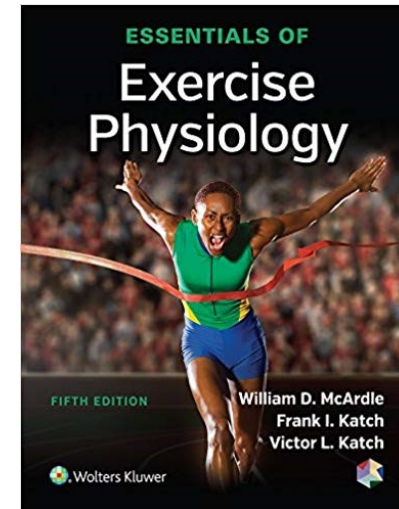
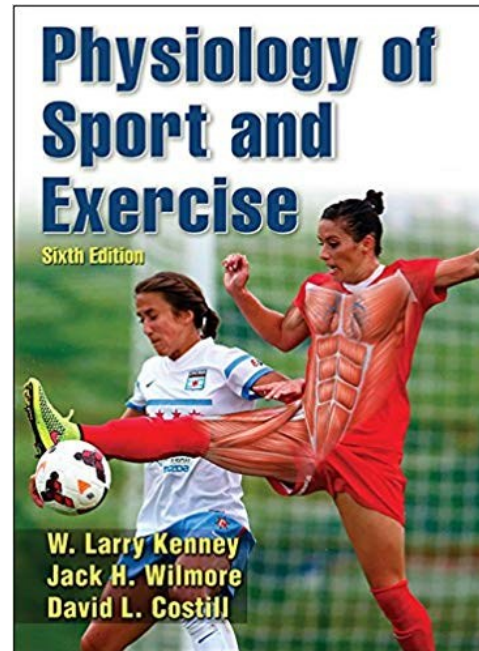
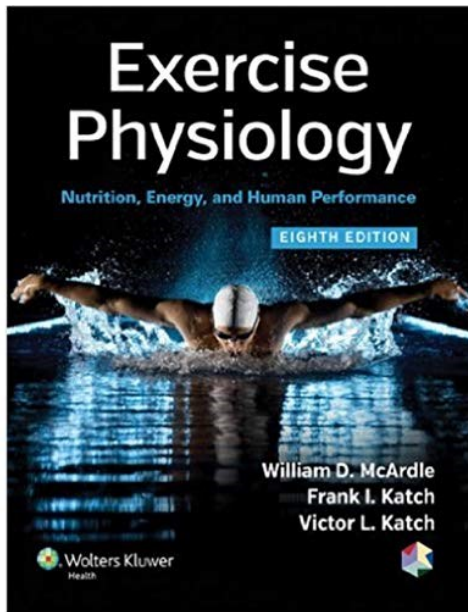


PHYSIOLOGY OF EXERCISE

Lecture# 01



Ashish Kumar Katiyar, Ph.D.
(Assistant Professor)

AN INTRODUCTION TO EXERCISE AND SPORTS PHYSIOLOGY

What is Exercise Physiology..?

Is it..?

