Malnutrition Review:

Incorporating Nutrition Focused Physical Exam (NFPE)

Katie Harper MS RD CNSC CSO

Clinical Dietitian II
University of Colorado Hospital

Objectives

At the conclusion of this presentation the audience will be able to:

1. Define the ASPEN/AND malnutrition criteria

2. Identify significant areas of fat and muscle loss in a nutrition focused physical exam

3. Accurately diagnose malnutrition in patients

Malnutrition

- Up to 50% of skilled nursing patients are malnourished
  - “Malnutrition in nursing homes is associated with declines in functional status and psychosocial well-being and can negatively influence quality of life”
  - <12% are diagnosed with malnutrition

- Malnutrition increases:
  - Length of stay
  - Healthcare costs
  - Admission/readmission rates
  - Mortality and Morbidity
  - Rates of medical complications/infections
  - Muscle/functional loss

- Identifying malnutrition improves patient outcomes

Arensberg MB, Brunton C, Richardson B, Bolhack S. The Case for Malnutrition Quality Measures and Nutrition-Focused Quality Improvement Programs (QIPs) in US Skilled Nursing Facilities. Healthcare. 2022; 10(3):549.

Malnutrition Financial Impact

- 1 in 4 patients discharged to SNF are readmitted within 30 days
  - 2/3rds may be preventable
  - Readmission rate is an important CMS quality measure that is tied to SNF Medicare reimbursement

- Estimated cost taking care of patients with protein calorie malnutrition in US is estimated to be $157 billion per year

House M, Gwaltney C. Malnutrition screening and diagnosis tools: Implications for practice. *Nutr Clin Pract. 2022; 37:12-22.* Arensberg (2022)

Diagnosing Malnutrition

If suspect malnutrition:

1. Determine if inflammation is present

- Increases nutrient demand
  - Create a larger calorie deficit, quicker
  - Exacerbate lean muscle breakdown

2. Determine Etiology of malnutrition:

- Acute illness or injury
- Chronic disease
- Social or Environmental (Starvation)

3. Determine characteristics of malnutrition

- **NFPE**

4. Determine level of malnutrition:

- Severe
- Moderate (Non-severe)
- Mild- not defined

Etiology: Malnutrition

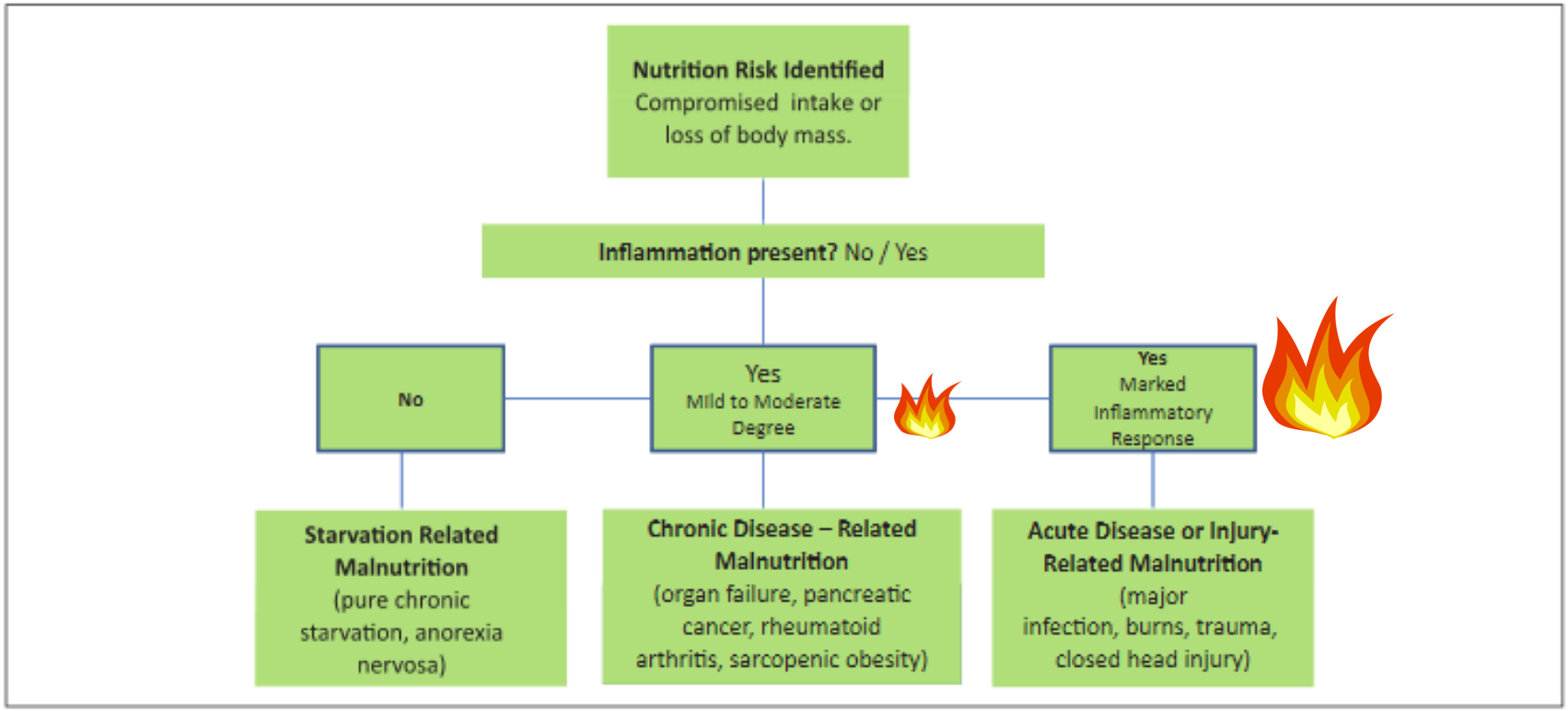


Figure 1. Etiology-based malnutrition definitions. Adapted with permission from Jensen GL, Bistrian B, Roubenoff R, Heimburger DC. Malnutrition syndromes: a conundrum vs continuum. *JPEN J Parenter Enteral Nutr*. 2009;33:710.

Markers of Inflammation

- Decreased albumin
- Decreased prealbumin
- Decreased transferrin
- Elevated CRP
- Elevated ferritin
- Hyperglycemia
- Leukocytosis
- Leukopenia
- Thrombocytopenia

ASPEN/Academy do not recommend any specific inflammatory marker for diagnostic purposes
May help you determine etiology

uchealth

Table 4. Characteristics to Diagnose Severe Malnutrition.[4]

Characteristic	Acute Illness or Injury Related Malnutrition	Chronic Disease Related Malnutrition	Social or Environmental Related Malnutrition
Weight loss	>2%/1 week >5%/1 month >7.5%/3 months	>5%/1 month >7.5%/3 months >10%/6 months > 20%/1 year	>5%/1 month >7.5%/3 months >10%/6 months > 20%/1 year
Energy intake	≤50% for ≥5 days	≤75% for ≥1 month	≤50% for ≥1 month
Body fat	Moderate depletion	Severe depletion	Severe depletion
Muscle mass	Moderate depletion	Severe depletion	Severe depletion
Fluid accumulation	Moderate → severe	Severe	Severe
Grip strength	Not recommended in intensive care unit	Reduced for age/gender	Reduced for age/gender

Table 5. Characteristics to Diagnose Nonsevere (Moderate) Malnutrition.[4]

Characteristic	Acute Illness or Injury Related Malnutrition	Chronic Disease Related Malnutrition	Social or Environmental Related Malnutrition
Weight loss	1%-2%/1 week 5%/1 month 7.5%/3 months	5%/1 month 7.5%/3 months 10%/6 months 20%/1 year	5%/1 month 7.5%/3 months 10%/6 months 20%/1 year
Energy intake	<75% for >7 days	<75% for ≥1 month	<75% for ≥3 months
Body fat	Mild depletion	Mild depletion	Mild depletion
Muscle mass	Mild depletion	Mild depletion	Mild depletion
Fluid accumulation	Mild	Mild	Mild
Grip strength	Not applicable	Not applicable	Not applicable

Nutr Clin Pract. 2013; 28:642

uchealth

Etiology: Social/behavioral/environmental

- Also known as "starvation related malnutrition"
- No inflammatory response

EXAMPLES:

- Lack of access to food or assistance with eating
- Unable to eat
  - Dysphagia, Gastroparesis, Poor dentition
- Unwilling to eat
- Pain
- Alcohol/drug use
- Dementia

Etiology: Chronic disease

- Lasting ~1-3 months or longer
- Mild to moderate inflammatory response
- Patient sometimes provide vague causes and time frames of development of symptoms

Etiology: Chronic disease

- Organ failure (kidney, liver, lung, heart)
- Pressure wounds
- COPD
- HIV
- Lupus
- Small bowel obstruction*
- DM
- Neuromuscular disease
- Sarcopenic obesity
- CVD
- CHF
- Cystic fibrosis
- IBD
- Celiac disease
- Chronic pancreatitis
- Rheumatoid arthritis
- Solid tumors
- Hematologic malignancies

Etiology: Acute illness/injury

- Acute disease/illness = short duration
- Heightened, intense inflammatory response
- Usually a very clear event or “spark” that initiated the decline

Etiology: Acute illness/injury

- Closed head injury
- Critical illness
- Major infection/sepsis
- Multi-trauma
- Severe burns
- Small bowel obstruction*

- Chronic disease "flare"
  - Severe acute pancreatitis
  - IBD flare
  - COPD exacerbation

- Major surgery
  - Abdominal
  - Cardiothoracic
  - Vascular
  - Postoperative ileus

Malnutrition Characteristics

1. Weight loss (*NFPE)
2. Energy intake
3. Body Fat (NFPE)
4. Muscle Mass (NFPE)
5. Fluid accumulation (NFPE)
6. Grip strength

Malnutrition: Meet 2 of the 6 defined characteristics

Table 4. Characteristics to Diagnose Severe Malnutrition.[4]

Characteristic	Acute Illness or Injury Related Malnutrition	Chronic Disease Related Malnutrition	Social or Environmental Related Malnutrition
Weight loss	>2%/1 week >5%/1 month >7.5%/3 months	>5%/1 month >7.5%/3 months >10%/6 months > 20%/1 year	>5%/1 month >7.5%/3 months >10%/6 months > 20%/1 year
Energy intake	≤50% for ≥5 days	≤75% for ≥1 month	≤50% for ≥1 month
Body fat	Moderate depletion	Severe depletion	Severe depletion
Muscle mass	Moderate depletion	Severe depletion	Severe depletion
Fluid accumulation	Moderate → severe	Severe	Severe
Grip strength	Not recommended in intensive care unit	Reduced for age/gender	Reduced for age/gender

Table 5. Characteristics to Diagnose Nonsevere (Moderate) Malnutrition.[4]

Characteristic	Acute Illness or Injury Related Malnutrition	Chronic Disease Related Malnutrition	Social or Environmental Related Malnutrition
Weight loss	1%-2%/1 week 5%/1 month 7.5%/3 months	5%/1 month 7.5%/3 months 10%/6 months 20%/1 year	5%/1 month 7.5%/3 months 10%/6 months 20%/1 year
Energy intake	<75% for >7 days	<75% for ≥1 month	<75% for ≥3 months
Body fat	Mild depletion	Mild depletion	Mild depletion
Muscle mass	Mild depletion	Mild depletion	Mild depletion
Fluid accumulation	Mild	Mild	Mild
Grip strength	Not applicable	Not applicable	Not applicable

Nutr Clin Pract. 2013; 28:642

uchealth


Stay In YOUR Lane!

