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Nutrition and Cancer: Food Choices to Reduce Cancer Risk

Michigan State University Extension Service

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# Nutrition and Cancer:

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*Food  
Choices  
to  
Reduce  
Cancer  
Risk*



# Nutrition and Cancer

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Good nutrition always has been an essential key to staying healthy. Today it is widely recognized that the food you eat — or don't eat — can help cause or prevent serious diseases, including cancer.

Many questions remain regarding nutrition and cancer. Research has produced conflicting results. Thus, guidelines that are issued by various agencies and organizations for reducing cancer risk do not agree completely. The lack of agreement, however, is due to what guidelines to include, rather than conflicting recommendations.

There is little disagreement about the recommendations here. They are consistent with the Dietary Guidelines for Americans developed to help people, through good nutrition, reduce their risk of major chronic disease. These recommendations focus on:

1. the relationship between cancer and dietary fat and fiber
2. vegetables and fruits that provide vitamins A and C
3. body weight as it relates to cancer prevention
4. the protective effect of cruciferous vegetables.

In addition, frequently asked questions are answered about food additives, caffeine, alcohol, cured or smoked foods and charcoal-grilled meats.

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## *Dietary Guidelines for Americans*

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- Eat a variety of foods
- Maintain desirable weight
- Avoid too much fat, saturated fat and cholesterol
- Eat foods with adequate starch and fiber
- Avoid too much sugar
- Avoid too much sodium
- If you drink alcoholic beverages, do so in moderation

# Dietary Fat

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Many studies have shown a relationship between cancer and eating excessive amounts of fat. Breast cancer has been shown to be related to eating fatty foods. High fat intake also is a risk factor for cancer of the prostate. Colon cancer has been linked to diets high in fat and this association is stronger if the high-fat diet is low in fiber content as well.

We do not know how fat influences cancer development, although much research is underway. One theory is that fat may be converted into cancer-causing substances through chemical processes in the body.

The National Research Council's Committee on Diet, Nutrition and Cancer recommends "that the

consumption of both saturated and unsaturated fat be reduced in the average U.S. diet." It suggests reducing fat intake to 30 percent of total calories (the average now is 41 percent). Furthermore, it recommends that calories from polyunsaturated fat be no greater than 10 percent of total calories, because research indicates polyunsaturated fat may be more harmful than saturated fat in relation to cancer risk.

The role of dietary cholesterol (a substance found in animal products) in cancer risk is unclear at this time.

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## Ways to Reduce Fat in Your Diet

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- Buy lean meats; before cooking, trim and discard fat.
- Choose low-fat dairy products such as ½ or 2 percent milk; use skim milk.
- Broil, roast, bake, or poach meat, poultry, and fish instead of frying.
- Eat less high-fat foods such as fried batter-dipped fish and hush puppies, sausage, spare-ribs, potato chips and ice cream.
- Use moderate amounts of butter, margarine, sour cream, salad dressings, mayonnaise and other high-fat items.
- Try herbs, spices, lemon juice and other fat-free seasonings in cooked vegetables and on fresh salads.

- Read food labels for fat content to determine calories from fat: one gram of fat has nine calories.

(For additional suggestions, see MSU Extension bulletin E-1856, "Nutrition & Your Health: Dietary Fat.")

Fish and fish oils contain a unique type of fat (omega-3 fatty acids) which has been shown to reduce cancer development. Some scientists believe that certain people, such as Eskimos, who eat a high-fat diet from fish and other marine animals, are protected by this special fat. Still, it is too early to recommend eating more fish as a cancer preventive. Enjoy it for what it is — a source of protein and other nutrients.

# Fiber



Fiber is the indigestible remnant of plant cells that is found in vegetables, fruits, grains, nuts and beans. Fiber, or roughage, helps move food materials through the intestinal tract smoothly and quickly. With a low-fiber diet, food material can take two to three times longer to pass through the body than with a diet containing an adequate amount of fiber.

