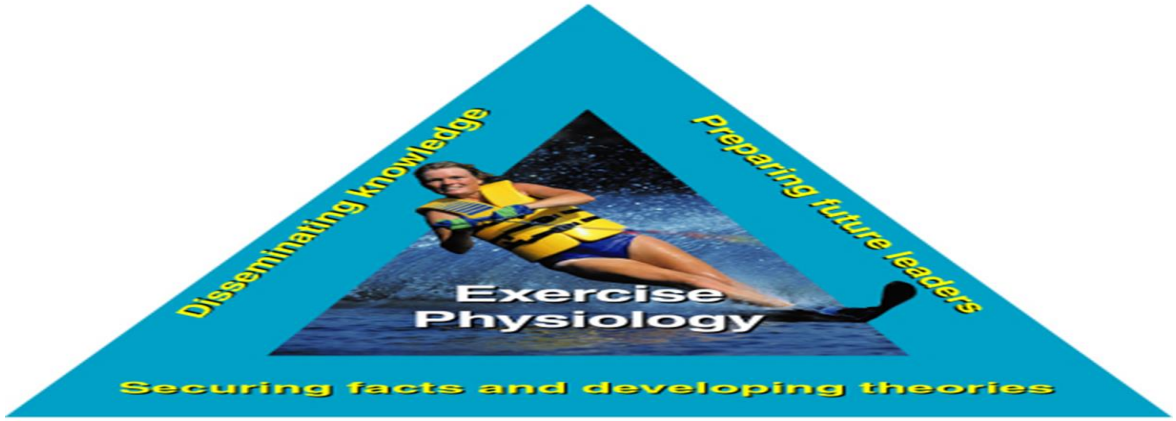
SECTION 1

INTRODUCTION TO EXERCISE PHYSIOLOGY

1.1. Science triangle



DR. REHAB GWADA

OBJECTIVES OF THE LECTURE

1- Define exercise , physical activity , and exercise training

2- Identify the physical fitness and its components

3- Explain Exercise Physiology and its parts of the field of study

4- Identify Clinical Exercise Physiology & physiologist

5- Know What does training do

6- Differentiate between acute & chronic adaptation

7- Introduce some Applications of Exercise Physiology To Other Disciplines and Professions

8- Briefly outline from past to present

WHAT IS EXERCISE?

Planned, structured, repetitive, and purposeful physical activity

e.g.: training for or performing athletics, sports, or recreational activities such as jogging, roller-blading, ice skating, swimming, etc.

What is Physical Activity?

Body movement produced by muscle action that increases energy expenditure.

eg: activities of daily living such as shopping, gardening, house keeping, child rearing, work-related activities, etc

What is Exercise Training?

The repeated use of exercise to improve physical fitness.

WHAT IS PHYSICAL FITNESS?

- Ability of the body's systems to function efficiently and effectively

- The ability to carry out daily tasks and routine physical activities without undue fatigue

- So, it's a product of exercise and/or physical activity

Can be broken into components like:

A- Health Related components

improved through proper training

B-Skill Related Components

improved through practice of motor skills

COMPONENTS OF PHYSICAL FITNESS

A- HEALTH RELATED COMPONENTS

Those factors that are related to how well the systems of your body work :

1. Cardiovascular endurance: The ability of the circulatory system (heart and blood vessels) to supply oxygen to working muscles during exercise.

2.Body Composition: The relative percentage of body fat compared to lean body mass (muscle, bone, water, etc)

3.Flexibility: The range of movement possible at various joints.

4.Muscular strength: The amount of force that can be produced by a single contraction of a muscle

5.Muscular endurance: The ability of a muscle group to continue muscle movement over a length of time.

B-SKILL RELATED COMPONENTS

Those aspects of fitness which form the basis for successful sport or activity participation

1. Speed: The ability to move quickly from one point to another in a straight line
2. Agility: The ability of the body to change direction quickly
3. Balance: The ability to maintain an upright posture while still or moving
4. Coordination: Integration with hand and/or foot movements with the input of the senses.
5. Power: The ability to use muscle strength quickly

it can be increased by three general ways: increase the force; decrease the time it takes; and increase the distance a force acts on one's body

WHAT IS EXERCISE PHYSIOLOGY?

