

## ANATOMY AND PHYSIOLOGY

1. **DESCRIPTION:** This event encompasses the anatomy and physiology of the muscular, **respiratory and endocrine system**.

**A TEAM OF UP TO:** 2

**APPROXIMATE TIME:** 50 Minutes

2. **EVENT PARAMETERS:** Each participant must bring a writing implement and may bring a non-programmable, non-graphing calculator. Each team may bring one 8.5" x 11" two-sided page of notes that contain information in any form from any source.

3. **THE COMPETITION:** Students should know the basic anatomy and physiology of the muscular, endocrine, and **respiratory** systems and how aging and specific diseases affect them. Process skills expected may include data collection, making observations, inferences, predictions, calculations, analyses and conclusions. The test may include various formats (e. g., timed stations, written test, PowerPoint slides, anatomical specimens, etc.) for the following topics:

a. **MUSCULAR SYSTEM** - See [www.soinc.org](http://www.soinc.org) for List of Skeletal Muscles. All levels should know:

- i. The interaction of the skeletal and muscular systems to allow movement.
- ii. Muscle fibers - the cellular and gross anatomy of skeletal muscle, cardiac muscle & smooth muscle.
- iii. Physiology of the skeletal muscle contraction system and the neuromuscular junction.
- iv. How the skeletal muscles move bone, maintain posture, and produce heat.
- v. Skeletal muscle actions – origin, insertion, interactions of different muscles.
- vi. Location and identification of the major skeletal muscles of the body including origin, insertion, and function. See [www.soinc.org](http://www.soinc.org) for a list of the Major Skeletal Muscles.
- vii. The effects of exercise on the cellular and gross anatomical structure of the muscular system.
- viii. Muscle and tendon injuries and their prevention (i.e., strains and sprains).
- ix. The diseases on each level from the cell to the whole person as listed: Poliomyelitis, Muscular Dystrophies, Myasthenia gravis, **tetanus, myositis**.

**National Level Only:** Kinds of muscle contraction, Classes of muscle fibers and their functions, Understand cardiac and smooth muscle roles in the body, Understand muscle sensory systems (e.g. spindles and Golgi tendon organs). Additional diseases: Carpal Tunnel Syndrome, **Botulism**, Fibromyalgia, and Chronic fatigue syndrome, Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.), Role of the nervous system in muscle function.

b. **ENDOCRINE SYSTEM** - All levels should know:

- i. The three classes of hormones – steroids, peptides, and amines
- ii. Mechanisms of hormone action – water soluble vs. fat soluble
- iii. Endocrine related problems – hypersecretion, hyposecretion
- iv. Hormone producing glands, their hormones and the function of each
- v. Understand disorders: diabetes mellitus, hypoglycemia, Graves disease, goiter

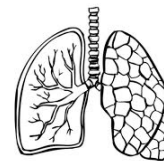
**National Level Only:** Endocrine cycles and negative feedback, Autonomic nervous system control of endocrine function, Additional Disorders: Cushing's Syndrome, Addison's Disease, and Myxedema, Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.).

c. **RESPIRATORY SYSTEM** All levels should know:

- i. Anatomy of the Respiratory System – Principal organs, their structure and function.
- ii. Functions of the Respiratory System
- iii. Mechanisms of Pulmonary Ventilation
- iv. Patterns of Breathing
- v. Measures of Pulmonary Ventilation
- vi. Gas Exchange and Transport
- vii. How exercise and high altitude affect the respiratory system
- viii. Understand disorders: COPD, asthma, emphysema, pneumonia, sleep apnea

**National Level Only:**

- ix. Additional diseases/disorders to know: tuberculosis, pulmonary edema, **Pleurisy**
- x. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)
- xi. Blood chemistry and the respiratory rhythm
- xii. Regulation of the Respiratory System
- xiii. **Ability to read a spirogram as related to pulmonary ventilation**



4. **SCORING:** Points are awarded for correct answers. Selected questions/free-response quality will break ties.

**Recommended Resources:** All reference and training resources including the **Bio/Earth CD** are available on the Official Science Olympiad Store and Website at <http://www.soinc.org>

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