U.S. Army War College

# Maximizing Senior Leader Health and Wellbeing

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# MAXIMIZING SENIOR LEADER HEALTH AND WELLBEING

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## DIET AND NUTRITION FOR ENERGY AND VIGOR

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> "Nutritional readiness is the attainment of an individual nutritional strategy that supports optimal physical and cognitive function as well as lifelong disease and injury prevention."
>
> - U.S. Army[1]

The health and wellness of senior military leaders is a strategic readiness issue. Poor senior leader health diminishes individual performance and, due to the influence of senior leaders, overall organizational performance.[2] Poor health increases health care costs for the nation for those currently serving and for the VA.[3] It may also perpetuate the "broken vet" stereotype, negatively impacting recruiting and retention efforts and the military's overall reputation.[4] Statistics from the Senior Leader Sustainment Program at Carlisle Barracks for the 2021 Army War College class paint a concerning picture. 70% of students had high blood pressure, 46% had high cholesterol, and 15% had a body fat percentage greater than 30%.[5] What is causing senior military leaders' poor wellness, and how can wellness be improved? An essential and often neglected component of overall wellness is nutrition.

1. Headquarters Department of the Army, *FM 7-22*, *Holistic Health and Fitness* (Washington, DC: Department of the Army, October 26, 2020): 8-1.
2. "Poor Nutrition," Centers for Disease Control, accessed March 26, 2021, https://www.cdc.gov/chronicdisease/resources/piblications/factsheets/nutrition.htm.
3. "Chronic Disease and Military Readiness," Centers for Disease Control, accessed March 26, 2021, https://www.cdc.gov/chronicdisease/pdf/factsheets/military-readiness-h.pdf.
4. Leonard Wong and Stephen.J. Gerras, *Veteran Disability Compensation and the Army Profession: Good Intentions Gone Awry* (US Army War College Press, 2021).
5. US Army War College 2021 Senior Leader Sustainment Program results data.

Nutritional requirements for senior military leaders in midlife are different from those at the beginning of a senior leader's career.

Indeed, healthy nutrition may even be more important for overall wellbeing as individuals age. Chapter 1, defined midlife and explained why midlife is a pivotal period for wellbeing.[6] Senior leaders often require deliberate adjustment to patterns from young adulthood to account for the lifestyle changes they face in midlife. These lifestyle changes often require a nutritional pivot. This chapter will help senior leaders understand what thoughtful nutrition can accomplish and provide practical recommendations to assess and manage food intake. It focuses on several critical aspects of nutrition for senior military leaders in midlife, emphasizing nutrition to sustain energy to meet work and life demands. The chapter also explains macronutrients and micronutrients, provides recommendations on what to eat in midlife, includes brief recommendations on the use of supplements, and provides nutrition recommendations for enhanced vigor and stress management.

**Army and Department of Defense (DoD) Publications and Initiatives**

Several Army and DoD publications provide baseline nutritional guidance applicable to senior military leaders in midlife. Army Regulation (AR) 40-25, *Nutrition and Menu Standards for Human Performance Optimization*, establishes nutritional standards utilized by military food service programs to support human performance optimization (HPO).[7] Army Regulation 30-22, *The Army Food Program*, operationalizes the guidance in AR 40-25 to feed soldiers across the enterprise.[8] Army Field Manual (FM) 7-22, *Holistic Health and Fitness*, also provides foundational nutritional readiness guidance and general guidelines for operational and therapeutic nutrition.[9] The *Warfighter Nutrition Guide* published by Uniformed Services University (USU) Consortium for Health and Military Performance (CHAMP) provides strategies for performance nutrition intended to give leaders and soldiers "…nutritional strategies to optimize performance during operations and to preserve health."[10] Specifically, chapter 16 of the Warfighter Nutrition Guide entitled "Sustaining Health for the Long-term Warfighter" provides practical nutrition recommendations for soldiers later in their careers. This chapter will expand on some of these

6. See Chapter 1, "Midlife and the Military" for a detailed discussion on midlife.

7. Headquarters Department of the Army, *AR 40-25: Nutrition and Menu Standards for Human Performance Optimization* (Washington, DC: Department of the Army, January 3, 2017).

8. Headquarters Department of the Army, *AR 30-22*, *The Army Food Program* (Washington, DC: Department of the Army, July 17, 2019).

9. Headquarters Department of the Army, *FM 7-22*, *Holistic Health and Fitness* (Washington, DC: Department of the Army, October 26, 2020).

10. Uniformed Services University, Consortium for Health and Military Performance (CHAMP), *Warfighter Nutrition Guide* (Bethesda, MD, February 2020).

recommendations and highlight nutrition science of particular importance for midlife senior military leaders.[11]

Despite recognizing the importance of nutrition to servicemember wellness, performance, and readiness, Department of Defense (DoD) efforts to improve nutrition policy, education, food choices, and the quality of feeding have stalled. Instead, a culture of inattention to nutrition is pervasive, exacerbated by stove-piped service nutrition programs that lack proper oversight from medical experts.[12] DoD Instruction (DoDI) 1010.10 *Health Promotion and Disease Prevention* addresses the need for healthy environments that support optimal wellness, including access to healthy foods.[13]

Numerous initiatives have been implemented across the DoD to meet the requirements of DoDI 1010.10, including Operation Live Well, Healthy Base Initiative (HBI), and Go for Green nutrition labeling. However, none of these programs have been translated into policy or are funded.[14] The culture of inattention to nutrition in the service is an obstacle to soldier wellness that negatively impacts readiness and has consequences for senior leaders who have poor habits due to growing up professionally in an environment that did not correctly emphasize proper nutrition. If a top priority of the DoD is wellness as outlined in DoDI 1010.10, then senior military leaders must begin by carefully managing their own nutrition to set the proper example and should work to institutionalize healthful nutrition across the Department based on the many published recommendations from experts in nutrition, human performance, and wellness.[15]

**Nutrition to Sustain Energy to Meet Work and Life Demands**

How do senior leaders know how much energy they need? What are the best sources for required energy? As senior military leaders age and their lifestyles become less active, the energy required to fuel the body also changes. It is essential to know individual daily energy requirements so that senior leaders can avoid over-fueling, resulting in obesity, or under-fueling and limiting their bodies' performance. A senior military leader's understanding of specific nutritional needs is an important and often overlooked aspect of self-awareness. Regular consumption of more

11. The foundational principles in AR 40-25 and FM 7-22 apply to senior military leaders in midlife; however, there are additional unique considerations covered throughout this chapter.

12. Pamela Elfenbaum et al., "Priorities for Implementing Nutritional Science into Practice to Optimize Military Performance," *Nutrition Reviews* 75 (2017): 89.

13. Department of Defense, *DoD Instruction 1010.10 Health Promotion and Disease Prevention* (April 28, 2014).

14. Melissa R. Troncoso et al., "Targeting Nutritional fitness by Creating a Culture of Health in the Military," *Military Medicine* 186, (2021): 83.

