

Nutrition

to aid wound healing
in the aging adult



Although often overlooked, nutrition is a key factor in wound healing. Learn about specialized nutrition considerations that help treat chronic wounds and support active aging

*by Julie Richards, MS, RDN, LDN,
Mary Litchford, PhD, RDN, LDN, and
Joyce Pittman, PhD, ANP-BC, FNP-BC,
CWOCN, FAAN*

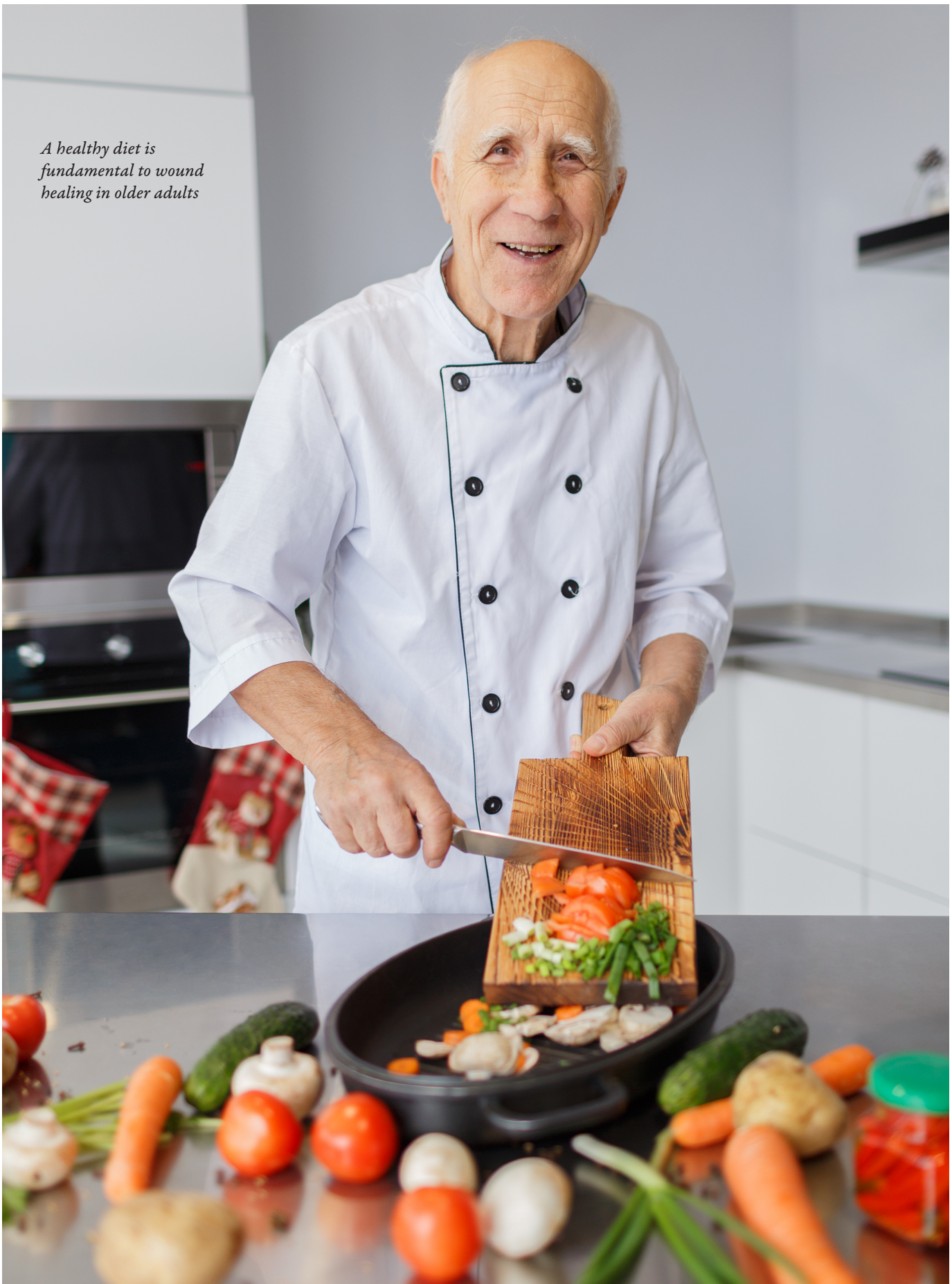
Advanced age is commonly identified as a risk factor for delayed wound healing—yet age in and of itself is not a risk for failure to heal. It is the multiple

