



## Wildland Firefighter Nutrition Education Program

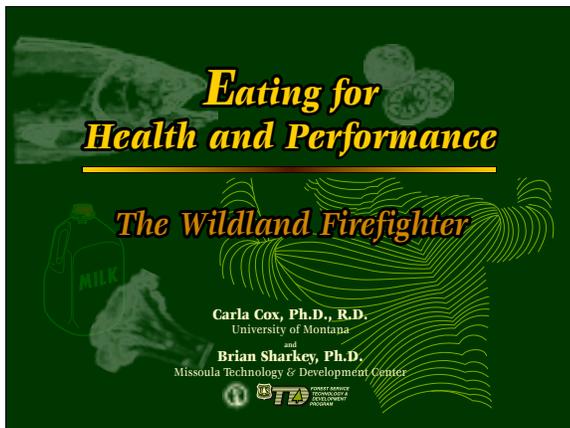
Brian Sharkey, Ph.D., Project Leader

Based on years of study of the energy expenditure and nutritional needs of wildland firefighters, the Missoula Technology and Development Center (MTDC) has developed a nutrition education program: *Eating for Health and Performance: The Wildland Firefighter.*

Recent research has identified nutritional strategies that will improve the health, safety, and performance of wildland firefighters. The right food sources, eaten at the proper times, provide energy and nutrients that help sustain work output and maintain the immune system. Supplemental high-energy foods delay fatigue and further enhance immune function while maintaining the ability to think and make decisions during hard work.

The program was developed by Carla Cox, Ph.D., a registered dietician associated with the University of Montana Human Performance Laboratory, and Brian Sharkey, Ph.D., a project leader at MTDC. Cox's research interests include nutrition for endurance athletes and wildland firefighters. Sharkey has studied wildland firefighters for over 40 years. He is a professor emeritus at the University of Montana and past president of the American College of Sports Medicine.

Firefighters are endurance athletes who require twice as many calories as normal—or more—when they are working on the fireline. To maintain their health and ensure peak performance, firefighters need to eat like endurance athletes. The nutrition education program was designed for wildland firefighters, incident management and support personnel, and those interested in good nutrition for health and performance. The program identifies energy and nutrient needs and discusses the timing of food intake, vitamin and mineral supplements, hydration, and weight management. It emphasizes the value of intermittent feeding (shift food) to maintain blood glucose, work output, immune function, mood, and decisionmaking throughout the workshift.



### Shift food

**Intermittent feeding throughout the shift maintains blood glucose and work output.**

Firefighters select shift food in MTDC/University of Montana field study. The shift food group performed more work than the sack lunch group, even when the energy consumed was the same for both groups.



Slides from the PowerPoint presentation *Eating for Health and Performance: The Wildland Firefighter.*



