

Pioneers of Exercise Science: Milestones and Innovations

Exercise Science · Answer Key · 18 Questions

1. Who is widely credited with performing the first systematic study of muscle physiology in the late 18th century, laying groundwork for understanding muscle contraction?

- A) August Krogh
- B) Archibald Vivian Hill
- C) Hermann von Helmholtz
- D) Luigi Galvani**

2. What groundbreaking invention in the early 20th century allowed for the non-invasive measurement of oxygen consumption during exercise, revolutionizing exercise physiology research?

- A) The treadmill ergometer
- B) The electromyograph (EMG)
- C) The Douglas bag apparatus**
- D) The spirometer

3. Which scientist is often referred to as the 'father of exercise physiology' for his extensive research on metabolism and the physiological responses to physical exertion in the early 20th century?

- A) Walter Cannon
- B) August Krogh**
- C) A.V. Hill
- D) Carl von Voit

4. The development of the concept of 'VO₂ max' as a measure of cardiorespiratory fitness is largely attributed to the work of which Nobel laureate?

- A) Olof Hetland
- B) Per-Olof Åstrand**
- C) Lars-Eric Saltin
- D) J.R. Pappenheimer

5. What physiological discovery in the mid-19th century by Carl Ludwig demonstrated that muscles utilize oxygen for energy production, challenging previous theories?

- A) The sliding filament theory
- B) The concept of anaerobic glycolysis
- C) The role of ATP in muscle contraction
- D) The discovery of lactic acid as a metabolic byproduct**

6. The first standardized method for testing muscular strength and endurance, developed in the early 20th century, was significantly influenced by the work of:

- A) Frederick Taylor
- B) Hans Selye
- C) Charles D. Mayhew
- D) Thomas Cureton**

7. Who is recognized for the groundbreaking discovery of the 'all-or-none law' of nerve impulses in the late 19th century, which has implications for understanding neuromuscular activation?

- A) Santiago Ramón y Cajal
- B) Edgar Douglas Adrian**
- C) Ivan Pavlov
- D) Sherrington

8. The invention of the first reliable cycle ergometer for laboratory use is often attributed to:

- A) James H. McArdle
- B) John B. Peterson
- C) Ernst Jakob Mathys**
- D) P.O. Åstrand

9. Which early 20th-century physiologist's meticulous studies on the energetic efficiency of muscle work, including the discovery of the 'efficiency of muscle,' earned him a Nobel Prize?

- A) Archibald Vivian Hill**
- B) August Krogh
- C) Otto Loewi
- D) Walter B. Cannon

10. The significant discovery that muscle fatigue is not solely due to lactic acid accumulation, but also involves central fatigue mechanisms, was a major advancement in the mid-20th century research led by:

- A) Robert F. Fitts
- B) Elsworth R. Buskirk
- C) George Brooks
- D) David Costill**

11. What revolutionary technique, developed in the late 1960s, allowed for the direct visualization and study of muscle fiber types and their metabolic characteristics?

- A) Magnetic Resonance Imaging (MRI)
- B) Positron Emission Tomography (PET)
- C) Histochemistry and Electron Microscopy**
- D) Computerized Tomography (CT)

12. The foundational work on the hormonal regulation of metabolism during exercise, including the role of insulin and glucagon, was significantly advanced by research in the early to mid-20th century by figures like:

- A) Frederick Sanger
- B) Emil Fischer
- C) Banting and Best**
- D) Hans Krebs

13. The concept of 'training adaptation' and its physiological basis began to be systematically studied with the advent of which type of measurement in the early 20th century?

- A) Blood lactate threshold
- B) Ventilatory threshold
- C) Maximal oxygen uptake (VO₂ max)**
- D) Heart rate variability

14. Who is credited with developing the first detailed biomechanical models of human locomotion in the early 20th century, influencing the study of gait and movement efficiency?

- A) Étienne-Jules Marey**
- B) John J. Zatsiorsky
- C) J.J. van Ingen Schenau
- D) Berton D. Thomas

15. The discovery of the 'sliding filament theory' of muscle contraction, a pivotal moment in understanding how muscles shorten, was proposed by which pair of researchers in the 1950s?

- A) Huxley and Hanson**
- B) Hodgkin and Huxley
- C) Katz and Liley
- D) Bernstein and Manin

16. The establishment of dedicated exercise physiology laboratories, often associated with universities, began to proliferate in the mid-20th century, with significant contributions from institutions like:

A) Harvard Fatigue Laboratory

- B) Kaiser Wilhelm Institute
- C) Max Planck Institute
- D) CERN

17. Which scientist in the early 20th century laid crucial groundwork for understanding the nervous control of movement by studying reflex actions and reciprocal innervation?

A) Charles Sherrington

- B) Edgar Adrian
- C) Ivan Pavlov
- D) Santiago Ramón y Cajal

18. The measurement of power output during cycling became a standard practice with the widespread adoption of which device, first developed for scientific purposes in the early 20th century?

A) Wattbike

B) Monark cycle ergometer

- C) Peloton bike
- D) Stryd power meter