NFPE: Purpose

- Component in Nutrition Care Process
  - Step 1- Assessment
- Standard of Practice for entry-level RD since 2012
- Joint Commission Standard (PC 2.20)
  - Reveal Nutrient Deficiencies/Excess not otherwise identified
- Elevate RD practice
- Improve identification and documentation of malnutrition
  - More evidence for our recommendations
- Increase revenue generated from accurate documentation

NFPE vs. Other Providers PE

- RD vs. MD/NP/PA/RN physical exams are not equal
  - RD PE is less extensive
  - MD preforms PE to determine signs/symptoms of disease
  - RD preforms NFPE to identify and grade malnutrition and potential deficiencies

NFPE Techniques

- **Inspection**:
  - Most common
  - Using critical eye to look for change color, texture, shape
- **Palpitation**:
  - Use sense touch evaluate, locate, texture, tenderness, size, etc.
  - Muscle feels like a leather belt
  - Depletion of muscle tissues feels “stringy”
- Percussion:
  - Tapping of fingers to assess sounds to determine body organs’ boarders, shapes, and position
- Auscultation:
  - Listening to sounds from organs
    - I.e. bowel sounds

NFPE: How to start?

- Inspect/Observe while assessing patient
  - Head to toe
  - Note wasting, poor dentition, fluid status, etc.
  - Tube/ Lines
  - Wounds, or other noticeable skin changes
- Ask patient/caregivers in the room
  - Noticeable changes in appearance?
  - Clothes fitting differently?
- Palpate to gather more information and look more in-depth for possible nutrition issues

NFPE Tips

- Look for symmetry/Bilateral losses
  - More reflective of malnutrition
- Consider other causes of muscle/fat loss
  - I.e. Stroke, Muscular dystrophy, ALS, recent cast on leg/arm, etc.
- Upper body more susceptible to muscle loss
  - Smaller muscles more sensitive to change
  - Less overlying subcutaneous fat
- Be sensitive with language used
  - Instead of wasting or thin- use “less fat/muscle”

Malnutrition Characteristics

1. **Weight loss (NFPE)**
2. Energy intake
3. Body Fat (NFPE)
4. Muscle Mass (NFPE)
5. Fluid accumulation (NFPE)
6. Grip strength

Malnutrition: Weight Loss

- Think critically about weights
  - Bed scale vs. standing scale?
  - Is there a diagnosis or medications causing patient to retain weight?
    - Dry vs. fluid up?
      - Calculate estimated dry weight if fluids present

Weight Loss: Estimated Dry Weight (EDW)

- Edema
  - 1L fluid retained= 1kg (2.2#)
  - Edema may not be noticeable until it accounts for at least 10% of body weight or when interstitial fluid volume increases by 2.5 to 3L
    - 2.5-3L x 2.2#= 5.5-6.6#; trace edema starts to appear
  - Upper body less affected by edema
  - Extra fluid around lungs, heart, small pockets ascites not appreciable on NFPE

Adult Nutrition Support Core Curriculum, Third Edition, 9. Malnutrition Screening and Assessment | Cindy Hamilton,https://publications.nutritioncare.org/epubreader/aspen-adult-nutrition-support-core-curriculum-3rd-edition-printebook-bundle

Nutrition Focused Physical Exam: Fluid Status

1+	2+	3+	4+
2mm or less Slight pitting Disappears rapidly	2-4 mm Deeper Pit Few seconds to rebound	4-6mm Extremity looks visibly swollen 10-12 seconds to rebound	6-8mm Pitting very deep Grossly distorted extremity >20 seconds to rebound

0+ No pitting edema
1+ Mild pitting edema. 2 mm depression that disappears rapidly.
2+ Moderate pitting edema. 4 mm depression that disappears in 10–15 seconds.
3+ Moderately severe pitting edema. 6 mm depression that may last more than 1 minute.
4+ Severe pitting edema. 8 mm depression that can last more than 2 minutes.

Weight Loss: EDW Calculation

Edema:

- 1+ = ~5# for lower extremity (LE)
- 1+= ~2-5# for upper extremity (UE)
- Less accurate for very low or high BMI

Ascites:

- Mild: 3 to 5 kg (~6-11#)
- Moderate: 7 to 9 kg (~15-20#)
- Severe: 14 to 15 kg (~30-33#)

Example: 150# with 2+ BLE edema

- 2+ LLE x 5# + 2+ RLE x 5#= 20# of fluids
- 150# - 20# = **EDW 130#**

Adult Nutrition Support Core Curriculum, Third Edition, 27. Liver Disease | Cindy Hamilton,https://publications.nutritioncare.org/epubreader/aspen-adult-nutrition-support-core-curriculum-3rd-edition-printebook-bundle

Malnutrition Characteristics

1. Weight loss
2. Energy intake
3. **Body Fat (NFPE)**
4. **Muscle Mass (NFPE)**
5. **Fluid accumulation (NFPE)**
6. Grip strength

Malnutrition: Muscle Mass

- Muscle wasting = loss of mass (smaller) and tone (softer)
- Upper body can be a good representation of overall muscle mass loss

Stress Response (Inflammation):

- Catabolism and negative nitrogen balance
- Faster rate of skeletal and lean muscle loss

Starvation:

- Preserves lean body mass due to adaptation and decreased energy expenditure
- Results in fat as the main energy source

NFPE: Additional Considerations- Obese

- Difficult to use fat loss as qualifying criteria
  - Typically have excessive fat stores, thus tend to still have excessive fat stores even with weight loss

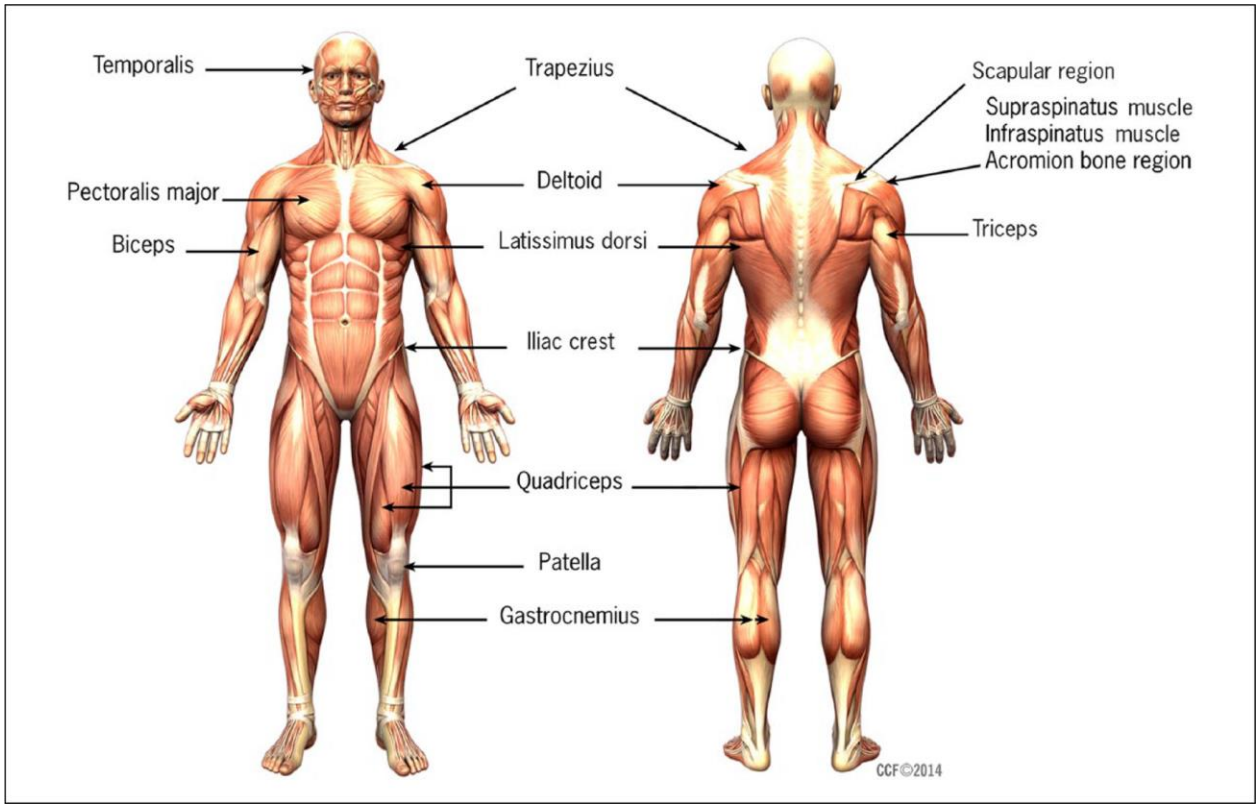
- Upper body
  - Less fat stores overlying muscle/ bone= most sensitive area on obese individual
  - Smaller muscles more sensitive to change
  - Fat may hide losses; need to palpate
    - Most evident around chest/shoulders/neck
      - Feel bony or “squaring” off of shoulder
      - Stringy muscles
      - Easily depressed with little resistance

