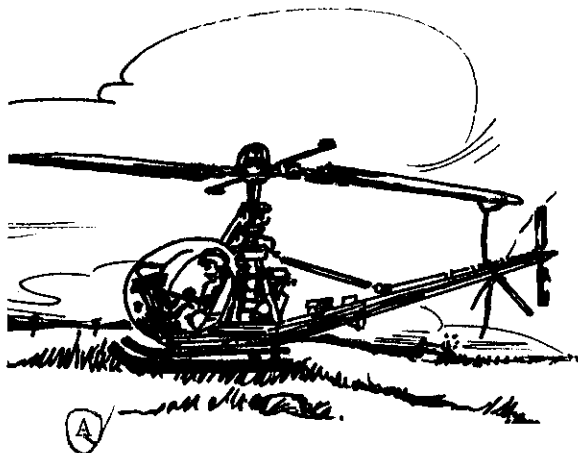
Look at this conversation and decide which symptom you are exhibiting:  
"Would you please bring me a coke on your way down-stairs; here's money for two," asks your roommate.

You answer, "What am I, your Mother? - Get it yourself you lunkhead!"



This man is either a TAC Officer or is suffering from a symptom of fatigue. TRUE ☒ or FALSE \_\_\_\_.

Which of the illustrations below best illustrates forgetfulness as a symptom of fatigue?





ANSWER: C. Increased irritability, True, A.

FRAME 4.

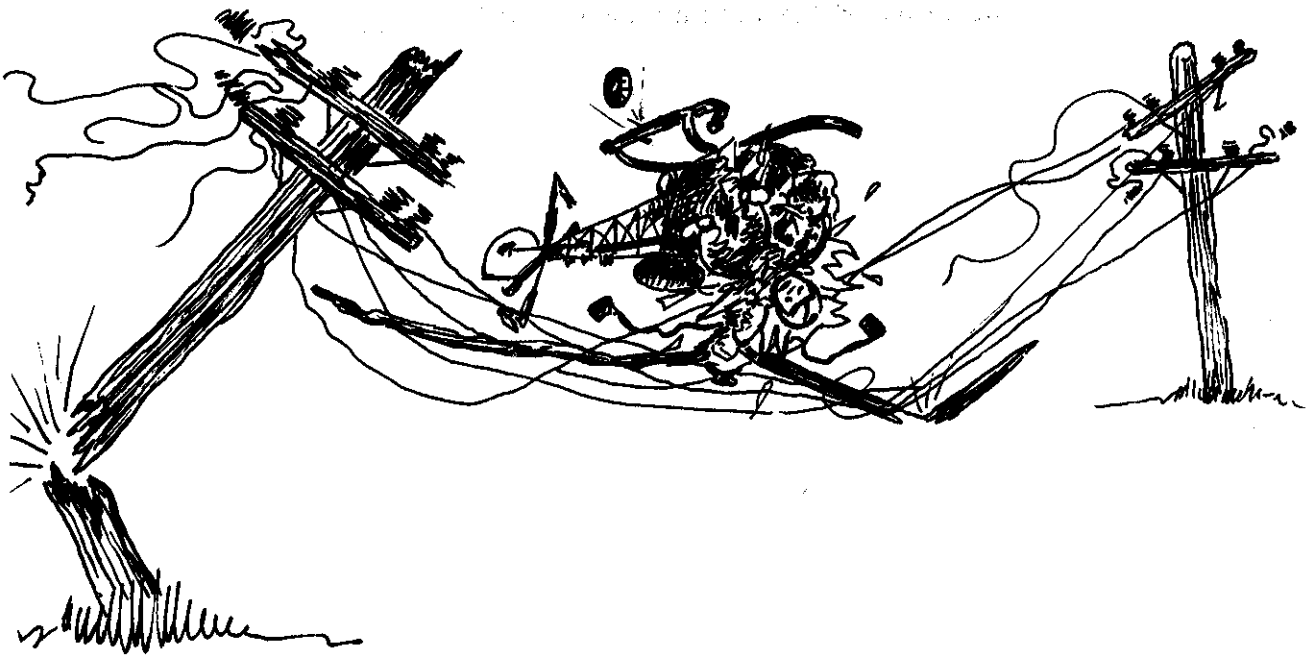
A fatigued pilot may often be doing a miserable job of flying but thinks he's doing better than usual. Poor judgment is another symptom of fatigue.

