

Basic Minerals - Macro and Trace

Summary

Function and sources of minerals and their role regarding optimum health.

Main Core Tie

Food And Nutrition

[Strand 5 Standard 2](#)

Materials

Any good Food and Nutrition text book.

American Cancer materials available from the local office of the American Cancer Society or by calling toll-free: 1-800-ACS-2345

Utah Office of the American Cancer Society, 941 East 3300 South, Salt Lake City, Utah 84106
Wellness Encyclopedia of Food and Nutrition, Sheldon Argen, M.D., and the Editors of the University of California at Berkeley WELLNESS LETTER, PO Box 420148, Palm Coast, Florida 32142. www.wellnessletter.com

Background for Teachers

Examine minerals as food nutrients and study their functions in the body and food sources in the diet. Minerals are found in nearly all the foods listed on MyPyramid. They do not supply energy as carbohydrates, fats and proteins do, but they are essential because they regulate the body chemistry and body functions.

Minerals cannot be produced by our bodies. They must be ingested (eaten in our food). Minerals are sometimes chemical constituents of vitamins. Minerals are also found in enzymes, hormones, bones and muscles. Minerals can become part of the body's structure. There are about sixty different minerals that make up about four percent of the body. Science is still learning about many of the functions of minerals.

Minerals are also divided into two groups. Macrominerals are found in relatively large amounts and trace minerals are found in very small amounts in the body. An incomplete list of minerals include:

MACROMINERALS	TRACE MINERALS
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Calcium	Iron
Phosphorus	Zinc
Sodium	Fluorine
Potassium	Copper
Iodine	

FUNCTIONS OF MINERALS

Calcium - strong bones and teeth

Phosphorus - strong bones and teeth

Sodium - maintains balance for water flow in and out of cell

Potassium - crucial in regulating the heartbeat

Iron - lets red blood cells carry oxygen, prevents anemia

Zinc - part of an enzyme involved in acid-base balance, liver function, digestion, and bone maintenance, prevents loss of sense of taste, growth failure, delayed healing of wounds, reproduction problems

Fluorine - produces tooth structure that resists acids, prevents tooth decay

Copper - used in breathing, energy release, production of red blood cells

Iodine - important component of thyroid hormones for metabolism

Instructional Procedures

LEARNING ACTIVITIES AND TEACHING STRATEGIES

OPTION #1

Have students take notes on minerals. Continue using the [SIX ESSENTIAL NUTRIENTS worksheet](#) found in the MyPyramid discussion section. Add to the bulletin board display.

OPTION # 2

To introduce minerals, have the students solve the following nutrition mystery. Do as a cooperative learning experience within each unit. After unit discussion, a spokesperson gives the solution from that unit.

"A two-year-old child, Sonya, craves mud pies and cat litter even though her parents provide her with a varied and healthy diet. Her parents can't solve this mystery. Can you?"

(Sonya's craving could be caused by a lack of minerals in her body. Both mud pies and cat litter contain minerals.)

OPTION #3

Have the students identify major and trace minerals. Have the students use the resource, [MINERAL SEARCH](#), to record their notes. Review with the class the general function of all minerals. Tell why some minerals are classified as major and some as trace minerals. Discuss mineral deficiency diseases.

calcium

potassium

iron

fluorine

iodine

phosphorus

sodium

zinc

copper

VARIATION: Create an advertisement and/or a bulletin board that sells a particular mineral. Have students work in groups. The advertisement or bulletin board must include: food sources, function in the body, deficiency disease. Use [EVALUATION FORM FOR MINERAL PRESENTATION](#) to judge results.

VARIATION: Have each group or team write one test question and the answer to that question. These could be compiled to comprise a quiz.

OPTION #4

Have the students find recipes which will make vegetables more appetizing and still maintain their nutrient value.

As a class, compare the nutrient differences between the raw vegetables and their prepared counterparts. Use nutritive values charts that you used in Section IV Unit 1--Basic Vitamins.

OR compare nutritive values of dark green vegetables vs. light green. Orange vegetables vs. white. You'll see that darker vegetables are rich in vitamins and minerals. That's why MyPyramid suggests eating a variety of vegetables and including the dark green and orange and red vegetables.

NOTE TO TEACHER: Students who are not experienced in reading the nutritive value charts will need some direction. They should not assume that a low number automatically translates to a low nutritive value. Have the students look at the % of RDA in order to make a value comparison. Helping them to read the charts is an excellent way to teach reading in the content area. For example 1000 IU of Vitamin A looks like a great amount but it is only 20% of the RDA.

