

Increase your physical resiliency through nutrition and exercise

by Michael T. Grill

Resiliency training encourages the development of practical physical and psychological skills that can improve your health, performance, and longevity in the often stressful profession of EMS practitioner.

When you first establish and maintain a regimen addressing your physical needs, developing the psychological skills for resiliency becomes considerably easier. So, to increase your resiliency, you first need to focus on nutrition and exercise.

By establishing sound nutrition and physical fitness habits, you accomplish two important objectives. First, you build a sound foundation for strengthening mental, social and spiritual fitness. Second – because sound nutrition and fitness can show positive results in a very short period of time – you create a sense of control and accomplishment, which leads to increased self-esteem.

Fuel your body

“He that takes medicine and neglects diet wastes the skill of the physician.” - Ancient Chinese proverb

We wouldn't think of responding to emergencies from our fire stations or ambulance bays without first ensuring our vehicles have the proper type and amount of fuel in them. Yet, many EMS practitioners ignore how they are fueling their bodies – especially in stressful conditions. To perform at peak levels, it's essential that you understand the importance of establishing sound nutritional habits. Your goal is to maintain a healthy balance between food intake and the amount of total energy your body needs. This concept, often referred to as energy balance, represents the difference between calories consumed and calories burned. Energy balance can be altered by:

- **Changing energy intake.** For example, you increase calories consumed but your energy output remains the same and you gain weight.
- **Changing energy output.** For example, you increase energy output but calories consumed remain the same and you lose weight.
- **Changing both energy intake and energy output.**

Obtaining baselines is an extremely important concept in patient care, and also is a key element in maintaining your personal resiliency. The first step to beginning a nutrition program is to determine personal nutritional baselines, for the same reason we must obtain baseline vital signs during patient care: it allows us to measure changes as they occur. It is a good way to monitor your body, which

is an important concept not only from a health perspective but also as a key element in maintaining personal resiliency.

These baselines aid in establishing personal nutritional requirements and diet.¹

You'll need to calculate your basal metabolic rate (BMR), a measurement that provides the basis of how much energy is required to simply sustain life.

To calculate your BMR, use the following formula:

MEN

$$66 + (6.3 \times \text{weight in pounds}) + (12.9 \times \text{height in inches}) - (6.8 \times \text{age in years})$$

For example, Robert is a 27-year-old EMT who is 5'11" tall and weighs 190 lbs.

$$66 + (6.3 \times 190) + (12.9 \times 71) - (6.8 \times 27) = 66 + 1197 + 916 - 184 = 1995$$

WOMEN

$$655 + (4.3 \times \text{weight in pounds}) + (4.7 \times \text{height in inches}) - (4.7 \times \text{age in years})$$

For example, Sarah is a 27-year-old EMT who is 4'6" tall and weighs 120 lbs.

$$655 + (4.3 \times 120) + (4.7 \times 54) - (4.7 \times 27) = 655 + 516 + 254 - 127 = 1298$$

Factors to consider that affect your BMR include:

- **Physical activity.** This value varies from person to person and is measured on the scale above, ranging from 1.2 to 1.9. See Table.
- **Estimated energy requirements (EER).** Multiplying the BMR by your physical activity factor determines how many calories must be consumed in order to maintain your current body weight. Example: For Robert, who jogs two miles a day, his EER is calculated by multiplying $1,999.5 \times 1.6 = \text{EER of } 3,199$ calories a day.
- **Waist to Hip Ratio (WTR).** People carrying excessive fat above their waist (often referred as “apple” shapes) are at greater risk of heart disease and diabetes than those carrying excessive fat below their waist (“pear” shapes).

Once you establish your baseline for energy require-

Table: Physical activity factor

Physical activity	Factor
Very light: Sitting, standing, driving, computer work	1.2
Light: Walking, light stretching	1.4
Moderate: Jogging, dancing, swimming, biking	1.6
Strenuous: Running, soccer, rowing	1.9

ments, it is important to establish baselines on not only the amount of food consumed (to lose, maintain, or gain weight) but also the quality of your food. Specific to diet, your baseline measures your daily intake of carbohydrate, protein, fat and water. The goal is to balance your actual dietary intake with your EER. Intake includes:

Carbohydrates (CHO) – Classified as either simple – such as glucose, a simple sugar and the main source of energy for the body – or complex (whole grains), which are digested into simple sugars. CHOs should comprise 60% of your caloric intake.

Proteins – Meat, dairy, beans and grains are high in protein. Approximately 10 – 15% of your diet should be from these food groups.

Fats – No more than 30% of your caloric intake should be from fat. Additionally, fat intake should be directed away from trans fats to polyunsaturated fat, which is found in fish, corn, nuts, and vegetable oil.

Water – To calculate your approximate daily water requirements in cups, use the following formula: Water cups = $\frac{1}{2}$ body weight in pounds/8

Diet affects your personal resiliency. No matter what your energy requirements, if you fuel yourself with whole grains, lean proteins and plant-based foods like legumes, vegetables and fruits, you'll be healthier and feel better overall – and will be able to do your job better.

Get FITT

Fitness - if it came in a bottle, everybody would have a great body. - Cher

Physical fitness can be defined as a set of characteristics (i.e., the work capacity of your heart and lungs, the strength and endurance of your muscles, and the flexibility of your joints) that relate to your ability to perform physical activities. Participating in a cardiovascular (aerobic) exercise routine is a hallmark of resilient people. The overwhelmingly positive impacts include:

- Stronger heart and lower resting heart rate
- Maintenance of a healthy body
- Stress management
- Enhanced physical appearance
- Positive impact on self-esteem
- Increased resiliency

A moderately intense cardiovascular (aerobic) workout – defined as exercising hard enough to raise your heart rate and break a sweat yet still be able to carry on a conversation

– should take about 30 minutes/day, five days a week for beneficial cardiovascular effect. More is better: while 30 minutes yields general health benefits, 60 to 90 minutes helps in preventing weight gain for most people.