NFPE: Additional Considerations- Elderly

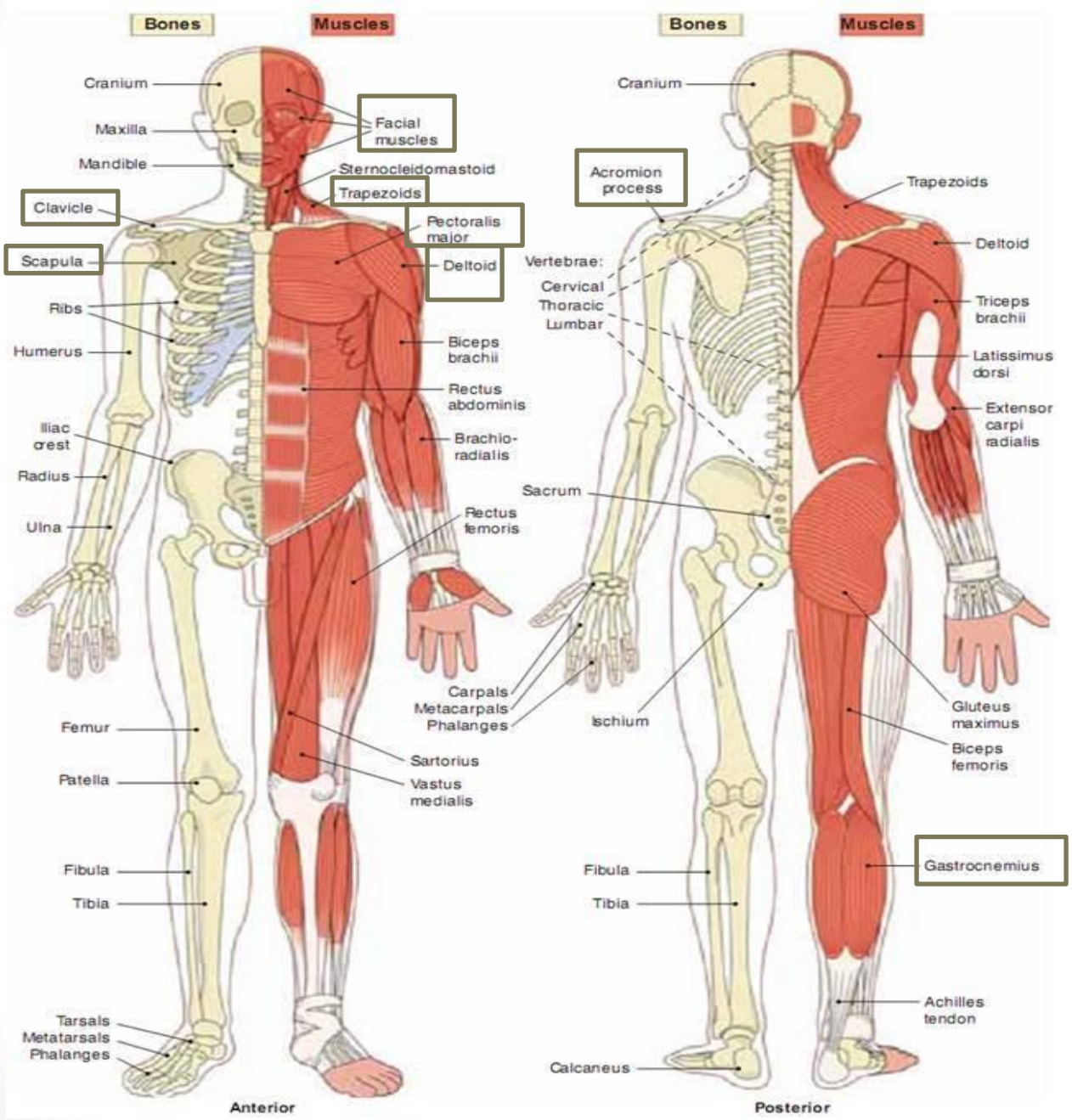
- Consider age related muscle loss
  - If stable body weight and intake is unchanged muscle loss likely related to age and not malnutrition
  - Think about etiology first then criteria

- Caution diagnosing elderly using NFPE without other supporting criteria

Evaluation of Muscle and Fat Loss as Diagnostic Criteria for Malnutrition



Nut in Clin Prac, Volume: 30, Issue: 2, Pages: 239-248, First published: 09 March 2015, DOI: (10.1177/0884533615573053)



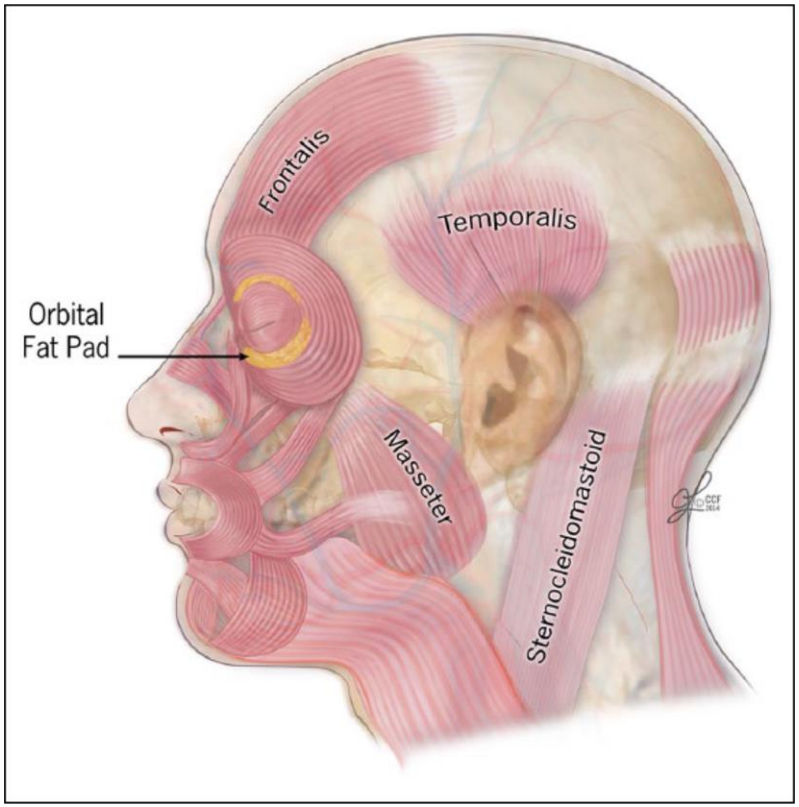
http://www.carlalimadance.com/anatomy-for-belly-dance.html

Nutrition Focused Physical Exam: Head-to-Toe

Area	Type	Location	Technique	Well-Nourished	Mild/ Moderate Malnourished	Severe Malnourished
Orbital	Fat	Surrounding eye	Inspection/Palpation- stand in front of pt, touch above cheekbone	Bulged Fat Pads	Slightly dark circles, somewhat hollow	Hollow, depressions, dark circles, loose skin, prominent brown bone

- Tips:
  - Fluid or chronic steroids may mask subcutaneous fat loss
  - Look for loss of fullness

Evaluation of Muscle and Fat Loss as Diagnostic Criteria for Malnutrition



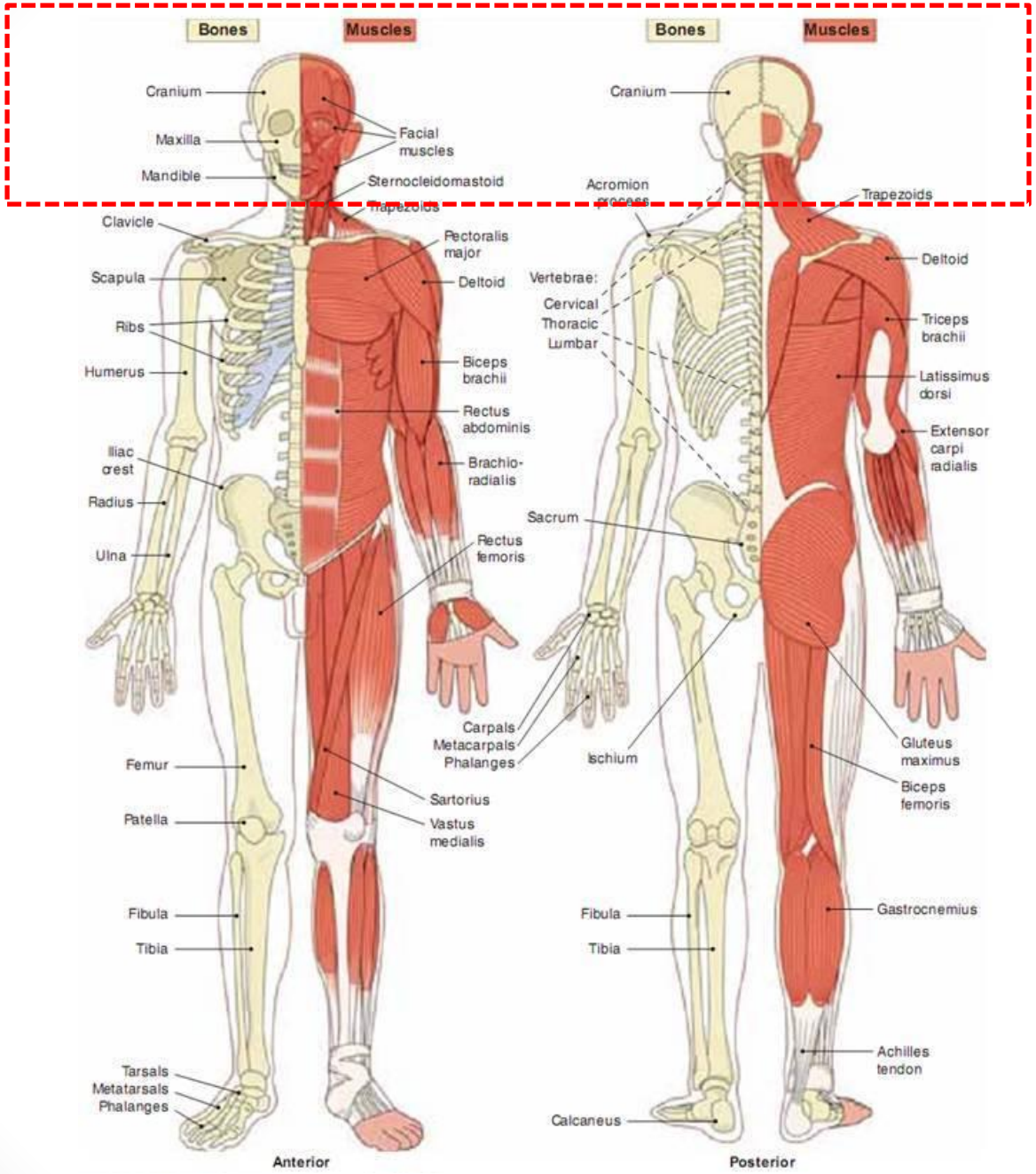
Nut in Clin Prac, Volume: 30, Issue: 2, Pages: 239-248, First published: 09 March 2015, DOI: (10.1177/0884533615573053)