health conditions, or comorbidities, affecting many older people that present a risk to healing. Even so, aging *is* associated with chronic wounds and impaired wound healing.¹ With the over-60 age group predicted to nearly double as a proportion of the global population in the decades to come, from 12% in 2015 to 22% in 2050,² chronic wounds will affect many more people worldwide.

In the United States, for example, the number of people 65 years and older is projected to double from 46 million to more than 98 million by the year 2060.³

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*A healthy diet is
fundamental to wound
healing in older adults*



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Currently, about 1 million Americans develop chronic wounds every year, with a large number of these wounds occurring in the older population.^{1,4,5,6}

Reported prevalence of chronic wounds in frail older adults ranges 20–35%.⁷ A recently published study found that nearly 15% of Medicare beneficiaries—around 8.2 million people—had at least one type of wound.⁸ For the older-adult population, wounds frequently occur from pressure injuries (sometimes referred to as pressure ulcers), diabetic foot ulcers, or surgical wounds. Overall,

chronic wounds affect 6.5 million patients in the US,⁹ while estimates suggest that more than USD\$25 billion is spent annually on their treatment.⁹

Adults ages 65 and older are more vulnerable to developing pressure injuries, which may progress into chronic wounds. People in this age group accounted for 72% of hospitalized patients diagnosed with hospital-acquired pressure injuries in one research study.⁹ In the majority of cases, individuals were admitted for something other than a pressure injury.⁹ Regardless, the pressure

injuries could become a source of infection and lead to other complications, considering that development of a pressure injury increased the mortality rate for patients by around 7%.⁹

Wound healing is complex. Many factors can hinder healing—including diabetes, obesity, malnutrition, vascular disease, infection and poor lifestyle choices—thus increasing the risk of a chronic wound.¹⁰ When a wound fails to heal in a timely or orderly manner, it may

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Servings of protein food choices		
Type of food	Amount that equals one protein serving	Common portion sizes
Meats	1 oz cooked lean beef, pork, or ham	1 small steak (eye of round, filet) = 3.5–4 protein servings 1 small lean hamburger = 2–3 protein servings
Poultry	1 oz cooked chicken or turkey, without skin	1 small chicken breast (about 3 oz) = 3 protein servings ½ Cornish game hen = 4 protein servings
Seafood	1 oz cooked fish or shell fish	1 can of tuna = 3–4 protein servings 1 salmon steak = 4–6 protein servings 1 small trout = 3 protein servings
Eggs	1 egg	1 egg = 1 protein serving 3 egg whites = 2 protein servings 3 egg yolks = 1 protein serving
Dairy	1 cup milk (skim, low-fat, or whole) 1 cup yogurt ¼ cup cottage cheese 1 oz cheese	1 cup milk = 1 protein serving 1 cup yogurt = 1 protein serving ½ cup cottage cheese = 2 protein servings 2 oz cheese = 2 protein servings
Nuts and seeds	1 oz nuts or seeds 1 tbsp peanut butter, almond butter, or most other nut butters	1 oz nuts or seeds = 1 protein serving 2 tbsp peanut butter = 2 protein servings
Beans and peas	¼ cup cooked beans or peas ¼ cup tofu 1 tbsp hummus	1 cup bean soup = 2 protein servings 1 soy or bean burger patty = 2 protein servings

Table 1. Servings of protein food choices. Sources: a) The Diabetic Exchange List (Exchange Diet). https://diabetesed.net/page/_files/THE-DIABETIC-EXCHANGE-LIST.pdf. Accessed November 16, 2018. b) US Department of Agriculture. All About the Protein Foods Group, 2018. <https://www.choosemyplate.gov/protein-foods>.