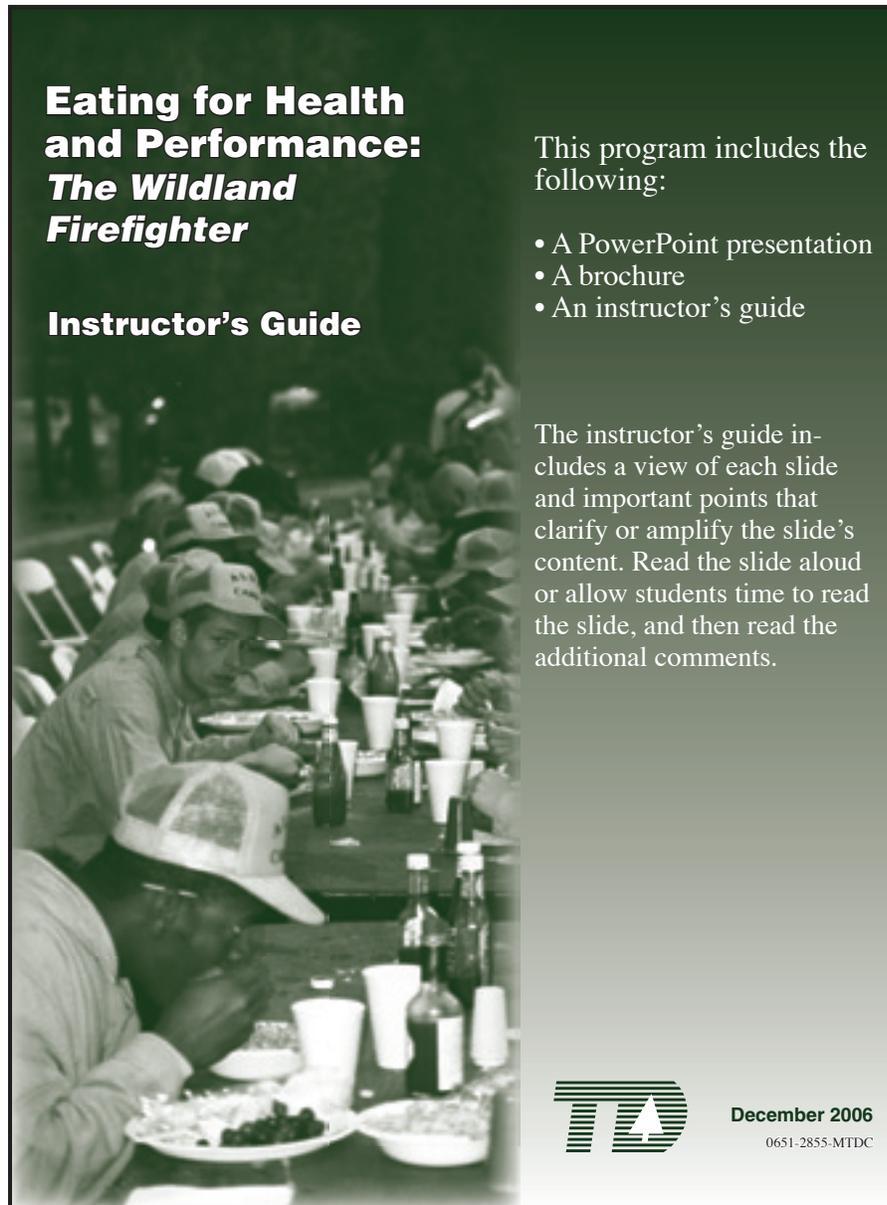
## The Nutrition Education Program

This program includes a PowerPoint presentation, an instructor's guide, and an informational brochure.

The PowerPoint program has three parts:

- Energy for work: calories
- Nutrients and hydration
- Related issues, including immune function, ergogenic aids, special needs of incident management teams, and weight management

Firefighters can take the brochure home to learn more about carbohydrate and protein requirements and to allow them to calculate their individual needs. The brochure also includes the addresses of Web sites that provide additional information. The instructor's guide includes a view of each slide and important points that clarify or amplify the slide's content.



Cover of the instructor's guide for the nutrition education program for wildland firefighters.

# Eating for Health and Performance: The Wildland Firefighter

This brochure will help firefighters balance food intake with energy demands before, during, and after the fire season.



December, 2006

©651-2833-MTDC

## Part I Energy for Work: Calories

Firefighting is a physically demanding occupation that may require 6,000 calories (kilocalories) per day. Firefighters who do not consume enough calories will become fatigued and lose body weight and muscle. Consuming too few calories over the weeks and months of a busy fire season can impair immune function and lead to illness. This is not the time to lose weight. Firefighters should check their weight every 2 weeks to monitor their energy balance. The best time to weigh is in the morning before breakfast (but after urination). Energy (calories) comes from carbohydrate, fat, and protein.

### Carbohydrate

Carbohydrate is converted to energy and stored in the liver and muscle as glycogen (polysaccharide molecules). Muscle glycogen is the primary fuel for the brain and muscle. During firefighting, blood glucose levels drop. To maintain activity, carbohydrates from food are used to produce blood glucose. If there is not enough carbohydrate through food, muscle protein is needed.