Nutrition Focused Physical Exam: Head-to-Toe

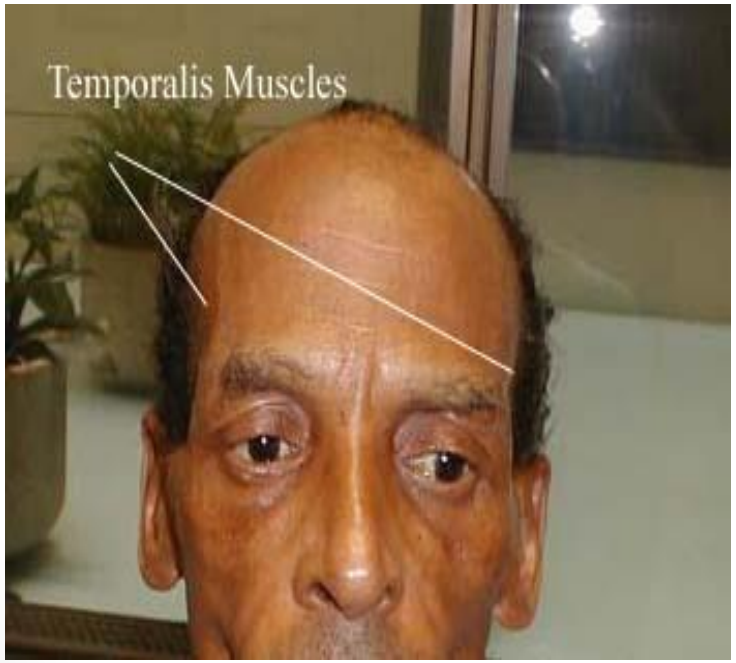
Area	Type	Location	Technique	Well-Nourished	Mild/ Moderate Malnourished	Severe Malnourished
Temples	Muscle- temporalis	Cheek bones	Inspection- Stand in front of patient, have them turn head to side Palpate- touch face to feel bone vs. muscle	See + feel well defined muscles	Slight depression	Hallowing, scooping, depression

Tips:

- Well nourished- feels like leather belt
- Wasting feels like a deflated water balloon
- Obese patient- use touch to distinguish between muscle and fat; wasting may not be visible
  - Pit of temple will depress easily w/residual “watery feel” above the bone
    - Similar to single serve condiment packet



www.thehillscenter.com (Accessed 3/5/2015)



http://meded.ucsd.edu/clinicalimg/head_temporal_wasting2.jpg
http://www.facechange.org/images/facial-wasting-1.jpg

Nutrition Focused Physical Exam: Head-to-Toe

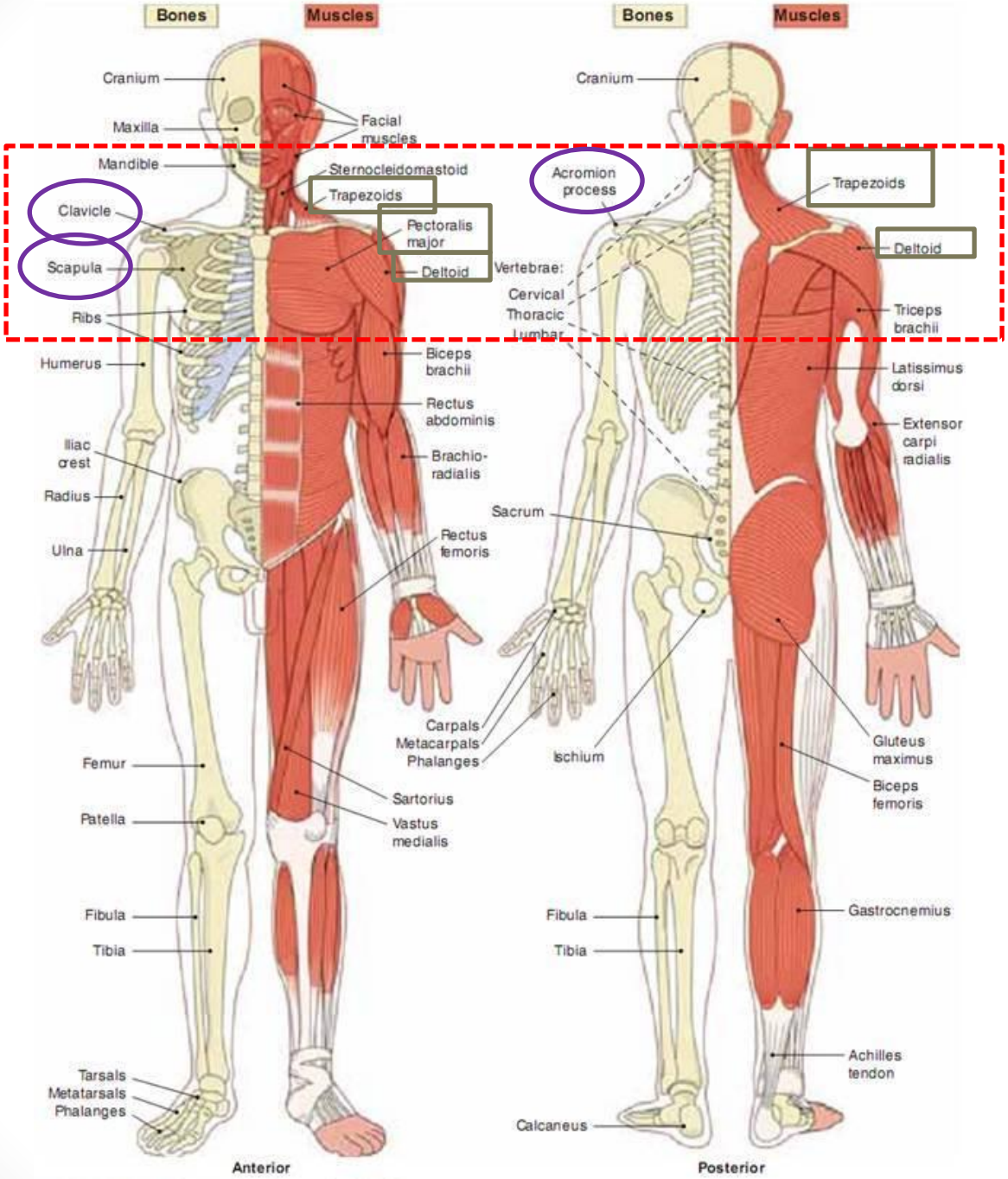
Area	Type	Location	Technique	Well-Nourished	Mild/ Moderate Malnourished	Severe Malnourished
Clavicle	Muscle- Pectoralis major, trapezius	Neck-shoulder junction	Inspection- pt arms at sides	Male- not visible Female- visible/not prominent Rounded curves at neck	Male- visible Female- some protrusion	Protruding
Shoulder	Muscle- Deltoid		Inspection- Round vs. Square, pt arms at sides	Rounded curves at arm/shoulder	Some protrusion acromion process	Square shoulder/arm joint, prominent bone

Tips:

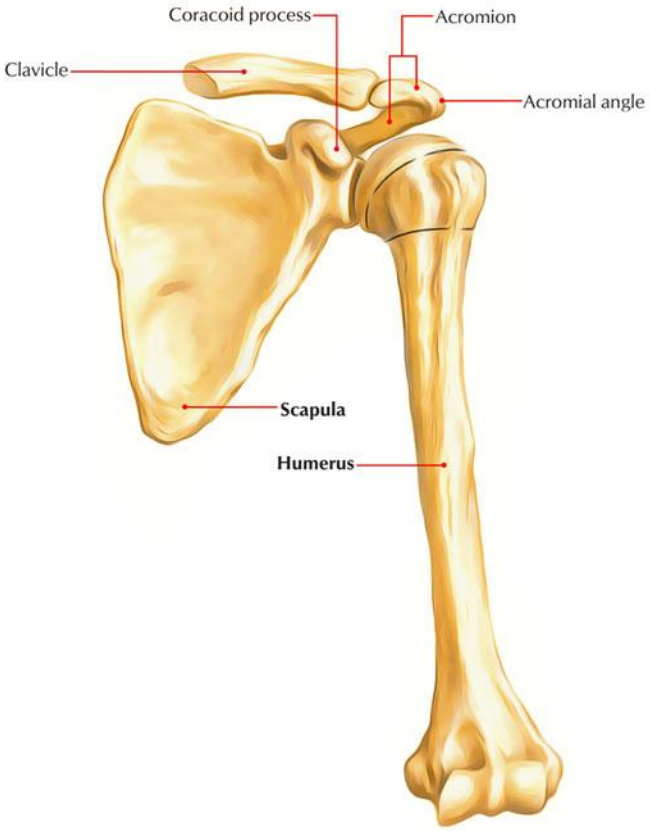
- Make sure patient is not slouched
- Neuro deficits may have unilateral muscle wasting; may produce false positive
- Wasted: Muscle will feel stringy and loose, it will feel hollow between joints and shoulder
- Obese: Depression of tissue may not be visible, need to feel for wasting of muscle
  - Shoulder easier to spot wasting in due to minimal fat and easy to feel bone despite weight status