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Along with proper nutrition, an active lifestyle is key to preventing and treating pressure injuries

lead to impaired physical function. Not only can functional limitations restrict physical movement, interrupt daily life activities and challenge independence, but they can also impact treatment regimens, creating a vicious cycle that prevents healing.

Although often overlooked as a factor in wound healing, good nutrition is fundamental to the healing process. Among the specialized nutritional considerations to treat chronic wounds and promote healing, the body requires increased amounts of calories, protein, water, and certain vitamins and minerals. Professionals, where scope of practice permits, can use this information to help older adults improve their diets and/or to devise and deliver dietary plans that

promote healing. Others may draw on the contents of this article and other reliable sources to educate themselves and create educational programming (see page 47 for the box, “Nutrition tips to promote wound healing in older adults”). Either way, an important starting point is the impact of poor nutrition on susceptibility to wounds.

Malnutrition affects wound development

Multiple factors contribute to the development of pressure injuries, and although staying active is key to prevention and treatment, so is proper nutrition. While poor nutritional status is a known risk factor for pressure injury development in hospitals and residential nursing settings, it has also been associ-

ated with a higher development rate of these injuries in individuals who receive home care.¹¹ A poor diet, and specifically a low dietary protein intake, is an independent predictor of risk.^{12, 13}

A poor diet can lead to malnutrition, which can delay wound healing. Malnutrition is the state of being inadequately nourished, or the lack of proper nutrition—and it is a common problem in the older-adult population. Researchers have found that up to 1 in 2 older adults are at risk for malnutrition.¹⁴ Although it is important for trained healthcare professionals to assess older patients for malnutrition, untrained individuals can help by keeping in mind three quick ways to determine if someone should seek evaluation. These nutrition indicators include:

- unintentional weight loss
- poor appetite
- decreased food intake

Researchers have found that nutrition interventions can directly enhance the healing process for patients with pressure injuries.¹⁵ So, healthcare providers and others caring for older adults should be aware of a person’s dietary intake and weight status because meeting nutritional needs is essential for wound healing, and the body requires an increased need for both energy and protein to heal wounds.

Let’s look now at some of the common nutritional factors that impair wound healing in the aging population and the role nutrition plays in the healing process.

Calories count

The body needs calories for energy, and during the wound healing process, its energy requirements increase, thus elevating daily calorie needs. Overall nutrition status, wound type and severity, underlying medical conditions, and activity level are all factors that help determine how much energy is required.^{11, 16}

The body will find alternative ways to meet increased energy requirements if it is not meeting these needs through food intake. For example, an individual with inadequate caloric intake will meet protein needs for survival by breaking down muscle tissue for both energy and protein requirements.^{11,16} That shift will make less protein and energy available for wound healing. In addition, the breakdown of muscle mass will decrease strength and endurance, further complicating wound healing by reducing the muscle reserves that assist the process.

Protein power

Some changes commonly associated with aging—including impaired chewing/swallowing and reduced stomach acid—can hinder protein digestion and absorption. Chronic inflammation from comorbidities like obesity and diabetes can lead to inefficiencies in how the body uses amino acids.¹⁷ Such factors increase the amounts of protein that older adults require.

People can struggle to meet their increased protein requirements, however, as approximately 40% of healthy adults over 50 years of age do not consume the protein they need.¹⁸ A reduced protein intake may result in many factors detrimental to proper wound healing, such as a decreased production of collagen,¹⁹ which is essential to maintain healthy tissues and skin. Consider also that protein needs increase when someone is ill or injured.

Optimal protein intake is vital to heal wounds and preserve muscle mass. To support health and well-being, older adults should be evaluated for protein requirements and educated on how much they need when in good health and during times of injury or illness.

