

PASSOR

MUSCULOSKELETAL PHYSICAL EXAMINATION COMPETENCIES LISTS

Update prepared by the PASSOR Task Force on Musculoskeletal Education

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Introduction

I. **Background and Purpose**

This document represents the combined efforts of individuals serving on the PASSOR Task Force on Musculoskeletal Education. The PASSOR Board of Governors charged the Task Force with developing a list of musculoskeletal physical examination competencies that would represent the “core” components of the musculoskeletal examination for each body region. Every physiatrist, regardless of background or current practice, should be able to demonstrate proficiency in these core competencies. It is anticipated that physiatrists at all levels of training can utilize these lists to ensure that they have become proficient in the core components of the musculoskeletal physical examination.

II. **Scope**

These physical examination lists were developed as a consensus opinion from the task force members. The items included on each list represent core components of the physical examination for that body region. As “core components,” they are examination elements that are commonly used by medical practitioners and assist in the diagnosis and treatment of musculoskeletal disease when combined with the history, additional physical examination findings, adjunctive diagnostic testing, and clinical experience.

III. **Structure of this Document**

Each body region represents a separate list in this document. There are a total of eight regions: (1) Cervical Spine Region, (2) Shoulder Region, (3) Elbow Region, (4) Wrist-Hand Region, (5) Lumbar Spine Region, (6) Pelvis-Hip Region, (7) Knee Region, and (8) Ankle-Foot Region. Within each region, core competencies are listed in the traditional format of Inspection, Palpation, Range of Motion, Neurovascular (Motor, Sensory, Reflex, Pulses), and Special Testing. The final section of the document pertains to Functional Testing. This section outlines various functional tests that may be useful when evaluating regional pathology in the context of integrated, multi-joint motions that are typical of daily life, work, and sport. Clinicians are referred to this section at the end of each body region specific examination section.

When preparing each list, the task force members have attempted to use common terminology when referring to body regions and special tests. In cases in which a landmark or special test may have more than one “name,” the authors have typically provided commonly used alternative names. With respect to the neurological examination, a dominant spinal segment has been boldfaced where appropriate. The term “sensory points” refers to the sensory points established by ASIA for sensory examination in patients with spinal cord injury.

IV. **General Comment Regarding the Physical Examination**

The physical examination is a dynamic, mechanical process with multiple nuances. The validity, reliability, sensitivity, and specificity of many physical examination maneuvers are currently unknown and are likely dependent on the particular clinical situation in which they are used. Despite these “limitations” most physiatrists will agree on the essential components of a good physical examination. These “core components” are completed to assist the clinical decision-making process and are presented in this document. The task force members specifically did not address issues of reliability, accuracy, and validity. In addition, this document does not attempt to provide instructions on performing the physical examination, although some descriptive information has been included in certain areas at the discretion of the task force members. Physiatrists interested in how to perform the physical examination maneuvers listed herein can obtain this information from colleagues, teachers, and physical examination textbooks or videos.

Cervical Spine Region

Inspection

During the physical examination, the physiatrist should identify the items listed below and adequately describe what he or she sees for the purposes of communication and documentation. The physiatrist should also understand the potential clinical relevance of any abnormal findings.

Recognize the importance of symmetry

Posture

Head position- forward, rotated, or laterally flexed

Cervical lordosis (increased or decreased)

Thoracic kyphosis

Thoracic scoliosis

Scapular winging

Protracted shoulder posture

Depressed dominant shoulder girdle

Muscle bulk for atrophy, fasciculations

Gait

Standing balance

Palpation

The physiatrist should be able to palpate the following structures or areas for asymmetry, tenderness, and/or deformity. The physiatrist should adequately describe and document the findings, and also understand the potential clinical relevance of any abnormal findings.

Bony landmarks

C0 External occipital protuberance

C1 Atlas transverse process lies inferior to mastoid process

C2 First bony prominence below occiput

C3 Level of hyoid bone

C4-5 Level of thyroid cartilage

C6 Level of cricoid ring

C7 Spinous process does not move with extension

T2 Superior angle of scapula

T3 Scapular spine

T7 Inferior angle of scapula

T12 Inferior rib margin

Regional lymph nodes (occipital, mastoid, submandibular, submental, parotid, supraclavicular, anterior chain, posterior chain)

Carotid pulse

Thyroid and parotid glands

Frontal and maxillary sinuses

Muscles tenderness or trigger points in the following muscles/muscle groups:

Sternocleidomastoid

Scalenes

Trapezius (upper and middle)

Levator scapulae

Splenius capitis

Splenius cervicis

Temporalis muscle

Masseter muscle

Supraspinatus muscle

Infraspinatus muscle

Location of greater occipital nerve in the posterior occiput-suboccipital region

Range of Motion (ROM)

The physiatrist should be able to assess the active and passive ranges of motion listed below. For active ROM, the physiatrist should appropriately position the patient and provide the patient with adequate instruction to perform the motion. When passive motion is appropriate, the physiatrist should appropriately position the patient area to complete the testing. The physiatrist should adequately describe and document the findings, and understand the potential clinical relevance of abnormal findings.