Good judgment is certainly important to an aviator. Knowing the extent of your capabilities and staying within them is good judgment.

Is the following an example of good judgment on the part of the aviator?

A. Yes

☒ B. No



Was this aviator suffering from a symptom of fatigue?

☒ A. Yes

B. No

When you are fatigued your vision is affected. You are going to have a harder time scanning the instruments and watching for other aircraft. Check the following that are symptoms of fatigue:

- A. ☒ Increased irritability
- B. ☒ Poor vision
- C. ☐ Sore throat
- D. ☒ Forgetfulness
- E. ☒ Poor judgment.

ANSWER: B, A; A, B, D & E

FRAME 5.

Identify the following symptoms:

- A. Your wife tells you that you are gaining weight and you tell her to mind her own business. iratability
- B. You are on final approach and are concentrating on the instruments. You fail to see another aircraft on final and come dangerously close to colliding. poor vision
- C. After take-off you notice the fuel gauge reads low. You then remember that you failed to check the fuel on pre-flight. lack of memory
- D. You are on short final into a tight area when you notice you are approaching downwind. You decide that you are good enough to handle the situation without going around but crash while attempting to land. poor judgement

- ANSWER: A. Increased irritability  
B. Poor vision  
C. Forgetfulness  
D. Poor judgment

FRAME 6.

There are six causes of fatigue we will cover. Look carefully at these four.

- A. Prolonged muscular work.  
B. Physical discomfort.  
C. Noise.  
D. Vibration.

Running a mile would be an example of A.

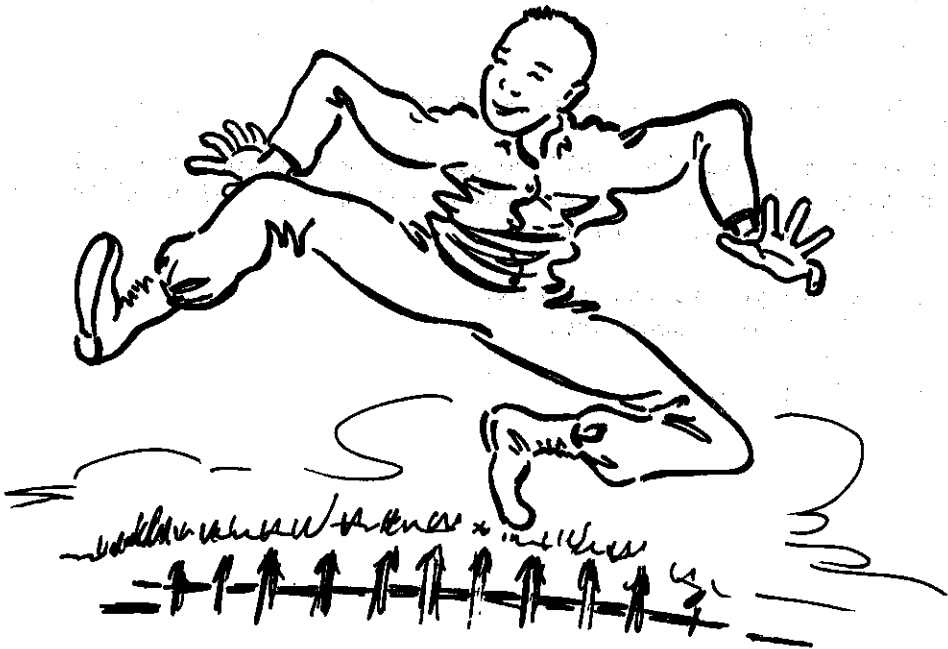
Sitting cramped in the small cockpit of a helicopter for long periods of time will cause you to become fatigued. Which of the following is a name for this cause of fatigue?

- A. Prolonged muscular work.  
☒ B. Physical discomfort.  
C. Noise.  
☒ D. Vibration.

ANSWER: A. Prolonged muscular work.  
B. Physical discomfort.

FRAME 7.

Whenever possible, prior to some critical part of your flight, try to take a few seconds to stretch or shift position to give yourself some relief from fatigue caused by physical discomfort.



Noise and vibration are closely related, but vibration unlike noise is generally communicated to the pilot by direct touch, i.e., contact with the airframe.

Irregular noise and noise above 120 decibels will cause fatigue and is present in some Army Aircraft.

If noise is a problem, wear ear plugs!



ANSWER: Physical, Vibration, & noise.

