Lesson Purpose: To introduce the student to a level of information on nutrition, physical fitness and wellness that will encourage and facilitate behavior changes toward a permanent "wellness" lifestyle, and to engage the student in a fitness training program that will improve endurance, strength, and agility required for effective performance of law enforcement duties.

Training Objectives: At the end of this block of instruction, the student will be able to achieve the following objectives in accordance with the information received during the instructional period:

1. List the primary risk factors that contribute to coronary heart disease, and at least three secondary risk factors.

2. List and describe methods of recognition and prevention of the most common injury/ailments that officers experience throughout their careers.

3. Describe in writing, the relationship between proper nutrition and optimal officer performance considering the following factors:
   a. Three major nutrients
   b. Daily caloric needs
   c. Determining appropriate food sources and amounts.

4. Describe the significance of and demonstrate the ability to perform each of the following as they relate to the development of an effective exercise program:
   a. Aerobic and anaerobic exercise
   b. Frequency, intensity, and duration
   c. Warm-up and cool-down activities
5. Demonstrate the ability to successfully complete the essential job tasks for a basic level enforcement officer by successfully completing the required skills test after participating in a physical training program for a minimum of nine weeks, three days per week, one hour per day.

Hours: Fifty-four (54)

(34 hours - Physical Fitness Training - one hour per day, three days a week)
(12 hours - 3 Fitness Assessments—beginning, middle and end)
(8 hours - Lecture)

Instructional Method: Lecture/Demonstration/Practical Exercise

Training Aids:
- Chalkboard
- Skinfold Calipers
- Stopwatch
- Yard Stick
- 12” Step Box
- Metronome
- Weight Machines:
  - Bench Press
  - Leg Press - (optional)
- Sphygmomanometer (Blood Pressure Cuff)
- Stethoscope
- Scales
- VCR and Monitor
- Calculator

Video:
- Physical Fitness for BLET, NCJA (1997)
- Police Officer Physical Abilities Test, NCJA (2000)

References:


Physical Fitness Training

Developing and Maintaining Cardiorespiratory and Muscular Fitness in Healthy Adults," 1995.


**Physical Fitness Training**


Physical Fitness Training

Fenton, Mark. “How Do I Get 10,000 Steps Per Day When I Can’t Even Cross the Street?” Summit Keynote Address, ACSM Summit, 2005.


Lynn, Jenny. “A Genuine Heart Stopper.” *Man at His Peak*.


*Basic Law Enforcement Training* Instructor 6
**Physical Fitness Training**


Physical Fitness Training


Prepared By: Peggy M. Schaefer
Instructor/Coordinator
North Carolina Justice Academy

Glenn Jones
Exercise Physiologist
Work Physiology, Inc.

Kim Kuhn
Wellness Coordinator
Town of Chapel Hill

Date Prepared: August 1997

Reviewed By: Kathy Moore
Agency Legal Specialist
North Carolina Justice Academy
Physical Fitness Training

Date Reviewed: December 1998
January 2000
November 2000
October 2001

Revised By: Peggy M. Schaefer
Training Manager
North Carolina Justice Academy

Jon B. Blum
Instructor/Coordinator
North Carolina Justice Academy

Date Revised: June 2000
November 2000
November 2001

Revised By: John E. Combs
Instructor/Coordinator
North Carolina Justice Academy

Date Revised: April 2004
January 2005
January 2006
July 2006
TITLE: PHYSICAL FITNESS TRAINING - INSTRUCTOR NOTES

1. Every BLET student should be thoroughly examined by a medical doctor before participation in any physical fitness program. The examining doctor should also be provided with a list of fitness activities/exercises students will be expected to perform during BLET. He/she must also complete all required medical forms [12 NCAC 9B.0203(e)].

2. Specialized Physical Fitness instructors should thoroughly review and discuss all student medical forms, records and related health conditions with the BLET school director prior to the delivery of any fitness activity.

3. Specialized Physical Fitness instructors should cultivate training environments that encourage students to develop fitness and wellness habits that last a lifetime.

4. Students should be instructed to wear athletic attire for all physical training sessions. Dress should be appropriate for climate and other weather conditions. Instructors should monitor and emphasize the importance of proper attire (especially shoes) to prevent unnecessary injuries.

5. This lesson plan allocates twelve (12) hours to fitness assessment testing. In the interest of time management, several trained instructors will be needed to conduct fitness assessments. Lead instructors must schedule and administer fitness assessments at least three (3) times during a course delivery: in the beginning, middle and end. The first fitness assessment should be completed, graded, and results provided to students prior to the lecture. The lecture is more effective when students have their fitness assessment results delivered and explained to them beforehand.

6. The fitness assessment testing battery should be administered in the following order. Instructors are encouraged to show the video, BLET Physical Assessment prior to the assessments. (Refer to Specialized Physical Fitness Instructor Course Notebook - Fitness Assessments for further information.)

a. Medical screening
b. Blood pressure measurement
c. *Body composition testing – skinfold measurements
d. Height and weight measurement
e. 3-minute step testing
f. *Flexibility testing – sit and reach test
g. *Absolute strength testing – 1 maximum repetition bench press
h. *One minute sit-up test
i. *One minute push-up test
j. *Vertical jump test
k. *Aerobic power testing – 1.5 mile test

*Main fitness profile event.

Using the *Fitness Assessment* and *Fitness Profile* forms, a total fitness score should be calculated by averaging the percentile rankings of the seven main (*) events. Results are generated using an age and gender adjusted scale developed by the Cooper Institute for Aerobics Research in Dallas, Texas. Students should be told that their fitness levels are compared to a general public, random sample of persons of their same gender and age range.

7. Using fitness assessment results, instructors should carefully design individual exercise prescriptions for each student. Programs should be designed to improve overall student fitness abilities and prepare them for their final abilities test. Student exercise programs should incorporate a wide variety of activities to include aerobic events, weight training, calisthenics, and other various combinations. Two (2) specialized fitness instructors must be present whenever the physical training class is in an environment where visual supervision of all students is hindered. All students should periodically receive individual counseling sessions to establish fitness goals and adjust other related lifestyle habits (diet, smoking cessation, etc.) as needed.

8. The Police Officer Physical Abilities Test (POPAT) course was inserted into this lesson for several reasons. Even though POPAT is strictly an “abilities” test, Specialized Physical Fitness instructors will be responsible for improving unintended student fitness attributes found in and directly related to POPAT. Furthermore, POPAT requires physical exertion with a potential for injury. Specialized Physical Fitness instructors must maintain their CPR certification and are trained in injury prevention and treatment strategies.

9. Specialized Physical Fitness instructors must fully explain, demonstrate and successfully complete POPAT themselves in the presence of all students prior to any final testing.

10. Several trained instructors will be needed to administer and document all aspects of POPAT properly. A minimum of six (6) trained instructors should be used when administering POPAT to students.

11. Instructors should provide students with several practice attempts at POPAT before any final testing. Instructors should also document practice attempts on the POPAT Student Evaluation Form. Students are given two (2) final attempts to successfully complete POPAT. Should a student require a second attempt, it CANNOT occur on the same day. Students MUST be given 24
Physical Fitness Training

hours of rest between attempts. Refer to the Course Management Guide for specific POPAT deficiency requirements.

12. Instructors and BLET School Directors should keep detailed and accurate fitness records on every student. This includes, but is not limited to all medical forms, fitness assessments, fitness profiles, exercise prescriptions, injury records, doctor’s notes/releases, daily log of activities and POPAT results (to include practice attempts).

13. School Directors must complete and forward the POPAT Post Course Delivery Form to the Criminal Justice Standards Division.

14. **FINAL POPAT** and fitness assessment tests **cannot** be administered on the same day.

15. All POPAT accreditation, equipment requirements and testing instructions can be found in the Course Management Guide.

16. The required POPAT video was also designed for instructors to use as a guide/refresher.

17. To promote and facilitate law enforcement professionalism, three (3) ethical dilemmas are listed below for classroom discussion. Instructors *must* provide students with each ethical dilemma listed below. Sometime during the Physical Fitness Training lecture instructors should “set the stage” for the dilemma prior to taking a break.

   a. Your agency allows you to work out daily to stay fit. You are in the gym with an officer you do not particularly like. You see him doing an exercise that could potentially hurt him because he is doing it wrong. What will you do?

   b. You begin to notice drastic personality changes in one of your fellow officers. He/She shows signs of depression, is becoming isolated from their colleagues and appears to be under a great deal of stress. What will you do?

   c. While running on the track, you observe a fellow officer fall. She grabs her ankle as if it is hurt badly. You see an officer run by her. The officer who ran by thinks women should not be in law enforcement. What will you do?
Physical Fitness Training

TITLE: PHYSICAL FITNESS TRAINING

I. Introduction

A. Opening Statement

NOTE: Show slide, “Physical Fitness Training.”

"There are numerous professions which demand a high level of physical fitness for the optimal performance of certain job-related tasks. Law enforcement is no exception. Indeed, an elevated fitness level in law enforcement personnel is a necessity, and one that could mean the difference between life, death and the welfare of the citizenry.

Over the years, the law enforcement profession has changed significantly from one requiring a good deal of physical exertion necessary to walk a beat to relying on a minimum level of physical activity now used to drive a patrol vehicle. Accompanying this decrease in physical activity has been an increase in illness and the number of injuries and deaths due to a sedentary lifestyle."\(^1\)

"An examination of the principal causes for early retirement and light duty assignments in law enforcement reveals that many are directly related to the onset and accumulated effects of obesity. Lower back problems, heart attacks, high blood pressure and circulatory disease account for approximately 45-50 percent of all early retirements and approximately 50-55 percent of all light duty assignments."\(^2\)

"These and other similar findings suggest that the introduction of a systematic physical fitness program for law enforcement officers would benefit participants both on and off duty. Therefore, in a move to counter disability trends and raise fitness levels, the state of North Carolina has added Physical Fitness Training to the Basic Law Enforcement Training curriculum."\(^3\)

B. Training Objectives

NOTE: Show slide, “Training Objectives.”

C. Reasons

The reasons are obvious why a law enforcement officer should participate in a continuous physical fitness program. The health benefits, alone, will enhance his/her life making it more rewarding and
Physical Fitness Training

fulfilling. "Many studies have shown that the more physically fit an officer is and feels, the more self-assured and happy he is with himself. By continuing a physical training program, an officer can sustain job enthusiasm, improve self control and total performance."

Another reason why an officer should be physically fit is for survival purposes. Being in better condition may give the officer a tactical edge when confronting assailants. Being in better condition may prevent heart attacks that could occur when an officer has to react to sudden crisis situations that elevate adrenalin. Being in better condition by knowing strengths and weaknesses may give the officer the self-confidence to perform his duties more competently by making better decisions. These reasons are why all police officers need a physical fitness program; so that they can "survive" in their work environment in order to enjoy their life at home.

NOTE: Tell an “officer survival” story.

NOTE: Show slide, “Every Day You Don't Work Out.”

But the primary reason why an officer should be physically fit is to prevent the onset of heart disease or the physical deterioration caused by age. Officers need to remember that:

NOTE: Show slide, “Officer Statistics.”

- Nationally, 70 to 90 police officers are killed each year by suspects, and an additional 50 are killed in accidental situations, but

- Approximately 2,035 police officers die from heart disease each year.

- As a matter of point, a police officer in the United States is 21 times more likely to die of heart disease than at the hands of a suspect or criminal!

II. Body

A. Health Concerns

“The first wealth is health.”
-- Ralph Waldo Emerson
Physical Fitness Training

1. Law enforcement disablers

This research was gathered from a study done in the state of California on their law enforcement officers. The project indicated that officers suffer from three primary "physical disablers." These conditions tend to occur in veteran officers who do not practice good health habits. Officers who start their careers with positive health practices tend to avoid these medical ailments.\(^6\)

NOTE: Ask class: What are the three major physical disablers for law enforcement officers?

