FDA/NSTA Symposium: Food Science and Nutrition
Friday, November 3, 2006

8:30 AM – 9:00 AM
Welcome, Introductions, Goals for the Symposium

Al Byers, Assistant Executive Director of Government Partnerships and e-Learning, NSTA
Flavio Mendez, Symposia and Web Seminars Program Manager, NSTA
- About NSTA Symposia
- Agenda/Goals
- Forms/Logistics/Introductions

Mark Walderhaug, Ph.D., Division Microbiological Studies, Office of Plant and Dairy Foods, Center for Food Safety and Applied Nutrition (CFSAN), FDA
Camille Brewer, M.S., R.D., Associate Director of the Office of Nutritional Products, Labeling, and Dietary Supplements (ONPLDS); CFSAN; FDA
Sherri McGarry, Office of Compliance, CFSAN, FDA
Shawn Eblen, Office of Science, CFSAN, FDA
Ken Bingman, Master Teacher – High School Science
Mimi Cooper, Master Teacher – Middle School Science
Elena Stowell, Master Teacher – Middle School Science
Louise Dickerson, Project Officer for FDA's Professional Development Program in Food Science

9:00 AM – 9:25 AM
Food: It Shouldn't Be a Mystery…

Shawn Eblen

Learning Outcome:

After participating in the presentation,
- Participants will name two food-associated risks, one nutritional and one microbiological, and one thing that can be done to reduce the risk from each.

9:25 AM – 10:00 AM
Understanding and Using the Food Label

Camille Brewer

Learning Outcomes:

After participating in the presentation,
- Participants will explain how to identify serving size and calories on the label.
- Participants will identify nutrients to limit and nutrients of which to get enough.
- Participants will describe how to use the %DV to help construct a healthy total daily diet.
- Participants will identify two nutrients that do not have %DVs.
- Participants will describe how to compare the amount of sugars in products.

10:00 AM – 10:15 AM
Break

10:15 AM – 11:25 AM

Activity 1: On the Label!

Mimi Cooper and Camille Brewer

Learning Outcomes:

After participating in the activity,

- Participants will explain the relationship between serving size and calories.
- Participants will describe how to use the label to compare the amount of saturated fat in two products.
- Participants will describe how to use the ingredient label to supplement information found on the Nutrition Facts Label.

11:25 AM – 12:15 PM

Lunch

12:15 PM – 12:50 PM

Food Safety and Careers in Food Science

Mark Walderhaug

Learning Outcomes:

After participating in the presentation,

- Participants will list five foodborne pathogens.
- Participants will list, at least, one chemical contaminant in foods.
- Participants will explain how food defense supports food safety.
- Participants will identify three food science careers.

12:50 PM – 2:00 PM

Activity 2: Blue's the Clue

Ken Bingman and Mark Walderhaug

Learning Outcomes:

After participating in the activity,

- Participants will define pasteurization.
- Participants will describe one method of detecting the presence of bacteria in a liquid.
- Participants will explain how some types of milk can stay fresh and safe without being refrigerated.
- Participants will describe how an indicator, such as methylene blue, is used in food science.

2:00 PM – 2:25 PM

Break

2:25 PM – 3:00 PM

Investigating an Outbreak

Sherri McGarry

Learning Outcomes:

After participating in the presentation,

- Participants will describe a network of public health officials, laboratories, and health professionals who work together in foodborne disease surveillance.
- Participants will name one of the most frequent pathogens associated with outbreaks.

- Participants will describe how the type of pathogen helps investigators narrow the source of contamination.
- Participants will briefly describe how one known outbreak originated.

3:00 PM – 4:10 PM

Activity 3: Outbreak Alert!

Elena Stowell and Sherri McGarry

Learning Outcomes:

After participating in the activity,

- Participants will identify five general key questions important to an outbreak investigation.
- Participants will describe the importance of retail foodservice employee hygiene in preventing foodborne illness.
- Participants will describe what is meant by carrier status.