Current scientific literature recommends that *healthy older adults* consume

1.0–1.2 grams of protein per kilogram of body weight daily. For *adults with illnesses or injuries*, the recommended protein intake increases to 1.2–1.5 grams of protein per kilogram of body weight daily, and *adults with very severe illnesses or injuries* may need even more.²⁰ For example, an older adult weighing 160 lbs. needs around 73–88 grams of protein per day when healthy, but 88–110 grams of protein per day when recovering from an acute illness or injury. This means the older adult would need to consume about 4 more eggs, 3 more glasses of milk, or 1 more three-oz chicken breast per day to get enough protein to aid recovery!

A typical serving of protein food provides around 7–8 grams of the nutrient,²¹ and Table 1 displays common protein food choices that equal 1 serving (see page 40).²² Often, people consume more than 1 serving of protein at meals. Table 2 indicates the suggested amount of daily protein servings for older adults based on their weight and health status,²⁰ while Table 3 provides a sample menu to display how protein servings can be adequately divided throughout the day (turn to pages 44 and 45, respectively).

Many food options are available to help older adults meet their protein requirements. It is important, therefore, for consumers to learn about the types of protein food choices and their benefits. For example, collagen, an abundant protein in the human body and also found in the diet from animal products, can help wound healing.^{23,24}

In general, it is crucial to assess people's knowledge of protein foods and assure they are educated on what foods contain high-quality protein. Based on two surveys recently conducted by Nielsen, the protein knowledge among consumers is fairly low, and they are often unaware of the amount of protein in foods.²⁵ For example, in one survey, only 20% of par-



Delayed healing raises the risk of a chronic wound, which can impair physical function

ticipants reported knowing that shrimp is a high protein food.²⁵ It is valuable to be aware of the misconceptions associated with protein foods when working with older adults in the community or home-based setting.

Building blocks of protein

During digestion, proteins are broken down to amino acids, which are the building blocks of protein. There are three types of amino acids: essential, nonessential and conditionally essential amino acids. The body can make nonessential amino acids, but essential amino acids must come from food. Some amino acids, however, become conditionally

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Protein recommendations based on weight and health status		
Body weight (lbs)	Recommended amount of protein servings daily for a healthy adult	Recommended amount of protein servings daily for an ill/injured adult
100 (45 kg)	6–8	8–10
120 (55 kg)	8–10	10–12
140 (64 kg)	9–11	11–14
160 (73 kg)	10–13	13–16
180 (82 kg)	12–14	14–18
200 (91 kg)	13–16	16–20
220 (100 kg)	14–17	17–21
240 (109 kg)	16–19	19–23
260 (118 kg)	17–20	20–25
280 (127 kg)	18–22	22–27
300 (136 kg)	19–23	23–29

Table 2. Protein recommendations based on weight and health status. Sources: a) Deutz, N. E., Bauer, J. M., Barazzoni, R., et al. (2014). Protein intake and exercise for optimal muscle function with aging: Recommendations from the ESPEN Expert Group. *Clinical Nutrition*, 33(6), 929–936. b) The Diabetic Exchange List (Exchange Diet). https://diabetesed.net/page/_files/THE-DIABETIC-EXCHANGE-LIST.pdf. Accessed November 16, 2018. c) US Department of Agriculture. All About the Protein Foods Group; 2018. <https://www.choosemyplate.gov/protein-foods>.

essential when the body undergoes stress or illness, such as during wound healing.

Dietary protein can be obtained from both plant and animal products. Protein from animal sources—milk, eggs and meat, for example—provides complete protein,²⁶ which includes all the essential amino acids necessary for wound healing. Sufficient intake of complete sources of dietary protein is needed to maintain tissue and heal wounds.^{16,19} For an injured older adult, it is vital that all essential amino acids are consumed daily to assist in the body's production of protein and the wound healing process.

