

# PHYSICAL FITNESS

The background is a solid teal color. In the lower half, there is a faint, semi-transparent image of two hands shaking, symbolizing agreement or partnership. The text 'PHYSICAL FITNESS' is centered in the upper half in a white, serif font with a thin black outline.

# WHAT IS PHYSICAL FITNESS

- Physical fitness is a level of health characterized by: 1) Muscular strength, 2) muscular endurance 3) flexibility, 3) cardiovascular endurance, 4) lean body composition.
- Muscular strength: the amount of muscular force exerted against resistance.
- Muscular endurance: ability to continue using muscular force without tiring.
- Flexibility: ability to move the body through a full range of possible motion.

# MUSCULAR STRENGTH, ENDURANCE AND FLEXIBILITY: BENEFITS

- 1) Tiring less easily.
- 2) Improved performance in sports.
- 3) Less likelihood of injuring your muscles.
- 4) Less likelihood of suffering from backache.
- 5) The body does not get stiff easily.
- 6) Less stiffness in old age.

# CARDIOVASCULAR ENDURANCE

- Cardiovascular endurance is the ability to sustain vigorous activity that requires increased oxygen intake for extended periods of time.
- Persons with CV endurance have greater cardiac output and O<sub>2</sub> consumption during activity and slower heart rate at rest.
- Benefits include a stronger heart, less atherosclerosis, and increased ratio of HDL /LDL.

# BODY COMPOSITION

- The tissues of the body are: 1) fat tissue, i.e., the fat in fat cells under the skin and around internal organs, and 2) lean tissues, i.e., muscle, bone, cartilage...
- Body composition is influenced by 1) heredity, the number of fat cells in a body is constant but they can become smaller; 2) gender: males usually have 16-19% body fat, females have 22-25%. 3) aging and decreased physical activity decreases muscle mass and increase proportion of body fat. Regular exercise has opposite effect.
- Area where fat tends to accumulate may influence susceptibility to heart disease ( greater risk for the abdominal area, apple configuration, than for the hips, pear configuration ).

# TYPES OF EXERCISE

- Different types of exercises confer different benefits. A variety of exercises is needed to acquire physical fitness.
- Isometric exercises: muscle contraction without motion, e.g., pushing against a wall. Increase muscle strength and bulk but not flexibility or CV endurance. To be avoided if heart problems because BP may rise suddenly.

# TYPES OF EXERCISES

- Isotonic exercises: muscle contraction with movement. Should be started gradually. Increase muscle strength and flexibility and, if of sufficient intensity, duration, and frequency, CV endurance.
- Isokinetic exercises: moving a weight or resistance through an entire range of motion. It is important to get help at an exercise club to determine how much weight you should lift, when to increase resistance, and how many repetitions to perform.

# AEROBIC EXERCISES

- Aerobic exercises involve using O<sub>2</sub> for at least 15-20' of continuous exercise, e.g., speed walking, distance running or swimming.
- CV endurance, muscle strength and some flexibility promoted.
- For maximum benefit, aerobic exercise should be performed at target heart rate, 3-5 days/week, each session including 15-60' of continuous aerobic activity.



# TARGET HEART RATE

- Lowest THR =  $RHR + 60\%(MHR - RHR)$
- Highest THR =  $RHR + 90\%(MHR - RHR)$
- $MHR = 220 - \text{age}$  ( e.g.,  $220 - 40 = 180$  beats/minute at age 40 ).

# ANAEROBIC EXERCISE

- Anaerobic exercise ( without O<sub>2</sub> ): During short, fast burst of exercise, e.g., running the 100 meter dash, more energy is required than can be provided by the O<sub>2</sub> taken in; a condition known as oxygen debt develops leading to shortness of breath. Recovery begins when exercise slows or stops.
- Anaerobic exercises improve muscular strength, endurance and flexibility with little effect on cardiovascular endurance.

# OTHER COMPONENTS OF PHYSICAL FITNESS

- Physical fitness is the result of a blend of healthful behaviors; regular exercise is one of them.
- Healthful meals: physically fit persons need the same nutrients as inactive persons but a different amount of calories to maintain ideal body weight.
- Getting the right amount of rest and sleep.

# PHYSICAL FITNESS: GUIDELINES

- Regular workout is important for physical fitness. For maximum benefit, certain guidelines and principles need to be known.
- Guidelines: Medical check up advisable before starting an exercise program. Current fitness levels, selecting suitable exercises, and knowledge about appropriate equipment, clothing, safety rules and prevention of common injuries is important.

# PHYSICAL FITNESS: TRAINING PRINCIPLES

- Training principles: Exercise should be: 1) selected according to goal, e.g., flexibility or endurance; 2) increased gradually in duration and intensity, (e.g., start with 10 curl ups and increase number in subsequent sessions ), gradually increasing the body's capacity to do more work than usual; 3) performed often enough for maximum benefits, e.g., 3-5 times/week. 4) Do not start or finish strenuous exercise abruptly; warm-up and cool-down with stretching and low intensity aerobic exercises, e.g., for 3-5 minutes.

