Physical Examination from a Nutritional Standpoint
Faith D Ottery, MD, PhD FACN

History and physical examination are considered the cornerstones of patient diagnosis. Unfortunately, the nutritional aspects of the physical examination -- beyond the global aspects of obesity or cachexia -- are frequently overlooked or under-appreciated. The primary basis for this is a lack of clinician education in this area.

Global aspects of physical examination

The global aspects of physical examination include one's first impression of the patient on global examination. This goes beyond the acronym commonly found in the medical record "WDWNWF" for "well-developed, well-nourished white female". It does include an assessment of general body composition (in terms of muscle, fat, and fluid status) and signs of altered nutritional need (e.g., pressure ulcers or open wounds) or status (e.g., nutrient deficiency). The physical examination includes both measurable and subjective/observable aspects.

The most important measurable parameters include height and weight. For accurate assessment over time, it is imperative that these are, in fact, actually measured rather than simply accepting the height or weight reported by the patient. As people age, they tend to lose height but rarely report this. Additionally, the obese or weight-gaining patient tends to underestimate their body weight, while the weight losing patient will often overestimate his/her current weight. If a patient has consistently had involuntary weight loss, the rapidity of weight change as well as the pattern of weight change are particularly important in terms of prognosis.

The observable aspects general body composition include an assessment of general muscle and fat mass status as well as evaluation of fluid status. Anthropometric measurements such as skin fold thickness using calipers or arm muscle circumference are potentially appropriate in chronic research settings, but are not useful in general clinical practice. Under- and over-nutrition are best assessed in terms of adipose (subcutaneous fat) stores and then in terms of muscle mass and function.

The presence of significant ***fat loss*** should be assessed by observations of the usual areas where adipose tissue is normally present. This includes an assessment of general loss or excess of adipose tissue as judged by clearly defined bony, muscular, and venous outlines. A fold of skin is pinched to see whether any / how much adipose tissue is present between the examining finger and thumb. Areas of particular interest include the fat pad of the posterior aspect of the upper arm (superficial to the triceps) and anterior aspect (superficial to the biceps). This may be made simpler by having the patient tense the muscles of hand and arm ("making a muscle like Popeye"). In general, the adipose stores will be greater in the triceps area. Another aspect to consider is examination of the face: are the cheeks hollow or filled out? Are the outlines of the upper limb muscles and veins obscured or clearly defined? Are the buttocks and perianal areas filled out or atrophied? Obvious loss of adipose tissue indicates severe energy deficit. The assessment of loss of adipose tissue may not be obvious in the obese patient and must be considered in the context of history; e.g., in a morbidly obese patient with ovarian cancer who has lost 60 pounds.

Evaluation of ***muscle wasting*** is important both in terms of assessment of muscle mass and functional status. Assessment of muscle must include consideration of muscle volume, (compared with normal composition), muscle tone, functionality, and gender. In general, the muscles of the upper body are more susceptible to muscle loss during nutritional deprivation. Muscle loss from inactivity and /or bed rest is most prominent in the muscles of the pelvis and upper leg. Areas of assessment for muscle loss/wasting

include observation of hollowing of the temples (wasting of the temporalis), flattening of the interosseous muscles in the area between the thumb and index finger, squaring of the shoulders (loss of deltoids), prominence of the infrascapular fossa (loss of pectoral and deltoid muscles), prominence of the scapula (loss of trapezius and deltoid), prominence of rib cage (loss of latissimus dorsi and intercostal muscles), and loss of muscle mass of the upper leg (quadriceps) or calf (gastrocnemius).

Upper body examination includes assessment of the head and shoulder area, hands, arms, and upper trunk. Examination of the head to assess temporal wasting can be carried out from either a frontal evaluation or from the side. Wasting in this area can be appreciated either as a hollowing of the area just lateral to the upper aspect of the eye socket or as a prominence of the orbital ridge. There are a number of physical maneuvers that the clinician may perform with a patient to more clearly assess muscle volume loss in a number of other areas. The loss of shoulder musculature can be best appreciated by examining the patient with the arms down at the side. Normal shoulders are curved, especially at the junction between the neck and the shoulder and at the shoulder joint. Mildly or moderately malnourished patients will show some signs of muscle wasting, and although the shoulders may not be square, the acromial protrusion may be evident. Observation of the upper back may be particularly helpful in assessing muscle loss. To better define the muscle around the scapula, the patient is asked to push his/her hand forward against a solid object such as the wall. With muscle wasting, there can be seen depressions above the scapula, between the scapula and the shoulder joint, and between the scapula and spine. In this position of the hand and arm extended against the wall, the clinician should also examine the ribs of the back. To examine the interosseus muscle between the thumb and index finger, the patient is asked to press the pads of the thumb and forefinger together. Normally, the muscle will protrude as a firm ballotable bulge in this area (i.e., separate from the firmness of the underlying bone). With muscle wasting, this interosseous area may appear flattened or depressed.

As noted above, the muscles of the lower body are less sensitive than those of the upper body in terms of nutritional depletion. Examination of the quadriceps is best carried out with the patient sitting, with the leg at a relaxed 90 degree angle and with the foot propped up on a low piece of furniture. This allows maximal relaxation of the muscle to allow accurate assessment. The quadriceps is grasped in an effort to differentiate the amount of muscle tissue from the amount of fat tissue. Muscle wasting in the severely malnourished individual may be marked, with that of the mildly or moderately malnourished patient less obvious. In the latter case, looking for slight depressions along the inner portion of the leg may be helpful. If these exist, the individual has experienced some muscle wasting. Assessment of the muscle around the knee will also be helpful. In the normal situation, muscle tissue protrudes around the knee, whereas with the malnourished patient the knee bones will protrude. Assessment of the muscle mass of the calf is carried out with the individual in the same position as for quadriceps assessment. The calf muscle is grasped to assess the amount of tissue compared with normal composition or volume. Additionally, assessment of tone of the muscles of the upper and lower extremity on contraction is assessed for tone in the neurologically normal individual.