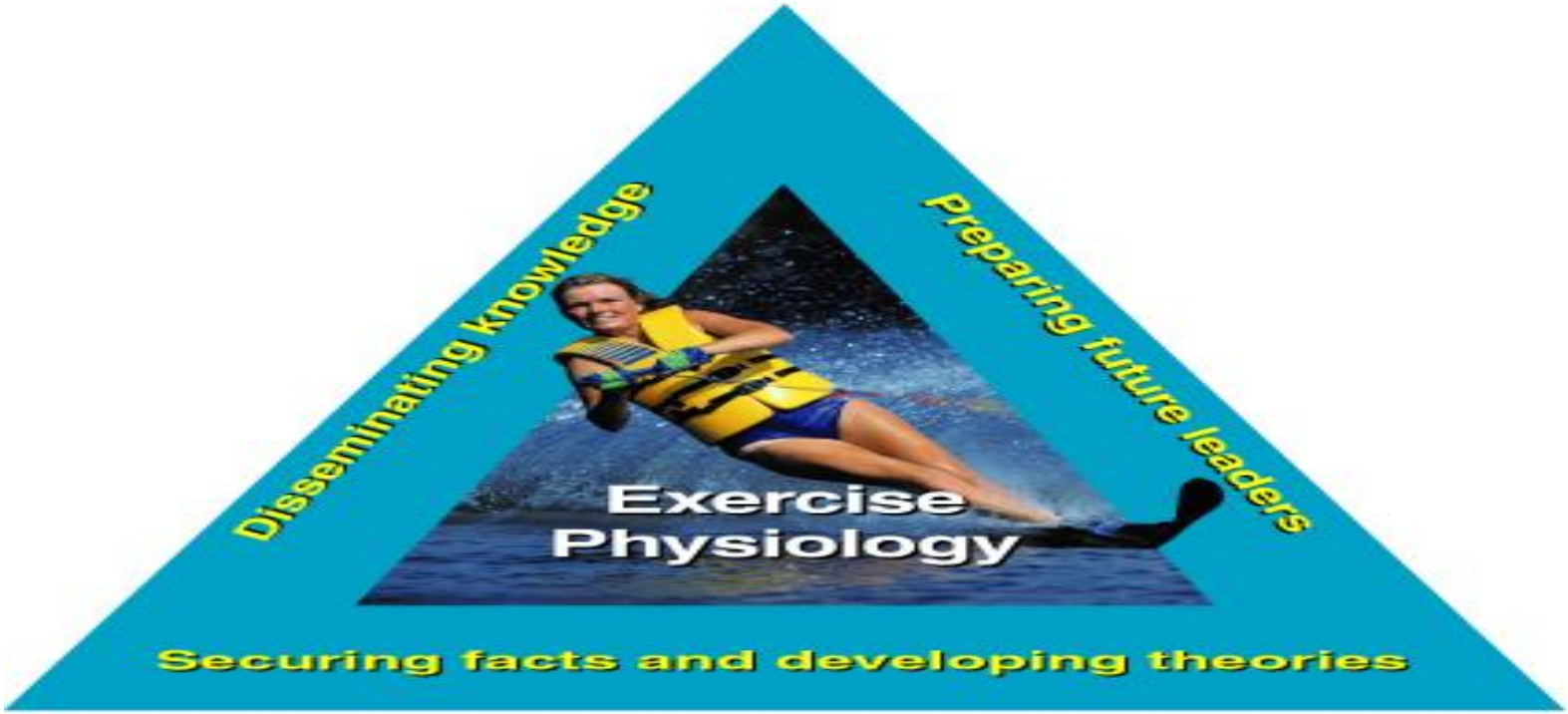
It is the study of how the body (cell, tissue, organ, system) responds in function and structure to acute exercise stress, and chronic physical activity.

As an academic discipline consist of :

1. Body of knowledge built on facts and theories derived from research.
2. Formal course of study in institutions of higher learning.
3. Professional preparation of practitioners, future investigators, and leaders in the field.

3-PARTS OF THE FIELD OF STUDY IN EXERCISE PHYSIOLOGY

1.1. Science triangle



WHAT IS EXERCISE PHYSIOLOGY?

Consider the physiological systems:

- Cardiovascular, Respiratory, Nervous, Renal, GI, Temperature Regulation, Endocrine, Muscle, Bone, Skin, Immune, Metabolism
- Exercise tends to disturb homeostasis.
- Adaptations of physiological systems tend to minimize this disturbance.

Why has ex. physiology developed as a field separate from physiology ?

ADAPTATIONS TO EXERCISE

Acute adaptations

The changes in human physiology that occur *during* exercise or physical activity.

Chronic Adaptations

The alterations in the structure and functions of the body that occur in response to the regular *completion* of physical activity and exercise.

WHAT HAPPENS PHYSIOLOGICALLY TO OUR BODIES WHEN WE START RUNNING?

there are some chronic or longer term reactions to training. What are some of these?

WHAT DOES TRAINING DO?