# LIFETIME SPORTS

- Healthful behaviors when young promote good health when old.
- It is a good habit to cultivate sport activities that can be continued as you grow older.
- Walking, swimming, bicycling, and playing tennis are good examples.
- Swimming is one of the best sports to promote CV endurance, - ( if target heart rate is maintained for 20' ) - , muscular strength and endurance **WITHOUT THE RISK OF INJURY TO JOINTS.**

# STAYING HEALTHY: PREVENTING EXERCISE INJURIES

- Know your body limitations, e.g., if you are obese, select a sport where your weight is not constantly supported by your legs, e.g., swimming or bicycling.
- Follow safety rules, e.g., walk, don't run around a swimming pool; know the depth of the water before diving; don't dive into shallow water.
- Be aware of common causes of sport injuries: poor flexibility, overtraining, muscle imbalance...

# STAYING HEALTHY: TREATMENT OF EXERCISE INJURIES

- The RICE treatment lessens pain, limits swelling, reduces damage, and promotes healing.
- R: rest; stop using the injured part until a physician tells you otherwise.
- I: Ice; place ice in an ice bag or wrap in a towel and apply to injured part.
- C: compression; wrap a bandage over the ice for 30', remove both for 15', repeat for 3 hours.
- E: elevation; above heart level to help in reducing the swelling.
- Medical treatment if severe pain, joint problems or infection.



# COMMUNICABLE DISEASES

- Definition: A Communicable disease is an illness that is caused by entry of pathogens into the body.
- Pathogens ( disease-causing organisms ) are of six main types: bacteria, viruses, fungi, protozoa, rickettsia, and parasitic worms.

# SOURCES OF PATHOGENS

- Pathogens may originate inside the body, ( e.g., colon bacteria causing UTI in the same person ), i.e., endogenous infection.
- Pathogens may also originate outside the body, from another patient, an animal, or the environment, i.e., exogenous infection.

# SPREAD OF PATHOGENS IN EXOGENOUS INFECTIONS

- Contact, person-to person, e.g., kissing, touching, or using contaminated objects, e.g., a toothbrush.
- Air-borne spread, germ-laden mist from sneezing or coughing, as in RTI.
- Fecal-oral route, e.g., water pollution by sewage.
- Transplacental, e.g., rubella.
- From animal and their products, e.g., salmonellosis from poultry and eggs; through insects, e.g., malaria from mosquito bites; or through nursing/medical procedures, e.g., hepatitis B from a needle prick.

# THE BODY'S DEFENSES AGAINST INFECTION

- Physical and chemical barriers between the body and the environment must first be overcome.
- Examples include: intact skin and mucous membranes, hairs in the nose and cilia and mucus in the airway, antibacterial substances in sweat, tears, saliva, and the gastric HCl.
- Once inside the body, pathogens have to evade the WBCs and the antibacterial substances in the blood.

# THE IMMUNE SYSTEM

- The immune system produces specific antibodies which attach to the microbes and kill or neutralize them.
- The antibodies may remain in the body after the microbes are destroyed, giving a permanent immunity.
- The immune system may be stimulated to produce specific antibodies by administration of dead or weakened microbes ( vaccination ).
- Preformed antibodies may be given to prevent an infection, ( passive immunity ), e.g., a tetanus shot when pricked by a rusty nail or a rose thorn.

# STAGES OF DISEASES

- Disease develops when the pathogens overcome the body's defenses and start to multiply inside the body. Four stages are recognized:
- The incubation stage refers to the time between the entry of pathogens into the body and the appearance of the first symptom.
- The prodromal stage of general symptoms, e.g., fever, malaise, fatigue...
- The acute stage where characteristic symptoms appear, e.g., jaundice in virus hepatitis.
- The recovery stage when the immune system, with or without medical help, gets the upper hand.
- The patient may be infectious in any of these stages.

# SOME COMMON COMMUNICABLE DISEASES

- The common cold: Any of hundreds of different viruses can be responsible for the symptoms, ( stuffy and running nose, watering eyes...), hence, specific vaccines cannot be developed.
- ASPIRIN SHOULD NOT BE GIVEN TO CHILDREN WITH THE COMMON COLD AS IT MAY CAUSE REYE SYNDROME ( damage to brain and liver ).

# SOME COMMUNICABLE DISEASES

- VIRAL HEPATITIS: A national health problem in Egypt, overtaking Bilharziasis in this respect. Three common types:
- Hepatitis A: acquired by fecal-oral route; usually innocuous in children but can be serious in adults and pregnant women; gives life-long immunity. Vaccine available.
- Hepatitis B and C: more serious; can lead to chronic liver damage and liver cancer; Spread by the blood ( contaminated needles, surgical/dental instruments...), saliva, sexual intercourse, and through placenta.
- A vaccine for active immunization and antibodies for passive immunity are available for hepatitis B and have decreased the incidence in high-risk populations.