Demonstrate the use of a variety of kitchen utensils used in various cooking methods and procedures. Beside conventional cooking pans, etc., demonstrate the use of the crock pot, pressure pan, electric fry pan, and microwave oven.

Have students research to discover what happens to minerals when vegetables are cooked. Have them complete the worksheet [RAW VS. COOKED](#). Discuss various cooking methods best suited for cooking vegetables.

VARIATION: Have each group prepare one recipe. Assign each unit a different vegetable recipe, and perhaps a different cooking or preparation technique. (This could be done as a round robin activity). Have them prepare that vegetable in two different ways. Assemble the prepared dishes in one location. Have students compare cooking methods visually and by taste. Discuss results.

NOTE TO TEACHER: An additional bit of information is an article by Beth Weinhouse reporting on Best Ways to Get the Broccoli Benefit. Quote: "We now know that eating broccoli can ward off cancer, thanks to a special chemical it contains, but how you cook the vegetable may be crucial to getting the full benefit. Best bets are microwaving and steaming because they leave the cancer-fighting chemical intact, say researchers at Baltimore's Johns Hopkins University (other cooking methods are still being studied). If you can't stand broccoli no matter how it's cooked, don't worry: high levels of the same chemical also show up in kale, cauliflower, brussels sprouts, carrots, and green onions."

OPTION #5

Discuss nutrient preservation. Select and display one raw vegetable with questionable popularity along with its nutrient content. Pose the questions, "If you don't like any vegetables, what can you do? What could be done to make this vegetable more appetizing?" On the chalkboard, help the students develop a list of techniques that will preserve the nutrient content. Include refrigeration, cutting, length of cooking time, cooking medium, temperature, and exposure to air.

VARIATION: Display a large variety of fresh vegetables. Place a stand-up card in front of each vegetable that gives the nutritive content of that vegetable. Have students select a vegetable to prepare (teacher can supply recipes or have students find their own). Have students calculate the calcium and sodium content of one serving and identify other foods that could be eaten in the meal to obtain 100% of the recommended daily allowance for calcium.

OPTION #6

Calcium -- Discuss the importance of calcium, especially to teenagers.

Have the students brainstorm ten ways for people who do not like to drink milk to increase their calcium consumption. Pass out copies of Nutritive Value booklets. Have students search for foods that are high in calcium. Record ideas on the chalkboard.

Teacher reference list for brainstorm session:

- homemade vegetable soup made with a soup bone

- 3 oz. canned salmon or sardines (with bones) -- 275 mg.

- 4 oz. tofu -- 150 mg.

- 1 portion bread or cereal made with calcium rich cornmeal -- 100 mg.

- 1 Tbsp. blackstrap molasses -- 150 mg.

- 1 c. calcium rich vegetables such as broccoli -- 200 mg.

- nuts: almonds, hazelnuts, peanuts, walnuts

- Any milk-based food: combination dishes such as macaroni and cheese

Supportive background information on calcium:

- For teenagers the RDA for calcium is 1200 milligrams daily

- Dark green leafy vegetables contain great amounts, but when eaten and digested, calcium passes right through unabsorbed. (Except for that in broccoli)

- All grains contain calcium but it is relatively unavailable for absorption. They contain calcium binders that hold on to the calcium and prevent absorption.

- Calcium needs to be included in the diet daily. If there is a sudden need for calcium and it isn't present in the blood, a mineral bank is available in the bones for instant withdrawal of any needed amount and the body will never feel the symptom. But, bones have been weakened.

When diets are high in protein, calcium is fully utilized and is excreted in the urine.

OPTION #7

Review (or use as an evaluation) the vitamin and mineral information by playing a Bingo game. Make cards with five boxes across and down -- [VITAMIN & MINERAL BINGO](#). Have the students fill in the nutrient names as the teacher gives clues using functions, sources, and deficiency diseases. Use VITAMIN BASICS and MINERAL SEARCH as a resource.

VARIATION: Divide the class into two groups (or divide each unit into two groups). Have groups sit opposite each other. Using flash cards containing the names of the vitamins and minerals, hold them over the heads of one group and have the other group give clues, functions, sources, and deficiency diseases. Students have one minute to guess what is on the flash card. Points are given for each card correctly identified.

NOTE TO TEACHER: This variation is an excellent review for the post test or final evaluation.

OPTION #8

As a final evaluation for basic minerals, have the students complete [MINERALS](#).

Bibliography

American Cancer Society (941 E 3300 S, SLC, UT 84106,)

Authors

[Utah LessonPlans](#)