15. Pamela Elfenbaum et al., "Priorities for Implementing Nutritional Science into Practice to Optimize Military Performance."

energy than is needed can result in excess energy storage as body fat.[16] Unfortunately, physiological and lifestyle changes in midlife increase the risk of obesity and associated diseases.[17] Excessive body fat, known as obesity, is a risk indicator for several metabolic and other diseases. While several studies surmise that restricted energy intake has positive impacts on aging,[18] regular consumption of less energy than is required diminishes physical and cognitive performance and reduces the ability of the body to heal and repair from stress, injury, and illness.[19]

Energy needs typically decrease with age for several reasons. Sarcopenia is a crucial physiological change explained in more detail in chapter 2, and is one important reason. Sarcopenia is "a progressive and generalized loss of skeletal muscle mass and strength."[20] Sarcopenia causes a decrease in lean muscle mass relative to body fat, resulting in reduced basal metabolic rates as individuals age.[21] Basal metabolic rate is the energy required to perform essential functions to sustain life. A reduction in basal metabolic rate means that the body needs less fuel for energy, commonly measured in kilocalories (kcal). When less fuel is required, overall caloric intake must be reduced to maintain the balance between fat and lean tissue, and exercise must be increased to increase lean muscle and energy consumption. Without deliberate action to rebalance energy consumption, individuals risk storing excess energy as body fat. In other words, most people require less food for sustenance as they age.

Chapter 2, explains how sarcopenia tends to increase with age and decreased physical activity and is higher for women.[22] Emerging research also indicates that basal metabolic rates are likely already lower on average for African Americans than whites by approximately 100Kcal/day.[23] Therefore, women and African Americans should be especially cognizant of midlife physiological changes and implement mitigation strategies such as adhering to the guidelines in this chapter and in Chapter 3, Lifestyle

16. Jeffrey M. Friedman, "Obesity: Causes and Control of Excess Body Fat," *Nature* 459, no. 7245 (2009): 340.

17. For a more thorough explanation, see Chapter 2, "Physiological Changes in Midlife."

18. Alison Abbott, "Reduced-calorie Diet Shows Signs of Slowing Ageing," *Nature* 555, no. 7698 (2018): 570.

19. Linda Partridge, "Diet and Healthy Aging," *New England Journal of Medicine* 367, no. 26 (2012): 2550.

20. Alfonso J. Cruz-Jentoft and John E. Morley, "Definitions of Sarcopenia," *in Sarcopenia* (Hoboken, NJ: John Wiley & Sons, Incorporated, October 1, 2012).

21. Institute of Medicine, *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements,* (Washington, DC: National Academies Press, 2005).

22. For a more thorough explanation, see Chapter 2, "Physiological Changes in Midlife."

23. Alfredo Jones et al., "Body-Composition Differences Between African American and White Women: Relation to Resting Energy Requirements," *American Journal of Clinical Nutrition* 79, no.5 (2004): 780.

changes due to aging that result in reduced physical activity also reduce energy requirements. Transition to a more sedentary job or lifestyle as a senior leader or into retirement can reduce energy expenditure. Reduced physical activity due to limitations from age-related diseases or injury also contributes to lower energy expenditure. Failure to adapt nutrition to decreased energy needs is a contributor to weight gain in midlife.

Fortunately, research indicates that senior leaders can improve energy expenditure components with dietary and lifestyle choices to gain or maintain appropriate body composition and fitness. The quality of foods we eat, not just how much, is vital for maintaining a healthy ratio of body fat and lean muscle tissue; it is also important to mental well-being, quality of life, and the ability to stay active into older age. For example, adequate protein intake mitigates sarcopenia.[24] Basal metabolic rate may improve through eating protein-rich foods that are high in iron, zinc, and selenium, including meat, seafood, legumes, nuts, and seeds. Basal metabolic rate may also be increased by consuming moderate amounts of caffeine, eating hot peppers, seaweed, certain spices, or even drinking ice water regularly.[25] In addition, of course, increasing physical activity increases energy expenditure.[26]

Senior leaders concerned with nutrition should start with a general knowledge of their daily energy requirements and demands. Calculating energy expenditure and energy needs is a relatively straightforward process aided by years of nutrition and physiological research translated into tools such as energy expenditure equations and calculators. Energy expenditure includes four components. The first component is basal metabolic rate (BMR), defined as the energy required to perform "basic functions to sustain life, such as breathing, circulation, nutrient processing, and cell production."[27] The second component is the thermic effect of food (TEF), which "refers to the number of kcal needed by the body to digest, absorb, and process nutrients from foods."[28] The third component of energy expenditure is thermoregulation, which is "the process that allows your body to maintain your core temperature."[29] The fourth component of energy expenditure is physical activity.[30] There are several equations to

24. Alfonso J. Cruz-Jentoft and John E. Morley, "Nutritional Approaches to Treating Sarcopenia," in *Sarcopenia* (Hoboken, NJ: John Wiley & Sons, Incorporated, October 1, 2012).

25. "The 12 Best Foods to Boost your Metabolism," Healthline, accessed February 1, 2021, https://www.healthline.com/nutrition/metabolism-boosting-foods.

26. Chapter 3 providers practical guidance on physical fitness and explain physical fitness benefits in greater detail in midlife and beyond.

27. "What is Basal Metabolic Rate?" Healthline, accessed November 18, 2020, https://www.healthline.com/health/what-is-basal-metabolic-rate.

28. "The 12 Best Foods to Boost your Metabolism," Healthline.

29. "What is Thermoregulation?" Healthline, accessed November 18, 2020, https://www.healthline.com/health/thermoregulation.

30. Institute of Medicine, *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements,* (Washington, DC: National Academies Press, 2006) 86-87.

calculate energy expenditure by combining these four components. The United States (U.S.) Government currently uses the equation developed in 2005 by the National Academy of Sciences to calculate Estimated Energy Requirement (EER) based on age, gender, height, body weight, and physical activity (computed as a coefficient based on four levels, sedentary, low active, active, and very active).

Energy Expenditure Requirement (EER) calculations are a starting point for determining appropriate intake. Mathematically, EER is the midpoint of a normally distributed population, therefore, 50 percent of the time, it overestimates energy needs, and 50 percent of the time, it underestimates energy needs for an individual.[31] However, EER helps establish a starting point for monitoring personal energy intake. Choosing the appropriate physical activity (PA) level is a critical step in computing EER correctly. The PA level should reflect an honest assessment of a senior leader's activity level. A review of the definitions in Table 1 indicates that few senior leaders likely fall in the "very active" category. After retirement, many are likely in the low or sedentary categories.