### Carbohydrate Requirements

High levels of continuous firefighting on the fireline for hours, increase carbohydrate requirements. Each gram of carbohydrate provides 4 calories of energy.

The following example shows the carbohydrate requirement for a firefighter weighing 154 lbs (70 kilograms).

**Moderate Work**—5 to 7 grams of carbohydrate/kilogram/day x 70 kilograms (body weight) = 350 to 490 grams of carbohydrate/day

**Hard Work**—7 to 10 grams of carbohydrate/kilogram/day x 70 kilograms (body weight) = 490 to 700 grams of carbohydrate/day

For ultraendurance activities or very hard work, such as a long, hard day on the fireline, the carbohydrate requirement could be even higher.

### A firefighter should consume:

	Light work (2,200 calories)	Arduous work (4,400 calories)
<b>Fruit</b>	4 servings (2 cups)	12 servings (6 cups)
<b>Vegetables</b>	4 to 5 servings (2 to 2½ cups)	8 servings (4 cups)
<b>Whole grains*</b>	6 servings	12+ servings
<b>Milk or yogurt</b>	1 to 2 cups	5 cups
<b>Meat, fish**</b>	6 ounces	10 ounces

\*Whole grains and enriched or whole-grain products.

\*\*Meat, fish, or meat substitute.

1

Firefighters can take this brochure home after the training or download it from MTDC's Web site.

## How To Get the Nutrition Education Program

A CD with the PowerPoint program, the brochure, and the instructor's guide can be ordered from MTDC, or the different parts can be downloaded from MTDC's Web site: <http://www.fs.fed.us/t-d/> Username: t-d Password: t-d.



## About the Author

**Brian Sharkey**, an exercise physiologist at MTDC, has researched and developed fitness tests and programs and has studied heat stress, hydration, nutrition, protective clothing, tools, fatigue, work/rest cycles, and employee health (wellness). His work has been honored with USDA Superior Service and Distinguished Service Awards and a Forest Service Technology Transfer Award. He is the author of several books and past president of the American College of Sports Medicine.

---

## Library Card

Sharkey, Brian. 2007. Wildland firefighter nutrition education program. Tech Tip 0751-2302P-MTDC. Missoula, MT: U.S. Department of Agriculture Forest Service, Missoula Technology and Development Center. 4 p.

This tech tip discusses a nutrition education program for wildland firefighters, who may need more than twice as many calories as normal when working on the fireline. The education program includes a PowerPoint presentation, an instructor's guide, and an informational brochure, all available on a CD that can be ordered from MTDC or downloaded from the center's Web site: <http://www.fs.fed.us/t-d>

**Keywords:** fire fighting, firefighting, immune function, incident management, nutrients, shift food, training, wellness

---

### Additional single copies of this document may be ordered from:

USDA Forest Service  
Missoula Technology and Development Center  
5785 Hwy. 10 West  
Missoula, MT 59808-9361  
Phone: 406-329-3978  
Fax: 406-329-3719  
E-mail: [wo\\_mtdc\\_pubs@fs.fed.us](mailto:wo_mtdc_pubs@fs.fed.us)

### Electronic copies of MTDC's documents are available on the Internet at:

<http://www.fs.fed.us/t-d>

### For additional information about nutrition for wildland firefighters, contact Brian Sharkey at MTDC:

Phone: 406-329-3989  
Fax: 406-329-3719  
E-mail: [bsharkey@fs.fed.us](mailto:bsharkey@fs.fed.us)

### Forest Service and Bureau of Land Management employees can search a more complete collection of MTDC's documents, videos, and CDs on their internal computer networks at:

<http://fsweb.mtdc.wo.fs.fed.us/search/>



The Forest Service, United States Department of Agriculture (USDA), has developed this information for the guidance of its employees, its contractors, and its cooperating Federal and State agencies, and is not responsible for the interpretation or use of this information by anyone except its own employees. The use of trade, firm, or corporation names in this document is for the information and convenience of the reader, and does not constitute an endorsement by the Department of any product or service to the exclusion of others that may be suitable.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.