

Inadequate protein and energy intake. Pure starvation is not a common cause of involuntary weight loss in this country. However, inadequate nutritional intake is common. The risk factors for suboptimal energy and protein can be categorized as follows:

- Inadequate nutrient intake to meet normal needs,
- Increased nutrient requirements,
- Increased nutrient losses, and
- Poor nutrient absorption.

Inadequate nutrient intake. Although inadequate nutrient intake encompasses all categories, there are specific high-risk populations where poor intake is due to environmental causes, either alone or with a chronic wound (Table 14).

Table 14. Causes of Inadequate Nutrient Intake (Quantity or Quality)

<ul style="list-style-type: none">■ Aging■ Mental illness■ Alcoholism■ Drug addiction■ Avoidance of specified food groups (meat, eggs, milk, fruits and vegetables, grains)■ Poor dentition■ Food idiosyncrasies■ Poverty, isolation■ Anorexia (from disease process, drugs, emotional problems)■ Recent weight loss or gain■ Inappropriate food choices from lack of information

The aging population is not only the largest population at risk, it also suffers from many of the other risk factors listed in Table 14.^[7,9,31] This population, especially if socially isolated or when living in a chronic care facility, is very prone to involuntary weight loss resulting in complications of lost lean mass.^[15-18]

The problem is so prevalent that the federal government issued the OBRA Act, which requires that long-term care facilities develop strategies to prevent involuntary weight loss in their residents. Nutritional plans and body weight monitoring are mandatory for all patients. Unfortunately, one can lose lean mass with inadequate physical inactivity and replace the weight with fat. This body compositional change results in the same lean mass loss morbidity. Therefore, to avoid the loss of lean mass and its complications, a nutritional program based on an individual's needs and a regular exercise program are necessary.^[9,17,31]

Increased nutrient requirements. The use of RDA values for energy, protein, and micronutrients are based on what is needed to maintain function, not restore a deficit. A 50% increase in all values is needed to restore losses; otherwise, involuntary weight loss and PEM occur.^[10,37-40]

It is important to understand that specific nutrient requirements for the elderly are higher than for the younger population (Table 15).^[37-50] The old notion that old people are frail and hypometabolic and, therefore, need less nutrition is untrue. The reality is that the elderly require increased nutritional intake to avoid losing lean mass, bone, calcium, cognition, and developing chronic illness such as adult onset diabetes.^[37-50] Specifically, they require at least 25% more calories than what the standard RDA table recommends to maintain activity, 1 g/kg/day to 1.2 g/kg/day to maintain lean mass, because protein synthesis is less efficient, calcium and vitamin D to prevent osteoporosis and vitamin B complex and folic acid to counteract increased homocysteine and its cardiovascular effects.

Table 15. Increased Nutritional Needs of the Elderly

<ul style="list-style-type: none">■ Calories at least 25% greater than standard RDA table to maintain activity ■ Protein 1 g/kg/day to 1.2 g/kg/day (not 0.8 g/kg/day) to maintain lean mass as protein synthesis is less efficient ■ Calcium and vitamin D (due to increased losses and decreased intake) in order to decrease osteoporosis ■ Vitamin B complex, folic acid, to counteract increased homocysteine and its cardiovascular effects
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Other patients at risk are pregnant women, cancer patients, and those with wounds.^[21]

Increased nutrient losses. An impaired or aging gastrointestinal tract is less efficient at absorbing nutrients. In addition, disease states such as inflammatory bowel disease, chronic diarrhea, and medication-induced intestinal disorders all lead to increased losses requiring increased intake.^[45]

Poor nutrient absorption. Poor absorption occurs most frequently in the elderly with drug-induced gastrointestinal disorders. Prior bowel resections will also impede absorption, increasing the risk of PEM.^[45]

Complications of Involuntary Weight Loss and PEM^[41-54]

The result of a loss of protein stores or lean mass and inadequate energy is a high-risk state for health problems. The process can be fatal with a severe "stress response" if nutrition and stress control is not optimized, especially in a previously compromised patient. Elderly or disabled patients or those with chronic illness do not tolerate severe body injury (eg, multiple fractures) well. However, if aggressive management leads to recovery, the lost lean mass and residual PEM remain major health problems.

The most common problems associated with involuntary weight loss and PEM are progressive disability, decreased activity, discomfort, and decreased appetite.^[44,45,49] Other common complications are infections due to impaired immune function and the formation of chronic wounds.^[44,48,50,51]

Those patients who develop PEM without a major insult (ie, a minor wound or semistarvation) have the same long-term complications, but the time course to reaching the complications is longer. Complications begin with a decreased activity level and poor nutrition, which accelerates further weight and lean mass loss, which results in depression, poor quality of life, and the progression of a downward spiral. Pneumonia often results and is a major cause of death in the PEM population (Figures 12-14).

