The Merriam Webster Dictionary defines malnutrition as “faulty nutrition due to inadequate or unbalanced intake of nutrients or their impaired assimilation or utilization.” This classic dictionary definition may work for grade school and middle school science classes but is no longer applicable for diagnosing adult patients. In recent years, it has become clear that malnutrition is a complex syndrome that manifests in different ways. As a result of this new understanding, the definition of the condition and how to diagnose it have been subject to intense scientific scrutiny. Many clinicians struggle to understand this change and wonder what parameters to use in order to assign a diagnosis of malnutrition. In an attempt to understand the whys and wherefores of recent changes in the malnutrition paradigm, a summary of the evidence follows.

**Historical Perspective**

Historically, a diagnosis of protein energy malnutrition (PEM) was made using serum albumin and/or pre-albumin. Malnutrition was classified as mild, moderate, or severe based on a patient’s serum hepatic protein levels. Table 1 outlines the malnutrition parameters that were standard in medical, nursing, and nutrition textbooks for generations. Many patients were labeled with a diagnosis of “severe malnutrition” when their serum albumin level was below 2.0, and the appropriate ICD-9 code was applied. Persons with low serum albumin or prealbumin often were referred to a registered dietitian (RD) and/or prescribed a protein supplement in an effort to correct their malnutrition. Serial serum albumin and prealbumin levels were requested to track nutritional status in patients with pressure ulcers, surgical wounds, and a host of other medical conditions.

Fast-forward to 2013, when evidence shows that although serum albumin and prealbumin may be good indicators of morbidity and mortality, they are not accurate indicators of malnutrition. The relevance of the entire class of hepatoprotein laboratory tests, including serum albumin, as indicators of malnutrition is now believed to be limited. This information has been documented in the literature for nearly 10 years but has admittedly been slow to trickle down to practicing physicians, nurses, and dietitians. Despite the volume of evidence to the contrary, it is still common to see a diagnosis of malnutrition based on a low albumin or prealbumin in medical records. Many clinicians still are confused by the subject and rely on albumin and prealbumin in the absence of other clear indicators of malnutrition. An understanding of the science continued on page 2
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behind the expert opinions can help practitioners understand the why serum proteins are not effective for a malnutrition diagnosis.

**Understanding Protein Lab Data**

Albumin and prealbumin are negative-acute phase reactants - ie, they decrease in the presence of inflammation in the body. Inflammation can be defined as “the aggregate of clinical, hematologic, and organ function abnormalities associated with sepsis, trauma, and a variety of other conditions such as pancreatitis.” The inflammatory response is a complex series of cellular reactions that results in catabolism and breakdown of lean body mass. Inflammatory conditions that affect serum albumin levels include (but aren’t limited to) dehydration, hepatic failure, infection, cancer, bed rest, and pregnancy. In reality, almost every chronic medical condition and most acute conditions can potentially result in a decrease in serum prealbumin and/or albumin because of the inflammatory response. This is one reason it is so common to see very low albumin and prealbumin levels in trauma patients, critical care patients, and persons with chronic illness and open wounds. As a normal part of the recovery process, inflammation subsides and serum albumin and prealbumin increase, often returning to normal levels. Because they are negative acute-phase proteins, serum albumin and prealbumin levels reflect the severity of the inflammatory process better than nutritional status.

So what is the relationship between nutrition and serum albumin levels? Doesn’t adding protein to the diet increase serum albumin and/or prealbumin levels? Surprisingly, even though they have been the gold standard for defining nutrition for years, no prospective, randomized studies have shown an increase in albumin and prealbumin in response to changes in protein and calorie intake. Evidence indicates that acute-phase proteins do not consistently or predictably change with weight loss, calorie restriction, or nitrogen balance. However, an indirect relationship exists between hepatic proteins and nutritional status. Inflammation contributes to an increase in net protein loss caused by catabolism, meaning a patient may need more calories and protein in the diet. Inflammation also can induce anorexia, reducing the possibility a patient will consume adequate nutrients. Experts agree that patients with low serum albumin or prealbumin may have compromised nutritional status for a number of reasons; however, the conventional wisdom of increasing protein in the diet to increase serum hepatic proteins no longer is considered valid. Patients still typically receive additional calories and protein but for other reasons, such as to correct defects in nutrient utilization.

**Defining and Diagnosing Malnutrition**

As knowledge of the inflammatory process increased, experts began to realize the existing definition of malnutrition did not account for this variable. In 2010, an international consensus group acknowledged widespread confusion among experts and worked to establish a more comprehensive definition for adults. This group proposed an etiology-based diagnosis for malnutrition, settling on three types of malnutrition: 1) pure chronic starvation without inflammation (eg, anorexia); 2) chronic diseases or conditions that impose sustained inflammation of a mild to moderate degree (eg, organ failure, pancreatic cancer, rheumatoid arthritis, or sarcopenic obesity); and 3) acute disease or injury states with marked inflammatory response (eg, major infection, burns, trauma, or closed head injury).