Fiber plays an essential role in health. A diet adequate in fiber reduces the risk of developing cancer of the colon, while a diet low in fiber has been shown to be associated with this type of cancer.

The mechanism by which fiber reduces cancer risk is not fully understood. Studies suggest two possible ways:

1. Since fiber causes food material to pass through the digestive system rapidly, cancer-causing substances that may be present have less time to exert their harmful effects.
2. Dietary fat seems to increase the production of bile acids in the digestive system and some of these acids are believed to promote colon cancer. The bulk produced by dietary fiber may dilute these acids and lower cancer risk in this way.

There is no official recommendation on how much fiber you should eat. Nutritionists suggest 25 to 45 grams a day depending on body size. The average American diet is estimated to contain 10 to 20 grams of fiber per day. Eating daily a wide variety of vegetables, fruits, and whole-grain cereals and breads with an occasional serving of legumes will provide adequate fiber.

When foods are refined, such as when rice is polished or wheat is milled, much of the fiber is lost. Thus, whole-grain breads and cereals provide more fiber than the

more common white products. In fruits, the skin, seeds and pulp contain most of the fiber.

Many people think that cooking destroys or reduces the amount of fiber in food. In most foods, cooking does not decrease the amount of fiber or the healthful properties of fiber. Thus, it is not necessary to eat large quantities of raw foods to get adequate fiber.

Research is still being done to measure the fiber content of different foods and to determine which type of fiber is most effective. An incomplete list of fiber sources appears here.

Other lists of the fiber content of foods may give different figures. The method used to measure fiber and the maturity of the food sample tested contribute to these differences.

Note that meat, dairy products, sweeteners, fats and oils do not appear on this list. They contain no fiber.

One final note about fiber. It is best to get fiber from vegetables, fruits, breads, cereals, legumes and nuts. Unprocessed bran and special fiber supplements are not necessary.

# Sources of Fiber



## Ways to Get Enough Fiber

- Include four or more servings of food from the vegetable & fruit group and the bread & cereal group daily.
- Occasionally substitute legumes for meat.
- Try a high-fiber version of a food to increase your fiber intake. A fresh apple instead of apple juice, 100 percent whole-wheat bread instead of enriched white bread or sliced peaches instead of peach pie are examples.
- Snack on fresh vegetables, fruits and whole-wheat crackers instead of candies, cakes, chips and other empty-calorie foods.

Source	Grams of Fiber
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### Flour

Whole-wheat flour, 1 cup (120g) .....	11.4
Enriched flour, all purpose, 1 cup (137g) .....	4.3
Bran flour, 1 cup (60g).....	26.4

### Bread

Whole-wheat, 1 slice (28g) .....	2.4
White, 1 slice (22g) .....	0.6

### Cereals

Shredded Wheat, crumbled, 1 cup (35g) .....	4.3
Corn Flakes, 1 cup (25g) .....	2.8
Rice Crispies, 1 cup (28g).....	1.2
Grape-Nuts, 1 cup (28g) .....	2.0
All-Bran, 1 cup (56g) .....	15.0
Puffed Wheat, 1 cup (14g) .....	2.2

### Legumes

Baked beans, ½ cup (100g) .....	7.2
Pinto, white, kidney beans, ½ cup (90g) .....	4.0 (approx.)

### Vegetables

Broccoli, boiled, 1 stalk (180g).....	7.4
Cabbage, boiled, ½ cup (73g) .....	2.1
Cauliflower, boiled, ½ cup (63g).....	1.1
Lettuce, raw, shredded, 1 cup (55g) .....	0.8
Peas, boiled, ½ cup (80g) .....	6.2
Carrots, boiled, ½ cup (78g) .....	2.9
Potato, medium (150g).....	3.0
Green beans, boiled, ½ cup (65g).....	1.5
Tomato, raw, medium (100g).....	1.4
Sweet corn, ½ cup (83g) .....	3.9

