

1. **DESCRIPTION:** Understand the anatomy and physiology of the nervous, **integumentary** and **immune** systems.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 Minutes

2. **EVENT PARAMETERS:** Each **team** may bring **only** one 8.5" x 11" two-sided page of information in any form from any source and up to 2 non-programmable, non-graphing calculators.
3. **THE COMPETITION:** Students should know the basic anatomy and physiology of the nervous, **integumentary** and **immune** systems. The test is **limited** to the following topics:

a. **INTEGUMENTARY SYSTEM - All levels should know and understand:**

- i. Functions of the Integumentary System
- ii. Basic anatomy of the component parts of the skin
- iii. Anatomy of the layers of the skin and sensory receptors
- iv. Skin Color and Texture, Hair and Nails, Integumentary Glands
- v. Effects of aging on the skin
- vi. The diseases on each level from the cell to the whole person as listed: burns, allergies to allergens (i.e., poison ivy, metals), infections (i.e., boils, carbuncles, athlete's foot, impetigo) and skin cancer

National Level Only:

- vii. Additional disorders: Psoriasis, human papilloma virus (HPV), other types of dermatitis
- viii. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)

b. **IMMUNE SYSTEM - All levels should know and understand:**

- i. Basic Functions of the Immune System
- ii. Anatomy and physiology of nonspecific defense system
- iii. Anatomy and physiology of specific defense system
- iv. The physiology of the immune response and allergic reactions
- v. Role of the Lymph System in immunity
- vi. Disorders: immunodeficiencies (i.e., AIDS), autoimmune diseases (i.e., multiple sclerosis, rheumatoid arthritis & systemic lupus erythematosus), and hypersensitivities (i.e., contact dermatitis)

National Level Only:

- vii. Types of Organ Transplants and Prevention of Rejection
- viii. Additional disorder: Grave's Disease
- ix. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)

c. **NERVOUS SYSTEM - All levels should know:**

- i. The Brain and Sense Organs - major regions and their functions
- ii. Identification of simple encephalographic wave forms
- iii. Neural Impulses - Cellular anatomy and physiology of glial and supporting cells, synapses and neurotransmitters, action potential generation and propagation, ionic basis of the cellular membrane potential, cellular anatomy and physiology of neurons
- iv. Central Nervous System - organization of the spinal cord, purpose/functions of sleep
- v. Peripheral Nervous System - neuroganglia, action of sensory and motor neurons, understand differences in and purposes of parasympathetic, sympathetic, somatic, and sensory systems
- vi. Disorders: Epilepsy, Alzheimer's Disease, Multiple Sclerosis and Parkinson's Disease, **shingles** (herpes zoster), cerebral palsy, glaucoma, pink eye (conjunctivitis)
- vii. Effects of the drugs: alcohol, caffeine, nicotine, and marijuana on the nervous system

National Level Only:

- viii. The Brain - anatomy and physiology of brain function including function and role of specific nuclei clusters and tracts, theories of dreaming, purpose and principles of MRIs and EEGs, Neural Impulses - Retrograde signaling
- ix. Treatments and/or prevention for all conditions listed above (drugs, surgery, etc.)



4. **SCORING:** High score wins. Selected questions/quality of free-response answers will be used to break ties.

Recommended Resources: All reference and training resources including the in-depth **Anatomy and Physiology CD (APCD)** and the introductory **Bio/Earth CD (BECD)** are available on the Official Science Olympiad Store or Website at <http://www.soinc.org>

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