Despite this proposed definition, no single, universally accepted approach to the diagnosis and documentation of adult malnutrition is available. Use of the Mini Nutrition Assessment, Subjective Global Assessment, or other nutrition screening tools has become customary in many settings, but most don’t acknowledge the concept of the inflammatory response. The good news is that an effort is underway to

**Table 1. Historical perspective: albumin levels for diagnosis of malnutrition in the past (no longer considered valid)**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Albumin level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&gt;3.5 g/L</td>
</tr>
<tr>
<td>Mild depletion</td>
<td>2.8-3.5 g/L</td>
</tr>
<tr>
<td>Moderate depletion</td>
<td>2.1-2.7 g/L</td>
</tr>
<tr>
<td>Severe depletion</td>
<td>&lt;2.1 g/L</td>
</tr>
</tbody>
</table>


**Table 2. Proposed etiology-based definitions of malnutrition**

1. **Malnutrition in the context of social or environmental circumstances (starvation-related malnutrition):** This may be pure starvation due to financial or social reasons, or could be caused by anorexia nervosa.

2. **Malnutrition in the context of acute illness or injury:** Examples include organ failure, pancreatic cancer, rheumatoid arthritis, or sarcopenic obesity.

3. **Malnutrition in the context of chronic illness:** Examples include major infections, burns, trauma, or closed head injury.
It’s a Sunday afternoon in July and I’m sitting on our boat, on beautiful Lake Merwin in Washington State. I hear waterfalls in the background, rippling lake water gently splashing on the boat and I am enjoying the beauty and serenity that surrounds me. The healthcare industry and the long term care sector many of us work in does not always feel so serene. We are working in a changing landscape. Providing quality care and exceeding customer expectations with decreasing funding can be challenging. We may feel that we are not in control of the situation at times. One thing we do control is how we react and our attitude. My husband of 26 years, a wise man, recently reminded me, “You bring the weather to your picnic.” Loose translation-focus on the aspects of our lives we can control. Attitude is one of those aspects. As I begin my year as chair, I reflect on the commitment I made at our DHCC budget planning meeting earlier this year. That was, I would bring sunny weather to our DHCC picnic. I am honored to represent this great group.

I would like to begin by welcoming our returning members and providing a hearty welcome to our new DHCC members. Our members are the foundation of our great organization. I would also like to welcome our newest members to the DHCC Executive Committee (EC). Laura Goolsby, MS, RD, LD, joins us as our Professional Development Coordinator; Patricio Iorio, MS, RD, LDN, is our Membership Coordinator and Paula Bohlen, MS, RD, LDN, LNHA, becomes our Newsletter Editor. They bring exciting new ideas to DHCC.

In June, we had our Spring Executive Committee board meeting. It was held at the Academy offices in Chicago. It was a great opportunity to meet Academy personnel face to face while planning our priorities for the upcoming year. Growing and developing our membership is a goal for the upcoming year. We have recently done a webinar for the Thirty and Under in Nutrition and Dietetics (TUND) MIG of the Academy, letting them know what types of jobs our members have and how we got there. We believe collaborating with other DPGs and MIGs will benefit all of us. We are developing a Membership Committee to aid with our efforts in growing and developing membership. Contact Patricio Iorio at piorio@comcast.net if you would like to be part of this important committee.

Our recent member survey revealed Professional Development continuing education/webinars and our newsletters were ranked as the two most valued member benefits. We want to continue to serve our members by providing high caliber webinars and resources. DHCC has many exciting upcoming webinars. Some topics include Nutrition Informatics in Long Term Care, Pioneer Network initiatives, Fitness in the Golden Years and joint webinars with the Renal and Oncology DPGs. Stay tuned for details on these exciting webinars! Our most popular publication is the Pocket Resource for Nutrition Assessment (PRNA). We will unveil the revision of this manual at FNCE®. We are working on updating the Inservice Manual, concentrating on the food service material. As you can see, our Professional Development Committee is very busy. In our efforts to go green we will be providing our newsletter, Connections, in an electronic format, while continuing to mail you the hard copy. We will be evaluating if transition to a completely electronic format will be in our future.

In this issue of Connections the topic of Re-hospitalizations will be highlighted. Whether you work in acute care or long term care, this topic is up front. It is important for you to understand what Re-hospitalization means and how it impacts you. We have a few articles to help educate you. Our PreFNCE DHCC Workshop will devote the afternoon session to this topic and will include a panel of RDs providing input on how re-hospitalization has affected them. Defining malnutrition has been the subject of many posts to our EML. Our feature newsletter article provides you more knowledge in this area. Knowledge is power. Our goal is to continue to provide you relevant, up to date information, you can use as you move through the changing landscape of healthcare.

FNCE® is around the corner, held October 19-22 in Houston. DHCC has many educational and fun events planned.