### Fruits

Apple, medium with skin (140g).....	2.3
(Estimated 10% skin, 90% flesh)	
Banana, medium (119g).....	2.1
Peach, medium with skin (100g) .....	2.3
Orange, medium (130g).....	2.0 (approx.)
Strawberries, whole, ½ cup (75g).....	1.6

### Nuts

Peanuts, ½ cup (75g) .....	7.0
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Source: *Understanding Normal and Clinical Nutrition, Whitney and Cataldo, 1983, Appendix K88 (values converted to grams per serving by Fudeko Maruyama).*

# Vitamins A and C

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Scientists who study the foods of people in different countries are finding that diets rich in vitamins A and C help reduce risk for certain cancers. Some research links diets high in vitamin C (also called ascorbic acid) with reduced risk of cancer of the stomach and esophagus. Diets low in vitamin A are linked with increased risk of cancers of the lung, bladder and larynx.

The manner in which these vitamins protect us from cancer is not fully understood. However, scientists recommend that people select vegetables, fruits and other foods high in these vitamins rather

than resorting to vitamin supplements.

Fruits and vegetables are our best sources of vitamins A and C. Many fruits and vegetables are good sources of both vitamins. Also fruits and vegetables are important sources of fiber, other vitamins and minerals, and are generally low in calories. When planning meals that reduce cancer risk, include a variety of fruits and vegetables in liberal amounts

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## Ways to Get Enough Vitamins A and C

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- Eat good sources of vitamin A such as greens (kale, collard, turnip, mustard, spinach, etc.), broccoli and yellow vegetables such as winter squash, sweet potatoes, carrots and pumpkin.
- Include good sources of vitamin C such as citrus fruits, tomatoes, peppers, berries, melons, potatoes, cabbage, broccoli and greens listed above.
- Use raw vegetables in salads or marinated for a snack or first course.
- Snack on fruits or vegetables.
- Use the natural sweetness of fruit to satisfy a sweet tooth.
- Add extra vegetables to stews, casseroles and soups. Try chopped broccoli, spinach or other vegetables as extra toppings on pizza.
- Include two vegetables and a salad in the menu for your main meal.

# Excess Weight



## Body Weight Ranges

Height	Weight <i>(in pounds)</i>	
	Men	Women
4'10".....		92-121
4'11".....		95-124
5' 0".....		98-127
5' 1".....	105-134	101-130
5' 2".....	108-137	104-134
5' 3".....	111-141	107-138
5' 4".....	114-145	110-142
5' 5".....	117-149	114-146
5' 6".....	121-154	118-150
5' 7".....	125-159	122-154
5' 8".....	129-163	126-159
5' 9".....	133-167	130-164
5'10".....	137-172	134-169
5'11".....	141-177	
6' 0".....	145-182	
6' 1".....	149-187	
6' 2".....	153-192	
6' 3".....	157-197	

Fewer calories are the added bonus of a diet moderate in fat and plentiful in vegetables, fruits, and whole grain breads and cereals. Fewer calories, especially in combination with more exercise, result in weight loss. Since excess weight is a problem for many Americans, the American Cancer Society has examined the relationship between obesity and cancer risk in a 12-year study.

They found a notably increased incidence of cancers of the uterus, gall bladder, kidney, stomach, colon and breast associated with obesity. In this study when data for men and women 40 percent or more overweight were reviewed, the women were found to have a 55 percent greater risk and the men 33 percent greater risk of cancer than those of normal weight. Since obesity already is known to be associated with other chronic disorders, a wellness plan should include weight reduction to achieve desirable weight if you are already overweight.

*Note: For women 18-25 years, subtract one pound for each year under 25.*

*Source: Dietary Guidelines for Americans, Second Edition, 1985, USDA and USHHS.*



# Cruciferous Vegetables



Research indicates that certain components of food reduce the likelihood of developing cancer; vitamins A and C and fiber have already been discussed. Studies also point to an as yet unidentified substance in cruciferous vegetables which protects against cancer.