Cervical

- Observe motion both quantitatively and qualitatively (substitution patterns, pain with motion, speed of motion)
- Check active ROM in sitting or standing
- Check passive ROM in supine
- Check for symmetrical motions of flexion, extension, rotation and lateral flexion (lateral bending)

Thoracic (T1-12)

- Flexion-extension (total) 45 degrees
- Rotation (from neutral) 50 degrees

Temporomandibular joint (as clinically indicated)

- Lateral deviation
- Jaw opening
- Protrusion and Retraction
- Clicking or popping

Shoulder Region

- See Shoulder Region list (page 5)

Neurovascular Testing

Neurological testing includes a motor, sensory, reflex and vascular examination relevant to the regions. Adequate examination is predicated on an understanding of the regional peripheral and segmental anatomy. The physiatrist should understand the inter-relationship of the regional neuroanatomy to adjacent and distant musculoskeletal structures, adequately describe and document physical findings, and understand the potential clinical relevance of any abnormal findings.

Motor (by spinal segment/myotomal)

- C1, C2 Neck flexion or extension
- C3 Neck lateral flexion/side bending
Neck rotation
- C4 Scapular elevation (trapezius, levator scapulae)
- C5 Shoulder abduction (deltoid, rotator cuff)
- C6 Elbow flexion (biceps), wrist extension (extensor carpi radialis longus and brevis)
- C7 Elbow extension (triceps), finger extension (extensor digitorum communis)
- C8 Thumb extension (extensor pollicis longus), ulnar deviation of wrist (flexor and extensor carpi ulnaris)
- T1 Hand intrinsic- adduction and abduction (interossei and lumbricals)
- T1-12 Thoracic extension, rotation, sidebending, rib elevation, depression
- T6-12 Thoracic flexion

Sensory (by sensory segment/dermatomal)

- C2 Posterior head
- C3 Peri-auricular, pinna, jaw, upper neck
- C4 Base of neck and shoulder
- C5 Lateral arm, just proximal to antecubital crease
- C6 Lateral forearm, thumb, index finger
- C7 Dorsal forearm, dorsal and volar index / middle / ring finger
- C8 Ring and little finger, medial forearm
- T1 Medial arm
- T2 Thorax (upper)
- T4 Nipple level
- T6 Thorax (lower)

Reflexes

- Biceps (**C5-6**)
- Brachioradialis (**C5-6**)
- Pronator teres (**C6-7**)
- Triceps (**C7-8**)
- Lower limb reflexes as clinically indicated
 - Patellar (**L3-4**)
 - Medial hamstring (**L5-S1**)
 - Achilles tendon (**S1-2**)
- Hoffman reflex
- Jaw jerk
- Babinski response

Special Testing

Special tests are used when appropriate to challenge the musculoskeletal and neurological systems and assist in physical diagnosis. These tests are used when clinical circumstances suggest the presence of a specific injury or condition such as a ligamentous sprain, cartilage lesion, radiculopathy or neuropathy. As such, the physiatrist should recognize when special tests are indicated and demonstrate competency in the performance and interpretation of special tests within the clinical context. The physiatrist should adequately describe the results of the special test and appropriately document his or her findings.

- Spurling's test or variant (e.g., Jackson's test or maximal cervical compression test)
- L'hermitte's sign
- Axial manual traction (for pain relief)
- Romberg's test
- Shoulder abduction relief sign (Bakody's sign)
- Thoracic outlet provocation tests
 - Roo's test
 - Adson's test

Adjacent Body Regions

The physiatrist should recognize the inter-relationships of myofascial and neurological structures throughout the musculoskeletal system, as well as the potential for referred pain from adjacent body regions. As a rule, the physiatrist should examine the body regions above and below this region. Please refer to the appropriate list.

Functional Testing

As appropriate, the physiatrist should evaluate body region specific complaints in the context of integrated kinetic chain motion. Several Functional Tests have been described for this purpose. These are listed at the end of this document.

Shoulder Region

Inspection

During the physical examination, the physiatrist should identify the items listed below and adequately describe what he or she sees for the purposes of communication and documentation. The physiatrist should also understand the potential clinical relevance of any abnormal findings.

- Atrophy or fasciculations
- Obvious deformity, edema, discoloration, laceration
- Recognize importance of symmetry and arm dominance effect on posture
- Posture abnormalities
 - Forward head posture
 - Protracted shoulder posture
 - Thoracic kyphosis
 - Scapular winging
- Step-off deformity (acromioclavicular joint)
- Rupture of long head of biceps muscle ("Popeye arm")
- Loss of contour of the lateral pectoralis major muscle (i.e. rupture)

Palpation

The physiatrist should palpate the following structures or areas for asymmetry, tenderness, and/or deformity. The physiatrist should adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings.