**Table 1: Physical Activity (PA) Categories[32]**

| PA category | PA Value | Military Context Example |
|---|---|---|
| Sedentary | Men: 1.00<br>Women: 1.00 | A person who spends the entire day sitting |
| Low | Men: 1.11<br>Women: 1.12 | A staff officer who sits most of the day, other than the walking necessary to perform tasks of daily living |
| Active | Men: 1.25<br>Women: 1.27 | A military leader who exercises approximately one hour a day, or walks 6–8 miles in a day in the fulfillment of duties |
| Very Active | Men: 1.48<br>Women: 1.45 | A military leader who is engaging in several hours of vigorous exercise daily; equivalent to a professional athlete |

PA, in addition to age, body weight, height, and sex can then be used in the following equations optimized for adults to identify a baseline for daily energy needs:

Men: EER = 662 – (9.53 x age [y]) + PA x [(15.91 x weight [kg]) + (539.6 x height [m])]

Women: EER = 354 – (6.91 x age [y]) + PA x [(9.36 x weight [kg]) + (726 x height [m])][33]

y = years; kg = kilograms; m = meters

31. Institute of Medicine, *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements* (2006), 36.

32. Institute of Medicine, *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements,* (2006), 36. Adapted and reproduced with permission from the National Academy of Sciences, Courtesy of the National Academies Press, Washington, D.C.

33. Institute of Medicine, *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements,* (2006), 82.; This equation differs from older equations in its enhanced accuracy and in its elimination of basal metabolic rate as a factor in the equation.; Steven B. Heymsfield et al. "How Much May I Eat? Calorie Estimates Based Upon Energy Expenditure Prediction Equations," *Obesity Reviews* 7, no. 4 (2006): 361.

## Table 2: Example EER Calculation (Woman)

45-year-old, female, senior leader who weighs 155 pounds, is 67 inches tall, and is active:

**Example EER Calculation**

EER for Women: 354 – (6.91 × age in years [y]) + Physical activity value [PA] × (9.36 × weight in kilograms [kg] + 726 × height in meters [m])

Step 1: Convert pounds (weight) to kilograms and inches(height) to meters.
155 pounds ÷ 2.2 = 70.45 kg
67 inches × 0.0254 = 1.70 m

Step 2: Multiply age in years times 6.91.
6.91 × 45 = 311

Step 3: Subtract result in Step 2 from 354.
354 – 311= 43

Step 4: Multiply weight in kg times 9.36.
70.45 kg × 9.36 = 659

Step 5: Multiply height in m times 726.
1.70 m × 726 = 1234

Step 6: Add results from Steps 4 and 5, multiply result by PA
1.12 (659 + 1234) = 2120

Step 7: Add results from Steps 3 and 6.
43 + 2120 = 2163 kilocalories (kcal) needed per day

**Table 3. Example EER Calculation (Man)**

45-year-old, male, senior leader who weighs 205 pounds, is 72 inches tall, and is active:

Example EER Calculation

EER for Men: 662 – (9.53 × age in years [y]) + Physical activity value [PA] × (15.91 × weight in kilograms [kg] + 539.6 × height in meters [m])

Step 1: Convert pounds (weight) to kilograms and inches(height) to meters.
205 pounds ÷ 2.2 = 93 kg
72 inches × 0.0254 = 1.83 m

Step 2: Multiply age in years times 9.53.
9.53 × 45 = 429

Step 3: Subtract result in Step 2 from 662.
662 – 429= 233

Step 4: Multiply weight in kg times 15.91.
93 kg × 15.91 = 1480

Step 5: Multiply height in m times 539.6.
1.83 m × 539.6 = 987.47

Step 6: Add results from Steps 4 and 5, multiply result by PA
1.25 (1480 + 987.47) = 3084

Step 7: Add results from Steps 3 and 6.
233 + 3084 = 3317 kilocalories (kcal) needed per day

The EER calculation generates a baseline or starting point for balancing energy intake with expenditure and is an important first step to managing nutrition.[34] Next, individuals should track food intake in detail to manage actual energy intake. Many helpful food journaling tools are available through applications such as MyFitnessPal™.[35] However, a simple handwritten notebook utilized to track all food intake is adequate. Comparing actual energy intake to the calculated recommended energy intake is often eye-opening. Energy intake that regularly exceeds the calculated recommended EER for an individual may indicate that an individual should reduce energy (kcal) intake for optimum health. This

34. For ease of computation, a calculator is available on the USDA website at https://www.nal.usda.gov/fnic/dri-calculator/results.php.

35. "About," MyFitnessPal, accessed February 1, 2021, https://www.myfitnesspal.com. The U.S. government and the Department of defense do not officially endorse MyFitnessPal or any other specific fitness or nutrition monitoring product.

reduction can mitigate the risk of the accumulation of body fat as excess energy is stored. Energy intake that is regularly less than the EER baseline may result in fatigue and other undesirable metabolic or performance-related effects. Sustained energy deficits pose significant health concerns, particularly in non-obese individuals, as energy stores deplete. The body begins to use muscle tissue for energy in the absence of other energy sources, which has several adverse effects on performance.[36]

Determining the correct energy intake for any individual requires some experimentation. Adding or removing 100 kcal per day for a week and evaluating objective factors such as changes in body weight, and subjective factors such as energy and vigor is an ongoing process that is well worth the effort. As mentioned previously, recent research indicates that a slight reduction in kcal can slow signs of aging. The Comprehensive Assessment of Long-term Effects of Reducing Intake of Energy (CALERIE) study sponsored by the U.S. National Institutes of Health tested the effects of energy restriction on 200 healthy, non-obese adults. The findings indicated improved metabolism and improved health across several age-related clinical markers.[37] Some leaders may find that EER calculated energy intake is too high to maintain healthy body composition, and others may find it too low to sustain energy needs. Because every leader has different energy requirements that cannot be clearly identified without some experimentation, individuals should expect to alter kcal intake for optimal energy after completing their EER calculation and food intake assessment.

**Macronutrients**

Determining the correct amount of energy intake for an individual is a foundational process of healthful nutrition. However, it does not tell the entire story. In addition to consuming the right amount of food, individuals need to eat the right kinds of food. Recent Army publications, including the "The Warfighter Nutrition Guide," provide excellent general information about what to eat in the military context that applies to senior military leaders in midlife. The three main sources of energy are carbohydrates, fats, and proteins. More commonly referred to as macronutrients, these fuels provide energy and are therefore required in large amounts for normal growth, development, and overall health.[38]

36. Stefan M. Pasiakos, "Nutritional Requirements for Sustaining Health and Performance During Exposure to Extreme Environments," *Annual Review of Nutrition* 40, no. 1 (2020): 221.

37. Alison Abbott, "Reduced-calorie Diet Shows Signs of Slowing Ageing," *Nature* 555, no. 7698 (2018): 570.

38. Adrienne Youdim, "Overview of Nutrition," Merck, accessed April 2, 2021, https://www.merckmanuals.com/professional/nutritional-disorders/nutrition-general-considerations/overview-of-nutrition.