Cruciferous vegetables are of the mustard family, many of which grow well in Kentucky and are well liked. Included in the cruciferae family are:

*Broccoli*  
*Brussels Sprouts*  
*Cabbage*  
*Cauliflower*  
*Chinese Cabbage*  
*Collards*  
*Cress ("Creasies")*  
*Horseradish*  
*Kale*  
*Kohlrabi*  
*Mustard Greens*  
*Radishes*  
*Rutabagas*  
*Turnips*  
*Turnip Greens*  
*Watercress*

Many of these vegetables can be eaten raw in salads or cooked.

Many cruciferous vegetables are excellent sources of both vitamins A and C as well. They also provide dietary fiber.

The exact nature of the substance which protects against cancer is unknown at this time. Scientists are working to identify the substance. In the meantime, the American Cancer Society recommends about two servings of cruciferous vegetables per week. More than that is not recommended because of the presence of potentially harmful substances that can cause goiter.

## Variety and Balance

In addition to vegetables and fruits and breads and cereals, foods from two other groups are essential for good health:

- Milk, cheese, yogurt and other products made from milk.
- Meats, poultry, fish, eggs and dry beans.

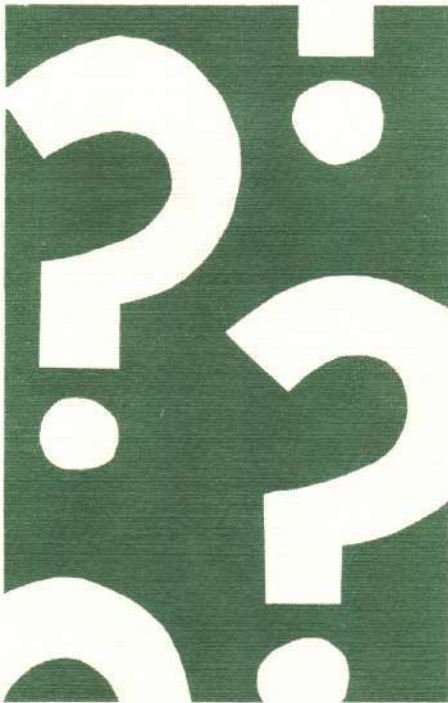
It is important to keep the diet in balance. Too much of any food or

nutrient can harm the body. For example, too much fiber can reduce absorption of trace minerals such as zinc and iron.

The link between cancer, diet and nutrition is complex. Research will continue to add to our knowledge about how dietary components influence cancerous cells.

# Issues and Answers

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**A.**

The possible cancer-causing effect of caffeine has been investigated in many studies with animals, but no proof has been found. In some studies, caffeine appears to prevent cancerous cells while in others it enhanced cell growth. Coffee has been reported to be associated with the development of urinary tract cancer, pancreatic cancer, and ovarian and breast cancer. The research, however, has not been confirmed. Thus the belief at this time is that neither caffeine nor coffee appear to be harmful as far as cancer risk is concerned. Caffeine is found naturally in coffee, tea, and cocoa and as an additive in other beverages such as soft drinks. Caffeine also is added to many medications, notably analgesics (pain medicines) and diet aids.

**Q.**

Do charcoal-grilled meats cause cancer?

**A.**

Theoretically, fat and meat juices dripping on hot coals (or meat cooked at high temperatures in a broiler or a very hot frying pan) can form carcinogens (cancer-causing agents) that rise in the smoke and are deposited on the meat. The amounts produced are extremely small and the risk is very remote. There is no convincing research data indicating that eating charcoal-grilled meats poses any hazard to your health when eaten in moderation.

**Q.**

Do coffee or caffeine cause cancer?

excessive? More than two drinks a day, according to most authorities.

**Q.**

Will avoiding processed foods that contain additives reduce cancer risk?