FRAME 8.

So far we have listed these causes of fatigue.

- A. Prolonged muscle exercise
- B. physical discomfort.
- C. Noise.
- D. vibration

Now let's look at the last two causes of fatigue; unbalanced diet and lack of sleep. Check the following which may lead to an unbalanced diet.

- 1. ☒ Eating at the Dairy Queen frequently.
- 2. ☒ Skipping meals.
- 3. ☐ Eating regularly in the mess hall.
- 4. ☒ Eating lots of candy and ice cream.



side black of ... 91 ...

ANSWER: A. Muscular 1  
B. Physical 2  
C. Noise 4  
D. Vibrations

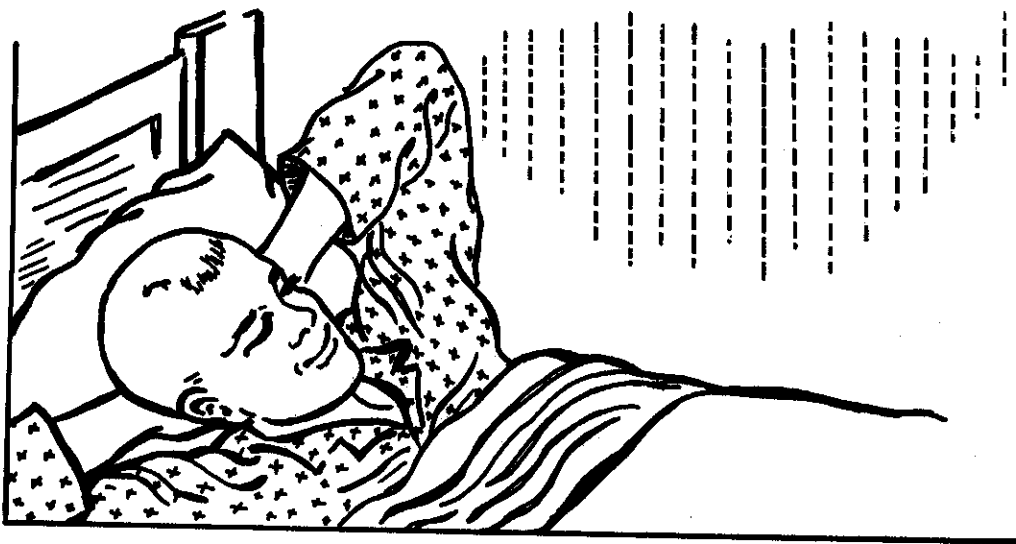
FRAME 9.

sleep Everybody requires sleep! It should be obvious that lack of sleep is another cause of fatigue.

"... the pilot, after several days of an inadequate sleep habit pattern, prepared for and flew a routine mission. He did not realize that he was probably tired and that his fatigue would result in a delayed reaction time. When he was suddenly confronted with an emergency landing situation, he was not completely capable of quickly and correctly performing the necessary emergency landing procedures..." This is a statement from the investigating medical officer. Check the most probable cause of this accident.

- A. Instrument error.
- ☒ B. Lack of sleep.
- C. Physical discomfort.

After you eat a big meal, your body is concentrating the blood supply around the digestive area. This limits the supply to the brain and you feel drowsy or fatigue



The man above has obviously had a big meal. To avoid this situation while flying you should eat small meals before flying.

ANSWER: Sleep, B, fatigued & small.

FRAME 10.

Complete the chart by matching the cause by the proper remedy.

<u>REMEDY</u>	<u>CAUSE OF FATIGUE</u>
1. Avoid strenuous activity prior to a flight.	E <i>muscular activity</i>
2. Stretch prior to some critical part of flight.	F
3. Get plenty of sleep.	B
4. Eat regularly in the mess hall.	C
5. Wear ear plugs.	A
6. Avoid excess periods on running machinery.	D

A. Noise

B. Lack of sleep

C. Inadequate diet

D. Vibration

E. Prolonged muscular work

F. Physical discomfort

Answers to Frame 10, Part I: 1. E, 2. F, 3. B, 4. C, 5. A, 6. D.

## PART II

### FRAME 1.

The task of flying a helicopter requires a vast amount of energy. Parts of the body are able to store excess energy in the form of fat. The brain is unable to do this; it depends entirely on the blood to transport energy to it in the form of blood sugar.