The body prefers carbohydrates for energy, which it converts to glucose to fuel the brain and muscles. Failure to eat adequate carbohydrates will likely result in a feeling of fatigue with an accompanying decrease in physical and mental performance.[39] Many leaders avoid carbohydrates due to a misconception that carbohydrate consumption is unhealthy and can lead to obesity. In fact, carbohydrates are required for optimal nutrition. Senior military leaders in midlife should eat between 5 and 8 grams (g) of carbohydrates per kilogram (kg) of body weight each day, depending on activity level. If we utilize the leaders from the EER examples, the calculation is as follows:

Female leader:

155 lbs. / 2.2 = 70 kg

70 kg x 6 grams = 420 grams of carbohydrates

Male leader:

205 lbs. /2.2 = 93 kg

93 kg x 6 grams = 558 grams of carbohydrates

Overconsumption of energy, including energy from carbohydrates, is a contributing factor to obesity, diabetes mellitus, and other metabolic conditions or diseases. However, energy comes from fat and protein in addition to carbohydrates, so avoiding needed carbohydrates in an attempt to restrict energy intake without comprehensively evaluating all macronutrient needs may actually reduce performance and health.[40]

Fats are also critical components of a balanced diet. Fat is foundational to producing certain hormones, protecting organs, insulating the body, transporting nutrients in the body, and serving a structural role in cells. Consume fats in moderation because they contain twice as many kcal per gram as carbohydrates.[41] Senior military leaders should primarily eat monounsaturated fats that are beneficial to health, such as the fats found in nuts and seeds, fish, olives, olive oil, and avocado.[42]

39. Louise M. Burke, "New Guidelines for Carbohydrate Intake in Sport from the InternationalOlympic Committee," *Pulse* 31, no.3 (2012): 7.

40. Louise M. Burke, "New Guidelines for Carbohydrate Intake in Sport from the International Olympic Committee."

41. "How Many Calories and in One Gram of Fat, Carbohydrate, or Protein?" USDA, accessed February 15, 2021, https://www.nal.usda.gov/fnic/how-many-calories-are-one-gram-fat-carbohydrate-or-protein.

42. "Facts About Monounsaturated Fats," MedlinePlus, accessed November 21, 2020, https://medlineplus.gov/ency/patientinstructions/000785.htm.

Protein intake should focus on the nine essential amino acids (EAA) that the human body cannot produce and must be consumed from protein sources in the diet. The EAA enable several critical functions, including muscle contraction, the formation of muscle, hair, nails, skin, and other tissues, production of energy (secondary source), repair of injuries, protection from infections, transport of fats, vitamins, and minerals throughout the body and structure for every part of the body.[43] Dietary protein should amount to between 0.8 and 1.6 g/kg of body weight/day, depending on activity level. When energy needs are high due to intense training or intense mission conditions, an individual should consume more protein. However, overconsumption of protein should be avoided because it stresses the kidneys and may result in disorders such as gout or kidney stones.

**Micronutrients**

Careful monitoring of macronutrient consumption is important but does not ensure optimal nutrition in isolation. Senior leaders should also ensure adequate consumption of micronutrients due to the essential support of myriad important physiological functions provided by these important substances. Micronutrients are vitamins and minerals required by the body in small amounts that help make energy and red blood cells, optimize immune function, maintain muscles and joints' health, and aid in recovery from exercise.[44] Numerous governmental and scientific organizations have developed recommended daily intakes of vitamins and minerals. The Army has developed military service-specific recommendations with the Air Force and the Navy, referred to as Military Dietary Reference Intakes (MDRI), which address service members' unique lifestyle requirements (see Table 4).[45] The MDRI is just a guide. Specific individual needs will vary, yet under or overconsumption of particular nutrients should drive dietary assessment and possibly adjustment. When combined with information explaining the nutritional content of various foods, MDRI are a guide to evaluation individual dietary intake. The following questions might arise: In a typical week, are there significant shortfalls for any particular micronutrient? Does one's diet unnecessarily (or even toxically) contain too much of a particular nutrient? What are vitamins and minerals, and why are they essential to overall health?

43. CHAMP, *Warfighter Nutrition Guide,* 18.
44. CHAMP, *Warfighter Nutrition Guide,* 23.
45. Headquarters, Department of the Army, *AR 40-25*: *Nutrition and Menu Standards for Human Performance Optimization*, 13.

## Table 4. Military Dietary Reference Intakes Per Day[46]

| Nutrient | Unit | Men | Women | Notes |
|---|---|---|---|---|
| Energy (General/routine) | kcal/d | 3400 | 2300 | Estimate that varies by individual for moderate levels of activity and are approp for most personnel in garrison. Values are rounded up to the nearest 50 kilocalc (kcal). |
| Light activity | kcal/d | 3000 | 2100 | |
| Moderate activity | kcal/d | 3400 | 2300 | |
| Heavy activity | kcal/d | 3700 | 2700 | |
| Exceptionally-heavy activity | kcal/d | 4700 | 3000 | |
| Protein | g/d | 102 (68-136) | 83 (55-110) | The MDRI is based on a recommended daily intake of 0.8 to 1.6 g/kg body weigl |
| Carbohydrate | g/d | 510 (340-680) | 414 (276-552) | |
| Fiber | g/d | 34 | 28 | |
| Fat | g/d | <113 (100-157) | <77 (70-100) | Total energy from fat should not exceed 30 percent of total kcal. |
| Linoleic acid | g/d | 17 | 12 | |
| a-linolenic acid | g/d | 1.6 | 1.1 | |
| Vitamin A | µg RAE/d (IU/d) | 900 (3000) | 700 (2333) | The unit of measure is microgram of retinol activity equivalent (µg RAE) |
| Vitamin D | µg/d | 15 | 15 | The unit of measure is milligram (µg) |
| Vitamin E | mg/d | 15 | 15 | |
| Vitamin K | µg/d | 120 | 90 | |
| Vitamin C | mg/d | 90 | 75 | |
| Thiamin ($B_1$) | mg/d | 1.2 | 1.1 | |
| Riboflavin ($B_2$) | mg/d | 1.3 | 1.1 | |
| Niacin | mg NE/d | 16 | 14 | The unit of measure is niacin equivalent (NE) |
| Vitamin $B_6$ | mg/d | 1.3 | 1.3 | |
| Folate | µg DFE/d | 400 | 400 | The unit of measure is micrograms of dietary folate equivalent (µg DFE) |
| Vitamin B | µg/d | 204 | 2.4 | |
| Calcium | mg/d | 1000 | 1000 | |
| Phosphorous | mg/d | 700 | 700 | |
| Magnesium | mg/d | 420 | 320 | |
| Iron | mg/d | 8 | 18 | |
| Zinc | mg/d | 11 | 8 | |
| Sodium | mg/d | <2300 | <2300 | |
| Iodine | µg/d | 150 | 150 | |
| Selenium | µg/d | 55 | 55 | |
| Fluoride | mg/d | 3 | 3 | The MDRI is based on a recommended daily intake of 0.05 mg/kg body weight |
| Potassium | mg/d | 4700 | 4700 | The MDRI is based on a recommended daily intake of 40 mg/kg body weight |

