

**NASA Space Life Sciences Directorate**  
**“The Human Effects of Space Flight”**  
**Friday, April 1, 2005**

**8:00-8:15**

**Welcome, Introductions, Goals for the Symposium**

*Julia Bulkowski, NASA Education Specialist, NASA Ames Research Center*  
*Lisa Neasbitt, NASA Education Specialist, NASA Johnson Space Center*  
*Monica Trevathan, NASA Education Specialist, NASA Johnson Space Center*  
*Dr. Steven Platts, Research Scientist, NASA Johnson Space Center Cardiovascular Laboratory*  
*Dr. Scott Smith, Manager, Nutritional Biochemistry Laboratory, NASA Johnson Space Center*  
*Al Byers, Director Professional Programs and e-Learning, NSTA*  
*Mark Bosveld, Program Manager, NSTA*  
*Flavio Mendez, Symposia Series Program Manager, NSTA*

- College Credit Forms
- Pre-Evaluation Forms
- Goals for the Day

**8:15-8:20**

**Opening Activity: Take Me Out to the Ballgame**

*Julia Bulkowski, NASA Education Specialist, NASA Ames Research Center*  
*Lisa Neasbitt, NASA Education Specialist, NASA Johnson Space Center*

**8:20-8:30**

**Big Picture Overview**

*Julia Bulkowski, NASA Education Specialist, NASA Ames Research Center*

**8:30—9:05**

**A Walk Through The Heart**

*Julia Bulkowski, NASA Education Specialist, NASA Ames Research Center*  
*Lisa Neasbitt, NASA Education Specialist, NASA Johnson Space Center*  
*Monica Trevathan, NASA Education Specialist, NASA Johnson Space Center*

Learning Outcomes:

- Explain (model) the structure and function of the cardiovascular system.

**Resting and Active Heart Rates**

*Julia Bulkowski, NASA Education Specialist, NASA Ames Research Center*  
*Lisa Neasbitt, NASA Education Specialist, NASA Johnson Space Center*  
*Monica Trevathan, NASA Education Specialist, NASA Johnson Space Center*

Learning Outcomes:

- Explain (model) the structure and function of the cardiovascular system.
- Perform and describe hands-on activities relating to the cardiovascular system on Earth.

**9:05—9:40**

**The Cardiovascular System in Space**

*Dr. Steven Platts, Research Scientist, NASA Johnson Space Center Cardiovascular Laboratory*

Learning Outcomes:

- Summarize the major effects of space travel on the cardiovascular system.
- Identify at least two known countermeasures to the negative effect of space travel on the cardiovascular system.

**9:40—10:00**

**Measuring Leg Volume**

*Julia Bulkowski, NASA Education Specialist, NASA Ames Research Center*

*Lisa Neasbitt, NASA Education Specialist, NASA Johnson Space Center*

*Monica Trevathan, NASA Education Specialist, NASA Johnson Space Center*

Learning Outcomes:

- Sequence the major effects of space travel on the cardiovascular system.
- Perform and describe hands-on activities relating to the cardiovascular system in space.

**10:00—10:15**

**Break**

**10:15—10:35**

**Muscle and Bone on Earth: Good Stress**

*Julia Bulkowski, NASA Education Specialist, NASA Ames Research Center*

*Lisa Neasbitt, NASA Education Specialist, NASA Johnson Space Center*

*Monica Trevathan, NASA Education Specialist, NASA Johnson Space Center*

Learning Outcomes:

- Experience then relay in descriptive writing the effects of stress (exercise) on hand muscles.
- Define muscle strength and stamina and describe in writing how good stress (exercise) will increase both.

**10:35-11:05**

**Muscle and Bone in Space**

*Dr. Scott Smith, Manager, Nutritional Biochemistry Laboratory, NASA Johnson Space Center*

Learning Outcomes:

- List at least 2 of the major effects of space travel on muscle and bone.
- Identify and describe at least two known countermeasures to the negative effect of space travel on the muscle and bone.

**11:05-11:30**

**Building Blocks and Decalcified Bone**

*Julia Bulkowski, NASA Education Specialist, NASA Ames Research Center*

*Lisa Neasbitt, NASA Education Specialist, NASA Johnson Space Center*

*Monica Trevathan, NASA Education Specialist, NASA Johnson Space Center*

Learning Outcomes:

- Analyze current diet for the nutritional needs of healthy bone.
- Write a meal plan for a day illustrating good food choices, especially in terms of calcium.
- Compare structure of a normal bone versus a decalcified bone using magnifying lenses and microscopes and list at least three differences.

**11:30-12:00**

**Post-evaluation form, Perception Feedback Survey**

**Raffle for Telescope and prizes!!**

**Standards Addressed:**

**Science**

**Content Standard C:**

- Structure and function in living systems
  - Living Systems at all levels of organization demonstrate the complementary nature of structure and function
  - The Human organism has systems for digestion, respiration, circulation, excretion, movement, control and coordination, and for protection from disease. These systems interact with one another.
- Regulation and behavior
  - All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing environment.
  - Regulation of an organism's internal environment involves sensing the internal environment and changing physiological activities to keep conditions within the range required to survive.
  - An organism's behavior evolves through adaptation to its environment.
- Diversity and adaptations of organisms
  - Biological adaptations include changes in structures, behaviors, or physiology that enhance survival in a particular environment.

**Content Standard F:**

- Personal Health
  - Regular exercise is important to the maintenance and improvement of health.
  - Food provides energy and nutrients for growth and development. Nutrition requirements vary with body weight, age, sex, activity, and body functioning

**Math**

- Data Analysis & Probability
- Use mathematical models to represent and understand quantitative relationships
- Three-dimensional object analysis & volume calculations
- Statistics and data analysis

**Health**

- Explain how health is influenced by the interaction of body systems
- Analyze how environment and personal health are interrelated
- Demonstrate the ability to use resources from home, school, and community that provide valid health information