NOTE: List answers on chalkboard.

a) Heart (Cardiovascular) disorders

(1) Cardiovascular disease (CVD) claimed 958,775 lives in 1999. This is 40.1 percent of all deaths or 1 of every 2.5 deaths. More than 2600 Americans die of CVD each day, and since 1900, CVD has been the number one killer in the U.S. every year but 1918. Almost 150,000 Americans killed by CVD each year are under age 65.\(^7\)

In North Carolina, 513 heart disease related deaths occur per 100,000 citizens, ages 60 to 65 each year. Among law enforcement officers, 800 heart disease deaths occur per 100,000 population each year. This means that there is a statistically significantly greater death rate from heart disease among criminal justice professionals than among other citizens in this state.

(2) "Specific research conducted for the law enforcement profession indicates EKG evidence of 'definite or suspect' cardiovascular disease in 5% of policemen aged 25 to 34 years, 13% of those aged 35 to 44, and 21% of those aged 45 to 54."\(^8\)

(3) "Other researchers have found a high incidence of cardiac risk factors in middle aged officers, sug-
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gestig that the cardiac death rate was higher for officers than for any other profession."\(^9\) \(^10\)

b) Lower back disorders

Most back injuries are caused by a sudden movement that requires the use of unconditioned muscles. Officers may hurt themselves pushing vehicles off roadways, pulling people out of cars, helping elderly persons pick themselves up and arresting violators. Other reasons why officers suffer from lower back pain are related to physical conditions: improper weight control combined with poor posture and weak abdominal muscles put a tremendous strain on the spine (this condition tends to develop slowly over years).

c) Stomach ulcers

These are often caused by emotional and environmental stresses and strains. It is well documented that all officers experience stressful situations while on-duty. "An individual under continual stress has an increase in blood adrenalin and adrenalin-like products. These are the substances that are produced by the body to get it ready for 'flight or fight.' They also keep the heart ready, increase the heart rate, increase the contractility of the heart, and, most of all, use an immense amount of oxygen."\(^11\)

NOTE: Tell a personal story of situation that triggered an increase in adrenalin.

2. Coronary risk factors

The most common cause of death for law enforcement officers is heart disease. By far, the most common heart disease is coronary atherosclerosis. From the Greek words *athero* (gruel or paste) and *sclerosis* (hardness), atherosclerosis is a buildup of cholesterol, waste products from cells, calcium, and fibrin, a clotting material found in the blood. In children, this fatty buildup, also called plaque, may begin as a fatty streak along the inside wall of the blood vessels. For some, the disease can progress rapidly and begin to cause problems while they are in their 30’s. Most individuals, however, don’t begin to feel symptoms until the fifth or sixth decade of life when the
Physical Fitness Training

arteries become clogged like a stopped up drainpipe, shutting off blood flow to the heart causing a heart attack.\footnote{12}

There is no practical test that will reliably indicate the presence of coronary atherosclerotic plaque build-up in a person who has no symptoms (chest pain, former heart attack, etc.).

Coronary risk factors: "Current behaviors or health dimensions that appear causative or predictive of developing heart disease." Many of the risk factors have been shown to damage/injure the endothelial (innermost) lining of the arteries, which is an important early step in the development of plaque.

Individuals possess certain attributes (age and gender) and/or engage in certain behaviors (smoking and inactivity) that cause damage to the endothelial lining of arteries, which is an important early step in the development of fatty plaque. **Plaque rupture, followed by blood clot formation, is the trigger for 95% of all myocardial infarctions.**

a) Primary risk factors

**NOTE:** Show slide, "Primary Coronary Risk Factors."

(1) Abnormal blood cholesterol

**NOTE:** Show slide, “Cholesterol.”

“One-third to 50% of all Americans have elevated blood cholesterol.” Cholesterol is an important substance used for bile synthesis, formation of hormones and cell membranes. It is also produced in the liver and obtained in the diet. Although many foods contain cholesterol, the liver produces about 80% of what we need. Cholesterol is transported in the blood and divided into three types:

(a) About one-third to one-fourth of blood cholesterol is carried by **high density lipoproteins (HDL)**. Medical experts think HDL tends to carry cholesterol away from the arteries and back to the liver,
where it's passed from the body. Some experts believe HDL removes excess cholesterol from plaques and thus slows their growth. HDL cholesterol is known as "good" cholesterol because an HDL level of **60 mg/dl or higher** seems to protect against heart attack. The opposite is also true: a low HDL level (**less than 40 mg/dL**) is a major risk factor. A low HDL cholesterol level also may raise stroke risk.

The following are lifestyle behaviors that increase HDL levels in humans:

i) Increase physical activity level

ii) Decrease individual body fat percentage

iii) Quit smoking

(b) **Low-density lipoprotein** is the major cholesterol carrier in the blood. If too much **LDL** cholesterol circulates in the blood, it can slowly build up in the walls of the arteries feeding the heart and brain. Together with other substances it can form plaque, a thick, hard deposit that can clog those arteries. This condition is known as atherosclerosis. A clot (thrombus) that forms near this plaque can block the blood flow to part of the heart muscle and cause a heart attack. If a clot blocks the blood flow to part of the brain, a stroke results. **A high level of LDL cholesterol (> 130 mg/dl) is a major risk factor.** That's why LDL cholesterol is called "bad" cholesterol. Lower levels of LDL cholesterol reflect a lower risk of heart disease. The following are lifestyle behaviors that decrease LDL levels in humans:

i) Increase physical activity level
Physical Fitness Training

ii) Decrease saturated fat intake (diet)

iii) Decrease individual body fat percentage

iv) Stress management

(c) Very low density lipoproteins (VLDL) are the triglyceride (blood fat) carriers in the blood – not a lot is understood about them. However, it appears that they do not have a major effect on CVD risk. Triglycerides are another type of fat that is carried in the blood by very low-density lipoproteins. Only a small amount of triglycerides is normally found in the blood; most are stored in fat tissue. A high triglyceride level along with a high LDL cholesterol also can increase the risk of heart attack.

<table>
<thead>
<tr>
<th>Triglyceride (mg/dL)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 – 199</td>
<td>Borderline high</td>
</tr>
<tr>
<td>200 or above</td>
<td>High</td>
</tr>
<tr>
<td>500 or higher</td>
<td>Very high</td>
</tr>
</tbody>
</table>

Cholesterol levels are determined by adding the three types:

\[ \text{HDL+LDL+VLDL} = \text{Total Cholesterol} \]

<table>
<thead>
<tr>
<th>Age</th>
<th>Ideal Total Cholesterol levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20</td>
<td>&lt;150 mg/dl</td>
</tr>
<tr>
<td>20 - 29</td>
<td>&lt;180 mg/dl</td>
</tr>
<tr>
<td>30+</td>
<td>&lt; 200 mg/dl</td>
</tr>
</tbody>
</table>

Normal values for HDL are > 40, for LDL is < 130, and for Triglycerides is < 150.

The 10% of people with the highest cholesterol levels (>265 mg/dl) have 3 times the rate of CHD syndromes of the people with levels below 200 mg/dl (the 50% of
**Physical Fitness Training**

American people with the lowest cholesterol levels. A **total cholesterol value of ≥ 200 mg/dl is a major risk factor.**

**NOTE: Show slide, “Cholesterol.”**

A more precise method to calculate cholesterol levels is to establish a **total cholesterol / HDL ratio.** The higher the ratio, the greater the risk for CHD.

**Example:** Total cholesterol = 240 mg/dl; HDL = 30 mg/dl
Ratio = 240/30 = 8.0 (a high risk ratio)

Ideal ratio for men: < 4.0    Ideal ratio for women: < 3.5

Any ratio above 5.0 is considered elevated and should be decreased.

(d) High blood cholesterol levels are typically acquired through:

i) Genetics/heredity

ii) Diets high in saturated fat

iii) Sedentary lifestyles

(e) High blood cholesterol can be controlled through the use of prescription drugs. However, regular exercise and healthy eating habits are the best form of medication.

**NOTE: Refer to handout, "Cholesterol in Common Foods."**

(2) High blood pressure (hypertension)

**NOTE: Show slide, “Hypertension.”**

Hypertension in adults is defined as a resting blood pressure ≥ 140/90 mmHg on two separate occasions, or an individual taking antihypertensive medications.
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Blood Pressure: "The pressure measured in the vascular system that is associated with cardiac contraction (systolic) and relaxation (diastolic)." Blood pressure is measured with a sphygmomanometer (cuff) and stethoscope and is indicated in millimeters of mercury.

NOTE: Ask question: "Does anyone know what the two numbers mean?"

Systolic: "The pressure associated with the expulsion of blood from the heart." This is the upper or higher number.

Diastolic: The arterial pressure during the relaxation phase of the heart cycle, which is the pressure necessary to hold the arteries open. This is the bottom or lower number.

Your heart beats about 60 to 100 times a minute under normal conditions. Your blood pressure rises with each heartbeat and falls when your heart relaxes between beats. Your blood pressure can change from minute to minute, with changes in posture, exercise or sleeping, but it should normally be less than 120/80 mm Hg for an adult. Blood pressure that stays between 120-139/80-89 is considered prehypertension and above this level is considered high (hypertension). Blood pressure of less than 120 over 80 is considered a normal reading for adults. Your doctor may take several readings over a period before making a judgment about whether your blood pressure is high.

High blood pressure adds to the workload of your heart and arteries. Your heart must pump harder, and the arteries carry blood that’s moving under greater pressure. If high blood pressure continues for a long time, your heart and arteries may not function as well as they should. Other body organs may also be affected. There is increased risk of stroke, congestive heart failure, kidney failure and heart attack. When
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high blood pressure exists with obesity, smoking, high blood cholesterol levels or diabetes, the risk of heart attack or stroke increases several times.3

NOTE: Show slide, “JNC Guidelines.”

In May 2003 the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC) revised the definitions of what is and is not “normal” blood pressure and created a new category: “Pre-hypertension.”

The biggest change is that blood pressure readings that used to be defined as “high normal” now carry the distinction “pre-hypertension.” This change was made to reinforce the point that without lifestyle changes, individuals in the “pre-hypertension” category are very likely to eventually be diagnosed with hypertension. It is estimated that with this change, 45 million Americans are now “pre-hypertensive.” The JNC stresses that individuals in this category do not need to be medicated, but should adapt dietary and exercise habits that will positively affect their blood pressure.

The second change is that what used to be referred to as “Stage 2” and “Stage 3” hypertension have now been combined into one category: Stage 2 Hypertension. The newest JNC guidelines appear below:21

<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic</th>
<th>Diastolic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120</td>
<td>and &lt;80</td>
</tr>
<tr>
<td>Pre-hypertension</td>
<td>121-139</td>
<td>or 81 - 89</td>
</tr>
<tr>
<td>Stage 1 hypertension</td>
<td>140-159</td>
<td>or 90 - 99</td>
</tr>
<tr>
<td>Stage 2 hypertension</td>
<td>&gt;160</td>
<td>or &gt;100</td>
</tr>
</tbody>
</table>
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There are several prescription medications used to control hypertension, but the following individual lifestyle behaviors contribute to elevated blood pressures:

NOTE: Show slide, “Factors Affecting Blood Pressure”

(a) Excessive sodium (<2400 mg/day)
(b) Excessive alcohol intake
(c) Obesity
(d) Genetics
(e) Chronic stress
(f) Sedentary lifestyle
(g) Cigarette smoking

NOTE: Refer to handout, “Heart Talk.”

(3) Tobacco smoking

“There is no safe cigarette and no safe level of consumption.”
- - Surgeon General of the United States

“Tobacco is the only product that, when used as directed, results in death and disability.”
- - Antonia Novello, M.D., former Surgeon General of the United States

NOTE: Show slide, “Tobacco Smoking.”