# SEXUALLY TRANSMITTED DISEASES

- STDs are a serious problem in permissive societies.
- Gonorrhea: a common STD. Pathogens do not survive in environment and require intimate contact to spread from person to person.
- Males develop painful urination and urethral discharge. Women are often asymptomatic, hence greater chance of complications, e.g., PID and sterility, and the possibility of unknowingly infecting sexual partners.

# AIDS

- AIDS is the scourge of modern times. It is basically still incurable.
- Avoiding sexual promiscuity should help in controlling AIDS and other STDs.
- Condoms are of value but are not always successful.
- When STDs are suspected, immediate medical help should be sought. Sexual partners also require medical attention.

# CARDIOVASCULAR DISEASES

## INTRODUCTION

- Cardiovascular diseases are among the most important causes of morbidity and mortality.
- Healthful behaviors and modification of risk factors can, and have, reduced mortality.
- Uncontrollable risk factors include advancing age, male sex, and genetic predisposition.
- Modifiable risk factors: cigarette smoking, high blood cholesterol, high BP, lack of exercise, and obesity.

# CARDIOVASCULAR DISEASE: PREVENTION

- Significant declines in mortality have been achieved by cessation of smoking, control of cholesterol levels ( LDL ) with statin drugs, aggressive control of hypertension, and exercise ( even mild exercise helps).
- Regular low dose aspirin reduces risk of MI
- Obesity is linked to high BP, high cholesterol levels and diabetes. Be careful about amount and type of foods consumed. Saturated fats ( animal fats, e.g., red meats, butter, eggs ) are linked to high cholesterol; salt is linked to high BP; both animal fats and salt should be reduced; vegetable oils, especially olive oil, are healthier.
- Stress is linked to high BP; check BP frequently if under stress.

# ATHEROSCLEROSIS

- Atherosclerosis is the basis of most heart diseases.
- The arteries are clogged by fatty deposits, plaque
- The heart must pump harder to move blood through the narrowed, hardened arteries. BP rises.
- Plaque build-up can cause complete obstruction of the artery by a thrombus ( a clot ); blood flow through artery stops. ( MI if coronaries ).

# ATHEROSCLEROSIS: THROMBOEMBOLISM

- A thrombus or plaque may break away within the artery to form an embolus ( moving clot ).
- The embolus may obstruct another artery and cause gangrene of a limb or organs.
- Angina pectoris is the chest pain that results when the heart has to pump more blood but cannot itself receive more blood because the coronaries are narrowed by atherosclerosis.
- A stroke results when blood flow to the brain is interrupted by a thrombus, embolus or bleeding from a ruptured artery or aneurysm.

# CANCER

- What is cancer?

Abnormal, uncontrolled growth of cells to form a lump ( tumor ), and spread of the abnormal cells to other parts of the body to form secondary tumors ( metastases).

- What causes cancer?

Genes control normal cell growth and division. During cell division, a copy of the genes is made for the daughter cells. Some genes are called tumor suppressor genes ( prevent cancerous growth ), other genes are called proto-oncogenes.

- When cells reproduce, an error ( mutation ) may occur during the copying of genetic material.
- A mutation in a tumor suppressor gene would cancel its tumor suppressing function.
- A mutation in a proto-oncogene would turn it into an oncogene, which stimulates tumor growth.
- The risk of mutations is increased by carcinogens, e.g., cigarette tar, asbestos, exposure to ionizing radiation, or the mutation may occur on a hereditary basis.



# EARLY DETECTION OF CANCER

- Awareness of warning signals of cancer and cancer screening may allow early detection of cancer at a time when it might be curable.
- Warning signals include: change in bowel or bladder habits; a sore that does not heal; unusual bleeding or discharge; thickening or lump in the breast or elsewhere; indigestion or difficulty in swallowing; obvious change in the size of a mole; nagging cough or hoarseness.

# CANCER SCREENING

- Screening means looking for a disease before it produces symptoms.
- Cancer screening may vary from procedures done by persons, e.g., regular self-examination for a lump in the breast or testis, to medical examinations and tests, e.g., PR and serum PSA for cancer of the prostate in men aged 50 and over, pap smear for cancer of the neck of the uterus, and yearly mammography for women > 50 years.

# CANCER PREVENTION

Cancer Type	Uncontrollable risk factors	Possible prevention
Breast	Age > 50; personal or family history	Monthly self-examination
Colon and rectum	Polyps in colon/rectum; personal/family history	Diet low in beef and high in fibre. Regular checkup at age < 50
Lung		No smoking; no exposure, e.g., to asbestos
Skin	Fair complexion	Avoid excessive exposure to sun