HMB (beta-hydroxy-beta-methylbutyrate) also supports wound healing. Created when the essential amino acid leucine is metabolized, HMB helps in

the formation of new tissues by slowing muscle protein breakdown and increasing protein production.²⁷

Conditionally essential amino acids are particularly helpful in the wound healing process. Arginine and glutamine are nonessential amino acids, but during stress or illness, they become conditionally essential.²⁶ Arginine is a substrate for the body's production of protein (or a substance acted on to aid in this production), and is required for tissue repair of acute and chronic wounds.²⁸ The body does not make sufficient amounts of arginine during times of stress, which is why supplementation is associated with improved wound healing and may be recommended to enhance healing.²⁸ Glutamine has many important functions in the body, including DNA production

and cell growth.²⁹ When a person has a serious illness or injury, glutamine concentration in the body may decrease, making it a conditionally essential amino acid. Supplementing with glutamine is also associated with improved wound healing.²⁹ Keep in mind that a trained professional is needed to determine if someone will benefit from amino acid therapy, as there are situations where it is inadvisable.

Hydrate, hydrate, hydrate

It is common for older adults to drink insufficient water to meet their daily fluid needs, whether or not they have an illness or injury.²⁶ Water is a major component of blood in the body. When the body is dehydrated, the volume of blood decreases. A reduced volume of blood decreases the amount of oxygen and nutrients that can be delivered to a wound.

Water requirements can be met from beverages and, to a lesser degree, the water content of foods. However, the water content of foods accounts for approximately 19–27% of total fluid intake,³⁰ so individuals need to be aware of their water intake and understand how much they need, especially if they have wounds.

The role of vitamins and minerals

Micronutrients play a key role in supporting the body's tissues. While a huge part of nutrition for wound healing involves meeting energy and protein needs, there are also micronutrients that specifically benefit the process—zinc, vitamin B₁₂, and the antioxidants vitamins C and E. People with suspected or confirmed micronutrient deficiencies may benefit from supplementation prescribed by a trained healthcare professional.

Zinc

The trace mineral zinc is involved in many enzymatic processes (which assist chemical reactions), and the body requires it for both protein and DNA production.³¹ Zinc also is a cofactor for

collagen formation, which makes it crucial in the wound healing process.³⁰ A deficiency of this micronutrient can delay healing, thus supporting the benefits of zinc supplementation in individuals with low levels.²⁶

Vitamin B₁₂

Deficiencies of vitamin B₁₂ are commonly reported in older adults²⁶ and may contribute to poor wound healing.³² Vitamin B₁₂ likely plays a role in the early stages of wound healing³³ due to its important role in DNA and protein production.³⁴ This micronutrient is also involved in the production of red blood cells,³⁴ which carry oxygen from the lungs to the body tissues. An adequate supply of oxygen is important for the wound healing process.

Vitamins C and E

Vitamins C and E work to help protect the body from oxidative stress, which is a negative effect of the body's own production of energy. Some studies have found that taking these vitamins can help improve wound healing.³⁵ Vitamin C also plays a role in the body's making of collagen.^{26,30} Obtaining these antioxidants through diet or with supplementation, if an individual is deficient, can be beneficial for wound healing.

Nutrition and comorbidities

A comorbidity is the presence of more than one health condition or chronic disease. Having multiple health conditions can hinder wound healing, with chronic wounds being the main complication that can result.³⁶ In the older-adult population, obesity and diabetes are 2 common comorbidities that impair the healing process. Individuals are at higher risk for developing a chronic wound if they experience an injury and have additional comorbidities.

Obesity

The prevalence of obesity is growing worldwide.¹⁰ Among the age 60+ population, 41% of adults are obese, which is

Sample menu of daily protein servings for a 160 lb injured/ill older adult	
<i>The menu below displays the amount of protein servings needed throughout the day to meet the protein requirements for a 160-lb. individual with an illness or injury. This menu only displays the protein foods for each meal/snack, and the individual should incorporate food choices from other groups into meals/snacks as well.</i>	
Meal	Protein servings
Breakfast	1 cup of milk (8 g protein) Omelet with 2 eggs, 1 oz cheese (21 g protein) <i>Protein servings: 4</i>
Snack	2 oz cheese (14 g protein) <i>Protein servings: 2</i>
Lunch	1 cup of milk (8 g protein) 1 peanut butter sandwich (14 g protein) <i>Protein servings: 3</i>
Snack	1 cup yogurt (8 g protein) <i>Protein servings: 1</i>
Dinner	1 cup milk (8 g protein) 3 oz chicken breast (21 g protein) <i>Protein servings: 4</i>
Snack	1 oz mixed nuts (6 g) <i>Protein servings: 1</i>
Total protein servings: 15	