“Cigarette smoking is a primary risk factor for CHD, stroke, peripheral heart disease, cancer and is directly responsible for more than 400,000 deaths per year. About one in five deaths from cardiovascular diseases is attributable to smoking. Smoking damages the lining of arterial
walls which aids in the buildup of fatty plaque. It is also responsible for blood clot formation and decreases HDL cholesterol levels. A pack a day smoker has two times the risk of heart attack and three times the risk of stroke than non-smokers. People who smoke have two to three times the rate of CHD than people who do not. Smoking costs an estimated $130 billion annually in medical care. One year after quitting, the risk of coronary heart disease decreases by 50%, and within 15 years, the relative risk of dying from CHD for an ex-smoker approaches that of a long-time (lifetime) nonsmoker.

For the years 1990-1994, an average of 430,700 Americans died each year of smoking-related illnesses. About 1 in 5 deaths from CVD is attributable to smoking. Smoking costs Americans an estimated $130 billion annually in medical care.

Benefits when you quit:

- Smoker's cough will lessen or disappear
- Cough and phlegm production due to chronic bronchitis and emphysema disappear during the first few weeks
- Respiratory function improves and breathing becomes easier
- Energy levels rise
- Circulation improves
- Self-esteem improves

(4) Sedentary lifestyle/physical inactivity

NOTE: Show slide, “Inactivity.”

NOTE: Show slide, “ACSM & CDC”
Physical Fitness Training

Recommendation.”

“Every U.S. adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all days of the week.” Joint statement from ACSM and CDC, February 1, 1995, Journal of the American Medical Association. This same recommendation is made in the U.S. Surgeon General’s report.

This recommendation is NOT an exercise prescription for weight loss. Following this recommendation will not result in high levels of fitness. However, it will promote moderate levels of fitness and significantly reduce the risk of chronic disease.

NOTE: Refer to handout, “General Physical Activities Defined by Level of Intensity.”

Twenty-five percent (25%) of the US population never exercises, 50% do on occasion and 25% never even try. In 1996, the Journal of American Medicine (JAMA) conducted the largest longitudinal study on the impact of cardiovascular fitness and mortality. Using 25,341 males and 7080 female patients over a period of 9 years, the following data was obtained:

- Low fit men were 70% more likely to die from CVD than moderately to highly fit men.

- Low fit women were 142% more likely to die from CVD than moderately to highly fit women.

- Individuals who exercise 3 times a week for 30 minutes at moderate levels, decrease their chances of heart disease by 58%. 27
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- People who exercise at a relatively high level (running 15 or more miles per week) have 30 to 50% lower CHD rates than people who do not exercise.

- Low fitness was shown to be as important a predictor of premature mortality as cigarette smoking, high blood pressure, or abnormal blood cholesterol level in both men and women.

- Cardiorespiratory fitness has an inverse relationship to blood pressure, LDL cholesterol, triglycerides, glucose, insulin, and body fat.

- Cardiorespiratory fitness has a direct relationship to HDL cholesterol.

It is worth noting that approximately 365,000 deaths per year occur due to sedentary living, and that 40 billion dollars per year in direct medical expenditures is borne by taxpayers due to obesity. If current trends continue, by 2014 Medicare/Medicaid will be 19% of the entire federal budget.28

b) Secondary risk factors

NOTE: Show slide "Secondary Coronary Risk Factors."

(1) Family history

NOTE: Show slide, “Family History.”

(2) Obesity - Using a body mass index (BMI) of 25.0 or higher as “overweight” and a BMI of 30.0 or higher as “obese,” 108,330,000 Americans age 20 and older are considered overweight. Of these, 44,250,000 are considered obese. In addition, an estimated 5,030,000 children ages 6-17 are considered overweight.29
Obesity is also defined as roughly 30 or more pounds over a healthy weight. About 40% of Americans, or 68 million people, will be obese by 2010 if people keep gaining at the current rate, government researchers predict. Another report released October 14, 2003 by the Rand Corporation, found that the number of severely obese people (100 or more pounds over a healthy weight) increased from 1 in 200 in 1986 to 1 in 50 in 2000. More than 4 million U.S. adults are in this category.30

(a) 57% of North Carolina adults are overweight or obese. (CDC, 2002)

(b) The obesity rate among North Carolina adults rose by 82% from 1990 to 2002. (CDC, 1990, 2002)

(c) 27% of North Carolina high school students are overweight or at risk of becoming overweight. (CDC, 2003)

Diabetes31 - Diabetes mellitus is the inability of the pancreas to produce or respond properly to the hormone insulin. The body needs insulin to convert glucose ("blood sugar") into energy. If insulin does not function normally, sugar builds up in the blood, damaging nerves and blood vessels. Diabetes is defined as a fasting blood glucose of >125 mg/dl measured on two occasions. A fasting blood glucose level between 100-125 mg/dl on two separate occasions is called prediabetes, also referred to as impaired fasting glucose (IFG). Normal fasting levels are between 70-99 mg/dl.

Type 2 diabetes, the most common form, usually appears in adults, often in middle age and affects 16 million Americans. Type 2 diabetes is often linked with obesity and physical inactivity, and may be delayed or controlled with diet and exercise.
**Physical Fitness Training**

NOTE: The American Diabetes Association recommends blood glucose screenings beginning at age 45, or younger if someone has a family history of diabetes, is obese or has other risk factors.

NOTE: Some cases cannot be prevented. However, maintaining a healthy weight and exercising regularly may help protect against the development of type 2 diabetes in many people.

Obesity and physical inactivity are two risk factors for type 2 diabetes. Obese people are often resistant to the effects of insulin and make more insulin to compensate for this defect. When they are unable to make enough extra insulin, they may develop type 2 diabetes.

(4) Stress – “Chronic psychological stress may trigger a fatal arrhythmia. The risk of sudden death is six times higher among men scoring high on an anxiety symptom questionnaire compared with those scoring low.”

(5) Type A personality – “Refers to a pattern of behavior characterized by easily aroused anger, hostility and impatience. Type A people are always in a hurry; they talk fast, eat fast, drive fast. They can also explode in a rage at least provoked.”

NOTE: Refer to handout, “Slow Down! Warning Signs.”

(6) Age and gender - Men older than 45 and women older than 55 have an increased risk of heart disease. Men typically acquire CHD more so than women.

(7) Abnormal resting EKG - An EKG (electrocardiogram) is a graphic record of electrical activity and heart beat patterns. This test must be conducted by a physician.
Physical Fitness Training

Each risk factor magnifies each other. In 1000 men aged 30 to 57 who have low cholesterol, who do not smoke, and who have normal blood pressure, there will be 1.6 CHD deaths over 6 years. Smoking doubles the risk (3.2 per 1000). However, high blood pressure and smoking together make the risk 6.3 per 1000. In men with cholesterol 245 mg/dl who smoke and have high blood pressure, the risk is 21.4 per 1000.

NOTE: Refer to handout, "Checking Your Heart Disease Risk Questionnaire."

3. Positive/Wellness life-styles

A positive/wellness life-style can differentiate between those who get disease and those who do not. Officers need to modify their lifestyle habits now to avoid future ailments.

NOTE: Show slide, "Positive Life-Styles."

a) Regular activity
b) No smoking
c) Moderate or no use of alcohol
d) Eating breakfast regularly
e) No between meal snacking
f) Maintenance of normal weight
g) Sleeping 7-8 hours daily

B. Injury Prevention

NOTE: Show slide, “Injury Prevention.”

Law enforcement involves inherently high-risk tasks that call for the utmost precaution and safety in developing and executing duties. Although a great deal of the "risk" is due to the unpredictable nature of the job, there are trends and patterns with injury and illness that allow us to develop and study prevention strategies.
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Any task or physical movement, especially when exertional or physically demanding, inherently poses risk of injury, and the more intense the task, the greater the risk. By nature, police work involves physically demanding duties, such as running, jumping, apprehending and arresting resistant suspects, and many other unpredictable and potentially dangerous physical tasks. The need to perform these types of tasks on a moment’s notice, under unpredictable, emergency or violent circumstances, poses risk of injury.

Likewise, the sedentary aspects of a patrol officer’s work also creates potential for injury, not only in situations of suddenly moving from a sedentary state to maximal output, but also from an ergonomic (or postural) standpoint. Thirdly, the common trend for most police officer recruits is that they fail to adequately condition through exercise prior to beginning BLET training, which increases risk of exercise-related (as well as training-related) injury during BLET. And studies have shown that career law enforcement officers (as a group) show declines in fitness levels through their career.

Lastly, police work, by nature, is mentally and emotionally challenging at times, such that stress related illness is common in this profession.

1. Common on-duty/career related police officer injuries
   a) Back pain/injury
      (1) According to most literature regarding back injury, approximately 80% of all Americans experience back pain or injury at some point in their lives. The origins of back pain and injury for police officers include:

      NOTE: Show slide, "Origins of Back Pain/Injury Among Police Officers."

      (a) Transition from sedentary state to maximal exertion without warming up the muscles (such as a foot chase after extended time riding in a patrol car)

      (b) Extra weight of duty belt and equipment around the waist/hip area
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(c) Placement of equipment on duty belt in a way that causes compression on the back muscles and sciatic nerve

(d) Extended periods of sitting and driving, and poor sitting posture

(e) Incorrect lifting posture (such as when lifting a stretcher or taking equipment out of the trunk of the patrol car)

(f) Subduing resistant suspects

(g) As a group, police officers tend to maintain a less-than-adequate level of physical fitness/conditioning

(2) Principles of back safety

As stated before, lower back injuries are the second most common law enforcement disabler. Officers should follow some simple guidelines that may prevent such injuries.

(a) Maintain an adequate level of physical fitness and conditioning to meet the demands of your job and leisure pursuits.

(b) Avoid obesity

(c) Practice good posture and body mechanics with both everyday activities as well as exertional tasks required in your job.

(d) While on duty, maintain some degree of blood flow so that your muscles are prepared for those unpredictable moments that call for sudden maximal output!

(3) Do’s and don’ts of on-duty back care

NOTE: Show slide, “On-Duty Back Care.”

(a) Placement of equipment on duty belt
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The equipment you carry on your duty belt is critical to your safety. However, the way you place the equipment can invite or discourage back problems. While assigned to patrol duty, which requires a great deal of driving (and sitting), handcuffs, or other equipment that causes compression at the hip and lower back area while sitting will cause pain, particularly "sciatica," which can be painful in the lower back as well as radiate down the leg. The compression is a force directly on the nerve (causing pain), and it restricts blood and oxygen flow, which also produces pain. Solution: Do not place equipment on your belt in a way that would produce compressive forces while sitting. (Carrying a wallet in your back pocket can create similar pressure.)

(b) Frequent movement

Sitting places more pressure on the back than standing. Also, sitting in the same position for long periods (such as when driving) can reduce blood flow to the muscles, causing muscle tension. Tension means that the muscles actually contract (get tighter), which constricts blood flow (and therefore oxygen) to the muscles. This leads to more pain, which causes more tension, which reduces blood flow further, which causes more pain, and so on.

Solution: Get out of the patrol car and MOVE at least once every 20-30 minutes. Movement and a change of position keeps blood flowing and oxygen available.

(c) Proper sitting/driving posture
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i) Sit all the way back in the seat so that your back is fully supported by the back of the seat.

ii) For extra support, place a small pillow (or a rolled up towel) in the lumbar region (low-back curve).

iii) Seat depth should support your thighs without pressing into the back of the knees (a 2” clearance behind the knees is ideal). However, you should not have to stretch your leg to reach the pedals.

iv) Knees should be even with or slightly higher than hips.

(d) Proper lifting (and lowering) posture

i) Always keep your shoulders above your hips.

ii) Lower yourself to the object you need to lift by bending at the knees, not from the waist.

iii) Keep a wide base of support by keeping feet at least shoulder-width (or more) apart.

iv) Test the load before lifting so that you know how much to exert.

v) Share the load with another person if at all possible. Count aloud so that you lift together (“1-2-3-lift”).

vi) Keep your major joints in the same plane and direction (i.e., NEVER TWIST while lifting or carrying a load). Pivot your whole body, so that your toes, knees, hips and
shoulders are all in the same direction.

vii) Keep the load as close to your body as possible. The further away from your body, the greater the force exerted on your back.