Figure 12. PEM resulting in severe life-threatening pneumonia.

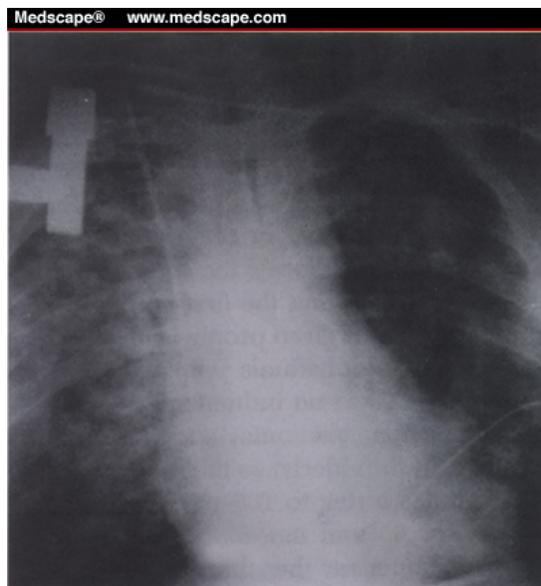


Figure 13. Severe ulcerations on lower leg in an elderly patient with 15% weight loss.



Figure 14. Bone demineralization and stress fractures due to loss of lean mass, debility, and decreased nutrient intake.



Diagnosis of Involuntary Weight Loss and PEM

Weight loss is determined using the following equation: present weight divided by usual weight times 100 = percent of weight loss.

After percent of weight change is calculated, the severity of PEM can be estimated. If percent of weight change is 10%, then PEM is considered mild, 15% to 25% is considered moderate, and more than 25% is severe.

The loss of weight is only a marker of risk because the degree of lean mass vs fat and the degree of nutritional deficiency actually define the degree of PEM.^[54,55]

Malnutrition is a metabolic disorder, and the diagnosis depends on the history, physical exam, and biochemical markers; the biochemical markers are the most sensitive indicators. Because this assessment is not an exact science, there are a variety of different scales used for defining the degree of malnutrition.^[54-61]

Physical examination. The routine physical examination should note signs of nutritional deficiencies, including muscle wasting or weakness, dermatitis, ulceration of mucous membranes, delayed wound healing, central nervous system depression, glossitis, and congestive heart failure (Table 16).

Table 16. Physical Findings^[56,57]

- Unintentional loss of body weight
- Loss of subcutaneous fat, evidenced by loose skin, especially on extremities
- Muscle wasting, usually first evidenced by quadriceps wasting
- Presence of peripheral edema, in the absence of recognized cardiac disease or circulatory disorder
- Poor healing of chronic wounds or pressure sores
- Glossitis, cracking at edges of mouth

- Chronic infections

- Listlessness, apathy

Biochemical data.^[37,56,59] Biochemical data are useful, objective, and usually readily available. They are, however, affected by the stress response to injury or infection or other medical conditions (Table 17).^[40,53,54]

Table 17. Degree of PEM

	Mild	Moderate	Severe
Albumin (g/dL)	2.8-3.5	2.1-2.7	< 2.1
Transferrin (mg/dL)	151-200	100-150	< 100
Total lymphocyte count (per mm ³)	1200-1500	800-1199	< 800

Serum albumin. This is a common indicator of the patient's protein stores. But because albumin has a half-life of about 20 days, and large amounts are stored in the body, a patient may already be malnourished before serum albumin levels drop. Serum albumin below 3.5 g/dL is considered low and a level below 2.5 g/dL indicates seriously deficient protein stores. The low values are usually associated with nonhealing pressure sores. However, nonnutritional factors also lower the serum albumin level. These include trauma, sepsis, liver disease, and wounds.

Serum transferrin. This is a more accurate indicator of protein stores. It responds more readily than serum albumin to acute changes in protein status. Serum transferrin has a shorter half-life (8-10 days) and smaller body stores than albumin. A serum transferrin level below 200 mg/dL is considered low and below 100 mg/dL is considered severe. Nonnutritional factors can also affect serum transferrin levels.

Serum prealbumin and serum retinol-binding protein. These indicators are more sensitive than serum albumin and serum transferrin and provide valuable information on a patient's current nutritional status.

Serum cholesterol. Cholesterol can indicate malnutrition if it is below 150 mg/dL. This level must be considered with other nutritional measurements.

The 24-hour urinary creatinine/height ratio. If this ratio is decreased, then protein stores are depleted. This is the most sensitive and practical clinical indicator of protein starvation and should be monitored at weekly intervals.

T-lymphocyte cell. If T-lymphocyte cell function is decreased, it indicates protein store depletion. This is revealed by the loss of cutaneous energy or the ability to respond to skin testing.