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## BODY COMPOSITION ASSESSMENT

(fat and muscle wasting)

Assessment of fat stores and muscle mass are an important part of the SGA. However, changes in body composition may be due to other factors such as disuse (for example, decreased ambulation secondary to a severe osteoarthritis) cachexia and sarcopenia. Individuals who continue to ambulate but restrict other activities may have a decrease in upper body muscle mass that is disproportionate to the lower body. These factors that can result in muscle wasting irrespective of nutritional status, must be taken into account when considering the body composition domain and classifying individuals according to the SGA. The power of SGA is the multiple body sites that can be considered for determination of fat or muscle wasting.

## EDEMA AND ASCITES

Edema and ascites are rarely manifestations of severe malnutrition but more commonly due to underlying disease. From a nutritional point of view, detecting fluid retention is relevant as this falsely increases body weight measurements. Accumulation of interstitial fluid needs to be taken into consideration when considering body weight measurements.

## PHYSICAL EXAMINATION

Loss of body fat

- No     Mild/Moderate     Severe

Loss of muscle mass

- No     Mild/Moderate     Severe

Presence of edema/ascites

- No     Mild/Moderate     Severe

## SGA RATING

- A** Well-nourished  
Normal
- B** Mildly/moderately malnourished  
Some progressive nutritional loss
- C** Severely malnourished  
Evidence of wasting and progressive symptoms

## CONTRIBUTING FACTOR

- Cachexia (fat and muscle wasting due to disease and inflammation)
- Sarcopenia (reduced muscle mass and strength)



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## SUBJECTIVE GLOBAL ASSESSMENT GUIDANCE FOR BODY COMPOSITION

### SUBCUTANEOUS FAT

Physical examination	Normal	Mild/ Moderate	Severe
<b>Under the eyes</b>	Slightly bulging area	Somewhat hollow look Slightly dark circles	Hollowed look, depression, dark circles
<b>Triceps</b>	Large space between fingers	Some depth to fat tissue, but not ample Loose fitting skin	Very little space between fingers or fingers touch
<b>Ribs, lower back, sides of trunk</b>	Chest is full; ribs do not show Slight to no protrusion of the iliac crest	Ribs obvious, but indentations are not marked Iliac crest somewhat prominent	Indentation between ribs very obvious Iliac crest very prominent

### FUNCTIONAL CAPACITY

The presence of protein-calorie malnutrition may affect functional capacity particularly in those who are severely malnourished. Capacity also needs to be considered in the overall context of the patient's clinical condition. In many cases function may be impaired due to underlying illness. For example, an individual with a CVA would have reduced functional capacity due to paresis. This may affect the body composition assessment (i.e., atrophy due to disuse) but these changes may not be the result of underlying malnutrition due to inadequate food or nutrient intake.

### METABOLIC REQUIREMENT

In most clinical circumstances, mild metabolic stress associated with underlying disease does not significantly influence nutrition requirements. States of high metabolic demand such as the systemic inflammatory response syndrome (SIRS), severe inflammatory bowel disease, burns, head trauma, and thyrotoxicosis are associated with an increased metabolic requirement. When performing the SGA, the adequacy of nutrient intake should be assessed in relation to presence of metabolic stress. An individual with high metabolic stress would be expected to have higher energy demand than an individual of similar body composition with mild or minimal stress. An inability to meet these requirements would result in malnutrition.

CVA=cerebrovascular accident.

**The following are specific factors to consider when completing the Subjective Global Assessment:**

### NUTRIENT INTAKE

One fundamental aspect of the SGA relates to the adequacy of nutrient intake, mainly energy and protein intake, in relation to metabolic needs. Malnutrition results when there is an imbalance of nutrient intake and/or absorption in relation to metabolic expenditure. Energy and protein intake in the form of specialized nutrition support (enteral or parenteral nutrition) needs to be considered in the determination of the adequacy of nutrient intake.

### WEIGHT LOSS

This is an important component of the SGA. However, body weight or quantifying weight loss is often a guess as patients do not weigh themselves regularly. The power of SGA is that it is valid even if the actual weight is not available.<sup>6</sup> The trajectory of weight change needs to be the focus of determining a turnaround to SGA A or continuation of a downward progression to SGA B/C.

### SYMPTOMS

Any symptoms that affect dietary intake or suggest malabsorption of macronutrients are relevant to interpretation of the SGA.

### MUSCLE WASTING

Physical examination	Normal	Mild/Moderate	Severe
Temple	Well-defined muscle	Slight depression	Hollowing, depression
Clavicle	Not visible in males; may be visible but not prominent in females	Some protrusion; may not be all the way along	Protruding/prominent bone
Shoulder	Rounded	No square look; acromion process may protrude slightly	Square look; bones prominent
Scapula/ribs	Bones not prominent; no significant depressions	Mild depressions or bone may show slightly; not all areas	Bones prominent; significant depressions
Quadriceps	Well-defined	Depression/atrophy medially	Prominent knee; severe depression medially
Interosseous muscle between thumb and forefinger (back of hand)**	Muscle protrudes; could be flat in females	Slightly depressed	Flat or depressed area

**\*\* In the elderly prominent tendons and hollowing is the result of aging and may not reflect malnutrition.**

## FLUID RETENTION

Physical examination	Normal	Mild/Moderate	Severe
Edema	None	Pitting edema of extremities Pitting to knees, possible sacral edema if bedridden	Pitting beyond knees Sacral edema if bedridden; may also have generalized edema
Ascites	Absent	Present (may only be present on imaging)	

**A – Well-nourished:** no decrease in food/nutrient intake; <5% weight loss; no/minimal symptoms affecting food intake; no deficit in function; no deficit in fat or muscle mass OR \*an individual with criteria for SGA B or C but with recent adequate food intake; non-fluid weight gain; significant recent improvement in symptoms allowing adequate oral intake; significant recent improvement in function

**B – Mildly/moderately malnourished:** definite decrease in food/nutrient intake; 5–10% weight loss without stabilization or gain; mild/some symptoms affecting food intake; moderate functional deficit or recent deterioration; mild/moderate loss of fat and/or muscle mass OR \*an individual meeting criteria for SGA C but with improvement (but not adequate) of oral intake, recent stabilization of weight, decrease in symptoms

additional interventions are required to further improve the status of the patient.