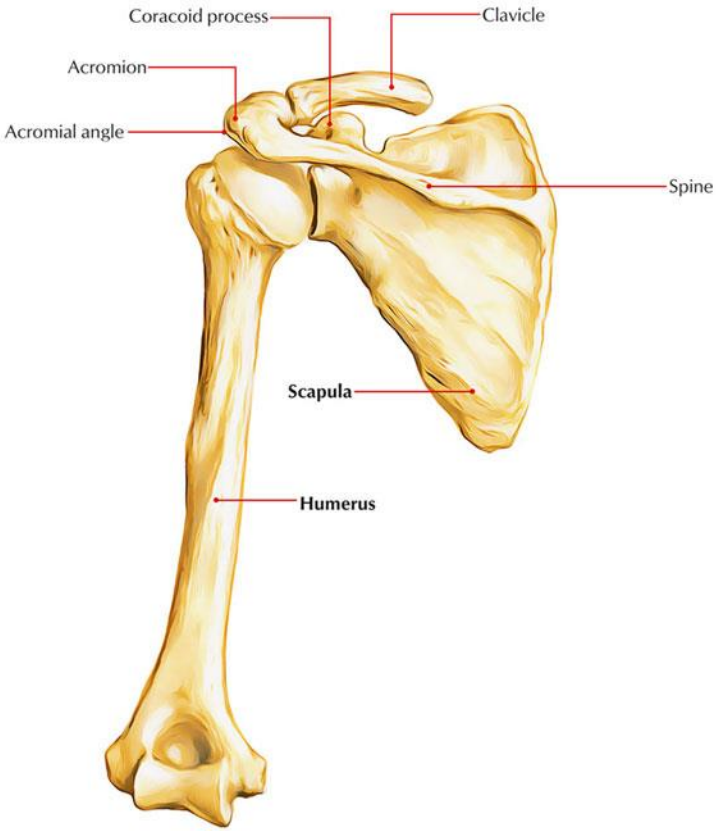
Nutrition Focused Physical Exam: Head-to-Toe

Area	Type	Location	Technique	Well-Nourished	Mild/ Moderate Malnourished	Severe Malnourished
Scapula	Muscle	Upper back	Inspection- pt push against solid object, roll onto 1 side, hands out front, pt push hands together	Bones not prominent, no significant depressions	Mild depression, some bones may show	Prominent, visible bone, depression between ribs, scapula, shoulder, spine

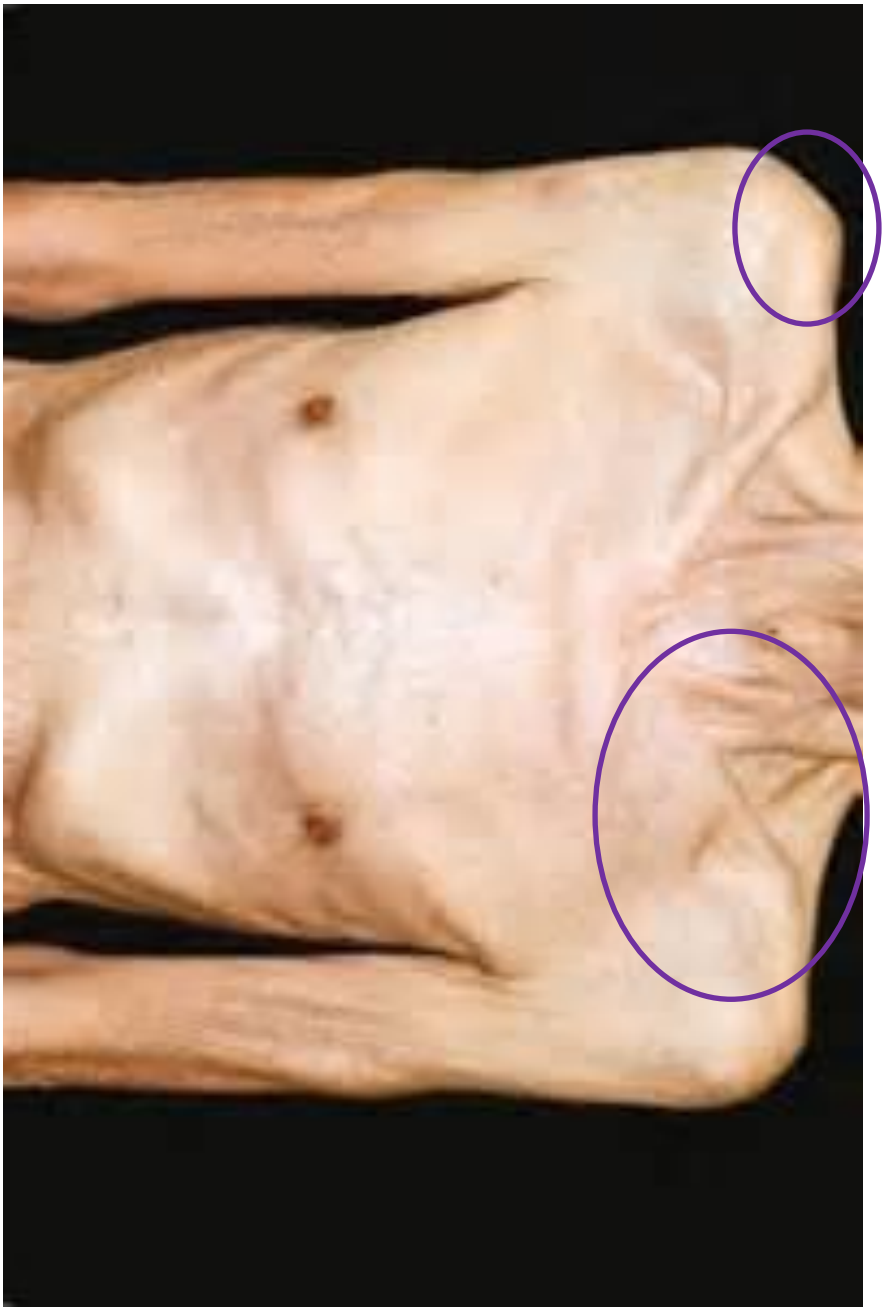


www.thehillscenter.com (Accessed 3/5/2015)



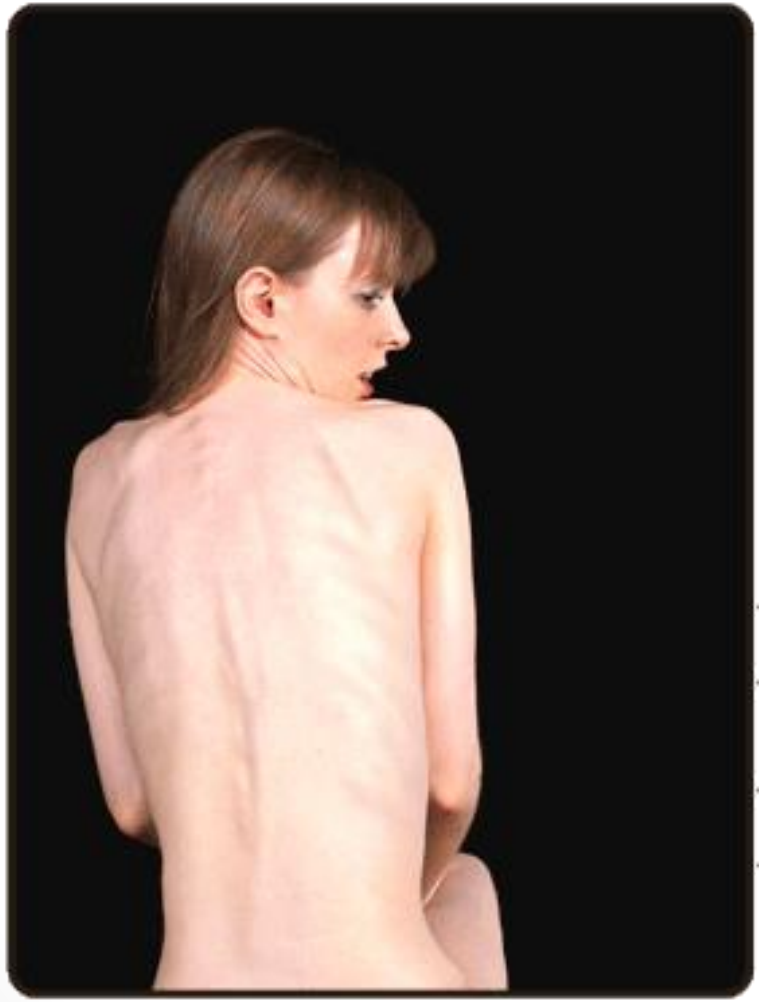


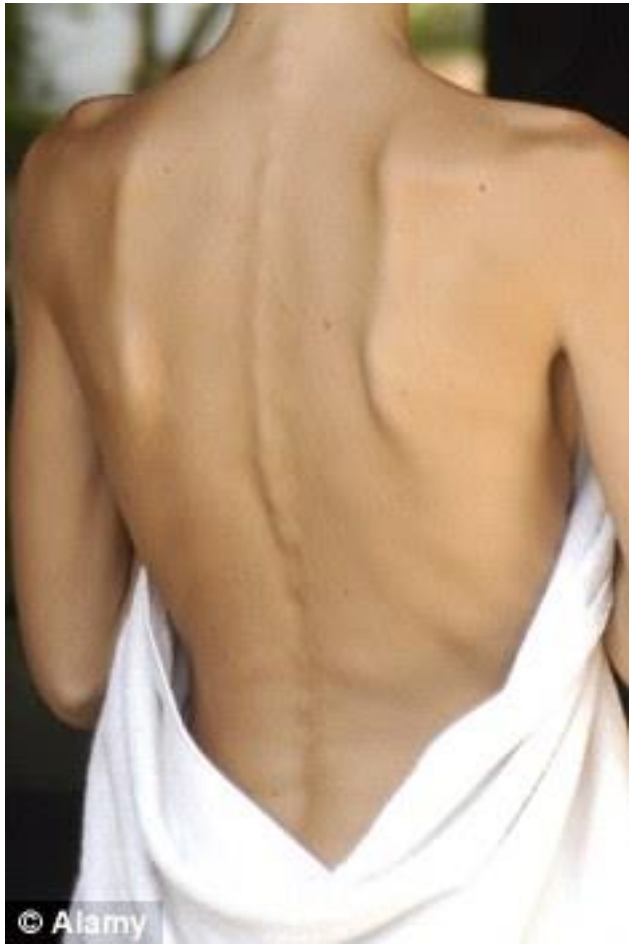
www.thehillscenter.com (Accessed 3/5/2015)



www.thehillscenter.com (Accessed 3/5/2015)