A. The blood sugar level is highest after a meal. When would you expect it to be the lowest?

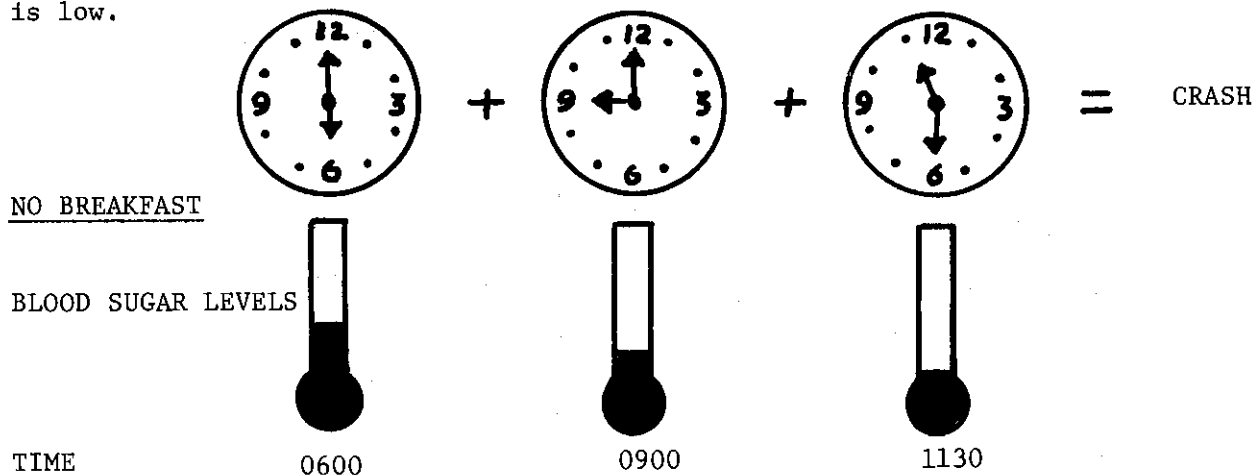
- ☒ 1. before breakfast.
2. before lunch.
3. before dinner.



ANSWER: 1. Before breakfast.

FRAME 2.

Breakfast is especially important to you as an aviator. Since you have been at least 8 hours without eating, your blood sugar level is low.



Which statement best describes the illustration above?

- a. This pilot's blood sugar was low; so he should have seen the flight surgeon.
- ☒ b. This pilot skipped breakfast; therefore, he did not replenish his blood sugar supply. As the morning wore on he lost so much blood sugar that he could not function properly.

A survey of training accidents made at Fort Rucker over a period of months showed that more mishaps took place during the second flying periods in the morning and afternoon than in the first. Select the best reason for this situation.

- a. The instructors were demanding more of the students.
- ☒ b. As the morning and afternoon wore on, the pilot's blood sugar level dropped.

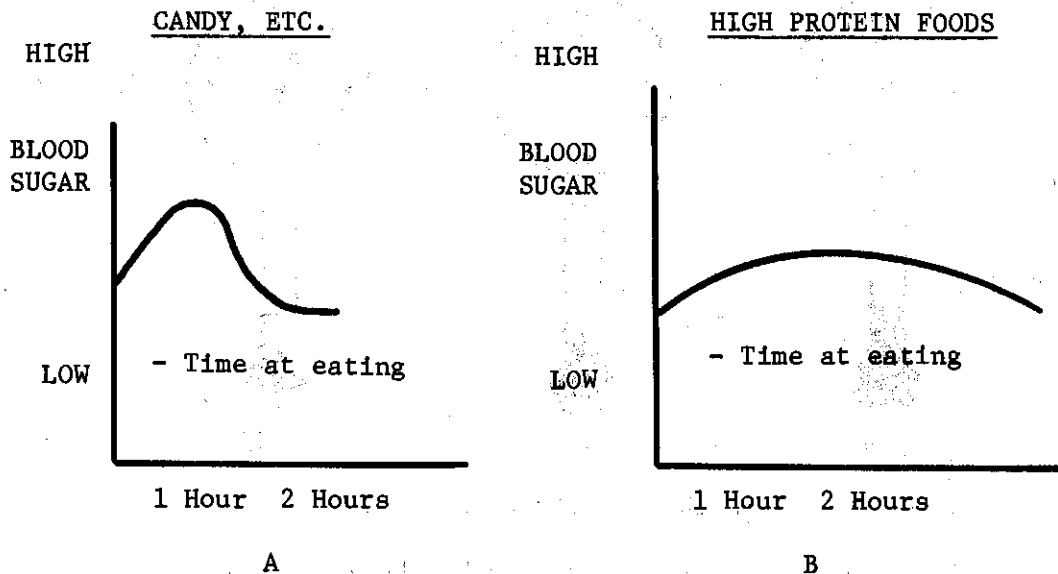
Now select the remedy.

