

The NASA SCI Files™
The Case of the Physical Fitness Challenge

Segment 2

Back at the tree house, RJ and Kali dial up Dr. Scott Smith at NASA Johnson Space Center in Houston, Texas, who explains how muscles and bones work together in the musculoskeletal system. He also makes clear the importance of nutrition and physical activity for the growth of healthy bones and explains why astronauts must continue to exercise in space to maintain bone health. Deciding that bones are an important part of being physically fit, RJ and Bianca check out the NASA SCI Files™ Kids' Club to learn more, and they dial up a classroom in Dundee, Scotland. Mr. David Shand's class at the Harris Academy has just finished conducting an experiment on how calcium loss affects bones. The detectives begin to realize that nutrition plays an important role in being physically fit and staying healthy. They decide to contact a doctor to learn more about nutrition. Bianca is on her way to Washington, D.C. and is able to get an appointment with Vice Admiral Richard H. Carmona, M.D., M.P.H., FACS, the U.S. Surgeon General! Vice Admiral Carmona explains what nutrients are and why they are important to good health. Meanwhile, back at Dr. D's lab, Dr. D explains that a calorie is a unit of measure that tells us the amount of energy stored in food and how our bodies combine oxygen with nutrients to produce energy. The detectives are sure they are on the right track but realize that there is much more to learn.

Objectives

Students will

- compare the amount of calcium needed by the body at different developmental stages.
- demonstrate the effect of calcium loss on bones.
- prove the importance of calcium in building and maintaining strong bones.
- calculate the amount of calcium consumed daily.
- identify the function of vitamins and minerals that are important to a healthy body.
- plan a nutritionally balanced snack.
- design a realistic nutrition label.

Vocabulary

bone marrow – soft tissue filling the spongy inside of bones; the purpose of bone marrow is to make new blood cells

calorie – a unit of measure that tells us the amount of energy stored in food

carbohydrates – a large group of compounds that includes sugars and starches, which are made naturally by plants and are one source of food energy (calories)

fat – an oily substance found in foods that is a source of energy (calories); excess fat is stored by the body and may cause health problems

ligaments – a strong band of white fibrous tissue that connects bones and cartilage

macronutrients – groups of nutrients, such as carbohydrates, proteins, and fats that provide energy and make up the bulk of the diet (nutrients required in small amounts are called micronutrients)

metabolism – all chemical processes of a living body; metabolism is influenced by exercise, food, and temperature

musculoskeletal system – network of bones and muscles that work together to move the entire body

nutrients – materials in foods that people need to grow and stay healthy

osteoporosis – a bone-thinning disease in which the levels of calcium in the body drop below what is needed, resulting in weakened bones and an increased risk of fractures or breaks

proteins – compounds that are very important for almost all parts of the body; also a source of food energy (calories)