

# HEALTH SCIENCE

**DESCRIPTION:** This event encompasses **basic anatomy and physiology** of the Urinary, Endocrine and Nervous systems in health and disease.

**A TEAM OF UP TO:** 2

**APPROXIMATE TIME:** 50 Minutes

**EVENT PARAMETERS:** Teams may bring non-programmable calculators. No printed or written resources may be used during the test. References, training resources and suggested regional/state competition emphasis are available on the Official Science Olympiad Web Page at <http://www.soinc.org>.

**THE COMPETITION:**

The competition will consist of stations. Each station will contain questions related to a concept, situation or problem to be solved. Students should know basic anatomy and physiology of the relevant body systems at rest, and apply this understanding to solve problems posed by the effects on the body systems in health and disease.

**FACTS AND CONCEPTS:**

Basic anatomy and physiology of the urinary system including the kidneys, ureters, bladder, and urethra. This section includes the formation and composition of urine, GFR calculation, and the concepts of tubular secretion and absorption, clearance concept and acid/base controls **along with related diseases and their prevention.**

Basic anatomy and physiology of the human endocrine system including definition of hormones, types of endocrine glands and their hormonal effects, the concepts of Half-life, synergism, and antagonism, and related diseases such as diabetes, Cushing Syndrome, Graves Disease, Giantism, and myxedema.

**Basic anatomy and physiology of the nervous system and neurodegenerative diseases with examples** including functional and gross neuroanatomy of the human brain and spinal cord, cellular anatomy and physiology of central and peripheral nerve cells) and may also include: cellular physiology of sensory and motor neurons, actions of neurotransmitters on nerve cells, ionic basis of the cellular membrane potential, action potential and synaptic potentials, actions of basic nerve cell circuits (e.g. motor reflexes) identification of simple electroencephalographic waveforms (e.g. alpha, theta, and delta waves and seizures), cellular basis of common neurodegenerative disorders (e.g. Parkinson's, amyotrophic lateral sclerosis, multiple sclerosis, Huntington's chorea, Alzheimer's disease).

**Process skills may include observations, calculations, predictions, drawing and interpreting graphs, analyzing and interpreting data, equipment and techniques.**

**SAMPLE PROBLEMS:**

- Given a graph indicating estrogen and progesterone levels, select the expected time of LH release.
- Given a data sheet, calculate the inspiratory reserve of an individual.
- **Given oscillographic photographs, strip chart recordings, or illustrations of nerve axon potentials, identify the resting potential, a synaptic potential, and periods of high potassium and sodium conductance during the action potential**
- **Given a model or illustration of the human brain, identify and name the lobe of the cerebral cortex that includes; the primary motor area, the primary somatic sensory area, the speech centers, primary optic areas.**
- Given the blood plasma and urine concentrations of a substance, and the urinary output per hour, calculate the GFR.

**SCORING:** Points will be awarded for correct answers. Contestants will be ranked from highest to lowest. Selected questions will be used as tiebreakers.