(4) Treatment of back pain/injury

NOTE: Show slide, “Treatment of Back Injuries.”

Back pain that persists and/or worsens for two weeks or more (even with lessened exertion), or that is accompanied by any other changes in your health (that might indicate a pathological/disease-related origin) calls for a visit to your physician.

Otherwise, most back pain is musculoskeletal misuse or overuse. As soon as possible after an acute event that causes the pain, apply ice for ten to twenty minutes, several times a day during the first 48 hours after the pain occurs. Beyond that, moist heat or warm baths may offer relief. If either ice or heat is painful or offers no relief, try the opposite.\textsuperscript{40}

Also, complete bed rest may not help or expedite recovery. The benefits of light exercise (blood flow, flexibility and strength-building) are more likely to help the healing process. Impact exercise (such as running) is not advisable, but walking, working up to light isometric (static) strength exercises (for the abdominals, back, legs and arms), along with stretching (especially the hamstrings, hips and back) should put you on your way to recovery! Gradually work up to more dynamic, strenuous work.\textsuperscript{41}

Just respect the injury, so that your efforts to restore strength and flexibility do not cause re-injury. There can be a fine line between therapeutic and detrimental exercise in a
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rehabilitation vs. fitness training program. When in doubt, discuss it with your physician and/or physical therapist.

b) Heat injury and illness

NOTE: Show slide, “Heat Injuries.”

When the body's ability to cool itself is hindered, heat illness will occur, and can progress to a dangerous, even fatal condition. Wearing a bullet proof vest is an on-duty situation in which the body's cooling mechanisms can be hindered. In BLET training, heat illness risk will be highest during exercise/fitness training.

The body's primary mechanism for controlling body temperature is the production and evaporation of sweat. Your blood carries internal body heat to the surface of the skin where sweat is secreted from an estimated 2.5 million sweat glands and evaporation occurs. As the sweat evaporates, it cools your skin; this, in turn, cools your blood. However, when the humidity is high, there is a large amount of moisture already in the air. At higher levels of humidity, the evaporation of your sweat is hindered because the air is highly saturated with water vapor and, as a result, there is little or no place for any extra moisture to go. This causes the body to overheat and may result in a heat-related injury.

(1) Factors contributing to heat illness/injury

(a) Humidity

Extreme humidity (more specifically, humidity greater than 75%) can inhibit sweat evaporation. Be aware of the environmental temperature-humidity index when planning outdoor workouts or while on duty. Add temperature and humidity (official reports available from the airport or radio weather line), and if the sum is:
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150+ Black flag warning! Outdoor exertion is unsafe. Use extreme caution.

140-149 Red flag warning! Exercise indoors if possible, but if no other choice, work at a lower intensity and use great caution.

130-139 Yellow flag warning! Humidity is somewhat elevated. Use some caution.

120-129 Green flag! Weather conditions are safe for outdoor exercise.

(b) Dehydration

Excessive water loss decreases blood plasma volume and inhibits sweating (because you simply do not have enough fluid to sweat). How do you know if you are dehydrated? Body weight. If you lose more than 3% of your body weight from exertion (weigh before and after your workout; weigh at the start of and during your shift, especially in the summer) you are dehydrated enough that you will likely notice a decrease in your work capacity. Thus, for every pound of body weight lost with exercise, drink 15 ounces of fluid. Thirst is not the way to prevent dehydration because by the time you feel thirsty, you are already significantly dehydrated. So drink lots of water for exercise sake, and while on duty. The fluid of choice is water because it is quickly absorbed into the system.
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(2) Prevention of heat illness and injury

NOTE: Show slide, "Prevention of Heat Illness & Injury."

(a) Keep well hydrated by drinking water before, during and after exercise.

(b) Properly acclimatize

The only way to boost your heat tolerance is to simply be in the heat. However, you should gradually increase the amount of time and exertion level in the heat. After ten days of exposure to the heat, your body will adjust so that your cooling mechanism kicks in at a lower temperature.

(c) Keep physically fit.

A physically conditioned body tends to be less fat, and excess fat can inhibit the body's cooling process. Body fat acts as insulation which prevents escape of heat. (Fatal heat stroke is 3 1/2 times more prevalent among excessively overweight individuals than those with normal body fat.) It is important to note, however, that even the most highly conditioned person can suffer heat illness.

(d) Know the signs and symptoms of heat-related disorders and take action early, before the condition worsens into illness or injury.

c) Stress related illness

NOTE: Show slide, “Stress.”

In law enforcement, the variance and often unpredictable nature of the job add up to the stress of feeling little or no control over your work environment. Whether in the form of post-incident stress syndrome, or
as the accumulation of stress into heart disease at a young age, police officers as a population suffer stress related illnesses and injuries.

"Stress" is the body's response to a situation, whether positive or negative. The physical responses include releases of epinephrine and norepinephrine, which are hormones that cause the blood vessels to constrict, muscles constrict, heart rate rises, and blood pressure rises. This process, repeated often over a lifetime, causes wear and tear on the body that can eventually manifest as disease, illness or injury. Other manifestations of stress can include broken relationships, negative effects on job performance, misuse of alcohol and drugs.

Having positive outlets in which to channel stress is critical, especially for police officers. Regular exercise not only physically clears the bloodstream of stress related chemicals, but it opens the vessels, increases blood and oxygen flow, and releases endorphins, which is an exercise by-product that can produce a lowered stress, even euphoric feeling. Also, communication outlets (counselors, therapists) are important resources, especially following critical incidents.

(1) Sources of stress among law enforcement officers

**NOTE: Show slide, “Sources of Stress.”**

(a) Physical

Long hours, rotating shifts, disrupted sleeping and eating patterns, skipping meals and fast-food meals, and physical encounters with suspects (chasing and subduing those resisting arrest) all stress a police officer's body physically.

(b) Mental

Maintaining in your memory a library of laws and procedures that have to be recalled without prior notification and in emergency conditions; memorizing and
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recalling streets; excellent listening skills are required to accurately respond and report on calls; being able to listen to the radio and in-person conversations simultaneously; staying alert at all hours of the night. Role conflict or ambiguity can also cause stress. For example, in domestic situations, you have a dual role: you are there to prevent or stop violence and enforce the law, but also to mediate and reassure the victims.

(c) Emotional

Graphic violence, dealing with victims (including children) in crisis, and general responsibility for other peoples' lives can add up to stress related problems over time.

(d) Social

"Serving" people who despise the police, handling the responsibility and authority of knowing and enforcing the law even with friends or acquaintances--all contribute to increased stress levels.

(2) Symptoms of stress (that need attention!)

NOTE: Show slide, “Symptoms of Stress.”

(a) Personality changes

- Some officers may exhibit the following personality changes due to stress buildup:

- An even tempered officer becomes aggressive and short-fused

- Situations handled calmly get out of control
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- Unusual amount and degree of physical involvement (numerous arrests for trivial offenses)
- Unusual outbursts at fellow officers
- Mood swings from highs to depressive symptoms
- Withdrawal from friends and family
- Inappropriate responses to difficult situations ("cloud nine" or laughter in situations that would elicit a morose response)
- Changes in patterns of alcohol use

(b) Appearance changes

- A well groomed officer becomes sloppy with clothing (tidiness and cleanliness)
- A more casual officer suddenly takes an approach similar to what would pass a military inspection
- Sudden weight gain or change in exercise habits
- Hands tremble

(c) Work pattern changes

- A punctual officer becomes consistently tardy
- "Cowboy" approach whereby s/he pushes the limit of bravery toward recklessness
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- Requests for leave on short notice
- Phone calls from spouse to supervisor
- Dramatic increase or decrease in officer activity (arrests, citations) relative to self and others doing the same job

Team work is important with stress control in law enforcement. Supervisors and fellow officers can often be the first ones to identify symptoms of serious stress related disorders, then help channel the stressed officer into a healthy outlet. This is important to the stressed officer’s safety and health AND the safety of his/her fellow officers and the public being served.

2. Apparent risks for exercise-related injury

   NOTE: Show slide, "Exercise Injury Risks."

   a) Training errors

      (1) Too much too soon

      The human body responds to exercise by adapting to its stimulus. Adaptations to exercise include increased physical capacities (strength, endurance, aerobic capacity, etc.). However, everyone’s body adapts differently and at different rates. There is a fine line between proper amounts of stimulus for strengthening tissue and overwhelming the body’s ability to adapt. Too much exercise overload can tear down tissue faster than it can rebuild itself. The result is injury. Fitness programs/exercise schedules should be designed for individual needs, goals and existing fitness levels, and risk factors. A speed and distance that is easy for one person could injure another. With exercise, you MUST work at a level appropriate for you!

      (2) Failure to follow proper workout protocol
The warm-up, cool-down and stretching phases of a workout are often overlooked or under-emphasized, especially when time is limited. Failure to include any one of these phases in a workout, however, is an open invitation to injury, especially for beginner-level exercisers.

Increasing blood flow to the extremities before imposing the exercise overload is essential. Failure to do so is detrimental to your muscles and joints just as starting the engine of your car on a below-freezing morning without oil and immediately taking off down the interstate. Failure to gradually cool down and stretch can cause cardiac complications and leaves exercise by-products in the muscle beds to create muscle soreness and tightness.

(3) Improper exercise technique

Proper form is critical, not only to fitness improvement, but to injury prevention. Joint alignment, slow and controlled movement, joint angles and holding (rather than bouncing) stretches are examples of exercise technique that make a difference in injury rates.

b) Environmental risk factors

(1) Weather

Extreme heat or cold, sleet, ice and snow can pose risks for injury. Sometimes rain can cause problems too--if it comes with thunder and lightning, or if it produces slippery terrain. These situations may call for bringing an outdoor workout session inside!

(2) Terrain

Uneven terrain (such as trails or unpaved or gravel surfaces) or a sloped surface (such as a hill or side of a road that is sloped) can present risks. Hills and trails can be excellent for agility training, but pose risk for ankle and knee
injuries. When running or walking on uneven terrain, keep your weight in your toes and forefoot rather than planting the whole foot or striking the ground with the heel. When the heel or foot is planted, it lends less response options for the ankle. In other words, if you step on a stone or stick with your forefoot, twisting the ankle is less likely than if your body weight is in the heel or on the whole foot.

c) Equipment: Improper running shoes, broken weight equipment, slippery gym floor, and equipment not properly adjusted for different body sizes are examples of equipment-related risk for injury.

The role of adequate shoes is often underestimated, but is likely the most common and significant contributor to injury. Always use a shoe that is specifically designed for the activity (run in a running shoe, not a court shoe; wear a court shoe, not running shoes for court sports, etc.). The cushioning and support structures built into shoes are very specially designed for the forces your joints will encounter in the activity. Also, you should only use your athletic shoes for athletic activity, not for exercise and as a street shoe. "Recycle" your worn out athletic shoes by using them as street shoes. The wear patterns developed with everyday use are different than the wear patterns in the activity, and using the shoe only for its intended exercise will lengthen the life span of the shoe. Lastly, do not use worn out shoes for exercise. Most running shoes lose shock-absorbing capacity after 300 miles of running. Check the soles for "flattening," and if you notice abnormal symptoms, such as sore feet the day after running, it's probably time to replace your shoes. (Think it's expensive? Compare the price of shoes to the price of medical treatment for injuries, the price of lost work days and the price of pain!)

d) Physical characteristics of participants

Age, gender, body structure, fitness level, previous injuries or illness, posture, existing health risks, knowledge of proper exercise technique and kinesthetic awareness can all contribute to an individual's risk for injury
and should be considered when planning an individual exercise program.

