

Nutritional Considerations in Wound Healing

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Objectives

- Identify markers of poor nutritional status that may contribute to the development of tissue breakdown
- Describe key nutrients needed for wound healing and their role in wound healing

Weight changes (losses or gains) may be related to a variety of risk factors

Weight change factors
include:

- Decrease in activity
- Decreased basal metabolic rate
- Disease-related anorexia
- Disease-related cachexia
- Effects of drugs
- Changes in eating habits/diet
- Increasing disability

Laboratory measures may be
affected by age because of:

- Hydration status
- Impact of multiple drug use
- Chronic disease
- Acute illness episodes
- Changes in organ function

Commonly used laboratory
measures include:

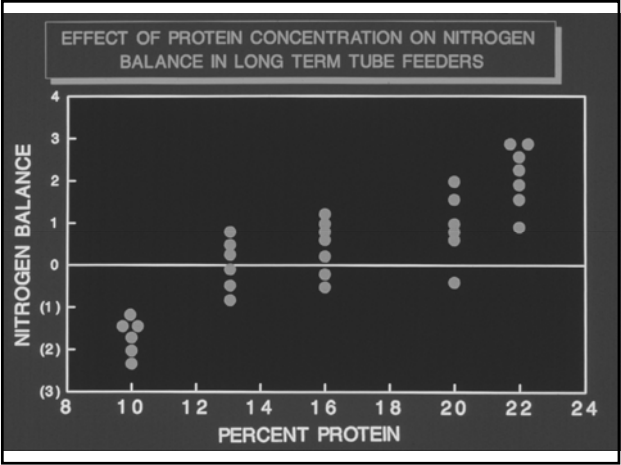
- Albumin
- Transferrin
- Prealbumin
- Retinol-binding protein
- Hemoglobin/hematocrit
- Electrolytes
- Renal function tests

Albumin is an indicator of many processes that do not have to do with nutritional status

Albumin levels may be affected by:

- Bed rest

Immobilization is a major factor in negative nitrogen balance



Albumin levels may be affected by:

- Bed rest
- Fluid balance

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- Bed rest
- Fluid balance
- Acute physiologic stress
 - Trauma
 - Infection
 - Fracture
 - Thermal injury
 - Emotional stress

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- Bed rest
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- Chronic inflammatory processes

Albumin levels may be affected by:

- Bed rest
- Fluid balance
- Acute physiologic stress
- Chronic inflammatory processes
 - Autoimmune diseases
 - Inflammatory bowel diseases
 - Radiation therapy
 - Chronic infection

Albumin levels may be affected by:

- Bed rest
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- Acute physiologic stress
- Chronic inflammatory processes
- Dysfunctional protein metabolism

Albumin levels may be affected by:

- Bed rest
- Fluid balance
- Acute physiologic stress
- Chronic inflammatory processes
- Dysfunctional protein metabolism
 - Advanced liver disease
 - Congestive heart failure
 - Nephrotic syndrome
 - Protein-losing enteropathies

Transferrin may not be a reliable indicator because:

- Total body iron stores increase with age
- Chronic infection, hepatic, renal diseases, cancer, all impact on serum transferrin
- It is not very specific for nutritional status

Prealbumin/Retinol-binding protein

- Negative acute phase reactant in response to inflammatory processes
- Declines in liver disease, iron deprivation
- Increases in renal failure and with steroid therapy
- RBP is primarily a carrier protein for vitamin A

For older adults other dimensions should be evaluated, including oral health and functional ability

Oral health evaluation in older adults:

- Teeth may be loose or missing
- Dentures may not fit
- Oral lesions may be present
- Taste sensitivity may be impaired
- Saliva production may be affected by drugs or disease
- Chewing/swallowing difficulties may exist

Functional status is usually evaluated by 2 commonly used scales

Activities of Daily Living

- Toileting
- Feeding
- Dressing
- Grooming
- Ambulating
- Bathing

Instrumental Activities of Daily Living

- Ability to use phone
- Shopping
- Food preparation
- Housekeeping
- Laundry
- Ability to travel
- Manages own medications
- Handles finances

To avoid or heal wounds of any type, nutrient needs must be met to support homeostasis

However, nutrient requirements may change with age due to physiological, health status, body composition, and activity level changes

Changes in nutrient requirements occur in old adults because:

- Body composition changes
- Health status
- Gastrointestinal function
- Drug/nutrient interactions
- Activity level
- Dietary choices

Disease will impact on nutritional requirements because:

- Side effects of medications
- Modified diets
- Demands of healing, recovery or rehab
- Changes in level of activity
- Changes in functional independence
- Ability to chew, swallow, digest, or absorb nutrients

Dietary intake may change because of:

- Health status
- Cognitive status
- Disease-related anorexia
- Swallowing disorders
- Oral health problems
- Changes in taste sensitivity
- Side effects of medications
- Functional status

Key nutrient requirement changes that occur with age:

- Protein
- Vitamin B12
- Vitamin A
- Vitamin C
- Vitamin D
- Iron
- Zinc
- Other trace minerals
- Fluids