- Our PreFNCE Workshop, Deep in the Heart of Nutrition: Beyond the Clinical Basics, dives deeper into many clinical issues facing you daily.
- We are also honored to sponsor Dr. Gordon Jensen, MD, PhD, and Mary Ellen Posthauer, RD, CD, LD, for the DHCC spotlight session titled “Sarcopenic Obesity, Impacting Our Aging Population.” The session is bright and early on Sunday morning- a great way to start the day.

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identify and document malnutrition. In 2012, the Academy of Nutrition and Dietetics (Academy) and the American Society for Parenteral and Enteral Nutrition (ASPLEN) released a joint consensus statement titled *Characteristics Recommended for the Identification and Documentation of Adult Malnutrition (Undernutrition)*. This groundbreaking article will likely change the world of adult malnutrition as we know it. The authors propose the three-pronged etiology-based definition of malnutrition adopted by the international consensus committee: starvation-related, chronic disease-related, and acute disease-related or injury-related. Table 2 outlines and defines the proposed categories.

The Academy/ASPEN consensus statement goes well beyond defining malnutrition; it suggests six characteristics for diagnosis: insufficient energy intake, weight loss, loss of muscle mass, loss of subcutaneous fat, localized or generalized fluid accumulation that may sometimes mask weight loss, and diminished functional status as measured by hand grip strength. If a patient has two or more of these criteria, he/she meets the proposed guidelines for malnutrition. Using specific parameters under each of these six criteria, the proposal recommends labeling malnutrition as non-severe or severe. The basic characteristics used to make a malnutrition diagnosis are detailed in Table 3.

The characteristics and criteria to identify malnutrition as proposed by ASPEN and the Academy rely on the age-old methods of medical history, physical examination/clinical signs, anthropometric data, food and nutrient intake, and functional assessment. Laboratory markers of inflammation (C-reactive protein [CRP], white blood cell count, and blood glucose levels) may be used to help determine if the condition is starvation-related, chronic-disease-related, or acute disease or injury-related. Identifying malnutrition clearly becomes more complex with the adoption of an etiology-based diagnosis. A comprehensive assessment requires more time than a simple blood draw but can give more clues as to how best to intervene for each type of malnutrition.

It should be noted that the Academy and ASPEN recognize the standardized approach to diagnosis of adult malnutrition is a dynamic work-in-progress and characteristics are likely to change over time. Currently, ICD-9 codes for malnutrition remain unchanged, although discussion is underway regarding changes to the current language to make it consistent with etiology-based diagnostic terminology.

**Practice Points**

Clinicians are hungry for a simple, clear way to diagnose malnutrition. Unfortunately, no single biological marker (such as albumin or prealbumin) can provide that information. Albumin and prealbumin levels, although still commonly used to diagnose malnutrition, are no longer considered reliable assessment mechanisms. These laboratory tests alone should not be used as a basis for nutrition interventions. Clinicians should recognize the need to use comprehensive diagnostic criteria to assess and document nutritional status in adults. Medical professionals in all healthcare settings must work

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**Table 3. Proposed clinical characteristics used to identify and categorize malnutrition**

1. **Energy intake**: Malnutrition is the result of inadequate food and nutrient intake or assimilation, thus recent intake compared to estimated requirements is a primary criterion defining malnutrition. The clinician may obtain or review the food and nutrition history, estimate optimum energy needs, compare them with estimates of energy consumed and report inadequate as a percentage of estimated energy requirements over time.

2. **Interpretation of weight loss**: The clinician may evaluate weight in light of other clinical findings, including the presence of under- or overhydration. The clinician may assess weight change over time reported as a percentage of weight loss from baseline.

3. **Body fat**: Loss of subcutaneous fat (eg, orbital, triceps, fat overlying the ribs).

4. **Muscle mass**: Muscle loss (eg, wasting of the tempes [temporalis muscle], clavicles [pectoralis and deltoids], shoulders [deltoids], interosseous muscles, scapula [latissimus corsi, trapezius, deltoids], thigh [quadriiceps] and calf [gastrocnemius]).

5. **Fluid accumulation**: The clinician may evaluate generalized or localized fluid accumulation evident on exam (extremities, vulva/scrotal edema, or ascites). Weight loss often is masked by generalized fluid retention (edema), and weight gain may be observed.

6. **Reduced grip strength**: Use standards supplied by the manufacturer of the measurement device (dynamometer).

A minimum of two characteristics is required for a diagnosis of malnutrition. Based on criteria proposed by the Academy/ASPEN, malnutrition can be identified into one of three categories (malnutrition in the context of acute illness or injury, malnutrition in the context of chronic illness, and malnutrition in the context of environmental circumstances) and can be classified as severe or non-severe within each category. Refer to source for more information.

together to begin to implement new ways to identify and classify malnutrition using the Academy and ASPEN proposal as a template.

References