Table 3. Sample menu of daily protein servings for a 160 lb injured/ill older adult.

categorized as a body mass index (BMI) greater than or equal to 30 kg/m².³⁷ Obesity is associated with serious health risks, while obesity-related changes in the body can impair wound healing.⁹

One major concern is the increased workload that obesity places on the heart to supply oxygenated blood to the tissues. If enough oxygenated blood does not spread throughout these tissues, a restricted blood flow, or ischemia, can occur, resulting in impaired wound heal-

ing.¹⁹ Obesity also contributes to the development of type 2 diabetes. This chronic condition can further complicate wound healing. Nutritional assessment and interventions are important to help treat chronic wounds in obese individuals.

Diabetes

Many factors affect the wound healing process in older adults with diabetes,

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Professionals can encourage healthy eating and stay alert to signs of malnutrition in older adults

including hyperglycemia (high blood sugar), chronic inflammation and impaired blood flow. The chronic low-grade inflammatory state seen in those with diabetes and the prolonged inflammatory response after injury is detrimental to healing.³⁶

In addition, diabetes makes people more prone to developing wounds, such as foot ulcers. Diabetic foot ulcers are one of the most serious complications for individuals with the disease, who have an estimated 25% lifetime risk of developing these wounds.³⁶ This susceptibility comes from a multitude of factors, including damaged nerves (neuropathy) and blood vessels (vascular disease).³⁸ Moreover, diabetes alters the immune response and lowers an individual's resistance to infection. If a wound becomes

infected in an individual with diabetes, it will further impair the healing process.³⁶ Nutritional interventions should be considered to help manage diabetes, such as consistent protein and carbohydrate intake throughout the day to help control blood sugar.

Nutrition helps healing

Wound healing increases nutritional needs in older adults. However, individuals may have difficulty meeting those needs through regular dietary intake alone. Failing to meet nutritional needs not only can hinder the wound healing process, but also make delayed healing or complications more likely.

Moreover, wound healing requires increased amounts of *specific* nutrients. To meet their increased and specialized needs during this process, older adults may benefit from consuming oral nutrition supplements (ONS). The goal of ONS in individuals with wounds is to increase overall calories, nutrients and fluid intake, while providing specific nutrients that help wound healing to proceed.

While many ONS will increase calorie and protein intake, a specialized ONS includes certain types and amounts of specific nutrients to meet the complex needs of someone with a wound. For example, specialized amino acid mixtures have been clinically shown to enhance collagen production in older adults to help heal wounds.³⁹ Such products also provide the increased amounts of micronutrients needed for wound repair. Adding specialized ONS to the diet is a safe and effective nutrition intervention to improve wound healing in the aging adult.

Promoting good wound healing

Proper nutrition is fundamental for healthy aging and wound healing. A failure to heal in a timely or orderly way can lead to the development of chronic wounds, which are common in older

adults particularly due to multiple comorbidities. Chronic wounds increase an older person's need for calories, protein, water and other nutrients, such as specific vitamins and minerals. A specialized ONS is an effective nutrition intervention to consider in these circumstances. Speaking with a professional, such as a Registered Dietitian Nutritionist, can help older adults learn about an individualized diet that will help promote good wound healing.⁴⁰

Across the continuum of care and in other settings, all professionals can play a supportive role. For example, if scope of practice precludes more direct intervention, they can stay alert to indicators of malnutrition (i.e., unintentional weight loss, poor appetite or decreased food intake) and suggest individuals seek evaluation when needed. Professionals may also encourage healthy behaviors such as staying active and eating well, which

Nutrition and chronic wounds: Four takeaways

- **Proper nutrition is fundamental for wound healing**, particularly increased calorie and protein intake.
- **Be aware of comorbidities** and how they can further hinder the wound healing process.
- **A specialized oral nutritional supplement can improve wound repair** and help ensure that older adults meet their increased nutritional needs.
- **The key nutrients/metabolites that support wound healing** include energy, protein, arginine, glutamine, HMB (beta-hydroxy-beta-methylbutyrate), zinc, and vitamins B₁₂, C and E.

strengthen the body's ability to heal and support active aging. 