**A.**

The National Research Council Committee on Diet, Nutrition and Cancer studied this question and concluded that the increasing use of food additives has not contributed significantly to the overall risk of cancer for humans. Additives must be evaluated for cancer causing activity before they are approved for use in processed food.

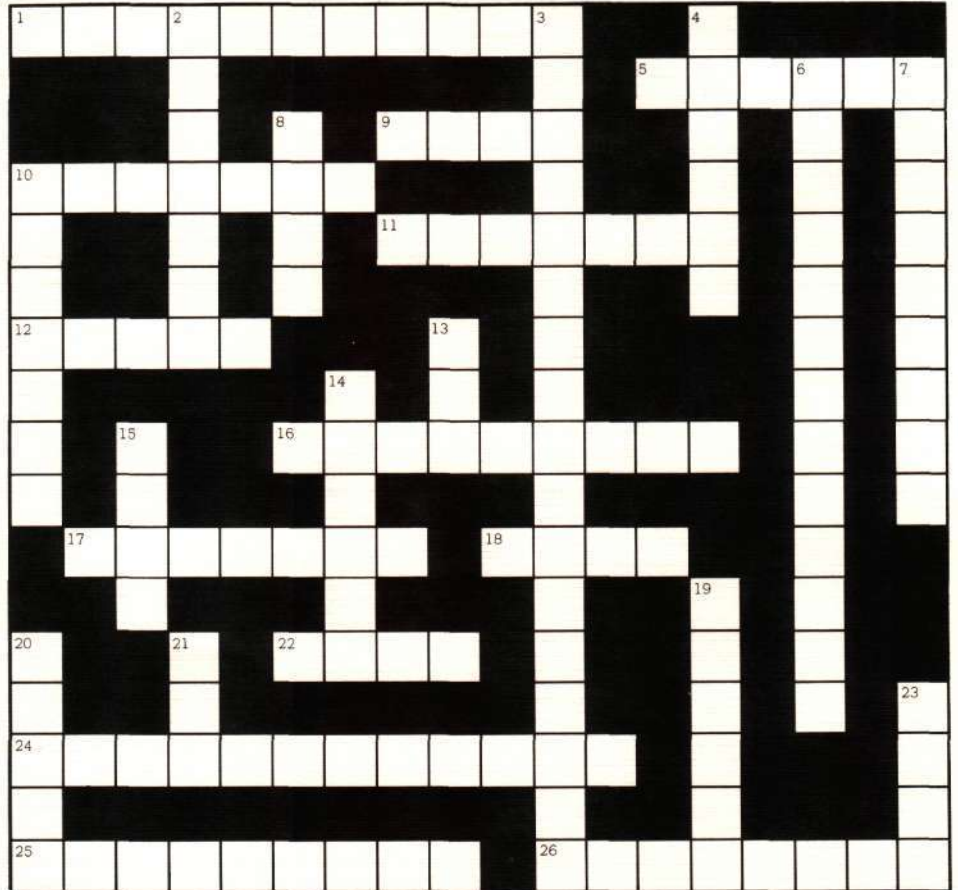
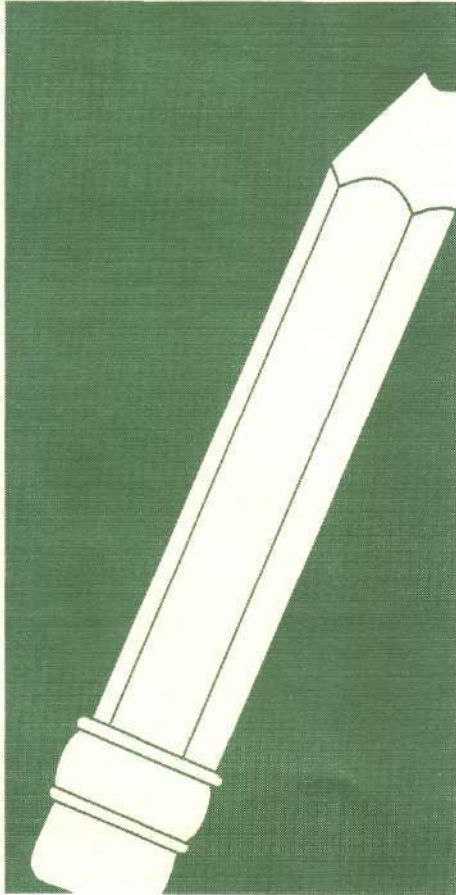
**Q.**

Why does the American Cancer Society say "Eat moderately of salt-cured, smoked and nitrite-cured foods"?

