

Assessing Nutrition Status in Infants and Young Children: Laboratory Assessment

Pediatric Malnutrition¹

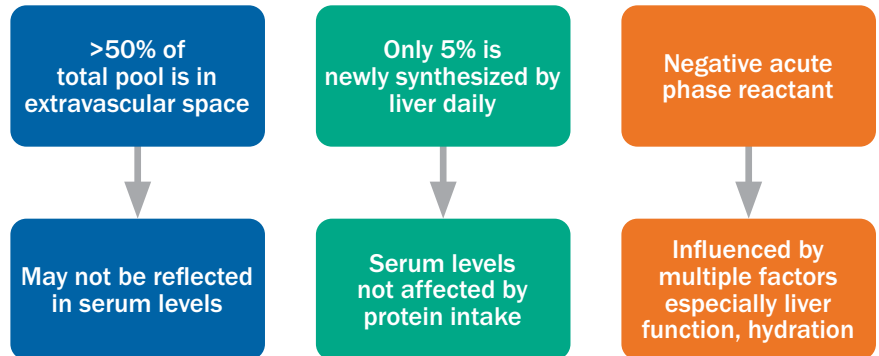
Pediatric malnutrition or undernutrition is defined by ASPEN as an imbalance between nutrient requirement and intake, resulting in cumulative deficits of energy, protein, or micronutrients that may negatively affect growth, development, and other relevant outcomes.

It is underrecognized due to lack of a uniform definition. Reported prevalence of illness-related malnutrition is 6%–51% in hospitalized children.

Historical Use of Albumin and Prealbumin^{2,3}

- Albumin and transferrin levels were recommended as markers to identify malnutrition and became highly utilized as a metabolic assessment of nutrition.
- In 1979, albumin and transferrin were used as 2 biomarkers for “instant nutrition assessment.”
- Prealbumin emerged as the more sensitive marker due to its shorter half-life and became the preferred lab marker to assess nutrition status and response to nutrition interventions.
- Retinol Binding Protein (RBP) is a visceral protein with the shortest half-life but is more difficult to measure.

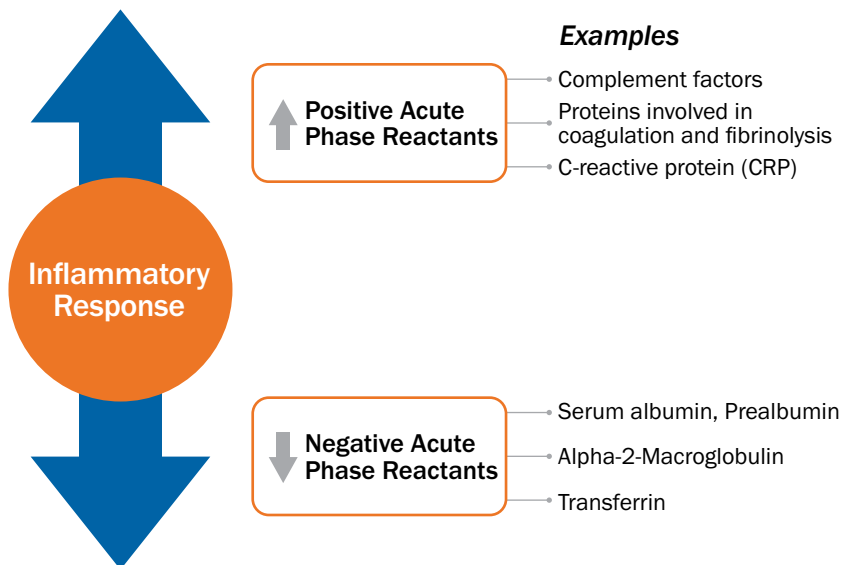
Utility of Albumin as a Biomarker for Nutrition⁴



Factors Affecting Prealbumin Levels⁵

Decrease in Prealbumin Synthesis	Increase in Prealbumin Synthesis
Starvation	Corticosteroid use
Liver disease	NSAID use
Dialysis, nephrotic syndrome	Oral contraceptive use
Hyperthyroidism	Renal failure
Hyperglycemia	Renal tubular damage

Inflammation and Visceral Proteins⁶



This tool is based on the presentation by Dr. Anushree Algotar, MBBS, MPH, Assistant Professor Pediatric Gastroenterology, Children’s Intestinal Rehabilitation Program, University of Michigan, C.S. Mott Children’s Hospital, Ann Arbor, MI, given during ASPEN Malnutrition Awareness Week 2023.

The recording can be found in the ASPEN Malnutrition Solution Center at nutritioncare.org/Malnutrition under Screening and Assessment after September 30, 2023.

Continued on next page

Role of Visceral Proteins in Monitoring Nutrition Support Efficacy⁶

- Visceral proteins have not been shown to be sensitive markers of energy and protein intake adequacy.
- Normalization of serum albumin and prealbumin levels may still have value in the monitoring of recovery.
- Normalization of visceral proteins may indicate the resolution of inflammation, the reduction of nutrition risk, a transition to anabolism, and potentially lower calorie and protein requirements.

Imaging and Body Composition: Emerging Biomarker for Nutrition Assessment⁶

- Imaging represents a new frontier in nutrition assessment.
- Dual-energy X-ray absorptiometry, bioelectrical impedance, ultrasound, and computed tomography scans are increasingly used for assessment of muscle mass.
- Each tool has been validated in select populations but are limited either by availability, standardization, or validation in relevant clinical populations.
- Imaging holds the potential of emerging as a biomarker for standardized nutrition assessment in the future as limitations are overcome.

Micronutrient Status for Nutrition Assessment⁷

- Is especially important for patients requiring medical nutrition therapy (MNT).
- Blood tests cover a wide range of individual micronutrients – but may miss functional deficiencies.
- Ideally, micronutrient status should be measured both intracellularly and functionally.
- Acute phase response can significantly affect plasma levels of micronutrients.
- Whole blood measurements are less likely to be affected by acute phase response as compared to plasma measurements.
- Specific pediatric diagnoses are associated with possible nutrient deficiencies.⁸

Summary⁶

- An ideal marker of nutrition should be sensitive, accurate, reproducible, relevant in health and illness, applicable to patients at bedside, and cost-effective.
- Serum albumin and prealbumin are not components of currently accepted definitions of malnutrition and do not serve as valid proxy measures of total body or muscle mass.
- Visceral protein levels decrease in the presence of inflammation regardless of underlying nutritional status.
- Visceral proteins recognized as negative acute phase reactants are associated with nutrition risk.
- Normalization of visceral protein levels may indicate resolution of inflammation, reduction of nutrition risk, transition to anabolism or potentially lower calorie and protein requirements.
- Acute phase response needs to be considered while measuring micronutrient status.
- Micronutrient assays may involve alternative functional options that better reflect status.
- Imaging and body composition assessment are emerging modalities.

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