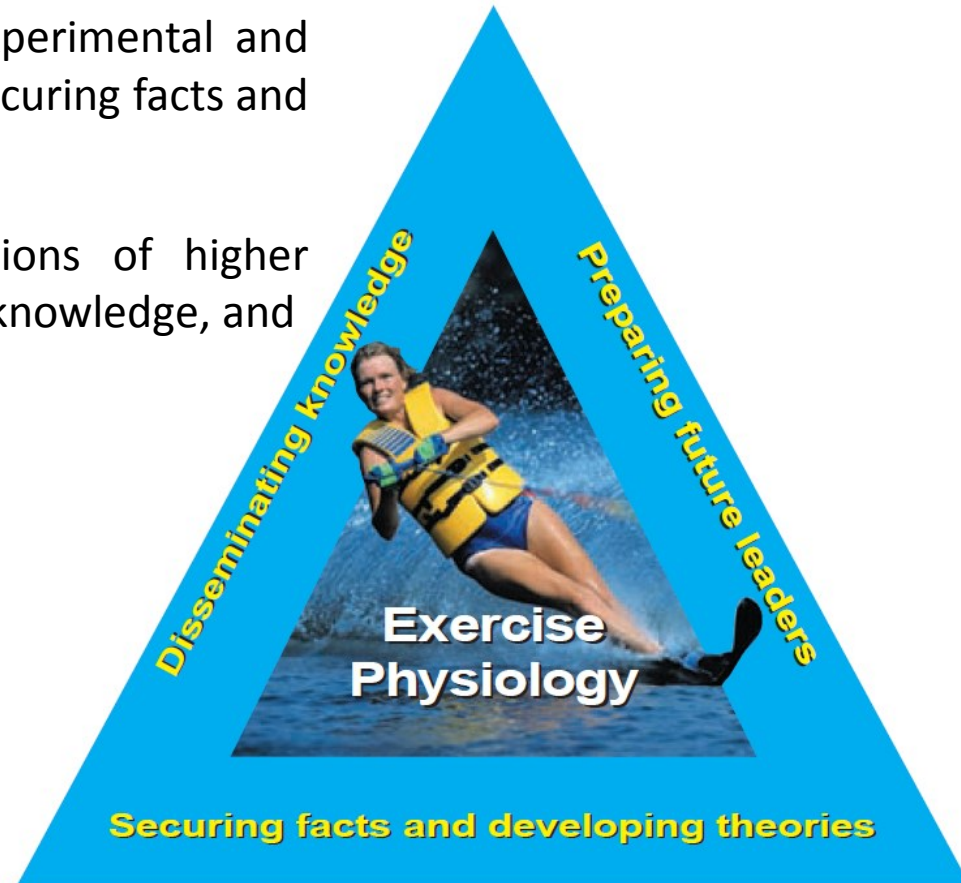
1. An Academic Program of Study, and a Course in Exercise or Sports Sciences..?
2. A Profession..?
3. Research or Areas of investigation..?

Think and Answer.....what is Exercise Physiology?

- Exercise Physiology is now a separate academic field of study within the biological sciences.
- Exercise physiology as an academic discipline consists of three distinct components:

The Science triangle :Three parts of the field of study for exercise physiology:

- (1) the body of knowledge evidenced by experimental and field research engaged in the enterprise securing facts and developing theories,
- (2) the formal course of study in institutions of higher learning for the purpose of disseminating knowledge, and
- (3) preparation of future leaders in the field.



(Adapted from Tipton, C.M.: Contemporary exercise physiology: Fifty years after the closure of the Harvard Fatigue Laboratory. Exerc. Sport Sci. Rev., 26:315, 1998.)

The current academic discipline of exercise physiology emerged from the influences of several traditional fields primarily of :

- anatomy,
- physiology, and
- medicine.

What they do?

Each of these disciplines uniquely contributes to our understanding of human structure and function in health and disease.

Human physiology integrates aspects of;

- chemistry,
- biology,
- nutrition, and
- physics

to explain biological events and their sites of occurrence.

Physiologists grapple with questions such as;

1. “What factors regulate body functions?” and
2. “What sequence of events occurs between the stimulus and the response in the regulatory process?”

The discipline of physiology compartmentalizes into sub-disciplines;

- **a systems approach** (e.g., pulmonary, cardiovascular, renal, endocrine, neuromuscular)
- **a broad area of study** (e.g., cell, invertebrate, vertebrate, comparative, human).

What is Physiology?

- Physiology is the study of life processes
- How living systems work at many levels
 - Molecular level
 - Organ and systems levels
 - Whole organism level
- How living systems respond to physical activity
- How living systems respond to environmental conditions
- How the genome translates into function at different levels

Introduction to Exercise Physiology

Exercise Physiology is one of the major sub-disciplines of Sport and Exercise Science, and evolved from its parent discipline **physiology**.

What is Physiology..?

Physiology is the study of how living systems function.

(Or)

Physiology is the study of how the human body functions.

Then, What is Human Physiology..?

Human **physiology** is the science of the mechanical, physical, and biochemical functions of normal humans or human tissues or organs.

Q. What is Exercise Physiology and What is Sport Physiology..?

Sports Physiology and **Exercise Physiology** are often used interchangeably, but there are subtle differences between the two.