**A.**

In some parts of the world, especially China, Japan and Iceland, where salt-cured or smoked foods are popular, there is a higher incidence of cancers of the esophagus and stomach. The American food industry is developing new processes to minimize possible cancer-causing chemicals. "Liquid smoke," a flavoring now used by some food processors, is thought to be less hazardous than "true smoke". The United States Department of Agriculture and the meat industry have substantially reduced the amount of nitrite used in curing meat. Moderation is the key word.

# Nutrition Crossword Puzzle



## Clues

### ACROSS

- 1 Kind of fat, usually liquid
- 5 Apples for example
- 9 Healthful way to cook meat
- 10 Unit of energy
- 11 A or C, for example
- 12 \_\_\_\_\_ wheat
- 16 Meat process to limit in diet: two words
- 17 Goal of a healthy diet
- 18 Committee on Diet, Nutrition and Cancer: abbr.
- 22 Unit of measure
- 24 Precursor of vitamin A

- 25 Form of cancer treatment

- 26 Mineral studied in cancer research

### DOWN

- 2 Beverage to consume in moderation
- 3 Cancer prevention recommendations
- 4 Vegetable leaves and stems
- 6 \_\_\_\_\_ units, vitamin measure
- 7 Kind of fat, usually solid

- 8 A cereal grain

- 10 Fish/vegetable stew

- 13 40% of average U.S. diet

- 14 Malignant tumor

- 15 Lowfat meat

- 19 Kidney bean, for example

- 20 Bulk in diet

- 21 Recommended Daily Allowance: abbr.

- 23 \_\_\_\_\_ milk

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# References

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**Diet, Nutrition, and Cancer Prevention: A Guide to Food Choices**, U.S. Department of Health and Human Services, Public Health Service, National Institute of Health, November 1984.

**Planning Meals That Lower Cancer Risk: A Reference Guide**, American Institute for Cancer Research, 1984. **Nutrition, Common Sense and Cancer**, American Cancer Society, 1984.