- a. Change instructors for the second period.
- ☒ b. Mid-morning and mid-afternoon snacks.

ANSWER: B, B and B

FRAME 3.

Hypoglycemia is the term used for low blood sugar. You can best avoid hypoglycemia by eating regularly and eating meals high in protein. Meat, milk, eggs, and cheese are high protein foods.



Study the graphs and answer the following questions.

1. Which food shows the quickest increase in blood sugar? A
2. Which food shows a prolonged increase in blood sugar? B
3. Which food would leave you hanging in the middle of a flight? A

For energy prior to a flight, which of the following do you think would be the best?

- a. Full course dinner.
- b. Chocolate bar for quick energy.
- c. Meat sandwich for prolonged energy followed by chocolate bar for quick energy.



ANSWER: A, B, A; C.

FRAME 4.

Rate each of the following WOC's in terms of mental effectiveness on this particular morning by placing a "1" in front of the best, "2" in front of 2nd best, and so on.

- A 4 WOC Jones got up late this morning and skipped breakfast. He is about to fly and hasn't had a chance to eat anything else.
- B 2 WOC Smith didn't eat breakfast but he did have a chance to grab a glass of milk.
- C 3 WOC Hedson also skipped breakfast but he did eat a candy bar.
- D 1 WOC Doe had breakfast.

Meals in the mess hall may not taste like they are just out of the kitchen at the Waldorf Astoria but they will provide you with a balanced diet if eaten regularly. You may, in fact, find that you are putting on too much weight. If this happens see the flight surgeon. He is trained in Aviation Medicine and knows how your body reacts in flight.

Don't take self medication and don't take medicine received from your family doctor. Although your family doctor may be outstanding, he is not familiar with the side effects of medicine on aviators.

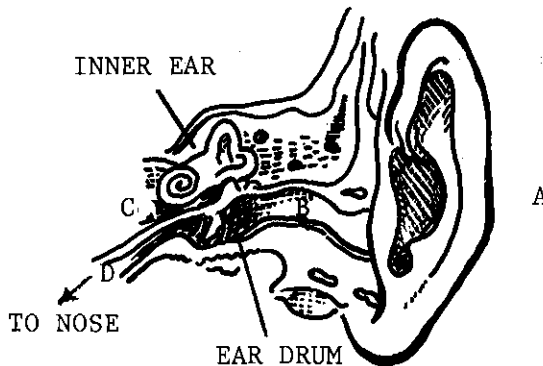
Answer the following true or false.

- A. T Regular exercise will help keep you from becoming overweight.
- B. F Take only enough medicine to feel good.
- C. T If you are sick enough to take medicine you are sick enough to see the flight surgeon.
- D. T Medicine given to you by a family doctor can be dangerous.

- ANSWER: A.  $\frac{4}{2}$  A. True  
 B.  $\frac{2}{3}$  B. False  
 C.  $\frac{3}{1}$  C. True  
 D.  $\frac{1}{1}$  D. True

FRAME 5.

A cold can cause a blockage of the passage between the nose and middle ear, (Eustachian tube D), the same way that your nose becomes obstructed. The eustachian tube is responsible for equalization of pressure in the middle ear. When the eustachian tube is blocked this is known as an ear block. If you fly with the eustachian tube blocked you can do damage to your inner ear.



If passage D is obstructed and the outside pressure at A decreases as it would in gaining altitude, then what would happen at B and C?

- ☒ A. Pressure at B would decrease. C would expand and push against the ear drum.  
 B. Pressure B would increase causing the ear drum to be pushed toward C.

Hold your nose and blow. You should feel both ears pop (Valsalva Maneuver). If your ears did not pop, then the passage between the nose and middle ear is not clear and you should not fly.

ANSWERS: Ear or Eardrum; A.; clear, fly.

FRAME 6.

Be sure and follow the flight surgeons instructions after taking immunizations or having dental work. You should never fly when under the effects of an anaesthesia, even the type used in dental work. Common drugs such as cold tablets and nose drops have dangerous side effects that will effect your ability to fly. Remember, each case must be judged on its merits by the flight surgeon.