If you are unaccustomed to exercise (just starting after a six month or longer break), or if your health or physical condition changes (if you have had surgery, a long-term illness, a serious accident, if you become pregnant), NEVER start an exercise program until you have consulted with your physician.

The foundation of a "wellness" lifestyle includes regular visits/check-ups with your doctor. Be sure to do this consistently, regardless of health changes. Regular exams can help prevent those major changes in your health condition. Again, another area where personal responsibility is key!

3. Injury prevention principles

a) Follow proper exercise protocol

Every workout should follow these steps in the order listed:

NOTE: Show slide, "Anatomy of a Workout."

(1) Warm-up for at least five minutes to increase blood flow to and temperature of muscles and joints. This is accomplished by large muscle-group, limbering-type movements (knee lifts, arm swings, calf raises, gently running in place, low-intensity jumping jacks, walking, cycling) that cause you to just begin to break a sweat. Do not confuse stretching with warming up. Stretching should be the last part of the workout; you should not stretch muscles unless they have been first warmed up. Some people prefer to further prepare the muscles for the workout by stretching after the warm-up and before the workout. This may be safely done if the pre-workout stretches are gentle, not deep.

(2) Workout. Whether a 30-minute aerobic workout or a full circuit of weight training exercises, this is the more intense segment of the session, and
the segment where it is important to design and monitor for intensity levels appropriate for the individual.

(3) **Cool-down.** After an aerobic workout, continue exercising for five to ten minutes at a lower, "cool-down" intensity. Either walk, cycle or continue with whatever aerobic exercise was being done. The key is to keep moving so that the muscles continue to contract to return blood flow to the upper extremities. If you simply stop the aerobic workout without a cool-down, blood can pool in the legs and cause dizziness or even fainting. This is also the point in the workout where cardiac irregularities can occur. Gradually (rather than suddenly) reducing heart rate, blood pressure and circulation (or gradually recovering from exercise) is critical to injury prevention. The cool-down is also the time when the body removes the metabolic by-products of exercise (lactic acid, for example) that can cause muscle soreness.

After a weight training workout, walking or cycling accomplishes the same thing (and is sometimes referred to as "warm-down" rather than "cool-down").

(4) **Stretch.** During exercise, muscles contract (or shorten). Stretching at the end of an exercise session returns the muscles to their length, and if done properly, can further develop flexibility. Flexibility (the ability to move a joint through and beyond its normal range of motion) is, in and of itself, important to injury prevention. But at the end of the workout session, the muscles are best prepared for stretching because they are warmer and supplied with blood and oxygen.

b) **Use proper exercise technique**

Exercise technique, proper form and basic biomechanics should be part of the instructions of each exercise program. Not only can improper exercise technique yield less than desirable training improvements,
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exercises done incorrectly can cause injury. Many exercises can be varied in technique to accommodate varying fitness levels. An example is push-ups: an older or unconditioned exerciser would start with wall push-ups, then progress to a modified version of lowering the chest by bending at the waist, followed by progression to a modified version whereby you lower your upper body from the knees, then military type (from the toes) is an advanced level, and finally elevating the feet is the most intense.

(1) Joint alignment

With any exercise, posture is key to isolating the muscle you are working on, and posture protects against injury. The basis of good posture is keeping the joints neutral and aligned with one another. Examples:

NOTE: Demonstrate proper vs. improper technique for the exercises (or tips) below.

(a) Toes, knees, hips and shoulders always in the same plane; avoid exercises that "twist" one set of joints into a different plane. The abdominal crunch, whereby the knees are dropped to one side to "isolate" the obliques, places torque on the spine that can be risky. Instead, keep the knees up and contract the obliques by lifting the shoulder in a diagonal direction toward the opposite knee.

(b) Always keep the knee directly over the ankle and no further forward than the shoelaces. A common error in exercise technique is with squats, whereby the knees bend and drop forward beyond the toes. This places unnecessary and risky force on the patella. Instead, do the squat by keeping the weight in the heels and knees "over the shoelaces." Another exercise example is the runner's stretch: the front knee should be directly above the
ankle, NOT several inches in front of the foot.

(2) Slow and controlled movements

The more slowly a muscle contraction is executed (with resistance exercises), the more effective the exercise and the lower the risk for injury. Fast motion creates momentum and greater propensity for poor posture, over-stretching and other injury. An example is abdominal crunches, pushups and any weight training exercise--ALWAYS execute these exercises slowly and in a controlled manner. Another example is stretching: stretches should be held for 20-30 seconds, not bounced.

(3) Proper adjustment of equipment

The seat height of a bicycle, for example, should be high enough that when the foot is in the "down" position in the pedal rotation the knee is extended fully but not "locked." Weight machines should be adjusted to enable the user to push the weight through a full range of motion.

(4) Balanced and stable posture, whereby the pelvis is tucked (to avoid over-arching the back) and abdominals held tight for back support. Shoulders over the hips and spine "tall." Exercises where stable posture provides preventive benefit is using free weights or dumbbells.

c) Cross train: incorporate exercise variety

Incorporating different types of workouts into your fitness program can produce more complete training results with fewer injuries. Doing the same type of workout each day only trains the muscles for that type of exercise, and can lead to overuse injury. The more variety and the more complete the training plan, the better the results in fitness improvements. For example, the training calendar might include, "power walking," jogging, weight training, cycling, aerobics, stair climbing, rowing, cross-country ski machines and
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calisthenics, or some combination of several of these. Whatever exercise mode(s) you choose, you should average at least three days of aerobic exercise and two days of resistance exercise each week, allowing for at least one day between resistance (weight training) sessions.

d) Other BLET related injuries

NOTE: Refer to handout, “Common BLET and Exercise-Related Injuries.”

4. Basic treatment for musculoskeletal Injuries: The "RICE" Principle

NOTE: Show slide, "The R.I.C.E."

The main concern in any musculoskeletal injury is the control of hemorrhage, early inflammation, muscle spasm and pain.46 The more immediate the treatment is applied, the less likely the injury outcome will be severe or prolonged.

"R.I.C.E.": Rest, Ice, Compression, Elevation

a) Rest

Rest is essential for musculo-skeletal injuries. This can be achieved by not moving the part or isolating the part by the application of tape, wraps, splints, casts and the assistance of canes or crutches. Immobilization of an injury for the first two or three days helps to insure healing of the wound without complication. Too early movement, will only increase hemorrhage and the extent of disability, prolonging recovery.47 For less severe injuries, "rest" can also imply discontinuing the activity (and substituting another less irritating activity) or lessening the intensity or duration of exercise until the injury is rehabilitated.

b) Ice - cold application

"Cold, primarily ice in various forms, has been found to be an effective first aid agent [for musculoskeletal injuries]. As a vasoconstrictor, cold applied for 5 to 10 minutes (especially if applied immediately following
exercise or the injury occurrence itself) decreases the swelling that usually occurs 4 to 6 hours following injury. It also can minimize pain and muscle spasms. Cold also decreases the blood flow to the injured area. It should be noted therefore, that prolonged application of cold can cause tissue damage. Application of cold should be for no longer than 10 to 20 minutes at a time.

"For best results, ice packs (crushed ice and towel) should be applied directly to the skin. Frozen gel packs should not be used directly against the skin because they reach much lower temperatures than ice packs. A good rule of thumb is to apply a cold pack to a recent injury for a [10- or] 20-minute period and repeat every 1 to 1 ½ hours throughout the working day. Depending on the severity and site of the injury, cold may be applied intermittently for 1 to 72 hours. For example, a mild strain will probably require one or two 20-minute periods of cold application, while a severe knee or ankle sprain might need 3 days of intermittent cold."

c) Compression

Immediate compression of an acute injury is considered an important adjunct to cold and elevation, and in some cases, may be superior to them. Placing external pressure on an injury assists in decreasing hemorrhage and hematoma formation. Fluid seepage into interstitial spaces is retarded by compression, and absorption is facilitated.

Many types of compression are available. An elastic wrap that has been soaked in water and frozen in a refrigerator can provide both compression and cold when applied to a recent injury. Pads can be cut from felt or foam rubber to fit difficult-to-compress body areas. A horseshoe shaped pad, for example, placed around the malleolus in combination with an elastic wrap and tape, provides an excellent way to prevent or reduce ankle edema. Although cold is applied intermittently, compression should be maintained throughout the day. At night, rather than removing the wrap completely, it should be loosened to avoid the pooling of fluids when the body processes slow down.
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d) Elevation

Along with cold and compression, elevation reduces internal bleeding. By elevating the affected part above the level of the heart, bleeding is reduced and venous return is encouraged, further reducing swelling.\(^{51}\)

e) Sample “R.I.C.E.” schedule\(^{52}\)

1. Evaluate the extent of injury.
2. Apply a crushed ice pack on the injury.
3. Hold ice pack firmly to the injury site with an elastic wrap.
4. Elevate injured part above the level of the heart.
5. After 10-20 minutes, remove ice pack.
6. Replace ice pack with a compress wrap and pad.
7. Elevate injured part.
8. Re-apply ice pack in 1 to 1-1/2 hours and, depending on degree of injury, continue this rotation until injury resolution has taken place and healing has begun.
9. In a second or third degree injury, upon retiring, wear a compress bandage and pad that is applied looser than during the day, and elevate injured part above the heart.
10. Elevate injured part above the heart again the next day.
11. With second or third degree injury, continue this same process for two or three days.

C. Nutrition

NOTE: Show slide, "Nutrition."
Almost everyone has heard the sayings, "You are what you eat" and "Garbage in = Garbage out," but how many people actually know what specific foods are needed to fuel bodies the best? And if they knew this information, how many would change and adjust their eating habits to reflect this knowledge?

Think of your body as a car. Fuel put into the car produces energy to move it. Each car requires a certain blend of gasoline to power it. What happens to a car that normally runs well with high-test gasoline but now has regular gas in the tank? Your body reacts in a similar way when it is not fueled properly. Over time, both your car and your body will need a major overhaul. Your car will be in the shop, your body in the hospital.

1. **Three major nutrients**

   Nutrients - "Substance obtained from food and utilized by the body to promote growth, maintenance and/or repair."\(^{53}\)

   a) **Carbohydrates**

   **NOTE: Show slide, "Carbohydrates."**\(^{64}\)

   The term carbohydrate refers to all sugars and starches. Carbohydrates are a major source of energy, providing the fuel to power our bodies. It is this nutrient in our system that the body calls on first to furnish energy. This in turn, helps the body store much needed proteins until the carbohydrates are depleted.

   Under normal circumstances, the nervous system relies exclusively on glucose as an energy source. For example, 130 grams of dietary carbohydrate is necessary to support normal daily brain function. Carbohydrates are also *protein sparing*, which means that muscle tissue is not used as a fuel source if carbohydrate stores are adequate.\(^{55}\)

   Carbohydrates are divided into two classes:

   (1) **Complex carbohydrates** - starches: breads, cereals, rice, spaghetti, macaroni, corn, grits, potatoes, beans and other legumes.
Most dietary carbohydrate should be in the complex form. Low carbohydrate diets should not be recommended in most cases. A low carbohydrate diet will typically cause chronic fatigue, ketosis, dehydration, loss of lean mass, and decreased exercise performance.

(2) **Simple carbohydrates** - sugars: honey, molasses, syrup, sugar, soft drinks, candy, cake, cookies.

Simple carbohydrates tend not to provide high nutrient value and are often high in fat. These foods are often referred to as "empty calorie" foods. **Monosaccharides** and **disaccharides** are other names for simple sugars.

Carbohydrates provide only **four calories** of energy per gram weight and are broken down in the body and used as fuel approximately one to four hours after consumption.

**Note**: Energy (calorie) is commonly measured in kilocalories (kcal). A kilocalorie is the work or energy required to raise the temperature of 1 kg of water 1 degree Celsius (or 2.2 lb of water 1.8 degrees Fahrenheit).