As with nutrition, establishing fitness baselines is essential so you can monitor your progress towards fitness goals. One baseline that should be monitored is resting and target heart rates. To start, first:

- Establish current resting heart rate.
- Calculate your age-predicted maximum heart rate: $220 - \text{your age in years}$

- Calculate your 60% and 90% target heart rate:

Age-predicted maximum heart rate $\times .06 = 60\%$ maximum heart rate

Age-predicted maximum heart rate $\times .09 = 90\%$ maximum heart rate

As fitness improves, the level of intensity required to maintain a target heart rate will increase to maintain the same target heart rate – indicating an increase in fitness.

For example, Norma is a 54 year old EMT. Her resting HR is 88 beats per minute. Her age-predicted maximum HR is $220 - 54 = 166$ beats per minute. Her fitness goal is to exercise at 80% of her age-predicted maximum heart rate – which is $166 \times .8 = 133$ beats per minute. As she begins her fitness program on a stationary treadmill, she

reaches her target heart rate when the treadmill speed is at 3.5 mph. Two weeks later, she must set the speed to 3.7 mph in order to reach the same heart rate, indicating an improvement in her fitness level. (Go, Norma!)

When beginning an exercise program, it is important to consider your exercise preferences when setting personal goals so you'll be more likely to sustain your fitness regimen. Ask yourself the following questions:

1. Are your interests health, fitness or performance related?
2. Do you prefer team or solitary activities?
3. How much time can you devote to your exercise program?
4. Is there specialized equipment you will need, such as a bicycle, racquet, etc.?

Finally, ensure the fitness program chosen integrates the four basic components of staying FITT:

Frequency of exercise. To be beneficial, a minimum of three days per week is required.

Intensity of the exercise. Strive to maintain a heart rate of between 60% to 90% of your maximum during the exercise period.

Time spent exercising. Set a goal of at least 30 minutes per exercise session.



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DHS helps to identify EMS technology gaps

by Mary Hanson

Science and technology can help make our jobs easier and, more importantly, save lives. The Department of Homeland Security Science & Technology Directorate (DHS S&T) is asking first responders to help it make the right investments.

DHS S&T has created a process called an Integrated Product Team (IPT) to identify the technology needs – or capability gaps – of first responders. Representatives from EMS, fire, law enforcement and emergency management services comprise a working group of 38 first responders that is advising DHS.

The working group has met twice in the Washington, D.C., area. In September, seven EMS representatives from diverse geographic areas and population bases – including NAEMT President Patrick Moore – identified five initial and broad technology needs.

At the next meeting, DHS will brief these representatives on current research to fill these gaps. The practitioners and researchers will discuss how close currently-available research is to meeting the needs. This discussion and other parts of the process will eventually lead to long-term R&D strategies to address the most critical first responder needs. These priorities may be presented to Congress for possible funding.

DHS S&T already is committed to providing solutions and services to first responders – see <http://firstresponder.gov>. While it believes it is important to have sustained inter-

action with 38 representatives of the first responder community, DHS S&T welcomes input from all first responders. Please go to its TechSolutions web site, <https://www.techsolutions.dhs.gov>, to provide comments.

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From left to right: NAEMT member and Ouray Co., Colo., EMS Chief Norm Rooker; Randy Zeller, Director of Interagency and First Responder Programs with DHS S&T Directorate; Patrick Moore, NAEMT President; Milton Nenneman, Director of First Responder Coordination - West, Interagency and First Responder Programs with DHS S&T Directorate; and NAEMT Region II Director and Director of EMS for Charleston, SC, Don Lundy.

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Type of exercise. Walking is low impact and beneficial, but only if you increase your heart rate to 60% – 75% of your maximum. You can start a running program by combining walking and jogging. Slowly increase the time you spend jogging, maintaining an exercise intensity of 60% to 75% of your maximum heart rate. Swimming is a good alternative for people having orthopedic problems. Swimming ¼ mile – or 440 meters – is the equivalent to jogging one mile.

Choosing sound nutrition and exercising regularly not only promotes physical health, but it improves psychological health by allowing us to concentrate on goals we can create and achieve. By achieving our goals we increase our self-esteem – and along with it, our personal resiliency.

References

Singh, A., Bennett, T. L., Deuster, P. A. (1999). Peak performance through nutrition and exercise. Dept of Military and Emergency Medicine Uniformed Services University of the Health Sciences F. Edward Hebert School of Medicine.

Physical activity and public health guidelines frequently asked questions and fact sheet (n.d.) In. http://www.acsm.org/AM/Template.cfm?Section=Home_Page&Template=/CM/ContentDisplay.cfm&ContentID=7762

Guidelines for healthy adults under age 65 (n.d.) In. http://www.acsm.org/AM/Template.cfm?Section=Home_Page&TEMPLATE=/CM/HTMLDisplay.cfm&CONTENTID=7764

Mike would like to thank Dr. Phil Callahan, PhD, NREMT-P, and Dr. Michael Marks for their assistance with this article.

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This is the second in a series of four articles to help you in your life and on the job. In the next issue: sleep issues and relaxation techniques for EMS practitioners.