46. Headquarters, Department of the Army, *AR 40-25: Nutrition and Menu Standards for Human Performance Optimization*, 13.

| MDRI Legend |
| --- |
| kcal/d = Kilocalories per day |
| g/d = grams per day |
| µg RAE/d (IU/d) = microgram of retinol equivalent per day<br>(retinol equivalents include retinol, beta-carotene, alpha carotene and beta-cryptoxanthin) |
| Mg NE/d = milligram of Niacin equivalent per day<br>(niacin equivalents include niacinamide, inositol hexanicotinate, niacin and tryptophan) |
| µg DFE/d = microgram of folate equivalent per day<br>(folate equivalents include folate and folic acid) |
| µg/d = microgram per day |
| mg/d = milligram per day |

Vitamins are substances needed for normal cell function, growth, and development.[47] Vitamins are broadly categorized as water or fat-soluble. The body cannot store water-soluble vitamins such as Vitamin C and B. Any excess consumed is eliminated through urination once the body has used what it needs. Therefore, there is no need to consume more than 100% of the MDRI for any water-soluble vitamin. Furthermore, water-soluble vitamins must be consumed daily to maintain adequate stores. The fat-soluble vitamins, vitamins A, D, E, and K, are stored in body fat and the liver, so they do not necessarily need to be consumed every day. However, fat-soluble vitamins are eliminated from the body much more slowly than water-soluble vitamins, so there is a great risk of toxicity if too much is consumed. Of the four fat-soluble vitamins, the most toxic if over-consumed is vitamin A. Many dietary supplements include well over the recommended intake of vitamins, so buyers should beware of the dangers of consuming these products and avoid products with very high amounts of vitamins.[48]

Minerals, naturally occurring inorganic solids, are also "essential for health and optimal performance," and are classified as major or trace minerals. Major minerals include calcium, phosphorous, magnesium, sodium, potassium, chloride, and sulfur.[49] They are classified as "major minerals" because relatively large amounts should be consumed daily (>200 mg/day). The body requires a lower amount of trace minerals, including iron, manganese, copper, iodine, zinc, fluoride, and selenium. Minerals aid in brain and neural function, bone structure maintenance, muscle function and growth, energy production, reproductive functions, and immune function.[50]

47. "Vitamins," MedlinePlus, accessed November 22, 2020, https://medlineplus.gov/ency/article/002399.htm.
48. Gerald F. Combs, "Vitamin Safety," in *The Vitamins, Fundamental Aspects in Nutrition and Health* (Burlington, MA: Elsevier Academic Press, 2008), 503-505.
49. CHAMP, *Warfighter Nutrition Guide,* 24.
50. CHAMP, *Warfighter Nutrition Guide,* 25.

**What should I eat?**

Food intake should vary to ensure proper consumption of carbohydrates, fat, protein, vitamins, and minerals. No single food is a complete source of all vitamins and minerals or necessary macronutrients, therefore nutrition needs, including protein, vitamins, and minerals, require consuming a wide variety of whole food for optimal wellness. Consuming a wide variety of foods is particularly important in midlife as physiological decline begins to become more apparent. Fortunately, several tools are available to inform the consumption of the right foods. The U.S. Department of Agriculture's (USDA) recently revised MyPlate™ eating guide is one such tool that recommends food intake utilizing food groups to help ensure adequate food variety for optimal health. Food categories are whole fruits, assorted vegetables, whole grains, lean protein, and dairy.[51] The USDA "Dietary Guidelines for Americans, 2020-2025," revised in 2020, is another important reference which provides more detailed food and beverage guidelines informed by the latest nutrition science that expand on MyPlate™ recommendations.[52] Consuming a variety of foods is especially important in the demanding forward deployed or field environment. The US Army has designed rations to provide the breadth of macronutrients and micronutrients required to sustain wellness even in austere environments. Field rations are carefully prepared to include the required nutrients, so they should be consumed in their entirety to ensure adequate nutrition when in a field environment.[53]

The busy lifestyle of a senior leader, travel demands, and the requirement to eat at restaurants or in a time-constrained environment can make the consumption of a good variety of foods daily difficult, if not wholly unrealistic. Fortunately, spreading healthy eating with good variety across several days is a viable solution. If vegetable intake or protein intake is low on a particular day, it should be balanced with an increased intake of these foods the following days, generally following the guidelines described in this chapter. Table 5 outlines the USDA recommendations for average daily intake by food groups to achieve an adequate intake of vitamins and minerals, and macronutrients. This information should guide senior military leaders in meal planning.

51. "What is My Plate?" MyPlate, accessed November 22, 2020, https://www.choosemyplate.gov.

52. U.S. Department of Agriculture and U.S. Department of Health and Human Services. *Dietary Guidelines for Americans, 2020-2025. 9th Edition*, December 2020, www.dietaryguidelines.gov.

53. Headquarters, Department of the Army, *AR 30-22, The Army Food Program* (Washington, DC: Department of the Army, July 17, 2019).

**Table 5. Healthy Eating Pattern in the United States at the 2,000-Calorie Level[54]**

| Food Group | Amount[(a)] in the 2,000 Calorie Diet |
|---|---|
| **Vegetables** | **2.5 c-eq/day** |
| Dark Green | 1.5 c-eq/wk |
| Red & Orange | 5.5 c-eq/wk |
| Legumes (Beans and Peas) | 1.5 c-eq/wk |
| Starchy | 5 c-eq/wk |
| Other | 4 c-eq/wk |
| **Fruits** | **2c-eq/day** |
| **Grains** | **6 oz-eq/day** |
| Whole Grains | ≤ 3 oz-eq/day |
| Refined Grains | ≤ 3 oz-eq/day |
| **Dairy** | **3 c-eq/day** |
| **Protein Foods** | **5.5 oz-eq/day** |
| Seafood | 8 oz-eq/wk |
| Meats, Poultry, Eggs | 26 oz-eq/wk |
| Nuts, Seeds, Soy Products | 5 oz-eq/wk |
| **Oil** | **27 g/day** |
| **Limit on Calories for Other Uses (% of Calories)[(b)]** | **270 Kcal/day (14%)** |

**(a) Food group amounts shown in cup-(c) or ounce-(oz) equivalents (eq). Oils are shown in grams (g).**

**(b) Calories from added sugars, added refines starches, solid fats, and alcohol are included in this category. Most diets do not have enough calories available after meeting food group needs to consume added sugars or saturated fats and stay within daily energy level requirements.**

## Supplements

Achieving adequate nutritional variety through supplementation is a temptation for many senior military leaders due to the perceived ease of maintaining sufficient nutrition with minimal effort. However, the multi-day approach to eating a good variety of whole foods is more effective than supplementation to achieve the needed variety of foods for optimal health. With few exceptions, there is little scientific consensus indicating that