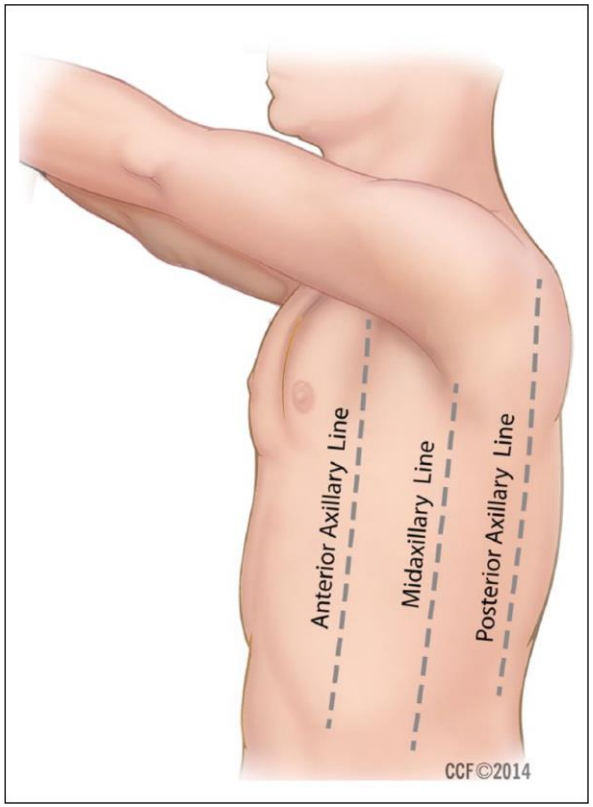
Scapula Wasting





www.thehillscenter.com + www.dailymail.co.uk (accessed 3/5/2015)

Evaluation of Muscle and Fat Loss as Diagnostic Criteria for Malnutrition



Nut in Clin Prac, Volume: 30, Issue: 2, Pages: 239-248, First published: 09 March 2015, DOI: (10.1177/0884533615573053)

Nutrition Focused Physical Exam: Head-to-Toe

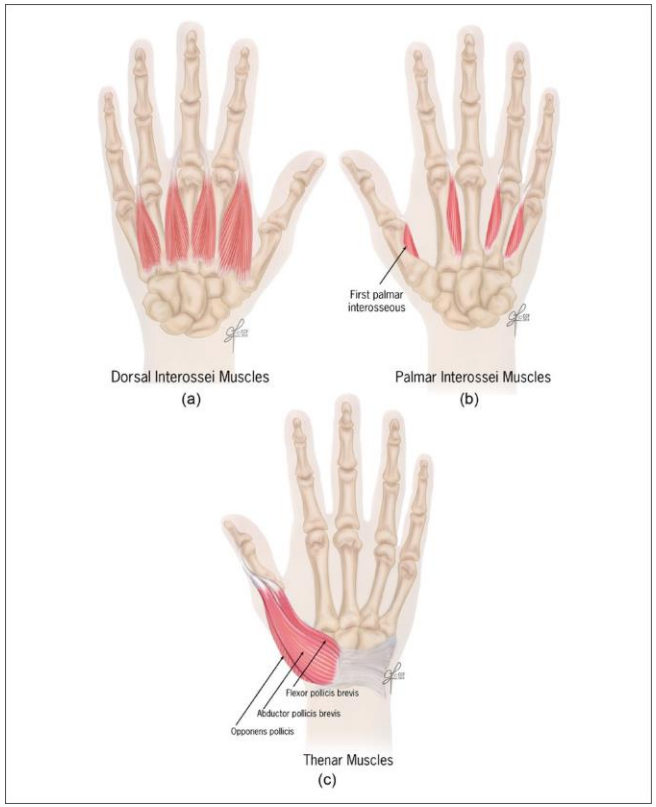
Area	Type	Location	Technique	Well-Nourished	Mild/ Moderate Malnourished	Severe Malnourished
Triceps	Fat	Back of upper arm	Inspection/ Palpation- pinch between thumb and forefinger	Ample fat between folds of skin	Fingers almost touch	Very little space b/w folds, fingers touch

- Tips:
  - Be careful to not pinch muscle
  - Mainly identified with fat loss

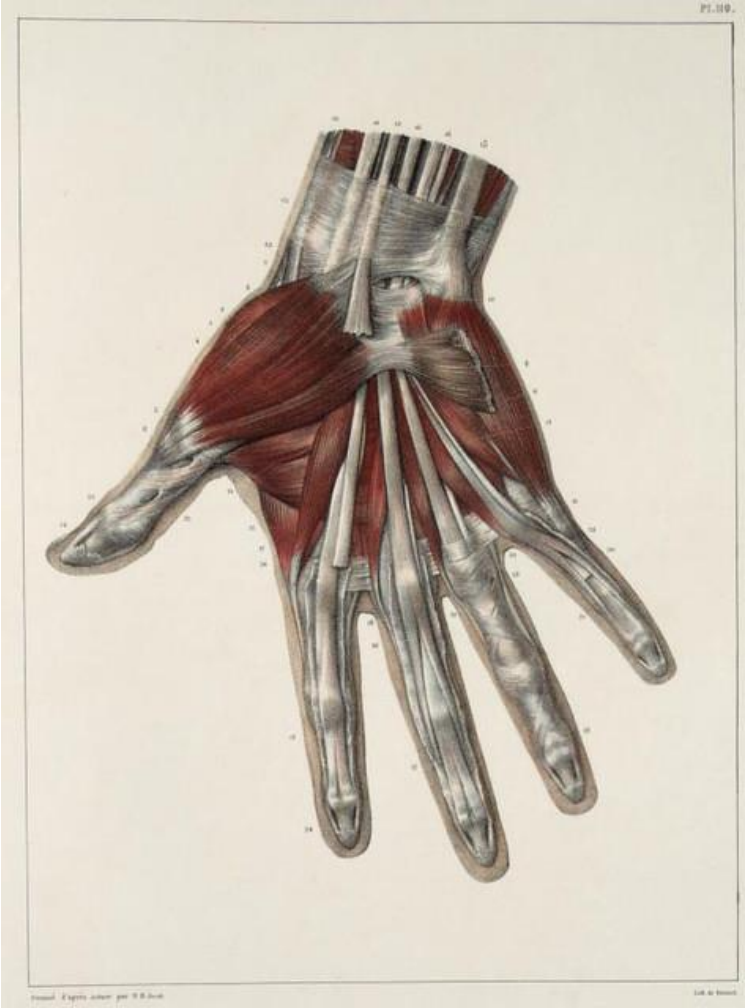
Nutrition Focused Physical Exam: Head-to-Toe

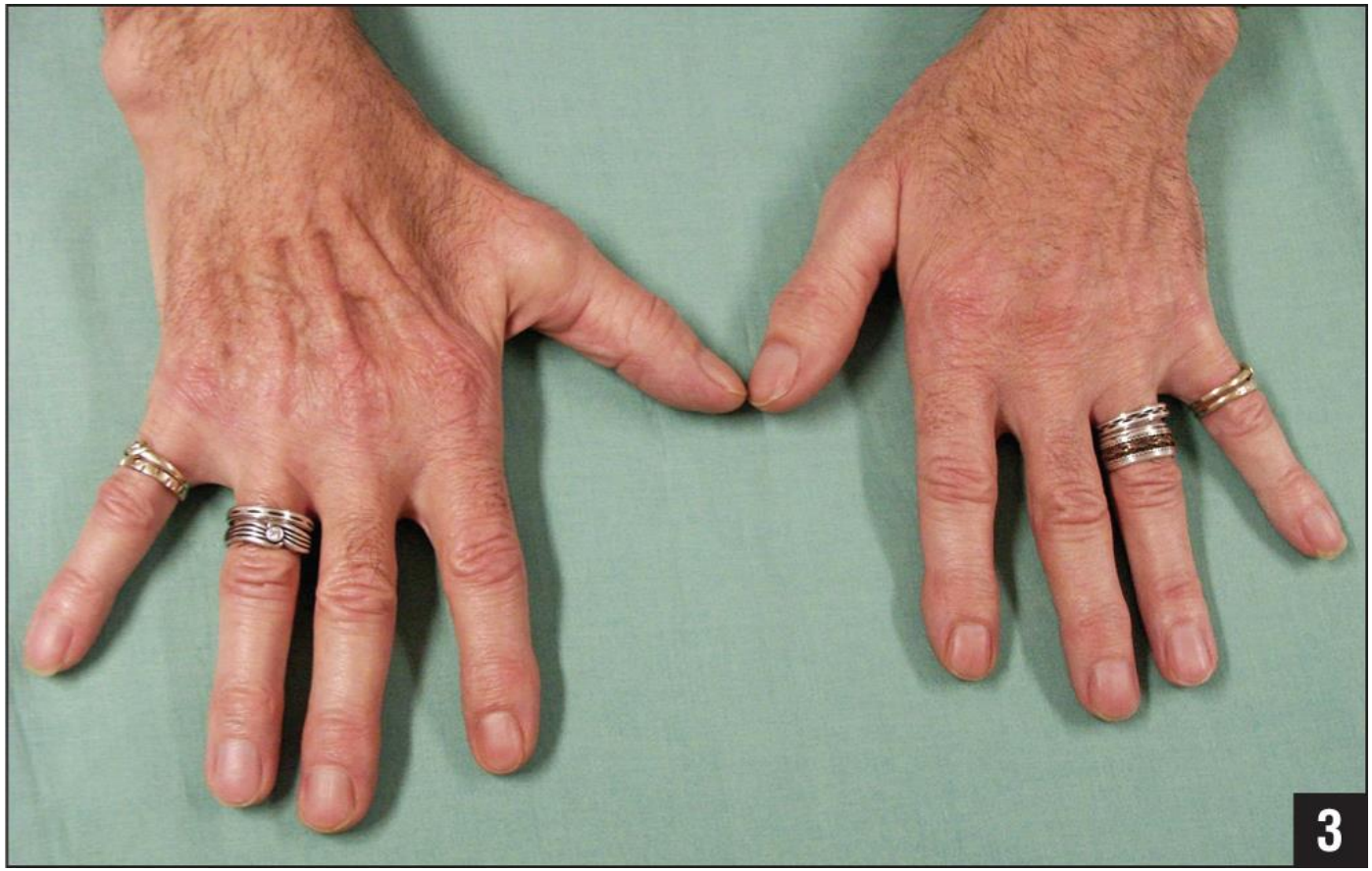
Area	Type	Location	Technique	Well-Nourished	Mild/ Moderate Malnourished	Severe Malnourished
Hand-Interosseous	Muscle	Between thumb and forefinger, palm down	Inspection- pt moves thumb and forefinger together and apart	Male- bulge Female- flat	Male- flat Female- slightly depressed	Flat or depressed area, bone visible

Evaluation of Muscle and Fat Loss as Diagnostic Criteria for Malnutrition



Nut in Clin Prac, Volume: 30, Issue: 2, Pages: 239-248, First published: 09 March 2015, DOI: (10.1177/0884533615573053)


Pl. 110.