A diet deficient in carbohydrates rapidly depletes muscle and adversely affects performance of intense short term exercise as well as prolonged exercise. The current RDA states that carbohydrates should comprise **45-65%** of daily calories.

**NOTE**: RDA's (Recommended Dietary Allowances) are set by the Food and Nutrition Board of the National Academy of Sciences, and are intended to meet the needs of 98% of all individuals in various age and gender categories. They have been updated 10 times since the early 1940's. In the absence of sufficient information to establish an RDA, an estimated Adequate Intake (AI) is established.

b) Fats
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NOTE: Show slide, "Fats."

Fats are actually a family of compounds that include both fats and oils. Fats have a very high fuel value. Any excess fat, carbohydrates or protein that are not burned off as fuel are converted into body fat and are stored in fatty tissues throughout the body.

(1) Functions of fats

(a) Fat aids in regulating the body temperature and insulates the body against rapid heat loss.

(b) Fat tends to protect and insulate the major organs.

(c) Fat produces taste and a sense of fullness to the diet.

(d) Fat is used as a reserve energy source.

(e) Fat aids in the absorption of vitamins A, D, E, & K.

(2) Types of fats

(a) Animal fats - saturated: butter, cream, whole dairy products, shortening, beef, pork, lamb, shellfish, visible meat fat and bacon.

Fat foods with the largest amounts of saturated fats are solid at room temperature. Saturated fat is associated with increases in cholesterol, and therefore should be limited in the diet. Saturated means that the fatty acid cannot hold any more hydrogen atoms. "Of the animal foods, poultry and fish are the lowest in saturated fat and are a better choice than red meat."

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(b) Plant fat - unsaturated: corn oil, tub margarine, mayonnaise, salad dressings, nuts and seeds.

"Unsaturated fats, which are liquid at room temperature, are vegetable oils such as corn oil, cottonseed oil, peanut oil and soybean oil." Look on the food labels and make sure that you make the best choice when making a fat selection. Unsaturated fats (polyunsaturated and monounsaturated) are not associated with cholesterol increases, but do contribute to body fat.

NOTE: Refer to handout, "Fat Comparison Chart."

NOTE: Refer to handout, "Food Choices and Fat."

(c) Triglycerides

The major dietary fats are in the form of triglycerides, a combination of three fatty acids and glycerol. Fat is stored in adipose tissue as triglycerides, which are also found in small amounts in muscle tissue and the bloodstream.

(d) Hydrogenated fats

Also called trans fats, these affect the body in much the same way as saturated fats (i.e., increase LDL cholesterol and increase the risk of CHD). Fried fast foods, baked goods, and stick margarines are examples, and should be consumed in limited quantities. Neither saturated fats or trans fats are required at any level in the diet.

Hydrogenation is a process by which hydrogen atoms are added to
monounsaturated and polyunsaturated oils. This is done for two reasons:

(1) The shelf life of the product is increased.

(2) Improves the texture of the product (i.e., peanut butter is made with very small amounts of hydrogenated oils, which gives it a smooth and creamy texture).

"Consuming less saturated and more unsaturated (polyunsaturated and monounsaturated) fats is thought to be effective in reducing the risk of heart disease. Because fats have such high caloric value (over twice that of equivalent weights of carbohydrate or protein), fairly small amounts should be consumed.\[60\] Fats provide **nine calories** of energy per gram weight. The current RDA states that fat should comprise **20-35%** of total daily calories.

c) Protein

**NOTE: Show slide, "Protein."** \[61\]

"Proteins are present in all living tissues--plant or animal--and are essential to life because they are a vital part of every cell.\[62\] They are considered to be the building materials of the body. Protein type is determined by chemical structure, or arrangement of amino acids (*amino* means nitrogen-containing, and *amino acids* form the thousands of proteins occurring in nature). Proteins in the human body are composed of 20 amino acids. Eleven of these can be synthesized by the human body and are commonly called "nonessential amino acids" because they do not need to be consumed in the diet. Nine of the amino acids are "essential" because the body cannot manufacture them.\[63\]

There are two types of proteins:
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(1) Complete - Chemically, complete proteins. "These are the food sources that contain all of the nine essential amino acids that our bodies cannot synthesize. Examples of complete protein are: meat, poultry, fish, milk, cheese and eggs."64

(2) Incomplete - "These are food sources that are deficient in one or more essential amino acids. Generally, they are of plant origin and must be consumed in specific combinations to get the full protein benefits. Examples of incomplete protein are: grains, legumes, seeds and nuts."65

NOTE: Ask question: "Do athletes and body builders need additional protein supplements?"

The average American diet provides 2-3 times more protein than the body really needs. The U.S. Recommended Daily Allowance for protein is 0.8 grams per kilogram of body weight (for a sedentary person or light exerciser) for both adult men and women (1 kg = 2.2 lbs). Research indicates that the protein requirement of aerobic endurance athletes is slightly over 0.8 g/kg of body weight and can reach 1.4 g/kg of body weight, due in part to increased use of protein as a fuel source during exercise. Strength training (for those maintaining maximal training loads) can increase requirements to as high as 1.7 g/kg of body weight. 66 67

Note: Any excess protein will be excreted or quickly converted to fat and stored. Eating too much protein also causes dehydration and loss of calcium from the bones. 68

Proteins provide four calories of energy per gram. The current RDA states that protein should comprise 10-35% of daily calories. Requirements are typically calculated based on age, body weight, and physical activity.

Be sure to choose protein sources that are low in saturated fat. High protein diets cause rapid weight loss due to a diuretic effect and are not recommended. Furthermore, excess dietary protein is converted to glucose and fatty acids by the liver. There is also
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evidence that long term excessive protein intake may cause kidney damage and osteoporosis.

d) Water

Sixty to sixty-five percent (60-65%) of body weight is water. There is no official RDA for water at this time, but new guidelines for adequate intake of water were established in February 2004. Adequate Intake for adult men and women was set at 3.7 and 2.7 liters per day (125 oz/90oz), respectively. This requirement can be met by drinking water, tea, coffee, soda, juice, milk, and by consuming foods rich in water content such as fruits and vegetables.

2. Food Guide Pyramid

NOTE: Show slide, “My Pyramid.”

On April 19, 2005, the new Food Guide Pyramid was unveiled by the United States Department of Agriculture (USDA). The major recommendations are very consistent with the 2005 Dietary Guidelines for Americans published in January 2005. The new pyramid is called “MyPyramid” and can be found at www.mypyramid.gov. By going to this site, you can determine how much (in cups and ounces rather than servings and serving sizes) of each food group you should be consuming based on your age, gender, and physical activity level.

a) Major guidelines for MyPyramid

(1) Physical activity

Find your balance between food and physical activity. Be physically active for at least 30 minutes on most days of the week. Children and teenagers should be physically active for 60 minutes every day, or most days.

NOTE: Refer to handout, “General Physical Activities Defined by Level of Intensity.”

(2) Grains
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Make half your grains of the whole variety. Eat at least 3 ounces of whole grain bread, cereal, crackers, rice, or pasta every day. Look for the “whole” before the grain name on the list of ingredients.

(3) Vegetables

Vary your vegetables. Eat more dark green vegetables. Eat more orange vegetables. Eat more dry beans and peas.

(4) Fruits

Eat a variety of fruit. Choose fresh, frozen, canned, or dried fruit. Go easy on fruit juices.

(5) Oils

Know your fats. Choose most of your fat sources from fish, nuts, and vegetable oils. Limit solid fats like butter, stick margarine, shortening, and lard.

(6) Milk

Get your calcium-rich foods. Go low-fat or fat-free. If you don’t or can’t consume milk, choose lactose-free products or other calcium sources.

(7) Meat and beans

Go lean on protein. Choose low-fat or lean meats and poultry. Bake it, broil it, or grill it. Vary your choices with more fish, beans, peas, nuts, and seeds.

b) Determining ounces, cups, etc.

(1) Grains

One ounce of grains includes 1 slice of bread, 1 cup of ready-to-eat cereal, ½ cup of cooked rice, cooked pasta, or cooked cereal. Also, 5 whole
Physical Fitness Training

wheat crackers, ½ bagel, ½ English muffin, or one 6” tortilla are considered 1 ounce of grains.

(2) Vegetables

One cup of raw or cooked vegetables or vegetable juice, or 2 cups of raw, leafy greens can be considered as 1 cup from the vegetable group.

(3) Fruit

One cup of fruit or 100 percent fruit juice, or ½ cup of dried fruit can be considered 1 cup of fruit. Also, 1 banana, 1 apple, 1 medium grapefruit, 1 peach, 1 pear, or 8 large strawberries are all considered 1 cup of fruit.

(4) Oils

One tsp of vegetable oil, 1/3 cup of nuts, 1 tsp of peanut butter, 1 tsp of margarine, 1 tsp of salad dressing, 1 tsp of mayonnaise, 4 olives. Generally speaking there are approximately 35 calories per tsp of oil. Important: there are 3 teaspoons (tsp) in 1 tablespoon (tbsp).

(5) Milk

One cup of milk or yogurt, 1.5 ounces of natural cheese, 2 ounces of processed cheese, or 1.5 cups of ice cream can be considered as 1 cup from the milk group.

(6) Meat and beans

One ounce of meat, poultry or fish, ¼ cup of cooked dry beans, 1 egg, 1 tablespoon of peanut butter, ½ ounce of nuts or seeds, ½ cup of split pea, lentil or bean soup can be considered as 1 ounce equivalent from the meat and beans group.

(7) Discretionary calories

These calories are the extras that can be used on luxuries like solid or trans fats, added sugars,
alcohol or one more food from any food group. For most people, especially those that are physically inactive, the number of discretionary calories is small. Many people exceed their discretionary calorie allowance by choosing more added fats, sugars, and alcohol than what is recommended. Examples of unhealthy discretionary calories are soda, candy, butter, imitation fruit drinks, potato chips, French fries, table sugar, cream sauce, etc.

NOTE: Refer to handout, “Sample Menus for a 2000 Calorie Food Pattern” and “MyPyramid Food Intake Pattern Calorie Levels.”

4. Calculating ideal body weight and caloric intake

To be truly healthy, a person should strike a balance between maintaining their ideal body weight by monitoring their caloric intake. This is not that difficult or time consuming to do. However, there are many Americans that have let this “state of equilibrium” disintegrate, usually so that there is far more body fat than is needed.

a) Calculating ideal body weight

NOTE: Refer to handout, "Metropolitan Life Insurance Height-Weight Tables."

(1) There are several different ways to calculate ideal body weight. One method is to compare your height and weight to the Metropolitan Life Insurance tables. "Your frame size can be estimated by wrapping the thumb and index finger around the opposite wrist. If the thumb and finger do not meet, you have a large frame. If they just meet or barely overlap, you have a medium frame, and if they overlap, you have a small frame."

These figures should provide an ideal body weight. Body fat percentages will be determined by using the skin fold calipers. The calipers will provide a more accurate measure of current body
fat, and combined with the formula below, will give a more precise ideal body weight. **No less than 3% body fat is recommended for males and no less than 10-13% body fat is recommended for females.** Having an excessively low body fat percentage can cause some medical problems. Women who reach a body-fat level under 10-13 percent may develop menstrual changes or irregularities, and there have been documented cases of athletes who have died trying to decrease their body fats in preparation for a race, by actually starving their hearts and themselves to death.

(2) Calculating ideal body weight from body fat percentage:

**NOTE: Show slide, "Calculating Body Fat."

1. Fat weight = current weight X %fat/100

2. Lean body weight (LBW) = current weight - fat weight

3. Desirable weight = LBW + [(LBW) x (Desired Body Fat %)]

4. Desirable fat loss = present weight - desirable body weight

**EXAMPLE: MALE = 190 POUNDS**
CURRENT BODY FAT = 22%
DESIRED BODY FAT = 15%

1. Fat weight = 190 lb X 22/100 = 41.8 lb

2. LBW = 190 - 41.8 lb = 148.2 lb

3. Desirable weight = 148.2 + [(148.2) x (15%)] = 170.4
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4. Desirable fat loss =
   190 - 170.4 lb = 19.6 lb

b) Calculating caloric intake

NOTE: Refer to handout, "Weight Goals." Have students calculate daily caloric intake.