Julie Richards, MS, RDN, LDN, is a nutrition consultant for Abbott Nutrition. Richards holds a master's degree in medical dietetics through The Ohio State University (OSU) and a bachelor's degree in dietetics and kinesiology from Miami University. While at OSU, she had extensive training in the surgical intensive care unit and burn unit, and she frequently treated severe wounds through nutrition intervention.

Mary Litchford, PhD, RDN, LDN, is an internationally recognized speaker, author and consultant to healthcare providers. Litchford received her PhD in human nutrition from the University of North Carolina–Greensboro. Her professional career has included clinical practice, university teaching, and business consulting. She is president of CASE Software & Books, a professional and educational resource company. Litchford is a member of the Academy of Nutrition & Dietetics and served on the Academy's Evidence Analysis Work Groups on wound care and hydration. In 2018 she received the Academy's Excellence in Practice Award for Consultation and Business Practice. She is currently the Immediate Past President of the National Pressure Ulcer Advisory Panel and serves as one of the NPUAP representatives on the International Clinical Practice Guidelines Governance Group.

Joyce Pittman, PhD, ANP-BC, FNP-BC, CWOCN, FAAN, has over 38 years in clinical practice, including 18 years as a Wound, Ostomy, Continence (WOC) nurse and 14 years as a Nurse Practitioner. Pittman is a clinician, nurse researcher, and educator providing system-wide WOC expertise at Indiana University Health Academic Health Center and Indiana University School of Nursing. She is past Deputy Editor for the Journal of Wound, Ostomy and Continence Nursing, active in the WOCN Society, and a director on the National Pressure Ulcer Advisory

Panel (NPUAP). Pittman has authored numerous journal articles and book chapters, is a national speaker regarding WOC conditions and issues, and is a consultant regarding complex wound and ostomy management. Her practice and research are focused on improving the quality of life of those individuals with wound, ostomy, and continence conditions.

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Nutrition tips to promote wound healing in older adults

1. Eat sufficient calories from a balanced, nutritious diet.
2. Consume optimal amounts of protein at meals and snacks.
3. Stay well-hydrated.
4. For a person with diabetes, control blood sugar levels.
5. Talk with a Registered Dietitian Nutritionist about an individualized diet plan for optimum wound healing.

Source: Grieger, L. (2015, July 21). 5 Nutrition Tips to Promote Wound Healing. <https://www.eatright.org/health/wellness/preventing-illness/nutrition-tips-to-promote-wound-healing>. Accessed January 14, 2019.

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Suggested resources

Internet

Abbott Nutrition Health Institute infographic: Adjusting to life with type 2 diabetes or prediabetes

Understand symptoms of diabetes and how to manage blood sugar

https://static.abbottnutrition.com/cms-prod/anh-2017.org/img/ANHI_Diabetes_Infographic_tcm1423-116921.pdf

Abbott Nutrition Health Institute infographic: Is dehydration on your radar?

Tips on how to stay hydrated

https://static.abbottnutrition.com/cms-prod/anh-2017.org/img/3567%20-%20ANHIPN_18_03567_B_ANHI%20Dehydration%20Infographic_R03e_tcm1423-118033.pdf

Choose MyPlate (US Department of Agriculture): MyPlate

Understand a healthy, well-balanced diet

<https://www.choosemyplate.gov/myplate>

Eat Right (Academy of Nutrition and Dietetics): Find an Expert

Find a Registered Dietitian Nutritionist

<https://www.eatright.org/find-an-expert>

Print

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