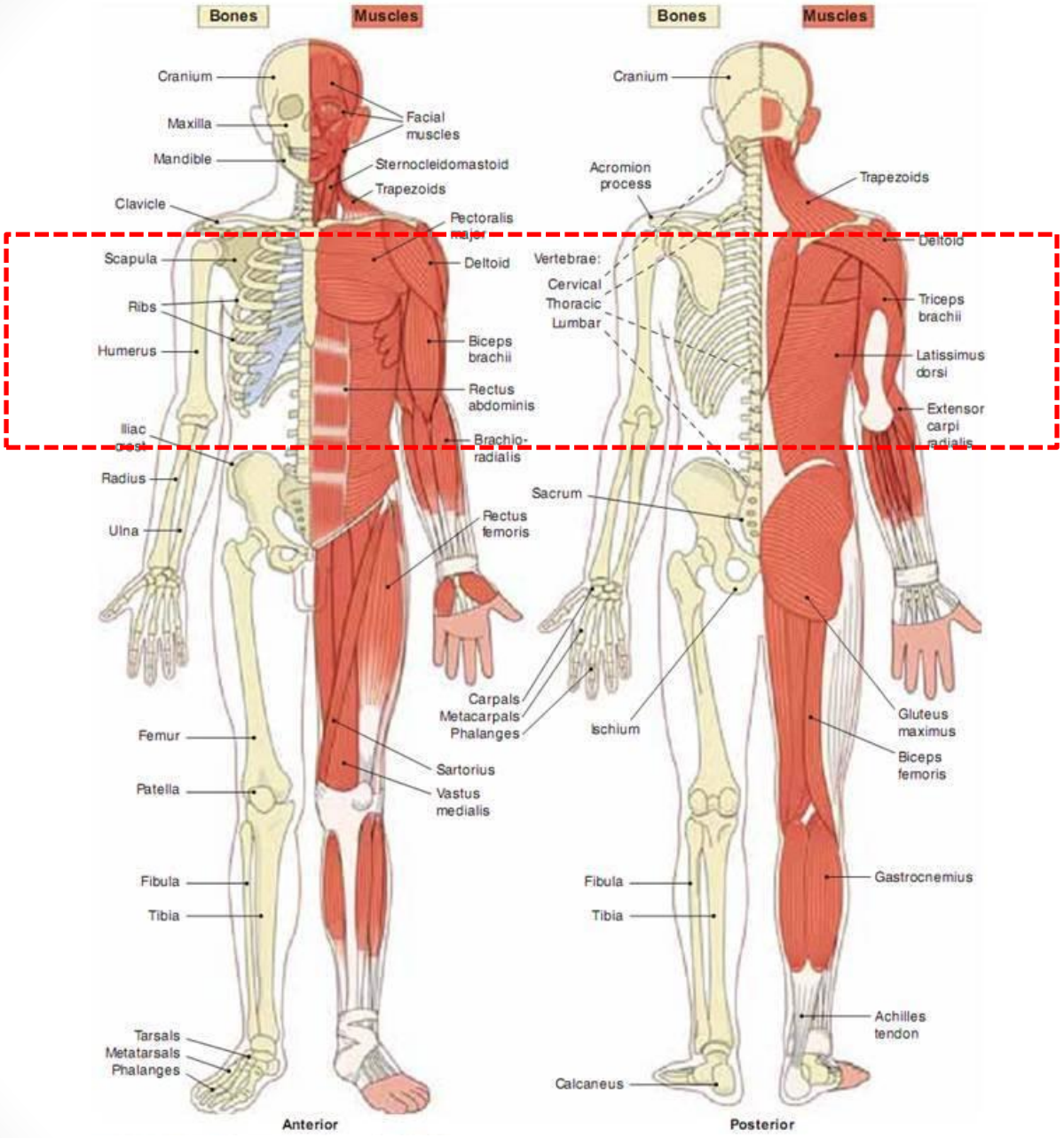


http://www.healio.com/~/media/Journals/ORTHO/2013/5_May/10_3928_01477447_20130426_04/fig3.jpg

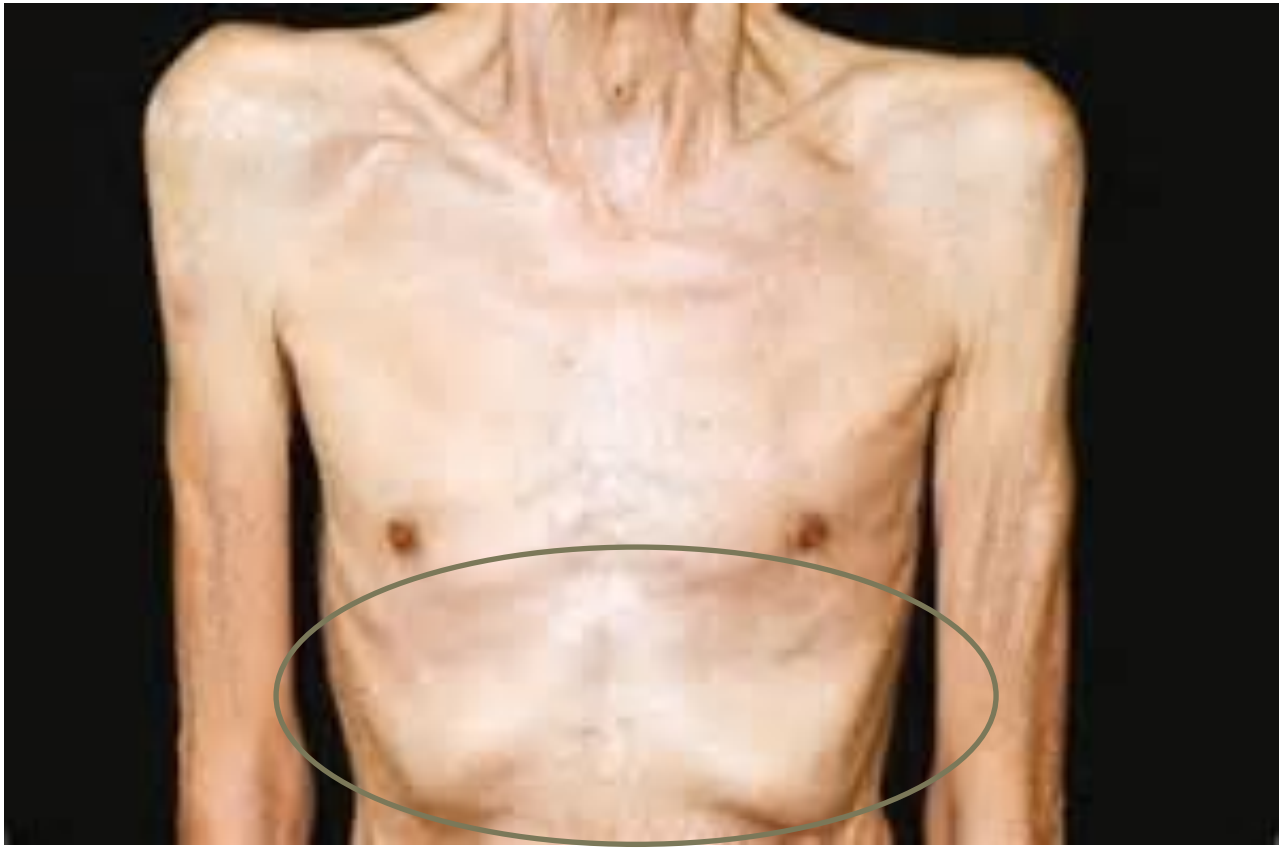
Nutrition Focused Physical Exam: Head-to-Toe

Area	Type	Location	Technique	Well-Nourished	Mild/ Moderate Malnourished	Severe Malnourished
Thoracic/ Lumbar Ribs	Fat	Chest, Lower ribs	Inspection- look for fullness, loose skin, ribs	No visible ribs or chest wall	Somewhat apparent ribs	Prominent, well defined ribs

- Tips:
  - May be difficult if patient unable to sit-up in bed in the inpatient setting
  - May be done w/patient lying on 1 side, pushing against bed/object as able