It is important to learn how many calories each individual needs to consume on a daily basis to begin to control any overeating habits. In order to burn more calories, you will need to add exercise to your life.

The actual physical work demands on patrol officers have diminished over the years. You will not be able to count on getting any exercise during your normal work day. Be prepared to commit some of your off-duty time to exercise.

NOTE: Instructors should pass out a variety of food labels and compare caloric values.

5. Dining in/dining out

Our society is one that is fast-paced and hectic. Most people find it very difficult to take the extra time to adequately prepare nutritious meals. This is so evident in the food selections that Americans make daily. Many people either purchase food products that can be prepared instantly at home, or opt for the local "fast-food" restaurant. Little emphasis is placed on the nutritional benefits of dining in either setting. It is imperative that officers know the nutritional content of the foods they eat, so that they will be able to make good selections while at home or at work.

a) Reading food labels

NOTE: Show slide, "Food Labels."

(1) A food’s nutritional content can be determined by reading its food label. The serving size or amount of food contained in one serving is indicated first on the label. The serving size is given as an amount such as one slice, three ounces, one-half cup, etc. The number of calories
in one serving is also given. The label then displays the number of servings in the container.

(2) The food label also tells you from what energy sources the calories come from, i.e., protein, fat, and carbohydrates, and the number of grams of each per serving of the food. One of the most important things we should look at is the fat content of a product. Fat has more than twice as many calories per gram as carbohydrates or protein. Fat is also a major contributor to heart disease (high cholesterol). Again, it is recommended that only 30 percent of your daily caloric intake should come from fats.

(3) The food label will describe the percentage of USRDA for protein, Vitamin A, Vitamin C, three B Vitamins, calcium, and iron in any one serving of the product. By eating a variety of foods from all the major food groups, you should easily be able to obtain 100 percent or more of your RDA for any nutrient. If by the suggestion of your physician, you need to pay close attention to any nutrient in particular, then using these values can be helpful.

(4) Other nutritional details may be stated on the product if some type of nutritional claim has been made, e.g., "low sodium" products. This information may include the amount of cholesterol, saturated and/or polyunsaturated fat and sodium content contained in one serving of the product.

(5) Other important information included on most labels is the ingredients list. Ingredients in the product are listed in descending order of amount by weight. This is notable because it tells you what they use in preparing the food product. For example, if you want to buy whole wheat bread you should look at the label and make sure whole wheat is the first ingredient listed. If it says "wheat flour," then you are actually getting regular flour with all the fiber removed. This list will also tell you the type of fat used in the product. If you are trying to lower your blood
cholesterol level then you should limit your intake of animal fats, as well as, the saturated vegetable oils (palm oil, coconut oil, etc.).

(6) The expiration date on a food label is especially important with regard to dairy products. Most dairy products are good for one week past their expiration date. It is a good practice to look at expiration dates when purchasing food and before your meal preparation at home. If you think the product has expired or you think it may be spoiled, then discard it.

**NOTE:** Use a variety of food labels to show the percentage of carbohydrates, fats, and proteins contained in the food product. Use the following formula:

\[
\begin{align*}
1 \text{ g carbohydrate} &= 4 \text{ calories} \\
1 \text{ g fat} &= 9 \text{ calories} \\
1 \text{ g protein} &= 4 \text{ calories}
\end{align*}
\]

**NOTE:** Another way to figure fat percentage is to multiply the fat grams listed on the label by 30; if the number you come up with is smaller than the total number of calories, your food is less than 30 percent fat.

b) Dining out

**NOTE:** Show slide, “Dining Out.”

A nutritional problem that police officers have is making good food selections while they are at work. One of the most common and valid complaints associated with officers is that there is nowhere to eat while they are on the night shift. So often, it is much easier to order a hamburger and French fries, than to think about bringing some fruit from home or having a prepared salad ready at meal time. Another complaint heard often is that there is no time between radio calls to stop and eat a well-balanced meal. Many officers have fallen into that time trap and visited the drive-through window of a fast-food chain. Little do they realize or want to realize
that it takes less time to pull out a piece of fruit or other prepared snack, than it does to locate a restaurant, wait in line, and then pay for something that has little or no nutritional value.

When you do choose to dine out, study menus carefully and order for yourself. If you wish to cut down on portion sizes, choose appetizers as a main course, order a la carte or share food with a companion. Insist that food be served the way you want it--with dressings and sauces on the side, for example. Be sure to ask how your selections are prepared.

To make all these principles easier to follow, here are some tips on reading menus.

**NOTE: Refer to handout, "Search and Seizure of Fat in Your Food."**

(1) Learn which items and phrases mean low-fat preparation.

Look for:

"steamed" "poached"
"in its own juice" "tomato juice"
"garden fresh" "roasted"
"broiled"
"drybroiled" (in lemon juice or wine)

(2) Be aware that some low-fat, low cholesterol preparations are high in sodium. Watch out for foods that are:

"pickled" "smoked"
"in broth" "in cocktail sauce"
"in a tomato base"

(3) Menu descriptions that warn of saturated fat and cholesterol preparation also indicate high sodium. Avoid foods that are:

"buttery," "buttered," "in butter sauce," "sauteed,"
"fried," "pan-fried," "crispy," "braised," "creamed,"
"in cream sauce," "in cheese sauce," "escalloped,"
"marinated," "stewed," "basted," "casserole," "prime," "hash," "pot pie"\textsuperscript{72}

NOTE: Several internet sites, including those of individual restaurant chains, contain caloric and nutritional information of popular fast food items. One such site is \url{http://www.foodfacts.info}. Review and discuss.

(4) "Fast foods may be desired for their convenience, speed, accessibility, and predictability, but unfortunately they can also be counted on for a meal that contains too much fat, sodium and calories. For example, a 1/4 pound burger (with everything), French fries, and a small shake add up to 1200 calories. You would half the caloric total without sacrificing the nutrients if you had a plain hamburger, salad and low fat milk, or low calorie drink.

(5) If you can, try to pick a restaurant that has a salad bar or salads, and start your meal by filling up on bulky vegetables (be sure to go easy on the oily dressing; look for low calorie dressing, but use sparingly). Order sandwiches without dressings, a plain hamburger, or pizza with vegetables rather than sausage. Hot dogs usually have considerable more fat and always have more salt than burgers. If the chicken or fish is fried, remove the fat soaked skin or crust. Skip the French fries (a baked potato is fine, however, as long as you do not drown it in butter). Instead of a shake or soft drink, order milk, coffee, tea or fruit juice for your beverage."\textsuperscript{73}

D. Physical Fitness

NOTE: Show slide, "Physical Fitness."

1. What does "being physically fit" mean?

a) The most common definition is "the ability to carry out daily tasks without undue fatigue and with ample
energy to engage in leisure time pursuits and encounter emergency situations.\textsuperscript{74}

b) Physiologically speaking, there are two types of fitness: aerobic fitness and muscular fitness (i.e., musculoskeletal fitness).\textsuperscript{75} Being “physically fit” requires achieving gains in both types.

(1) Aerobic fitness is defined as "the capacity to take in, transport, and utilize oxygen ('aerobic' means in the presence of oxygen).\textsuperscript{76}

(a) How does aerobic fitness contribute to physical fitness?

Aerobic fitness involves most of the important organs and systems in the body (lungs to collect, heart and vessels to transport and muscles to utilize oxygen).

(b) Benefits of achieving aerobic fitness\textsuperscript{77}

NOTE: Show slide, "Benefits of Aerobic Exercise."

i) Improved circulation, respiration and fat metabolism

ii) Reduced stress levels, body fat and risk of heart disease

iii) Stronger bones, ligaments and tendons

iv) More energy and less fatigue

v) Enhanced mood, self-concept and body image

(2) The components of muscular fitness include strength, muscle endurance and flexibility.\textsuperscript{78}

NOTE: Show slide, "Components of Muscular Fitness."
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(a) Strength: The greatest amount of force a muscle or muscle group can exert in one movement. 

(b) Muscular endurance: Ability of a muscle or muscle group to repeat submaximal efforts. 

(c) Flexibility: Ability to move the joints through an entire (normal) range of motion. 

(d) Benefits of muscular fitness 

NOTE: Show slide, “Benefits of Muscular Fitness.”

- Contributes to good posture. 
- Improves performance in activity and sport. 
- Helps to cope with demands of job (particularly in police work). 
- Slows decline in abilities normally attributed to aging. 
- Increases muscle mass thereby increasing metabolism (thereby lowering body fat). 
- Improves self-image 

2. Aerobic exercise vs. anaerobic exercise 

a) Fuel sources 

NOTE: Show slide, “Fuel Sources.”

(1) Aerobic Exercise: The primary fuel source for aerobic exercise is fat. As a fuel source, the benefit of fat is that it can be supplied for long periods of time. However, fat requires the pres-
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ence of oxygen in order to be broken down into a usable form.

(2) Anaerobic Exercise: The fuel source for anaerobic exercise is carbohydrate. Carbohydrate is readily available and can be utilized without the benefit of oxygen (anaerobic means "without oxygen").

b) Physiologically, aerobic exercise is defined as exercise performed at levels of intensity low enough to prevent the onset of lactic acid in the blood. Lactic acid is a by-product of anaerobic exercise which causes the pain normally associated with very intense levels of activity.¹¹

(1) In laymen’s terms, light to moderate activity is aerobic exercise while intense activity is anaerobic. Continuous pure anaerobic exercise can only be maintained for short periods of time even in the very fit (Olympic athletes can maintain high intensity levels for up to 3-4 minutes).

(2) The point of exercise intensity where aerobic exercise becomes anaerobic exercise is called the "anaerobic threshold." This is also the point where lactic acid levels begin to rise.²²

3. Aerobic exercise

NOTE: Show slide, “Aerobic Exercise.”

Virtually any physical activity may, to some extent, impact aerobic fitness. With this in mind, activities of all kinds should be encouraged (i.e., gardening, playing with your children, etc.). However, the amount of aerobic fitness which leads to the benefits described previously are most likely to be achieved through a structured program utilizing the principles described in this section.

a) What does good aerobic exercise consist of?

(1) The specific activity can be maintained for an extended period of time. Fifteen minutes is usually considered to be the minimal training time for good aerobic exercise.
(2) The activity is rhythmic in nature. In other words, activities with more starts and stops tend to be more anaerobic in nature (i.e., basketball).

(3) The activity utilizes large muscle groups. The more large muscle groups utilized, the more aerobic the activity becomes. It is easy to understand why cross country skiing is often considered to be the ultimate aerobic exercise.

b) What happens to the body as a result of aerobic training?

It is all about oxygen. Remember that oxygen must be present to burn fat which is the primary fuel of aerobic exercise. If oxygen doesn’t get to the muscle cell, then the cell will not be supplied with energy. Aerobic training has beneficial effects on oxygen intake, transport and utilization. This is why aerobic exercise becomes easier as the body is trained.

(1) Oxygen intake: Trained individuals do not necessarily have larger lungs, but are able to use a greater percentage of their lung capacity. This is achieved through the improvement of conditioning and efficiency in the breathing muscles. Slow, deep breaths allow for better penetration of air into the lungs and more time for oxygen to enter into circulation.

(2) Oxygen transport is improved in three ways.

(a) Increased blood volume: Blood volume, and thus hemoglobin (which carries oxygen), is increased with training. This increase in hemoglobin allows more oxygen to be picked up in the lungs and delivered to muscle cells.

(b) Increased stroke volume (the amount of blood pumped by the heart with each beat): With training, the size of the left ventricle which pumps blood to the body is increased. This allows for more blood to
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be pumped with each beat. This, in turn, allows for a slower heart rate. The slower heart rate allows for increased filling of the ventricle which allows for even more blood to be pumped.