Key nutrients needed for wound healing

- Protein
- Energy
- Vitamin A
- Vitamin C
- Zinc

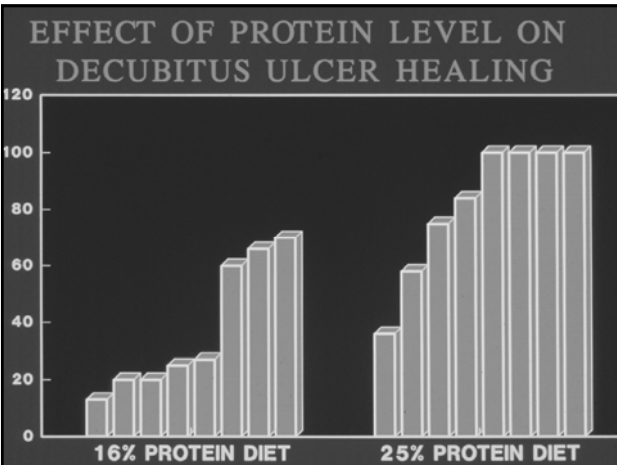
Protein requirements are affected by:

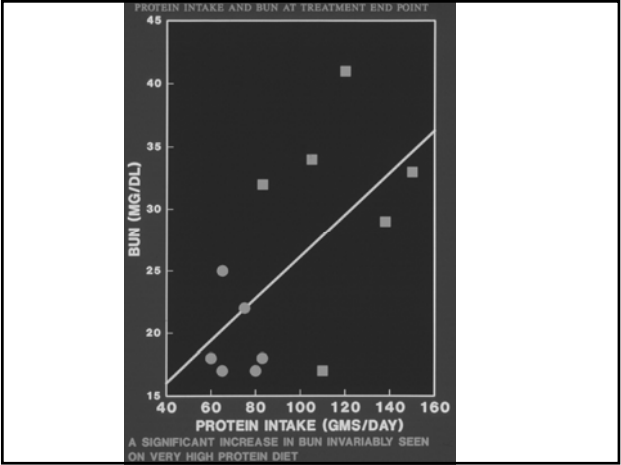
- Decrease in total LBM
- Loss of efficiency in protein turnover
- Increased need to heal wounds, surgical incisions, repair ulcers, make new bone
- Infection
- Immobilization

Protein requirements for older adults is 1 g/kg body weight

Protein is necessary to make new tissue, fight infection, heal fractures

Protein needs may be as high as 2+ g/kg body weight





Energy needs increase with demands for wound healing, fracture repair, infection response

To maintain weight, 20-25 kcals/kg body weight is usually adequate in a relatively sedentary adult

For stress, wound healing, infection, fracture, energy needs may increase to as much as 35 kcals/kg body weight

Vitamin A is needed for cell differentiation

Cell differentiation processes allow for the development of different tissues

Vitamin A requirements in wound healing should not exceed 200% of the RDA

Vitamin C

- Status is related to dietary intake
- Institutionalization, hospitalization and illness lead to sharp decreases in vitamin C intake
- Decreases seen with chronic disease including atherosclerosis, cancer, senile cataracts, lung diseases, cognition, and organ degenerative diseases

Vitamin C

- Vitamin C is easily replaced
- Smokers may need 2x RDA just to meet requirements
- Vitamin C is important in wound healing because of its role in hydroxylation but tissue saturation is achieved easily and large doses are excreted in urine

Zinc

- Most older adults are not zinc deficient
- Increased levels may be needed for wound healing but do not have to be very high (225mg/day in divided doses)
- Large amounts of zinc interfere with absorption of other divalent ions

Copper, iron,
magnesium, manganese
may be affected by
large doses of zinc

Meeting fluid
requirements is often an
issue in wound healing
protocols

Dehydration may be associated with:

- Hypotension
- Elevated body temperature
- Constipation
- Nausea/vomiting
- Mucosal dryness
- Decreased urinary output
- Mental confusion

Fluid intake can be estimated at 30 ml/kg body weight with a minimum of 1500 ml/day

Recommendations for 8 glasses of fluid per day may be an overestimation of fluid needs for older adults

Thirst is actually a bigger issue

Thirst may be impaired because:

- Decrease in aortic osmoreceptors
- Decrease in renal function
- Voluntary limited intake
- Brain injuries

Voluntary intake may be compromised for many reasons

- Mild incontinence
- Inconvenience
- Decreased thirst sensitivity
- Dementia

Sometimes involuntary intake is inadequate too

Chronic infections, pressure ulcers, significant weight loss, poor intake, and dehydration are associated with under nutrition

Nutrition is only one of several factors involved in pressure ulcer development

Other factors include:

- Pressure
- Friction
- Shear
- Circulation
- Moisture
- Sensory loss
- Dry skin
- Infection

Sometimes pressure ulcers are unavoidable but optimal healing includes a nutrient dense diet that addresses the nutrient needs described