54. U.S. Department of Health and Human Services and U.S. Department of Agriculture, *2015–2020 Dietary Guidelines for Americans. 8th Edition,* December 2015, http://health.gov/dietaryguidelines/2015/guidelines.

supplementation, including protein, multivitamins, or minerals, improves overall health for otherwise healthy individuals. In some circumstances, under the direction of a healthcare provider, senior military leaders may benefit from therapeutic supplementation of calcium, vitamin D, iron, and some antioxidants or other nutrients not otherwise available in adequate quantities through whole foods. Single micronutrient supplements are generally only appropriate for the correction of clinically defined medical conditions.[55]

The American College of Sports Medicine (ACSM) position statement on Nutrition and Athletic Performance further warns that "…supplements represent an ever-growing industry, but a lack of regulation of manufacture and marketing means that [individuals] can fall victim to false advertising and unsubstantiated claims." In addition, the U.S. Food and Drug Administration (FDA) regulation of supplements is minimal. It does not guarantee the efficacy or safety of a supplement and instead relies on manufacturers to assure the safety and contents of their own products despite the profit incentives that might motivate a less scrupulous manufacturer to hide or obscure risks.[56] A cautious approach toward supplementation is prudent and drastically reduces the risk of accidental consumption of a dangerous compound or one prohibited by the DoD, at worst or simply wasting money on a substance that has not been shown to provide the benefits its manufacturer claims. Operation Supplement Safety (OPSS), the "Department of Defense dietary supplement resource for the military community, leaders, healthcare providers, and DoD civilians," is a uniquely helpful resource for senior military leaders.[57] The program website includes detailed information on supplementation, a portal to consult an expert on supplements, and a regularly updated extensive list of dietary supplement ingredients prohibited by the DoD.

**Nutrition for Enhanced Vigor**

The demands placed upon senior military leaders can diminish the vigor of even the most seemingly energetic individuals. Fortunately, many recent studies indicate consumption of specific foods can enhance vigor. Research focuses on specific foods to enhance cognition and generally improve

55. Academy of Nutrition and Dietetics, Dieticians of Canada, & American College of Sports Medicine, "Nutrition and Athletic Performance. Medicine & Science" in *Sports & Exercise* 48, no. 3, (2016): 543.

56. "Questions and Answers on Dietary Supplements," U.S. Food & Drug Administration (FDA), accessed November 28, 2020, https://www.fda.gov/food/dietarysupplements/usingdietarysupplements/ucm480069.htm.

57. "Operation Supplement Safety," Uniformed Services University (USU), Center for Health and Military Performance (CHAMP), accessed March 3, 2021, https://www.opss.org.

health through the pivotal midlife years and beyond. While the research to date has not resulted in recommendations for specific therapeutic dosages of particular foods to cure or prevent any condition, it has identified widespread positive effects from several nutrients experts agree should be in a balanced diet. Studies of caffeine's and omega-3 fatty acids' effects on brain health have resulted in essential considerations for senior military leaders. Additionally, research on dietary fiber consumption, whole grains, iron, and calcium, and the impacts of alcohol consumption have promising results or warnings senior military leaders should heed. Key findings for each of these dietary components are summarized below.

Omega-3 fatty acids are essential for cell and tissue development. Experts agree that long-chain omega-3 (LC-n3-FA) consumption derived from sea-fish such as mackerel or salmon, is likely beneficial, but specific dosages require additional research. Most researchers agree that LC-n3-FA is critical to the developing brain *in utero* and after birth. While the mechanisms are not yet clear, most researchers agree omega-3 fatty acids remain important throughout life and, when in adequate supply in the brain, may increase cognitive performance while providing a lowered risk of dementia.[58] Senior military leaders ideally should include oily ocean fish in their diet regularly. "The American Heart Association recommends eating two, 3 – 5 ounce servings of fatty fish per week."[59] However, in situations preventing adequate consumption, senior leaders should discuss a fish oil supplement with a health care provider to capitalize on any potential benefits and discuss and weigh risks from fish-oil supplement interactions with some medications and conditions.[60]

In general, researchers also agree caffeine consumption can benefit health, particularly liver health, and provide a beneficial boost to energy and cognition when taken in appropriate doses.[61] FM 7-22 recommends 200 milligrams of caffeine (equivalent to two cups of coffee) before a critical meeting or engagement to enhance alertness.[62] This standard dose can be used to restore alertness temporarily, but is not a substitute for sleep and, if overused, can result in dehydration, disrupted sleep patterns, or other adverse health effects.

58. Sebastian Huhn et. Al, "Components of a Mediterranean Diet and their Impact on Cognitive Functions in Aging," *Frontiers in Aging Neuroscience* 7, no. 132 (2015): 1.

59. "Fish and Omega-3 Fatty Acids," American Heart Association, accessed November 29, 2020, https://healthyforgood.heart.org/Eat-smart/Articles/Fish-and-Omega-3-Fatty-Acids.

60. "Fish Oil, " National Medicines Comprehensive Database, accessed November 28, 2020, http://naturaldatabase.therapeuticresearch.com

61. Robin Poole et al., "Coffee Consumption and Health: Umbrella Review of Meta-Analyses of Multiple Health Outcomes," *BMJ (Clinical Research Ed.)* (2017): 359, https://doi.org/10.1136/bmj.j5024.

62. Headquarters, Department of the Army, *FM 7-22, Holistic Health and Fitness* (Washington, DC: Department of the Army, October 8, 2020).

Table 6, adapted from FM 7-22, outlines recommended caffeine intakes for optimal alertness.

**Table 6. Caffeine Dose for Optimal Alertness[63]**

| Type of sleep challenge | Dose |
|---|---|
| **Sustained Operations** | • 200 mg at midnight<br>• 200 mg again at 0400 and 0800 if needed<br>• Use during daytime (1200 mg and 1600 mg) only if needed |
| **Night Operations with daytime sleep** | • 200 mg at start of night shift<br>• 200 mg again 4 hours later<br>• Late dose: at least 6 hours prior to start of daytime sleep |
| **Restricted Sleep (<6 hours)** | • 200 mg upon wakening<br>• 200 mg again 4 hours later<br>• Late dose: at least 6 hours prior to sleep period |
| mg = milligrams | |

Dietary fiber is not explicitly related to cognition and brain health, but it is related to general wellness in midlife. Dietary fiber is the structural component of plants that humans cannot digest. Dietary fiber is either soluble or insoluble. Soluble fiber absorbs water, which slows digestion, while insoluble fiber adds bulk that aids in regularity. Fiber is an essential component of a healthy diet that plays a role in risk reduction for several diseases, including high blood pressure, diabetes mellitus, heart disease, and several cancers. Adequate consumption of fruits, vegetables, and whole grains will likely result in sufficient consumption of fiber. The U.S. Department of Health and Human Services Dietary Guidelines for Americans recommends women 31-49 years of age, consume at least 25 grams of fiber daily, while women over 50 years of age, should consume at least 22 grams of fiber daily. Men, between 31 and 49 years of age, should consume 31 grams of fiber daily, and men over 50 years of age, should consume at least 24 grams.[64] Table 7 lists several foods high in fiber to aid in meal planning for adequate fiber consumption.