- Recognize importance of bilateral palpation to differentiate normal verses abnormal tenderness
- Sternoclavicular joint
- Clavicle
- Acromioclavicular joint
- Coracoid process
- Intertubercular groove (bicipital groove) and long head of biceps tendon
- Subacromial space
- Posterolateral acromion
- Greater tuberosity
- Musculotendinous junction of infraspinatus muscle
- Musculotendinous junction of supraspinatus muscle
- Posterior glenohumeral joint
- Scalene muscles
- First rib
- Upper, middle, and lower trapezius muscles
- Levator scapulae muscle
- Scapular spine, superior angle, inferior angle, and spinoglenoid notch area

Range of Motion (ROM)

The physiatrist should be able to assess the active and passive ranges of motion listed below. For active ROM, the physiatrist should appropriately position the patient and provide the patient with adequate instruction to perform the motion. When passive motion is appropriate, the physiatrist should appropriately position the patient in order to complete the testing. The physiatrist should adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings.

Quantitative

- Recognize the importance of assessing for symmetry
- Scapular plane elevation 150–170 degrees
- Forward flexion 150–170 degrees
- External rotation at 90 degrees abduction (compare side to side)
(or at end-range of tolerable abduction, e.g., anterior instability)

Internal rotation at 90 degrees abduction (compare side to side)
(or at end-range of tolerable abduction; should also be done passively and with the scapula immobilized to screen for a glenohumeral internal rotation deficit – GIRD; side-side difference should be < 20 degrees)

Qualitative

Should be able to reach up behind the back to the T5-T10 spinous process
Painful mid-range arc of abduction
Painful terminal range arc of forward flexion
Scapular winging
Scapulothoracic dyskinesia, including substitution patterns
After 120 degrees of elevation, thoracic spine should extend to contribute to shoulder motion

Neurovascular Testing

Neurological testing includes a motor, sensory, reflex and vascular examination relevant to the regions. Adequate examination is predicated on an understanding of the regional peripheral and segmental anatomy. The physiatrist should understand the inter-relationship of the regional neuroanatomy to adjacent and distant musculoskeletal structures, adequately describe and document the findings, and understand the potential clinical relevance of any abnormal findings.

Motor

Deltoid (**C5-6**, axillary nerve)
Biceps (**C5-6**, musculocutaneous nerve)
Infraspinatus (**C5-6**, suprascapular nerve)
Supraspinatus (**C5-6**, suprascapular nerve)
Subscapularis (**C5-6**, upper and lower subscapular nerves)
Trapezius (spinal accessory nerve/cranial nerve XI)

Sensory

Segmental

Dermatomes or sensory points for C4-5 (see Cervical Spine Region list – page 2)

Peripheral

Axillary nerve innervation
Brachial plexus to upper limb as clinically indicated

Reflexes

Biceps (**C5-6**)
Brachioradialis (**C5-6**)
Pronator teres (C6-7)
Triceps (**C7-8**)

Vascular

Axillary and brachial pulses as appropriate
Observe for venous congestion (effort thrombosis, DVT)
Lymphedema

Special Testing

Special tests are used when appropriate to challenge musculoskeletal structures and assist in physical diagnosis. These tests are used when clinical circumstances suggest the presence of a specific injury or condition such as a ligamentous sprain, cartilage lesion, radiculopathy or neuropathy. As such, the physiatrist should recognize when special tests are indicated and demonstrate competency in the performance and interpretation of special tests within the clinical context. The physiatrist should adequately describe the results of the special test and appropriately document his or her findings.

Scapulothoracic articulation

Lateral scapular slide test
Differentiation of trapezial verses serratus winging
Serratus weakness – winging, manual muscle test, wall push-up, quadruped, or scapular pinch
Lower trapezius manual muscle test
Scapular pinch for scapular retractors

Acromioclavicular joint (ACJ) special tests

- Step off deformity
- Scarf sign/Horizontal adduction test (also with resisted horizontal abduction)
- O'Brien Test (with localization to the ACJ)

Tests for rotator cuff dysfunction

- Impingement signs
 - Neer's impingement sign
 - Hawkin's impingement sign
- Mid-range painful arc during abduction range of motion
- Empty can test (for pain provocation and weakness; to reduce pain, perform Full can test)
- Motor testing of cuff musculature (see Neurovascular Testing – page 6)

Laxity/Instability/Labrum

- Understand difference between laxity and instability
- Anterior apprehension and relocation test
- Posterior apprehension test
- Sulcus sign (inferior)
- Signs of hyperlaxity (generalized ligamentous laxity) syndrome
- Labral provocative maneuvers
 - O'Brien test (aka active compression rotation test)
 - Anterior slide test
 - Labral shear maneuver

Biceps tendon complex

- Speed's Test

Thoracic outlet syndrome provocation testing

- Roo's test
- Adson's test

Adjacent Body Regions

The physiatrist should recognize the inter-relationships of myofascial and neurological structures throughout the musculoskeletal system, as well as the potential for referred pain from adjacent body regions. As a rule, the physiatrist should exam the body regions above and below this region. Please refer to the appropriate list.