Wilmore and Costill (2004) clearly distinguish between these in the following definitions:

- **“Exercise Physiology** is the study of how our bodies' structures and functions are altered when we are exposed to acute and chronic bouts of exercise.”
- **“Sports Physiology** further applies the concepts of exercise physiology to training the athlete and enhancing the athlete’s sport performance.”

Note: *Exercise and Sports Physiology overlap significantly, and therefore are generally considered together. **For the remainder**; the term exercise physiology will be used to encompass the area of both exercise and sports physiology.*

Now again what Is Exercise Physiology and Why we Study It?

Exercise physiology as an academic field of study consists of three distinct components:

- (1) A body of knowledge built on facts and theories derived from research,
- (2) A formal course of study at institutions of higher learning, and
- (3) Professional preparation of practitioners and future leaders in the field.

Exercise physiology has developed as a field separate from physiology because of its unique focus on the study of the functional dynamics and adaptations to human movement and associated physiological responses.

- ✓ **Exercise physiology** can be defined as both a basic and an applied science that describes, explains, and uses the body's response to exercise and adaptation to exercise training to maximize human physical potential.
- ✓ **Exercise physiology** is an aspect of Sports Medicine that involves the study of how the body, from a functional standpoints, respond, adjust and adapt to exercise.

Why we Study It..?

1. Understand how the basic physiological functioning of the human body is modified by short- and long term exercise as well as the mechanisms causing these changes. Unless one knows what responses are normal, one cannot recognize an abnormal response or adjust to it.
2. Provide quality physical education programs in schools that stimulate children and adolescents both physically and intellectually. To become lifelong exercisers, students need to understand how physical activity can benefit them, why they take physical fitness tests, and what to do with fitness test results.
3. Apply the results of scientific research to maximize health, rehabilitation, and/or athletic performance in a variety of subpopulations.
4. Respond accurately to questions and advertising claims, as well as recognize myths and misconceptions regarding exercise. Good advice should be based on scientific evidence.

Focus of Exercise and Sport Physiology

Q. Exercise Physiology evolved from its parent discipline,?

The two cornerstones of exercise physiology are:

(1) how the body responds to the acute stress of exercise, or physical activity, and

(2) how it adapts to the chronic stress of repeated bouts of exercise, that is, exercise training.

- Some exercise physiologists use exercise or environmental conditions (heat, cold, altitude, etc.) to stress the body in ways that uncover basic physiological mechanisms.
- Others examine exercise training effects on health, disease, and well-being.
- Sport physiologists apply these concepts to athletes and sport performance.

WHAT DO EXERCISE PHYSIOLOGISTS DO?

Exercise physiologists assume diverse careers.

Some use their research skills primarily in colleges, universities, and private industry settings. Others are employed in health, fitness, and rehabilitation centers, and others serve as educators, personal trainers, managers, and entrepreneurs in the health and fitness industry

Exercise physiologists also own health and fitness companies or are hands on practitioners who teach and service the community, including corporate, industrial, and governmental agencies.

Some specialize in other types of professional work such as massage therapy, and others go on to pursue professional degrees in physical therapy, occupational therapy, nursing, nutrition, medicine, and chiropractic.



Additional topics studied

- Nutrition for health and performance
- Body composition techniques
- Physiological response to environmental stress
- Exercise testing protocols
- Exercise prescription models
- Exercise responses in special populations
- Exercise and aging
- Pediatric exercise responses
- Exercise effects gravity
- Sports training & performance
- Metabolic disorders
- Bone health

Class Room Task...!

Q. Write 10 Organizations and Certifications Courses in each discipline ?

Professional Organizations and Certifications

Fitness Related Organizations and Certifications

Careers in Exercise Physiology



Many career options for different levels of study (select examples):

Personal trainer	Bachelors
Fitness instructor	Bachelors, Masters
Sports consultant	Bachelors, Masters, Doctorate
Exercise physiologist	Masters, Doctorate
Clinical exercise physiologist	Bachelors, Masters, Doctorate
Exercise technologist or stress testing technician	Bachelors, Masters
Exercise specialist	Bachelors, Masters
Wellness counselor	Bachelors, Masters
Professor	Doctorate
Physical therapist/Occupational therapist	Bachelors, Masters, Doctorate in Physical or Occupational Therapy
Medical doctor	Bachelors & Medical School
Chiropractor	Chiropractic School
Nursing	Bachelors plus degree in nursing