Select the Warrant Officer Candidate that you would rather fly with by circling the letter.

- A. WOC Jones had a tooth pulled this morning. His jaw is still numb but he feels fine.
- B. WOC Smith had a cold when he got up so he took 2 cold tablets and the symptoms disappeared.
- C. WOC Doe had shots yesterday but he failed to find out if they were grounding.
- ☒ D. WOC Hudson got up with a headache but after he had breakfast it subsided.

Below are the reasons each of the above should not fly. Match each WOC with the correct reason he should not fly.

- ☒ A 1. Under the effects of a pain killer.
- ☒ B 2. Dangerous side effects.
- ☒ C 3. Some immunizations can be dangerous.
- ☒ D 4. He's OK to fly.

ANSWERS: D; 1-A; 2-B; 3-C; 4-D.

FRAME 7.

Pilots rarely try to fly when drinking therefore flying while under the "influence" is rarely a problem, conversly pilots will rarely hesi-  
tate to fly while suffering from a hangover. Hangovers have been implica-  
ted in many accidents.

Alcohol is a potent depressant that causes a loss of inhibitions, a loss of muscular coordination, a deep anesthesia, even to the point of death.

Alcohol invariably stays in the blood stream longer than most people think. Regardless of how many hours sleep you get, how much you eat or how much you exercise alcohol is eliminated from the blood stream at the same slow rate of one-third ounce per hour. One highball contains approximately 2/3 oz. of alcohol. How long will it take your body to completely eliminate 6 highballs?

- A. 10 hours
- B. 9 hours
- ☒ C. 12 hours
- D. 4 hours

$$\frac{2}{3} \times 6 = 4 \times \frac{12}{3} = 12$$

RULE OF THUMB

It is generally concluded that 24 hours should be the minimum safe period to fly following the consumption of the last drink containing alcohol. Plan your drinking and if it is a real "binge" don't fly for 48 hours.

ANSWER: C.

FRAME 7.

Fill in the blanks in the following chart using the information from A thru E below?

<u>CONDITIONS</u>	<u>EFFECTS</u>	<u>REMEDY</u>
1. <u>candy</u> C	quick energy quick letdown	eat meat, milk eggs, cheese E "candy"
2. Low blood sugar	lowered performance	
3. Overweight	tire faster; more susceptible to certain diseases	D Ht. weigh. D E shape up
4. Bad physical Condition	bad pilot	
5. Dental work	B pain killer	See flight surgeon
6. Flying with a cold	A ears blocked	See flight surgeon
7. Intoxicated	depressant	F do not fly for 24
A. Ear damage		
B. Under effects of a pain <u>killer</u>		
C. Eating candy		
D. See flight surgeon		
E. Eat eggs, milk, cheese		
F. Wait 24 hours before flying		

Answers to Frame 7: 1. C, 2. E, 3. D, 4. D, 5. B, 6. A, 7. F

SELF EVALUATION EXERCISE  
FOR  
DIET, FATIGUE, AND FLIGHT SURGEON

Select the best answer from the four choices given.

1. Three kinds of fatigue are:
  - A. Skill, stomach, chronic.
  - B. Physical, dietary, skill.
  - ☒ C. Physical, chronic, skill.
  - D. Mental, chronic, dietary.
2. The normal mental and physical tiredness experienced after hard work, exercise or excitement is:
  - A. Mental fatigue.
  - ☒ B. Physical fatigue.
  - C. Skill fatigue.
  - D. Chronic fatigue.
3. The result of adjusting to a life full of stresses is:
  - A. Physical fatigue.
  - ☒ B. Chronic fatigue.
  - C. Skill fatigue.
  - D. Dietary fatigue.
4. The most dangerous type of fatigue to an aviator is:
  - A. Mental fatigue.
  - B. Physical fatigue.
  - C. Chronic fatigue.
  - ☒ D. Skill fatigue.



5. Some causes of fatigue are:

- ☒ A. Noise and vibrations.
- ☐ B. Work and an unbalanced diet.
- ☐ C. Lack of sleep and physical discomfort.
- ☐ D. All of the above.
- ☐ E. B & C of the above.

6. Some effects of fatigue are:

- ☒ A. Poorer vision and forgetfulness.
- ☐ B. Poorer judgment and irritability.
- ☐ C. Sleepiness and slow reactions.
- ☐ D. All of the above.
- ☐ E. B & C of the above.