For example, if a patient has lost 15% of their body weight due to decreased oral intake from a gastric outlet obstruction, but has definitive therapy to relieve the obstruction and oral intake normalizes, they would be considered SGA A (well nourished) despite evidence of fat loss and muscle wasting on physical examination, because of other components of SGA being normal or improving. In essence, no additional nutritional treatment or diet prescription is needed as the patient is on a successful trajectory towards full recovery.

Malnutrition often develops gradually, and the repletion of nutritional status with normalization of muscle and fat stores is also gradual and not corrected in a short period of time. However, the SGA considers an individual well nourished once nutrient intake is sufficient to meet metabolic demands and the symptoms affecting intake and/or malabsorption are managed, even though body compositional changes have not fully normalized. The SGA accounts for this by considering the trajectory of intake, symptoms, and weight loss in the 2 weeks prior to the assessment.



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individual, muscle wasting may not be due to lack of nutrients but to a combination of disuse and muscle fibre atrophy, a condition called sarcopenia of aging. If oral intake is appropriate for an elderly individual and there is no evidence of malabsorption but there is evidence of muscle wasting, this would be consistent with sarcopenia of aging.

The distinction between cachexia or sarcopenia and malnutrition is made by an overall evaluation as to whether the intake of nutrients, as well as gastrointestinal health (good appetite, absence of vomiting and diarrhea) permit adequate intake and absorption, or are restricted sufficiently to partially or fully account for loss of weight and wasting. Prior to the final rating, the evaluator must determine whether changes in body composition (muscle and fat) and body weight are dominated by insufficient nutrition intake (malnutrition) or by cachexia/sarcopenia.

Classification using SGA is a dynamic process and this classification can change, even in a relatively short period of time. The change in classification is related to the patient's capacity to reach nutrition requirements, begin to gain weight and improve functional capacity. Thus, the SGA classification can be modified towards improvement in status, even if there is still evidence of depleted fat reserves and muscle mass. Clinicians need to ask themselves if

affecting oral intake, and stabilization of functional status

**C – Severely malnourished:** severe deficit in food/nutrient intake; >10% weight loss that is ongoing; significant symptoms affecting food/nutrient intake; severe functional deficit OR \*recent significant deterioration with obvious signs of fat and/or muscle loss

**Cachexia:** If there is an underlying predisposing disorder (e.g., malignancy), evidence of reduced muscle and fat, and no or limited improvement with optimal nutrient intake

**Sarcopenia:** If there is an underlying disorder (e.g., aging), evidence of reduced muscle and strength, and no or limited improvement with optimal nutrient intake

\* See SGA Rating for more description.



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## UNDERSTANDING SUBJECTIVE GLOBAL ASSESSMENT

Subjective global assessment (SGA) evaluates whether an individual is appropriately nourished (i.e., whether nutrient intake and absorption meet the requirements of an individual). When there is an imbalance among nutrient intake, absorption and requirement, then malnutrition occurs. The primary purpose of SGA is to determine whether nutrition deficit plays a role in a patient's condition and therefore, **whether nutritional treatment is required**. SGA uses a focused history and physical examination to classify individuals into well nourished, mildly/moderately malnourished and severely malnourished categories. The objective is to identify patients who would benefit from nutritional therapy.

Since the original description of the SGA in pre-operative patients in 1982, this nutrition assessment tool has been validated in many different disease states.<sup>1,2</sup> In addition, several detailed descriptions regarding the use and interpretation of the SGA have been published.<sup>3,4</sup> Despite its widespread use, there remain misunderstandings regarding the classification of nutrition status using the SGA. The following is a brief explanation of some of the core concepts integral to performing a valid nutrition assessment using the SGA.

The SGA provides a global overview of the patient with respect to nutrition, considering food intake, function, potential malabsorption, reasons for poor food intake, weight loss, and

changes in body composition. Due to this global perspective, it can distinguish those who have body composition changes due to malabsorption or poor food intake from conditions such as cachexia and sarcopenia.

Cachexia is a multi-factorial syndrome defined by an ongoing loss of skeletal muscle mass (with or without loss of fat mass) that is variably, but incompletely, treated by conventional nutritional support.<sup>5</sup> For example, a patient with metastatic pancreatic cancer may, with the addition of nutrition supplements, be consuming sufficient calories to meet the metabolic demand of the disease and their baseline nutritional requirements, but still have weight loss and evidence of significant muscle wasting. If their history indicates no malabsorption and sufficient intake, they would be classified as having cachexia. Frequently, nutrient intake may be moderately or severely compromised in which case the person would be classified as SGA B or C. However, if this patient is given full nutritional support that meets requirements and there is no significant improvement in weight and functional capacity, a subsequent evaluation could reclassify them as being cachexic.

Sarcopenia – a preferential wasting of muscle mass due to a variety of mechanisms, which requires exercise and potentially nutrition for improvement – may be related to several different factors. For example, in the aged