63. Headquarters, Department of the Army, *FM 7-22, Holistic Health and Fitness,* 11-11.

64. U.S. Department of Health and Human Services & U.S. Department of Agriculture,"Shifts Needed to Align with Healthy Eating Patterns," *2015–2020 Dietary Guidelinesfor Americans 8th ed*., (Washington, DC: Health and Human Services Dept. and Agriculture Dept, 2015) 37-62.

**Table 7. High Fiber Foods**[65]

| Food | Serving Size | Fiber (grams) |
|---|---|---|
| **Cereals** | | |
| Fiber One | ½ cup | 14 |
| All-Bran | ½ cup | 10 |
| Shredded Wheat | 1 cup | 6 |
| **Vegetables** | | |
| Spinach (Cooked) | 1 cup | 4 |
| Broccoli | ½ cup | 3 |
| Carrots | 1 medium | 2 |
| **Baked Goods** | | |
| Whole-wheat bread | 1 slice | 3 |
| Bran muffin | 1 | 2 |
| **Legumes (cooked)** | | |
| Lentils | | 8 |
| Kidney beans | ½ cup | 6 |
| Lima beans | ½ cup | 6 |
| **Grains** | | |
| Barley | 1 cup | 9 |
| Wheat Bran | ¼ cup | 6 |
| **Fruit** | | |
| Pear (with skin) | 1 medium | 6 |
| Strawberries (fresh) | 1 cup | 4 |
| Prunes (dried plums) | 6 | 12 |

Encouraging research also indicates the importance of consuming whole grains for individuals in midlife. However, specific intake recommendations are not available beyond the MRDI. Because of the broad consensus about whole grains' healthfulness, senior leaders should consume whole grains, instead of less nutritious processed grain foods that include white flour or white rice where important nutritional components of grains have been removed. Examples of whole grain substitutes for white flour or white rice include quinoa, brown rice, farro, oatmeal or other whole grain cereals, whole wheat breads, and whole wheat pastas.

Finally, moderation of alcohol consumption is vital for vigor in midlife. Alcohol has no nutritional value and can be high in kcal. Alcohol

65. "High Fiber Foods," MedlinePlus, accessed January 31, 2021, https://medlineplus.gov/ency/patientinstructions/000193.htm

consumption disrupts sleep, as outlined more thoroughly in chapter 5. It also can damage the liver and pancreas, increase blood pressure and the risk for stroke and cardiovascular disease, and when consumed in excess, can suppress the immune system. Interestingly, recent research indicates that for many adults, one to two glasses of red wine consumed daily can increase good cholesterol in the blood (high-density lipoprotein cholesterols or HDL-C) and provide some protection against heart disease. However, senior military leaders should be cautious because the harmful effects caused by overconsumption can be severe.[66]

**Nutrition to Manage Stress**

Senior military leaders are well acquainted with stress, particularly as they enter midlife and face the complex stresses of senior leadership, aging, and family during this pivotal time (see Chapter 7, for additional discussion). The strains from chronic stress can cause wide-ranging adverse outcomes and place senior military leaders "at greater risk for illness, injury, and mental health issues."[67] Research indicates a strong relationship between stress and nutrition. Researchers are working to identify nutritional interventions for stress reduction and clarify the connections between nutrition and various stress types. Fortunately, some researchers have indicated consuming certain foods may have a mitigating effect on several stress-related conditions.[68] This section briefly highlights some of the most promising findings in the area of stress and nutrition, provides brief nutritional recommendations for managing the impact of stress, and explains oxidative stress and what research indicates can be done to combat it.

Chronic stress, a common experience of military professionals, combined with high-fat, high-sugar diets, is a significant factor in the development of obesity.[69] Therefore, limiting the intake of high-fat and high-sugar foods reduces the risk of developing obesity for senior military leaders subjected to chronic stress. Mental health, which impacts the ability to manage stress, is also likely affected by nutrition. Recent research indicates that a diet including vegetables, fruit, and whole grains promotes mental health, particularly in women.[70] These benefits are in addition to the benefits discussed elsewhere in this chapter. Adequate micronutrient consumption

66. "Alcohol's effects on the body," National Institute on Alcohol Abuse and Alcoholism accessed November 30, 2020, http://www.niaaa.nih.gov/alcohol-health/alcohols-effects-body.

67. CHAMP, *Warfighter Nutrition Guide,* 113.

68. Tarique Hussain et al., "Oxidative Stress and Inflammation: What Polyphenols Can Do for Us?" *Oxidative Medicine and Cellular Longevity* (2016).

69. CHAMP, *Warfighter Nutrition Guide,* 118.

70. Felice N. Jacka et al., "Nutrient Intakes and the Common Mental Disorders in Women," *Journal of Affective Disorders* 141, no. 1 (2012): 79–85.

also aids in managing stress. Zinc, magnesium, vitamins B, C, and E help mitigate the effects of stress, while magnesium and B vitamins are essential to serotonin production, a hormone regulating mood and stress response.[71]

Chapter 5 explains the connection between sleep and stress. Fortunately, many foods appear to aid with restfulness. Tart cherries and tart cherry juice are a natural source of dietary melatonin, a hormone thought to enhance restfulness and sleep. Almonds and spinach, and other foods rich in magnesium can also improve sleep and relaxation.[72] Some foods can aggravate stress-related conditions. Substances frequently consumed by military leaders that are likely to worsen stress include caffeine, alcohol, tobacco, and fried or highly processed foods. Senior military leaders should be careful when including these items in their diet. These items should be consumed in moderation, or not at all, according to the guidelines in this chapter.[73]

Oxidative stress is the excessive production of reactive oxygen species (ROS), otherwise known as free radicals, in the cells and tissues within the body. Oxidative stress that the body's antioxidant system cannot overcome may increase inflammation in the body and contribute to several chronic diseases, especially age-related diseases.[74] This oxidation or production of free radicals results from metabolism and exposure to the environment. However, the accumulation of these free radicals can result in structural and functional damage to tissues. Antioxidants, including polyphenols, which are natural antioxidant compounds present in plants, and other phytonutrients, can interact with ROS and limit cell damage.[75]

The mechanism of action for phytonutrients, including polyphenols, is still not completely understood. However, nutrition experts still recommend consuming a wide variety of diversely colored fruits and vegetables to ensure adequate consumption of antioxidants. There is no recommended daily allowance for phytonutrients but eating a wide variety of foods ensures sufficient intake. Green leafy vegetables such as spinach are exceptionally nutrient-dense and, therefore, should be consumed regularly in addition to red, yellow, and orange vegetables in the greatest variety possible.[76] Additional possible benefits from the consumption of antioxidants include

71. David O. Kennedy, et al., "Effects of High-dose B Vitamin Complex with Vitamin C and Minerals on Subjective Mood and Performance in Healthy Males," *Psychopharmacology* 211 no. 1 (2010): 55–68.