7. Hypoglycemia is:

- ☐ A. Over eating.
- ☒ B. Low blood sugar.
- ☐ C. Over ventilating the lungs.
- ☐ D. Not enough red corpuscles in the blood.

8. Eating regularly is important because

- ☐ A. The brain stores energy in the form of brain fat and it is important that this fat be replaced as it is used.
- ☐ B. The brain needs the oxygen in the diet.
- ☒ C. The brain is unable to store energy, therefore, it is entirely dependent on the blood which in turn is dependent on a regular diet for its energy.
- ☐ D. Because the muscles need the energy to perform properly.

9. For energy prior to flight, it is best to eat:

- ☐ A. Chocolate bar.
- ☒ B. Meat or cheese sandwich.
- ☐ C. Cookies.
- ☐ D. Chocolate cake.

10. If you should become over weight, you should:

- ☐ A. Go on a diet and start exercising.
- ☒ B. See your flight surgeon.
- ☐ C. See your family doctor.
- ☐ D. Start the "airman's diet" as listed in TM 255-3201-5.

11. Some safe drugs that are recommended for use while flying are:
- A. Cold tablets, nose drops.
  - B. Antifatigue pills, antibiotics.
  - C. Diarrhea mixtures and tranquilizers.
  - ☒ D. None.
12. What is the minimum safe period for flying after taking cold tablets?
- ☒ A. As prescribed by the flight surgeon.
  - B. 4 hours.
  - C. 8 hours.
  - D. 16 hours.
13. What is the minimum safe period for flying after having a tooth pulled?
- ☒ A. As prescribed by the flight surgeon.
  - B. 12 hours.
  - C. 24 hours.
  - D. 48 hours.
14. The reason you should not fly after you have had a tooth pulled is:
- A. Because the pressure change could cause a recurrence of bleeding.
  - ☒ B. You should not fly when under effects of pain killers.
  - C. When you have a tooth pulled, it causes sharp sensations to be sent to the brain which have a dulling effect.
  - D. It will keep you from eating and, therefore, cut your blood sugar supply.
15. You should be very cautious about flying with a cold because:
- A. A cold dulls your senses.
  - ☒ B. If the passage between your nose and middle ear is stopped up, it can cause damage due to pressure change.
  - C. It can cause intestinal damage.
  - D. It is alright to fly with a cold as long as it is a minor one.

16. If you should become ill, you should:
- A. See the flight surgeon if the illness involves an inflight sickness.
  - B. See your family doctor or General Medical Officer for minor illnesses, such as colds, sore throats, etc. See your flight surgeon for illnesses or troubles encountered in flight.
  - ☒ C. See the flight surgeon in all cases.
  - D. Treat yourself for colds and headaches. See the family doctor or Medical Officer for more serious illness and finally the flight surgeon if it is serious enough to affect your flying.
17. The difference between a flight surgeon and a regular doctor is:
- A. None except that the flight surgeon confines himself to pilots.
  - B. The flight surgeon is responsible for grounding pilots unfit to fly while a regular doctor can not.
  - ☒ C. The flight surgeon is trained in a different type of medicine called aviation medicine.
  - D. The flight surgeon is a pilot.
18. In order to stay in top mental and physical condition, you should:
- A. See your doctor once a month.
  - ☒ B. Get plenty of sleep, eat regularly, have an balanced diet, exercise regularly.
  - C. Avoid hard work, eat as much as you can and practice flying.
  - D. Drink lots of water. See that you get plenty of nutrients once a day and exercise at least once a month.
19. After drinking 12 highballs that contains  $\frac{2}{3}$  oz. of alcohol each how long should you wait before flying.
- A. 9 hours
  - B. 10 hours
  - ☒ C. 24 hours
  - D. 16 hours
- $\frac{2}{3} \times 124 = 8 \cdot 3 \frac{24}{3} =$

KEY FOR  
SELF EVALUATION EXERCISE  
DIET, FATIGUE, AND FLIGHT SURGEON

- |      |       |
|------|-------|
| 1. C | 10. B |
| 2. B | 11. D |
| 3. B | 12. A |
| 4. D | 13. A |
| 5. D | 14. B |
| 6. D | 15. B |
| 7. B | 16. C |
| 8. C | 17. C |
| 9. B | 18. B |
|      | 19. C |