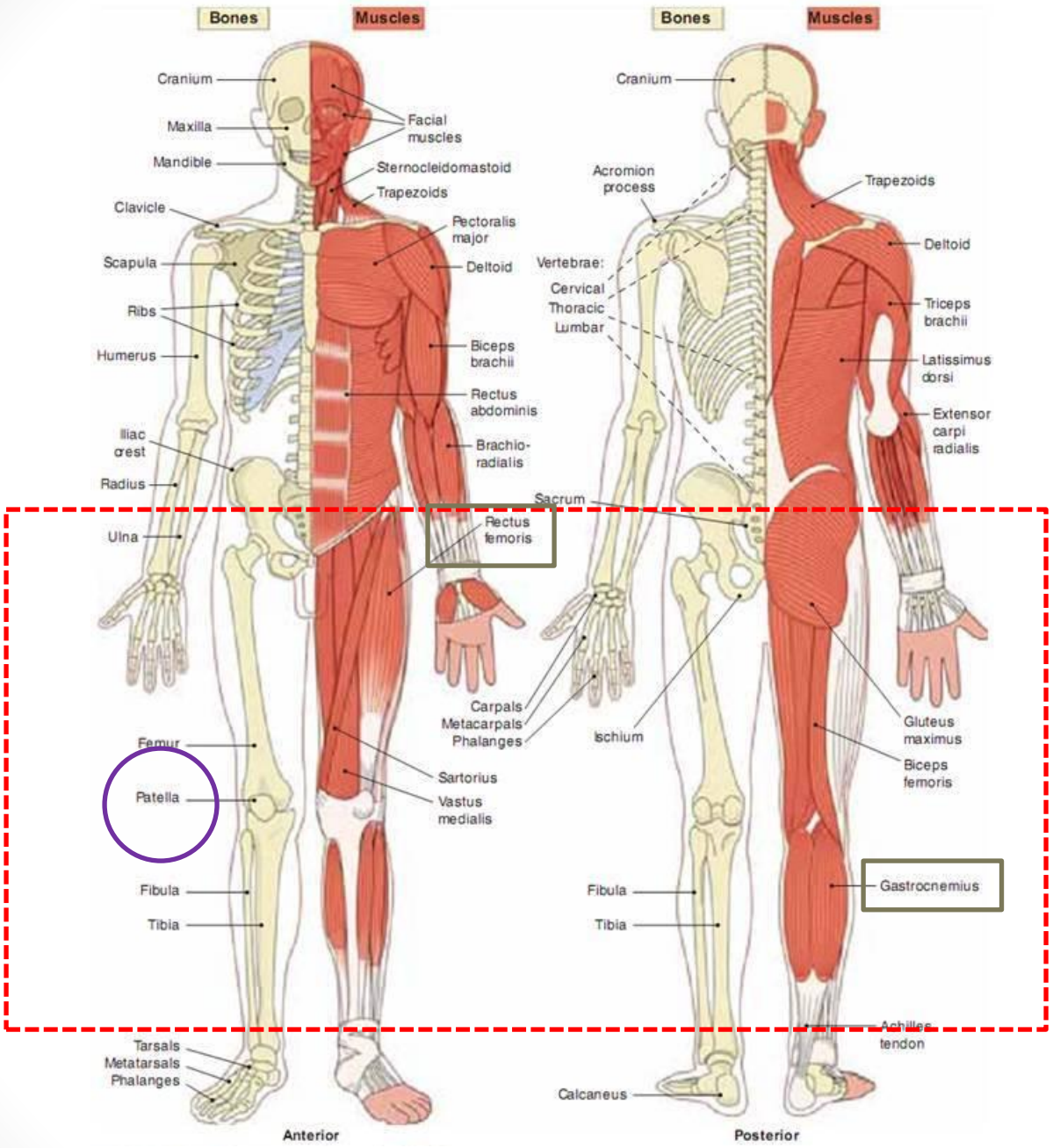
www.thehillscenter.com (Accessed 3/5/2015)



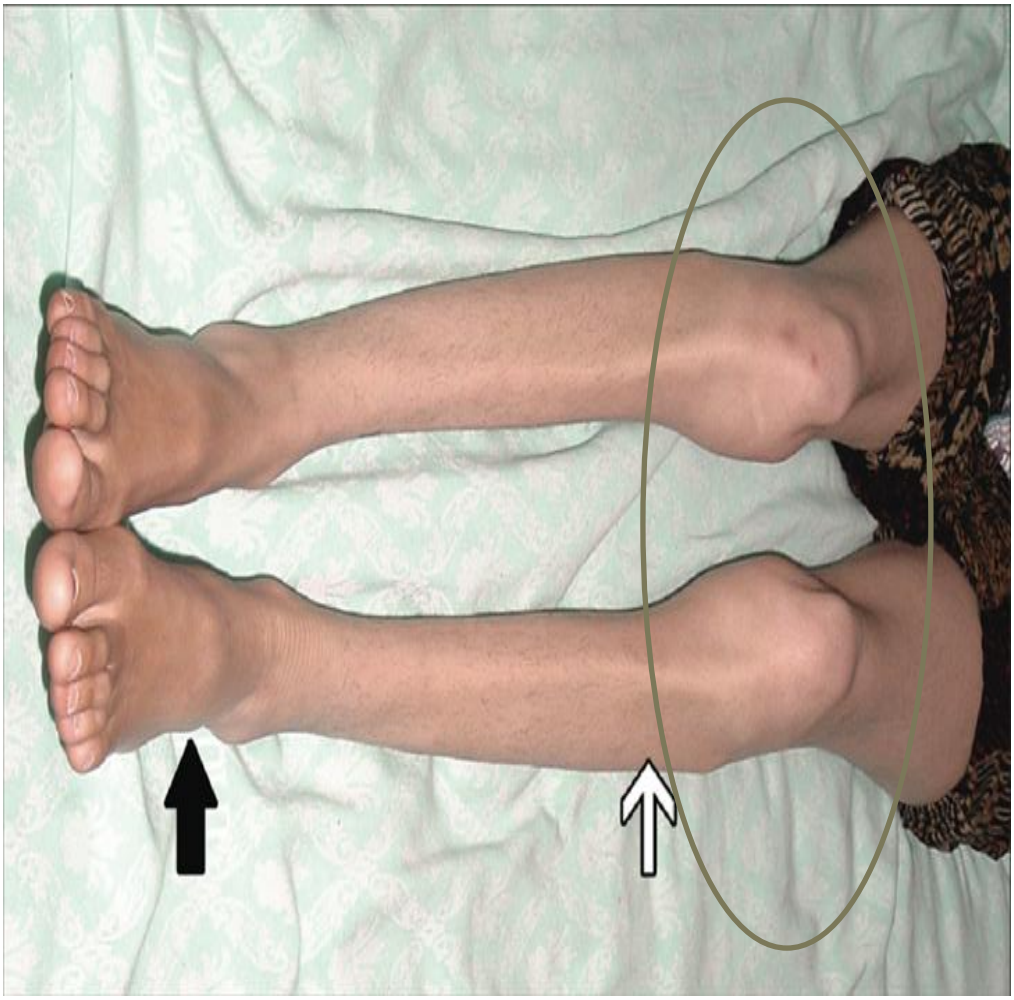
Nutrition Focused Physical Exam: Head-to-Toe

Area	Type	Location	Technique	Well-Nourished	Mild/ Moderate Malnourished	Severe Malnourished
Quad / Knee	Muscle	Anterior thigh, patellar region (knee)	Inspection- Pt sit on edge of bed, leg propped up, or bring bed down until feet on floor; Palpation- grasp quad to differentiate muscle/fat	Muscle protrudes, bone not prominent	Knee cap less prominent, more round	Prominent knee cap, minimal muscle, both side depressed
Calf	Muscle	Posterior	Inspection- pt sit on edge of bed or bend legs lying in bed; Palpation- grasp to determine amount of muscle	Well developed bulb of muscle	Not well-developed, some loose skin	Loose, hanging skin, thin, minimal muscle

- Tips:
  - May be difficult for patient to sit on the side of the bed in the inpatient setting
  - Muscle loss from inactivity is most prominent in pelvis and upper leg



www.thehillscenter.com (Accessed 3/5/2015)



Nutrition Focused Physical Exam: Fluid Status

1. Determine if related to disease or malnutrition
2. Look at fluid balance- I+O's, vitals
3. Ask patient weight history; est. dry weight
4. Palpate legs/feet/hands- pull-up covers

*Cautious using fluid status for malnutrition diagnosis

Nutrition Focused Physical Exam: Fluid Status

1+	2+	3+	4+
2mm or less Slight pitting Disappears rapidly	2-4 mm Deeper Pit Few seconds to rebound	4-6mm Extremity looks visibly swollen 10-12 seconds to rebound	6-8mm Pitting very deep Grossly distorted extremity >20 seconds to rebound

0+ No pitting edema
1+ Mild pitting edema. 2 mm depression that disappears rapidly.
2+ Moderate pitting edema. 4 mm depression that disappears in 10–15 seconds.
3+ Moderately severe pitting edema. 6 mm depression that may last more than 1 minute.
4+ Severe pitting edema. 8 mm depression that can last more than 2 minutes.

Nutrition Focused Physical Exam: Hand Grip Strength

- Easy to preform and evidenced based
  - Indicator muscle function
- Preform 3 grips
  - Take highest reading
- Compare vs standard reference
  - Normal/Weak/Strong
  - Measure over time

Questions?

www.thehillscenter.com (Accessed 3/5/2015)

Malnutrition Case Studies

Case Study

1. Does this patient have weight loss?
2. Has this patient experienced a change in energy intake?
3. Does this patient have muscle and/or fat loss?
4. Does this patient have fluid accumulation?

Case Study #1

70 year old woman with long standing obesity metabolic syndrome and joint disease of the knees.

Chief complaint: compromised mobility, lives alone, almost housebound, limited financial resources

Objective date: 25 lbs (11%) wt loss over 6 months

Subjective data: Lack of interest in food. Daughter dropped off meals every other week and often left in the refrigerator uneaten, unless daughter ate with her.

Case Study #1 Data

Anthropometrics:

Height: 5’2”

Weight: 200 lbs

BMI: 37 kg/m2

Clinical data:

BP: 135/85

A1c: 7.0% (elevated)

Cholesterol: 180 mg/dL

TG: 125 mg/dL

Albumin: 4.1 (normal)

WBC: 5100/mm (normal)

CRP: 48 mg/dL (elevated)

Intake data;

Diet recall: PO intake <75% estimate nutrition needs over past 6 months

uchealth

What is the etiology?

Chronic disease associated malnutrition

- Inflammation present from obesity and metabolic syndrome

uchealth

What characteristic of malnutrition?

Inflammation present

Weight loss: 11%/ 6 months

Intake: <75% x 6 months

NFPE:
Muscle: mild wasting in temporal/shoulder/clavicle
Fat: none
Fluids: none

Chronic Disease Related Malnutrition
>5%/1 month
>7.5%/3 months
>10%/6 months
> 20%/1 year
≤75% for ≥1 month
Severe depletion
Severe depletion
Severe
Reduced for age/gender

lalnutrition.[4]

Chronic Disease Related Malnutrition
5%/1 month
7.5%/3 months
10%/6 months
20%/1 year
<75% for ≥1 month
Mild depletion
Mild depletion
Mild
Not applicable

uchealth

Etiology: Case Study #2

24 year old female with no PMHx

Chief complaint: Gastroparesis admit for gastric pacer placement

Objective Data: 42# weight loss/1 year (38%)

Subjective Data: Nausea, vomiting x 6 months. Intake ~4 oz of high calorie supplements, small amounts of soft foods BID x 3 months. Intake in past month ~ 8 oz of a high calorie oral nutrition supplements per day.

Case Study #2 Data

Anthropometrics:

Current weight: 68 lbs

1 year ago: 110 lbs

3 months ago: 90 lbs

1 month ago: 80 lbs

Clinical Data:

Temperature: 98.4 degrees F

Albumin: 4.3 g/dL (normal)

Prealbumin: 15.6 mg/dL (normal)

What is the etiology?

Social/environmental circumstances

- No evidence of inflammation

uchealth