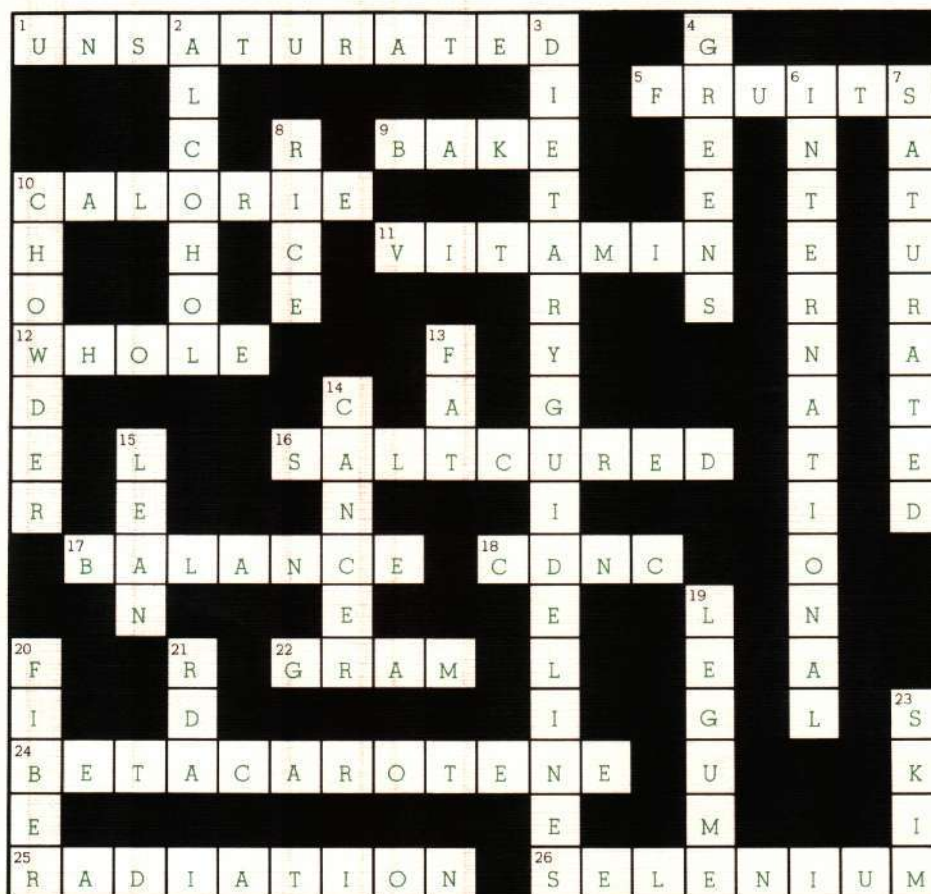
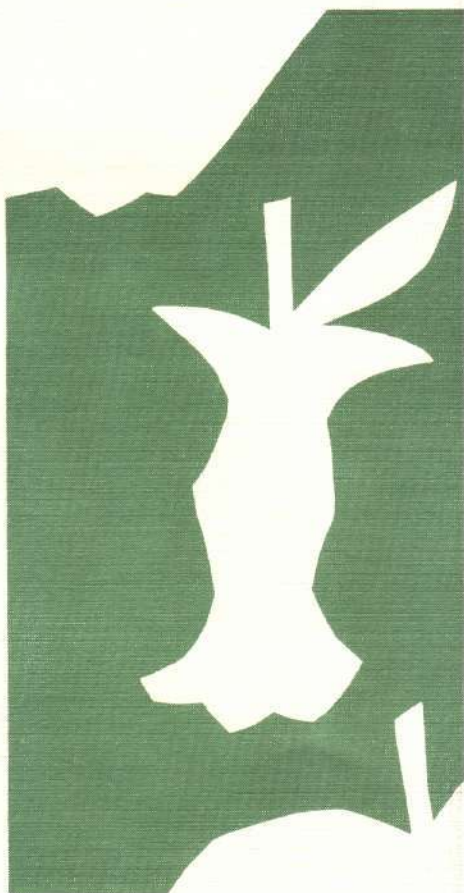
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*Dietary fiber constituents of selected fruits and vegetables*. J. K. Ross, C. English, and C. A. Perlmutter, **Journal of the American Dietetic Association**, 85, 1111-1116, 1985.

*For solution, see next page.*

# SOLUTION TO NUTRITION CROSSWORD



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For more information about nutrition, contact Judith Anderson, Dr.P.H., R.D., MSU Extension Food and Nutrition Specialist, or consult these MSU publications, available from your county Cooperative Extension Service office:

- E-2144, "Basic Nutrition Facts: A Nutrition Reference," \$2.50

(Single copies of the following are free of charge):

- E-1854, "Nutrition & Your Health: Vitamin A"
- E-1855, "Nutrition & Your Health: Dietary Fiber"
- E-1856, "Nutrition & Your Health: Dietary Fat"
- E-1857, "Nutrition & Your Health: Sodium"
- E-1954, "Nutrition & Your Health: Calcium"
- E-1955, "Nutrition & Your Health: Managing Your Food Choices"
- E-2141, "Nutrition & Your Health: Cholesterol"
- HG232, "Nutrition & Your Health: Dietary Guidelines"
- PA1388, "Using Less Sugar, Fat & Sodium"

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