Interestingly, isolated muscle strength on testing may be normal or minimally decreased but global assessment of integrated muscle functional may be limited. Functional deficit of the muscles of the upper leg is evidenced by difficulty in arising from a sitting position or from squatting, as well as with difficulty in climbing stairs. Endurance may be decreased in both upper and lower extremity muscle groups, contributing to the decrease in patient tolerance of the testing situation as well as activities of daily living.

Body weight is determined by fluid status, muscle and adipose tissue, and bone structure, with these components listed in terms of potential for acuity of change. Skeletal changes are minimal in terms of assessment of nutritional weight changes. Assessment of ***fluid status,*** in terms of its contribution to body weight, is important. The malnourished cancer patient may be taking in inadequate fluids in conjunction

with inadequate nutrition; adequate fluid in the face of low calorie and/or protein intake in anorexia; or may be receiving supplemental hydration intravenously, as with chemotherapy.

Fluid status is important to assessment in terms of the 1) hydrational status of the patient (euvolemic, over-hydrated, or dehydrated), 2) the oncotic status as determined by the patient's total body and serum protein status, and 3) abnormal fluid accumulations due to organic or mechanical abnormalities. The two components of fluid status that need to be assessed include tissue turgor and presence of ascites. Tissue turgor can be either decreased as in dehydration or increased (increased firmness, with or without the presence of edema).

Decreased tissue turgor seen in dehydration is associated with "sunken eyes" and may be associated with skin "tenting". The latter is assessed by gently pinching the skin of the dorsal (back) aspect of the hand or forearm. In normal hydration, the skin will spring back into place when the pinching finger and thumb let go of the skin, whereas in marked dehydration the skin will only slowly return to its normal position, i.e. forms a slowly falling triangular tenting of skin.

Increased tissue turgor is generally identified as edema. It can be present in a number of conditions including malnutrition with hypoalbuminemia, renal or cardiac failure, decreased venous or lymphatic return for the distal aspect of the upper or lower extremity. Edema assessment is best carried out by observing the dependent areas of the body, most commonly the ankle and/or sacral areas. In the ambulatory patient, the ankle is most commonly involved and easy to assess. The presence of edema can be obvious to visual examination or by noting impressions in the skin from shoes or socks. More subtle presence of edema can be appreciated by gentle finger pressure on the upper aspect of the foot, along side the ankle, or along the pre-tibial ridge of the anterior aspect of the lower leg. It is important to remember that in the bed-ridden patient or one who is sitting in a chair much of the day with the feet elevated, the sacral area is particularly important to evaluate. In the euvolemic, hypo-albuminemic patient in bed -- or in overhydrated patient in bed-- sacral edema can be marked with little or no peripheral/ankle edema.

Ascites, accumulation of fluid in the abdominal cavity, may be present in a number of conditions including malnutrition, liver failure, and intraabdominal carcinomatosis (e.g., in peritoneal studding of ovarian cancer). Presence of ascites in patients undergoing peritoneal dialysis is difficult to appreciate. The presence of ascites in some patients, such as those with carcinomatosis, may be multifactorial in etiology. The ascites may be related to either excessive peritoneal fluid production or impaired absorption due to impaired lymphatic drainage. The drainage of ascitic fluid through repeat paracentesis is important in the context of nutritional assessment in that it can further contribute to the protein requirements of the patient who is already at increased risk for malnutrition.

Global assessment will also include assessment of skin integrity, since the presence of open wounds or decubiti will increase the patient's protein requirements and may be a source of increased metabolic requirements related to infection.

Consistent with the increased appreciation of the nutritional physical examination, there are a number of video presentations currently or becoming available. We have only examined the Baxter Laboratories (Renal Division) video on the SGA, with the second tape of the series being extremely helpful. If you are interested you may consider contacting your Baxter representative. Additionally, the Dietitians in Nutrition Support (DNS) practice group of the American Dietetics Association have apparently recently produced one concerning the nutritional physical examination. The Oncology Practice Group of the ADA is also planning on producing a video specific to the oncology patient.

Components of Physical Examination from a Nutritional Perspective		
Body Composition Component	Area assessed	Observation
Subcutanous fat	• infraorbital fat pad • triceps skin fold (pinch test) • midaxillary line at the level of the lower ribs	• sunken appearance, • excessive or normal to fingers touching • excessive or normal to fingers touching
Skeletal muscle (loss of muscle bulk and tone by palpation)	• temporalis muscle • deltoid muscles • pectoral muscles • latissimus dorsi muscles • thenar interosseous muscles	• temporal wasting • squaring of the junctions of the neck and shoulder and at shoulder joint (i.e., loss of normal curvature); prominent acromial process; prominent infraclavicular fossa along it its lateral aspect; depression above scapula when hand extended against wall • prominent infraclavicular fossa along it its medial aspect; loss of chest wall muscle mass • depression medial to scapula or at axillary border when hand extended against wall • flattening of to prominence between thumb & index finger when pt asked to press the pads of these digits together
Fluid status	• skin • periorbital area • ankle, pretibial or sacral area • abdomen	• “tenting” • sunken eyes • edema - none to severe • ascites - none to severe