4:10 PM – 4:30 PM

Presenting Dr. X and *The Science in Our Food Supply* Curriculum

Ken Bingman

4:30 PM – 5:00 PM

Final Words

- Post-assessment form
- Evaluation form/Survey/Credit info
- NSTA Web Seminars
- Raffle of door prizes

National Science Education Standards Addressed:
Content Standards, 5-8

Content Standard A:
Abilities Necessary to do Scientific Inquiry

- Design and conduct a scientific investigation.
- Use appropriate tools and techniques to gather, analyze, and interpret data.
- Develop descriptions, explanations, predictions and models using evidence.
- Recognize and analyze alternative explanations and predictions.
- Communicate scientific procedures and explanations.
- Use mathematics in all aspects of scientific inquiry.

Understanding about Scientific Inquiry

- Different kinds of questions suggest different kinds of scientific investigations. Some investigations involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.

Content Standard B:
Physical Science
As a result of their activities in grades 5-8, all students should develop an understanding of

- Properties and Changes of Properties of Matter
  - A substance has characteristic properties, such as density, a boiling point, and solubility, all of which are independent of the amount of the sample. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.
  - Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties. In chemical reactions, the total mass is conserved. Substances often are placed in categories or groups if they react in similar ways: metals is an example of such a group.
  - Chemical elements do not break down during normal laboratory reactions involving such treatments as heating, exposure to electric current, or reaction with acids. There are more than 100 known elements that combine in a multitude of ways to produce compounds, which account for the living and nonliving substances we encounter.

Content Standard C:
Life Science
As a result of their activities in grades 5-8, all students should develop an understanding of

- Structure and Function in Living Systems
  - All organisms are composed of cells – the fundamental unit of life. Most organisms are single cells; other organisms, including humans, are multicellular.
  - Cells carry on the many functions needed to sustain life. They grow and divide, thereby producing more cells. This requires that they take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or an organism needs.
  - The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control and coordination and for protection from disease. These systems interact with one another.

  - Disease is a breakdown in structures or functions of an organism. Some diseases are the result of intrinsic failures of the system. Others are the result of damage by infection by other organisms.
- Reproduction and Heredity
  - Reproduction is a characteristic of all living systems; because no individual organism lives forever, reproduction is essential to the continuation of every species. Some organisms reproduce asexually. Other organisms reproduce sexually.
- 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 external environment.
  - All organisms are composed of cells – the fundamental unit of life. Most organisms are single cells; other organisms, including humans, are multicellular.
  - Cells carry on many functions needed to sustain life. They grow and divide, thereby producing more cells. This requires that they take in nutrients, which they use to provide energy for the work that cells do and make the materials that, a cell or an organism needs.

Content Standard E:
Science and Technology
As a result of activities in grades 5-8, all students should develop

- Understandings about Science and Technology
  - Scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world, and engineers propose solutions relating to human problems, needs, and aspirations. Technological solutions are temporary; technologies exist within nature and so they cannot contravene physical or biological principles; technological solutions have side effects; and technologies cost, carry risks, and provide benefits.
  - Many different people in different cultures have made and continue to make contributions to science and technology.
  - Science and technology are reciprocal. Science helps drive technology, as it addresses questions that demand more sophisticated instruments and provides principles for better instrumentation and technique. Technology is essential to science, because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable due to factors such as quantity, distance, location, size, and speed. Technology also provides tools for investigations, inquiry, and analysis.
  - Perfectly designed solutions do not exist. All technological solutions have trade-offs, such as safety, cost, efficiency, and appearance. Engineers often build in back-up systems to provide safety. Risk is part of living in a highly technological world. Reducing risk often results in new technology.
  - Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.
  - Technological solutions have intended benefits and unintended consequences. Some consequences can be predicted, others cannot.