(c) Redistribution of blood: Training teaches the body to redistribute blood flow from less active tissue to active muscles (including the heart) and to skin for heat dissipation. This is caused by constricting of some blood vessels and dilation of others. This redistribution can increase blood flow to muscles by 20 times or more even though cardiac output is only increased 3-5 times.

c) How much aerobic exercise is necessary?

NOTE: Show slide, “The FIT Principle.”

Three factors are normally considered in determining the amount of aerobic exercise necessary to get desired effects. They are Frequency, Intensity, and Duration or Time (a.k.a. "FIT"). Each is important in achieving the desired aerobic benefits and each factor is affected by the other.

(1) **Frequency:** For healthy aerobic activity, the American College of Sports Medicine recommends 3-5 aerobic workouts per week, ideally maintaining exercise intensity for 30 to 45 minutes. If weight loss is a major goal, participate in your aerobic activity for at least 30 minutes for 5 days each week.

(2) **Intensity:** Ideally exercise intensity is determined by directly measuring oxygen consumption. Unfortunately, the only way to do this is with expensive laboratory equipment. As an alternative, simpler methods have been developed to determine proper exercise intensity.

(a) **Training Heart Rate:** Increases in heart rate have been shown to correlate with
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increases in oxygen consumption. A "Training or Target Heart Rate" (THR) can be determined using the following formula.

NOTE: Show slide, “Calculating Training Heart Rate.”

Target Heart Rate Range

1. 220 - Age

<table>
<thead>
<tr>
<th></th>
<th>Lower Limit</th>
<th>Upper Limit</th>
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</thead>
<tbody>
<tr>
<td>2. Maximal heart rate*</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>Resting heart rate</td>
<td>- 60</td>
<td>- 60</td>
</tr>
<tr>
<td>Heart rate reserve</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Conditioning intensity</td>
<td>x .60</td>
<td>x .80</td>
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<tr>
<td>(60-80% HR range)</td>
<td>72</td>
<td>96</td>
</tr>
<tr>
<td>4. Resting heart rate</td>
<td>+ 60</td>
<td>+ 60</td>
</tr>
<tr>
<td>5. Target Heart Rate</td>
<td>132</td>
<td>156</td>
</tr>
</tbody>
</table>

During aerobic exercise, individuals should remain within their own THR. The use of a heart rate monitor is strongly recommended. Individuals may also divide their THR numbers by six (6) and conduct 10 second pulse counts at the carotid artery during the activity.

(b) Rate of Perceived Exertion (RPE): Using a 15 point RPE scale (from 6 to 20), heart rates and can be estimated with some degree of accuracy. A rating of 12 corresponds to 60% of heart rate range. A rating 16 corresponds to 85% of heart rate range. Most people should work in this range of intensity.
NOTE: Show slide, “Perceived Exertion Scale.”

(c) Talk Test: The simplest, yet most useful, method to determine proper exercise intensity is the talk test. Generally speaking, a participant should be able to carry on a conversation during exercise without having to stop to catch their breath (swimming excluded).

(3) **Duration (time):** For most individuals, an aerobic exercise period (not including warm-up and cool-down) should last 30-45 minutes (for best results, workouts should last at least 30 minutes while maintaining a THRZ), although three 10-minute daily sessions can also be effective. The length of the session is inversely related to the intensity. In other words, more intense activities do not require a long bout of exercise. Variations in the appropriate exercise duration may be made based on the goal of the participant. For example, an individual trying to lose weight would be better off performing a low intensity exercise for a long duration.

d) Types of aerobic exercise

Aerobic exercise can be performed in a nearly countless variety of forms. Consider the principles discussed earlier in evaluating the exercise activity you choose. Common forms of aerobic activity include:

(1) Running/jogging: Excellent aerobic benefits with little equipment required. Not an appropriate activity for obese or those with orthopaedic injuries.

(2) Walking: Good aerobic benefits if done properly (pace should be fast). Due to lower intensity, this activity can be performed for a longer duration making it excellent for weight loss.
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(3) Aerobic dance/step: Excellent group activity helps to maintain motivation. Works a variety of muscle groups.

(4) Rope skipping: Too intense for most people to be considered a good aerobic activity.

(5) Cycling: A good aerobic activity but must be performed for a longer duration due to limited number of muscles used. Caloric expenditure is generally higher on a real bike as opposed to a stationary cycle. Boredom also seems to be a problem with stationary cycles.

(6) Swimming: Excellent aerobic and muscle development benefits. Weight loss is somewhat limited due to cooling of body temperature.

(7) Cross country ski machines: Excellent aerobic benefits and easy on joints. This is a learned skill and can be frustrating at first.

(8) Stairclimbers: Good to excellent aerobic benefits (better if hands are not resting on rails).

NOTE: Show NCJA video, Physical Fitness for BLET - "Aerobic Exercise" (5 minutes).

4. Muscular fitness

NOTE: Show slide, “Muscular Fitness.”

As with aerobic capacity, good muscular fitness can be obtained, in part, by leading an active lifestyle. In past days when most people labored long hours on farms or in factories, formal muscular training was not necessary. Today, however, most people lead sedentary lifestyles. As a result, planned exercise programs as described in this section are needed to obtain good muscular fitness.

a) Resistance training

NOTE: Show slide, “Resistance Training.”
Calisthenics or any type of weight training can be termed resistance training. The basic goal of resistance training is to impose a workload on the muscles which is greater than that normally encountered (overload principle). How the load is applied will impact the overall results.

(1) Increases in muscular strength are obtained by applying heavy workloads (at least 2/3 of maximum) to the muscle. As a result, the number of repetitions which can be performed will be very limited.

(2) Increases in muscular endurance can be obtained using lower levels of resistance while performing more repetitions.

(3) Determining the proper amount of resistance training

The ideal amount of training obviously depends upon the ultimate goals of the training. Athletes preparing for competition would gear their training toward the sport. For general adult fitness, however, the following guidelines will produce adequate strength and endurance gains in a limited amount of time. These minimal guidelines have been shown to produce strength gains of at least 75% of much more intense and time consuming programs.

(a) A minimum of 8-10 exercises involving the major muscle groups should be performed a minimum of two times per week.

(b) A minimum of one set of 8-12 repetitions to near fatigue should be completed.

b) Muscle groups

(1) Chest

(a) Bench press

(b) Pec deck
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(c) Dumbbell bench
(d) Dumbbell fly
(e) Push-up

(2) Shoulder
(a) Shoulder press
(b) Shrugs
(c) Deltoid fly
(d) Upright row

(3) Upper back
(a) Lat pulldown
(b) Lat row (seated)
(c) Bentover row
(d) Wide grip chin-ups

(4) Low back
(a) Roman chair (hyperextensions)
(b) Butterflies

(5) Abdominals
(a) Crunches
(b) Abdominal machines
(c) Leg raises

(6) Gluteus
(a) Squats
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(b) Kick backs

c) Leg press

(7) Quadriceps

(a) Leg extension

(b) Leg press

(8) Hamstrings

Leg curl

(9) Gastrocnemius (calves)

(a) Heel raises

(b) Toe press

(10) Biceps

(a) Bicep curl (free and machine)

(b) Pull-up

(11) Triceps

(a) Tricep extension

(b) Chair dips

(c) Push-ups

(12) Forearm

(a) Wrist curls

(b) Wrist rolls

**NOTE:** Show NCJA video, *Physical Fitness for BLET - Weight Lifting* (6 minutes).

5. Flexibility
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NOTE: Show slide, “Flexibility.”

"Flexibility is the range of motion through which the limbs are able to move. Skin, connective tissue, and conditions within joints restrict the range of motion as does excessive body fat. Injuries occur when a limb is forced beyond its normal range, so improved flexibility reduces this potential."

a) How to stretch

"Static stretching involves using slow movements to reach a point of stretch, holding the position 5 to 10 seconds, and relaxing. The stretch should be repeated."

b) When to stretch

Contrary to popular practice, the time to stretch is not before beginning exercise, but after the muscles have been warmed. This is not to say that you should jump right into vigorous exercise before stretching, but light activities such as a stationary cycle will help to prepare the muscles for stretching. Flexibility and reduced soreness can also be greatly enhanced by stretching after the full workout is complete.

NOTE: Show NCJA video, Physical Fitness for BLET - "Stretching" (5 minutes).

6. Other essential components of a workout

a) Warm-up

Improper warm-up may be one of the greatest causes of injuries which occur during exercise. Unfortunately, many people associate stretching and warming up as being one in the same. They are not. the basic goal of a warm-up is to get the blood into the muscles which will be active during the exercise session. When a person has been at rest, most of the blood volume is in the internal organs and the head. At maximal exercise, as much as 85% of the blood volume can be in the arms and legs. Getting blood to the active muscles is best accomplished with 5-10 minutes of low intensity activity. Ideally, that activity may look like the exercise to be performed (i.e., walking or light jogging before a run).
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The result of moving blood to the active muscles is increase the temperature and availability of oxygen in the muscles. Warmer muscles, being more limber, are less likely to be injured. This is an ideal time to stretch.

b) Cool-down

Just as blood volume is not in skeletal muscle prior to exercise, the blood may "pool" in the active muscles immediately following exercise. This can cause light-headedness and nausea and even cardiac stress responses such rapid or skipped heart beats. While the natural response is bend over when fatigued, this does not assist the veins in returning blood to the lungs for needed oxygen. The best response is simply to keep moving but at a more moderate pace. In other words, the cool-down should look pretty much like the warm-up.

7. Danger signs

While the benefits of exercise are numerous, exercise can also be dangerous, particularly in hot and humid conditions. If any of the following signs or symptoms occur during or soon after exercise, that particular workout should be discontinued. If the signs are severe or re-occur, consult a physician.

NOTE: Show slide, “Danger Signs.”

a) Nausea or vomiting

b) Inappropriate shortness of breath, labored breathing or chest pain (if chest pain occurs, seek medical attention immediately)

c) Mental confusion or disorientation

d) Unusual or severe fatigue

e) Dizziness or feelings of faintness

f) Extreme muscle or joint pain

g) Pale or clammy skin or chills during heated conditions

E. Ability Tests

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At the end of BLET, students must successfully complete the Police Officer Physical Abilities Test (POPAT). POPAT is a timed, continuous sequence of actual and simulated job task events that measure basic individual abilities directly related to the law enforcement profession. Obstacles/events are correlated to specific job tasks. The BLET physical fitness program is designed to improve overall health/fitness attributes and help prepare students for POPAT.

NOTE: Refer to POPAT handouts in lesson. Instructors should thoroughly review POPAT with students and explain the job task correlations for each event.

NOTE: Show NCJA video, POPAT (20 minutes).

III. Conclusion

A. Summary
This physical fitness program is designed to teach each officer good health and fitness habits. After the BLET course is completed, the officer should still be able to continue in an exercise and nutritional program and reap many benefits from this block of instruction throughout his career.

NOTE: Show slide, “Training Objectives.”

B. Questions from Class

C. Closing Statement

Maintaining a good level of fitness is a core requirement needed to perform the various functions of a law enforcement officer. More and more law enforcement managers are realizing the importance of having physically fit officers in their departments. They are concerned about on-the-job injuries that may occur and the officer’s overall mental health. The managers want to ensure that their officers survive the rigors and stressors of the law enforcement profession; matters dealing with assailants, victims, and the general public; and with the frustrations felt with the judicial system and departmental administrative concerns. It is absolutely essential for each officer to take the personal responsibility of staying prepared to survive in their chosen career field. This can only be achieved by the adoption of an overall “wellness” attitude, an attitude that will stay with them at home and at work.
Physical Fitness Training

Officers need to remember that "when you choose a career in law enforcement, you lose the right to be unfit!" But the choice is all yours!!!
NOTES


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