72. Glyn Howatson et al., "Effect of Tart Cherry Juice (Prunus Cerasus) on Melatonin Levels and Enhanced Sleep Quality," *European Journal of Nutrition* 51 no. 8 (2012): 909–916.

73. CHAMP, *Warfighter Nutrition Guide,* 119.

74. Zdenka Durackova, "Some Current Insights into Oxidative Stress," *Physiological Research* 59, no.4 (2010): 459–469.

75. Shashank Kumar and Abhay K. Pandey, "Chemistry and Biological Activities of Flavonoids: An Overview," *The Scientific World Journal* (2013).

76. Claudine Manach et al., "Polyphenols: Food Sources and Bioavailability," *The American Journal of Clinical Nutrition* 79, no.5 (2004): 727–747.

optimized muscle performance, injury prevention, enhanced immune function, reduced pain and inflammation, prevention of heart disease and diabetes mellitus, and mitigation of high blood pressure. Interestingly, but consistent with other research related to supplementation, antioxidant supplement consumption has not consistently shown these protective benefits. However, consumption of whole foods has been consistently shown to provide these nutrients and lead to the aforementioned health benefits.[77] For reference, Tables 8 and 9 list common antioxidants and phytonutrients and what foods contain them.

**Table 8. Common Antioxidants[78]**

| Name | Classification | Food Sources |
|---|---|---|
| **Beta-Carotene** | A pigment found in plants that gives them their yellow and orange colors | Carrots, squash, sweet, potatoes, tomatoes, cantaloupe, peaches, and apricots |
| **Cysteine** | Nonessential amino acid | High-protein foods, including ricotta and cottage cheese, yogurt, pork, chicken, turkey, wheat germ and granola |
| **Flavonoids** | Natural compounds found in plants | Kale, beets, cranberries, red and black grapes, oranges, lemons, grapefruits, and green tea |
| **Selenium** | Mineral | Fish, shellfish, red meat, grains, eggs, chicken, and garlic |
| **Vitamin A** | Fat-soluble vitamin | Salmon, eggs, milk, spinach, carrots, sweet red peppers, mangos, black-eyed peas, and broccoli |
| **Vitamin C** | Water-soluble vitamin, also called ascorbic acid | Citrus fruits, green pepper, broccoli, leafy greens, strawberries, raw cabbage, and potatoes |
| **Vitamin E** | Fat-soluble vitamin | Wheat germ, nuts, seeds, whole grains, leafy greens, and vegetable oil |

**Table 9. Common Phytonutrients[79]**

| Type | Food Sources |
|---|---|
| **Anthocyanins** | Red and blue fruits such as acai, blueberries, blackberries, raspberries, cherries, plums, and vegetables such as eggplant, red onions, red potatoes, and radishes |
| **Beta-Carotene** | Leafy green, orange and yellow vegetables such as broccoli, spinach, collard greens, kale, sweet potatoes, carrots, and cantaloupe |
| **Flavanones** | Citrus fruits |
| **Flavonols** | Apples, apricots, beans, broccoli, cherry tomatoes, kale, pear, onions, cherries, tea, dark chocolate |
| **Isoflavones** | Celery, parsley, thyme, and oregano |
| **Lutein** | Soybeans and soybean products such as tofu, soy milk, and edamame |
| **Lycopene** | Tomatoes, watermelon, pink grapefruit, and red peppers |
| **Zeaxanthin** | Green vegetables, citrus fruits, and eggs |

77. "Antioxidants: In Depth," National Center for Complementary and Integrative Health, accessed November 31, 2020, https://nccih.nih.gov/health/antioxidants/introduction.htm.
78. CHAMP, *Warfighter Nutrition Guide,* 26.
79. CHAMP, *Warfighter Nutrition Guide,* 125.

## Conclusion

Senior military leaders have an obligation to the military to model healthful nutrition as stewards of the profession and to support initiatives that support a culture of wellness across the force. They must also maintain their health to enable continued service and pivot to a high quality of life through retirement and beyond. The foundational nutrition requirements for midlife senior military leaders are similar to younger soldiers' requirements. However, they vary in some critical ways including the need for specific nutrients to combat the effects of aging and stress. Fortunately, numerous resources are available to reasonably manage nutrition for optimal wellness using the latest nutrition science. Many of these resources are highlighted in this chapter, in other Army publications, or are available through other reliable resources.

Set in the midlife military professional context, recommendations to manage nutrition can be summarized by five guidelines. 1) Senior military leaders must carefully monitor energy intake to prevent excess body fat storage and ensure adequate sustained energy for performance. Time invested to determine daily energy requirements is well spent for long term health and foundational to any comprehensive nutrition plan and is an often-overlooked component of knowing oneself. Complete an EER calculation to establish a baseline. Additional resources to determine energy needs are available through Army Wellness Centers, Registered Dietitians (RDs), and even some fitness facilities who can test basal metabolic rates and other physiological factors. This testing can provide a much more precise measure of actual energy needs. 2) Senior leaders should be aware of macronutrient and micronutrient requirements for age and gender and consume the recommended amounts of whole foods that will ensure adequate intake. The human body is remarkably resilient, but optimal function requires the correct balance and variety of nutrients. 3) Leaders should take special care to ensure the most food variety possible daily or at least weekly. Varied whole foods help provide the correct mix of carbohydrates, protein, healthy fats, vitamins, and minerals. Furthermore, consuming various and colorful fruits and vegetables ensures a broad range of antioxidants, critical to mitigating oxidative stress and chronic disease. 4) Senior military leaders should ensure adequate intake of omega-3 fatty acids, antioxidants, iron, calcium, and whole grains. A growing body of research indicates that these nutrients help manage the negative physiological changes associated with aging. 5) Senior military leaders should regularly discuss their dietary intake with their healthcare provider and a Registered Dietitian in the context of overall wellness, energy, and vigor and only use therapeutic supplements under their healthcare provider's direction to treat specific medical needs.

## Key Takeaways

- Obesity is a chronic and widespread problem in the United States and the military. Lifestyle changes in midlife require a nutritional pivot.
- Familiarity with caloric needs will inform effective nutritional strategies to sustain energy to meet work and life demands.
- What you eat is equally important as how much you eat. A balanced diet will have appropriate macronutrient (carbohydrate, protein, fat) and micronutrient (vitamins, minerals) content. Seek variability in your diet.
- Due to a lack of regulatory oversight, approach dietary supplements with skepticism and caution.



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