Content Standard F:
Science in Personal and Social Perspectives
As a result of their activities in grades 5-8, all students should develop understanding of

- Personal Health
  - Regular exercise is important to the maintenance and improvement of health. The benefits of physical fitness include maintaining healthy weight, having energy and strength for routine activities, good muscle tone, bone strength, strong heart/lung systems, and improved mental health. Personal exercise, especially developing cardiovascular endurance, is the foundation of physical fitness.
  - The potential for accidents and the existence of hazards imposes the need for injury prevention. Safe living involves the development and use of safety precautions and the recognition of risk in personal decisions. Injury prevention has personal and social dimensions.
  - Food provides energy and nutrients for growth and development. Nutrition requirements vary with body weight, age, sex, activity, and body functioning.
  - Natural environments may contain substances (for example, radon and lead) that are harmful to human beings. Maintaining environmental health involves establishing or monitoring quality standards related to use of soil, water, and air.
- Populations, Resources, and Environments
  - When an area becomes overpopulated, the environment will become degraded due to the increased use of resources.
  - Causes of environmental degradation and resource depletion vary from region to region and from country to country.
- Natural Hazards
  - Human activities also can induce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal. Such activities can accelerate many natural changes.
- Risks and Benefits
  - Risk analysis considers the type of hazard and estimates the number of people that might be exposed and the number likely to suffer consequences. The results are used to determine the options for reducing or eliminating risks.
  - Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes, and volcanic eruptions), with chemical hazards (pollutants in air, water, soil, and food), with biological hazards (pollen, viruses, bacterial, and parasites), social hazards (occupational safety and transportation), and with personal hazards (smoking, dieting, and drinking).
  - Individuals can use a systematic approach to thinking critically about risks and benefits. Examples include applying probability estimates to risks and comparing them to estimated personal and social benefits.
  - Important personal and social decisions are made based on perceptions of benefits and risks.
- Science and Technology in Society
  - Science influences society through its knowledge and worldview. Scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment. The effect of science on society is neither entirely beneficial nor entirely detrimental. Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research.

- Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research
- Technology influences society through its products and processes. Technology influences the quality of life and the ways people act and interact. Technological changes are often accompanied by social, political, and economic changes that can be beneficial or detrimental to individuals and to society. Social needs, attitudes, and values influence the direction of technological development.
- Science and technology have advanced through contributions of many different people, in different cultures, at different times in history. Science and technology have contributed enormously to economic growth and productivity among societies and groups within societies.
- Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
- Science cannot answer all questions and technology cannot solve all human problems or meet all human needs. Students should understand the difference between scientific and other questions. They should appreciate what science and technology can reasonably contribute to society and what they cannot do. For example, new technologies often will decrease some risks and increase others.

Content Standard G:
History and Nature of Science
As a result of their activities in grades 5-8, all students should develop understanding of

- Science as a Human Endeavor
  - Women and men of various social and ethnic backgrounds--and with diverse interests, talents, qualities, and motivations--engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams, and some work alone, but all communicate extensively with others.
  - Science requires different abilities, depending on such factors as the field of study and type of inquiry. Science is very much a human endeavor, and the work of science relies on basic human qualities, such as reasoning, insight, energy, skill, and creativity--as well as on scientific habits of mind, such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas.
- Nature of Science
  - Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models. Although all scientific ideas are tentative and subject to change and improvement in principle, for most major ideas in science, there is much experimental and observational confirmation. Those ideas are not likely to change greatly in the future. Scientists do and have changed their ideas about nature when they encounter new experimental evidence that does not match their existing explanations.
  - In areas where active research is being pursued and in which there is not a great deal of experimental or observational evidence and understanding, it is normal for scientists to differ with one another about the interpretation of the evidence or theory being considered. Different scientists might publish conflicting experimental results or might draw different conclusions from the same data. Ideally, scientists acknowledge such conflict and work towards finding evidence that will resolve their disagreement.
  - It is part of scientific inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists. Evaluation includes reviewing the experimental procedures, examining the evidence, identifying faulty

reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Although scientists may disagree about explanations of phenomena, about interpretations of data, or about the value of rival theories, they do agree that questioning, response to criticism, and open communication are integral to the process of science. As scientific knowledge evolves, major disagreements are eventually resolved through such interactions between scientists.

- History of Science
  - Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science, and the relationships between science and society.
  - In historical perspective, science has been practiced by different individuals in different cultures. In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture.
  - Tracing the history of science can show how difficult it was for scientific innovators to break through the accepted ideas of their time to reach the conclusions that we currently take for granted.