Permits adaptations within the physiological systems to minimize the disturbance to homeostasis resulting from *exercise*

Exercise intensity can be increased for a given distance or duration, or a given intensity can be sustained longer

WHAT IS CLINICAL EXERCISE PHYSIOLOGY?

A sub-component of exercise physiology that involves the application of exercise physiology principles, knowledge and skills for purposes of the prevention, rehabilitation or diagnosis of *disease or disability* in humans.

APPLICATIONS OF EXERCISE PHYSIOLOGY TO OTHER DISCIPLINES AND PROFESSIONS

Cardiology	*Applications*
• ***Biochemistry***	-metabolic adaptations to muscle contraction and exercise training
• ***Cardiology***	-diagnostics, rehabilitation, and prevention -reversal of risk factors for heart disease
• ***Endocrinology***	-rehabilitation of type II diabetes
• ***Neurology***	-effects of exercise on the autonomic nervous system
• ***Nutrition***	-macro-nutrient & micro-nutrient needs during exercise, and exercise training
• ***Orthopedics***	-effects of exercise on bone remodeling
• ***Physical Therapy***	-injury rehabilitation/prevention
• ***Pulmonology***	-training/conditioning of muscles used in ventilation

CLINICAL EXERCISE PHYSIOLOGISTS

Healthcare professionals who use fundamental principles of exercise physiology in clinical settings to:

1- minimize the risk of chronic diseases associated with physical inactivity

2- treat those already afflicted.

SERVICES

Services may be provided in several medical settings such as:

- ✓ hospitals,
- ✓ rehabilitation centers,
- ✓ outpatient clinics.

HISTORY

- ✓ Late 1800s, the use of anthropometry to measure changes in students' development after training programs.
- ✓ McKenzie: Investigating effects of exercise on various systems of the body and the idea of preventative medicine (early 1900s)
- ✓ After WWII: increased interest in fitness as a result of youth fitness tests and the results of the physicals of men in the military.
- ✓ Specialized area of study mid 1960s and 1970s

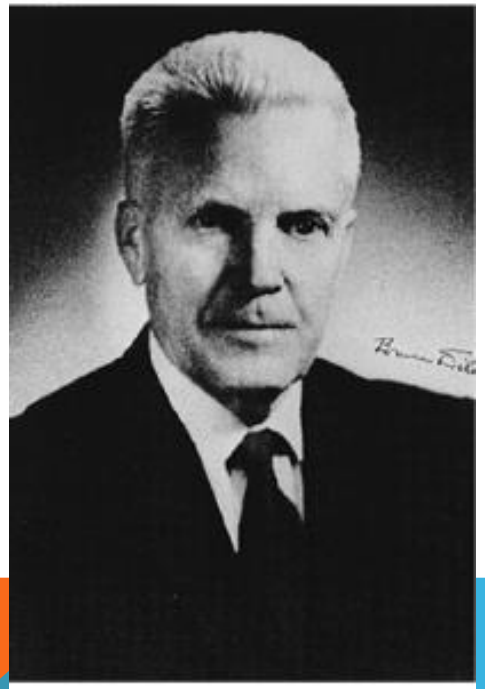
WHAT WAS THE FIRST EXERCISE PHYSIOLOGY LABORATORY?

George Wells Fitz

- Helped establish the Dept. of Anatomy, Physiology, and Physical Training at Harvard University in 1891.

WHAT WAS THE FIRST EXERCISE PHYSIOLOGY LABORATORY?

1.11. David Bruce Dill



Harvard Fatigue Laboratory

- David Bruce Dill established a fatigue laboratory at Harvard University, 1927
- Refocused his efforts from biochemistry to experimental physiology

PROFESSIONAL ISSUES

American Society of Exercise Physiologists (ASEP)

Founded in 1997; functions to accommodate the professional needs of exercise physiologists.

http://www.css.edu/users/tboone2/asep.toc.htm

American College of Sports Medicine (ACSM)

Founded in 1954; functions to support and "bring together" all disciplines and professions interested in how exercise affects the human body.

http://www.acsm.org

PROFESSIONAL ISSUES, CONT'D.

National Strength & Conditioning Association (NSCA)

Functions to promote the knowledge and skill competencies of individuals who are interested in muscular strength and power.

http://www.nsca-lift.org

American Physiological Society (APS)

Functions to support the knowledge and research of all aspects of physiology.

QUIZ

True or false

- ✓ all exercise is physical activity, but not all physical activity is exercise .
- ✓ Exercise training is attribute related to how well one performs physical activity.
- ✓ Physical fitness ’s a product of exercise and/or physical activity .
- ✓ physical fitness can be improved through proper training& practice of motor skills.

Thank you