Mr J, a 50-year-old man with type 2 diabetes, is depressed and has a diabetic foot ulcer and chronic urinary tract infections. He takes Humalog insulin in the morning and Lantus in the evening, plus sliding scale coverage if his blood glucose level rises. Blood is drawn for glycosylated hemoglobin (hemoglobin Aic) and blood glucose tests, and the results confirm Mr J’s dietary nonadherence and the effect on his overall health status.

A patient like Mr J who has a poorly controlled blood glucose level and poor eating habits is at risk for numerous physiologic problems. An elevated blood glucose level creates a negative effect on the wound healing process, causing wounds to heal slowly or not at all. This is especially a problem for patients with diabetes. Combined with medication, dietary intake plays a significant role in the repair of wounds because the diet also provides protein, calories, fluids, and other nutrients. When the blood glucose level is elevated, glucose does not diffuse easily through the pores of the cell membrane. This creates a dehydrating effect; the increased osmotic pressure in the extracellular fluids causes water to transfer out of the cells. Loss of glucose in the urine causes osmotic diuresis, increasing urinary losses of electrolytes and water. Both extracellular and intracellular dehydration can occur, which affects the healing time of the skin.

An elevated blood glucose level also damages both the blood vessels and the nerves. In addition, it places the patient at risk for developing peripheral vascular disease. Several studies show the importance of optimal insulin control in diabetes to lower the incidence of neuropathy.

Free radicals generated by the autoxidation reactions of sugar and sugar adducts to protein are possible sources of oxidation stress and damage to protein in patients with diabetes. Glycoxidation products accumulate in tissue collagen at an accelerated rate in patients with diabetes. This oxidative stress leads to complications in diabetes, such as tissue damage and cell death, which are reversed by antioxidants.

Controlling the blood glucose level has also been related to the rate of infection. Poor glycemic control—which impairs the body’s ability to eliminate bacteria—leads to an increase in infections. Urinary tract, respiratory, and soft tissue infections are particularly common in people with diabetes. Soft tissue infections of the lower extremities and gangrene are serious complications.

In addition, hyperglycemia decreases oxygen to the tissues. Delivery of leukocytes and antibiotic agents to the wound is impaired due to lack of blood flow. Oxygen is necessary for macrophage mobility and growth of granulation tissue during wound healing.

Hyperglycemia can cause neuropathy or damage to the intestinal nerves, causing diarrhea, vomiting, or bloating, which affect the nutritional status of the diabetic.

**MANAGEMENT STRATEGIES**

Based on the latest guidelines from the American Diabetes Association, goals of medical nutritional therapy for all diabetics are below.
Attain and maintain optimal metabolic outcomes including blood glucose levels in the normal range or as close to normal as possible to prevent or reduce the risk for complications of diabetes; a lipid and lipoprotein profile that reduces the risk for macrovascular disease; blood pressure levels that reduce the risk for vascular disease. Prevent and treat the chronic complications of diabetes. Modify nutrient intake and lifestyle as appropriate for the prevention and treatment of obesity, dyslipidemia, cardiovascular disease, hypertension, and nephropathy. Improve health through healthy food choices and physical activity. Address individual nutritional needs taking into consideration personal and cultural preferences and lifestyle while respecting the individual’s wishes and willingness to change.

Mr J consults a dietitian and a certified diabetes educator (CDE). Mr J admits that he often skips meals and does not monitor his blood glucose level on a daily basis. He usually consumes sodas, milkshakes, cookies, and chips, along with fast food items.

The dietitian completes a nutritional assessment, including a history of the patient’s food preferences and meal times (Table 1). The dietitian and the CDE establish treatment goals that include diet, medication management, blood glucose monitoring, and appropriate skin care.

Mr J’s new diet plan encourages a selection of vegetables, starches and legumes high in fiber, which are beneficial for glucose control. They also help to maintain normal bowel function\(^\text{22}\); whole fruits instead of juice for fiber and their positive effect on blood glucose levels; an oral supplement to be taken during the day, formulated for diabetics containing fructose, which promotes glucose removal from the blood.\(^\text{23,24}\) Supplements with a high rate of monosaturated fatty acids are also beneficial for blood glucose and serum lipid control; energy bars designed for diabetics, alternated with liquid products for variety; MUFAs, including olive, canola, or peanut oil, peanut butter, and nuts.\(^\text{25}\)

Protein comprises 20% of Mr J’s daily caloric intake, with an emphasis on lean meats, poultry, and fish. Additionally, he and his family are taught to read food labels so they select products with the appropriate carbohydrate/protein balance. Portion control is emphasized, as well as spacing meals evenly throughout the day. Over the next 3 months, Mr J consistent amounts of carbohydrates and keeps detailed records of his glucose level and insulin coverage required. At the end of 3 months, his glycosylated hemoglobin and blood glucose levels improved and his wound is showed positive signs of healing after off-loading treatment.

### REFERENCES


<table>
<thead>
<tr>
<th>TABLE 1. Mr J’s nutritional assessment</th>
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<tbody>
<tr>
<td>Height: 70’’ tall, large frame</td>
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<tr>
<td>Weight: 190 lb</td>
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<tr>
<td>Desirable body weight: 158–180 lb</td>
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<tr>
<td>Caloric needs: 2850–3000 kcal/d</td>
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<tr>
<td>Protein: 1.3 g/kg = 112 g protein/d</td>
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<tr>
<td>Food preferences: Dislikes most vegetables except carrots, peas, corn, potatoes, and tomatoes; enjoys any type of meat, eggs, cheese, and milk</td>
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<tr>
<td>Work schedule: Works night shift; sleeps until 10 AM</td>
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