Functional Testing

As appropriate, the physiatrist should evaluate body region specific complaints in the context of integrated kinetic chain motion. Several Functional Tests have been described for this purpose. These are listed at the end of this document.

Elbow Region

Inspection

During the physical examination, the physiatrist should identify the items listed below. The physiatrist should adequately describe what he or she sees for the purposes of communication and documentation and also understand the potential clinical relevance of any abnormal findings.

- Carrying angle
- Cubitus Valgus (greater than 15 degrees or asymmetry)
- Cubitus Varus (less than 5 degrees or asymmetry)
- Swelling and ecchymosis
- Atrophy
- Skin lesions

Palpation

The physiatrist should palpate the following structures or areas for asymmetry, tenderness, and/or deformity. The physiatrist should adequately describe and document the findings, and also understand the potential relevance of any abnormal findings to the clinical case.

- Anterior
 - Biceps tendon
 - Brachial artery
 - Anterior joint and capsule
- Medial
 - Medial epicondyle
 - Common flexor muscle-tendon group
 - Medial collateral ligament complex
 - Ulnar nerve
 - Cubital tunnel
- Lateral
 - Lateral epicondyle
 - Common wrist extensor muscle-tendon group
 - Radiocapitellar joint
 - Radial head
- Posterior
 - Olecranon process
 - Olecranon bursa
 - Triceps muscle and tendon

Range of Motion (ROM)

The physiatrist should assess the active and passive ranges of motion listed below. For active ROM, the physiatrist should appropriately position the patient and provide the patient with adequate instruction to perform the motion. When passive motion is appropriate, the physiatrist should appropriately position the patient to complete the testing. The physiatrist should adequately describe and document the findings, and understand the potential clinical relevance of any abnormal findings.

Flexion	140-150 degrees
Extension	0–10 degrees
Pronation	80-90 degrees
Supination	80-90 degrees

Neurovascular Testing

Neurological testing includes a motor, sensory, reflex and vascular examination relevant to the regions. Adequate examination is predicated on an understanding of the regional peripheral and segmental anatomy. The physiatrist should understand the inter-relationship of the regional neuroanatomy to adjacent and distant musculoskeletal structures, be able to adequately describe and document the findings, and should also understand the potential relevance of any abnormal findings to the clinical case.

Motor

Flexion

Biceps brachii (**C5-6**, musculocutaneous nerve)
Brachialis (C5-6, musculocutaneous nerve)
Brachioradialis (C5-6, radial nerve)

Extension

Triceps (C6,7,8, radial nerve)

Supination

Biceps (**C5-6**, musculocutaneous nerve)
Supinator (**C5-6**, radial nerve[posterior interosseous nerve])

Pronation

Pronator teres (C6-7, median nerve)
Flexor carpi radialis (C6-7, median nerve)

Sensory

Segmental

C5	Lateral arm, just proximal to antecubital crease
C6	Lateral forearm, thumb, index finger
C7	Dorsal hand and forearm, index / middle / ring finger
C8	Ring and little finger, medial forearm
T1	Medial arm

Peripheral

Medial arm: medial brachial cutaneous nerve
Lateral forearm: lateral antebrachial cutaneous nerve (musculocutaneous nerve)
Medial forearm: medial antebrachial cutaneous nerve
Posterior forearm: posterior antebrachial cutaneous nerve (radial nerve)

Reflexes

Biceps (**C5-6**)
Brachioradialis (**C5-6**)
Pronator teres (C6-7)
Triceps (**C7-8**)

Vascular

Brachial artery pulse
Radial and ulnar pulses
Varicosities about the shoulder girdle and upper limb

Special Testing

Special tests are used when appropriate to challenge the musculoskeletal system and assist in physical diagnosis. These tests are used when clinical circumstances suggest the presence of a specific injury or condition such as a ligamentous sprain, cartilage lesion, radiculopathy or neuropathy. As such, the physiatrist should be able recognize when special tests are indicated and be able to demonstrate competency in the performance and interpretation of special tests within the clinical context. The physiatrist should be able to adequately describe the results of the special test and appropriately document his or her findings.

Ligamentous testing

Varus stress test
Valgus stress test, including Moving Valgus Stress Test

Provocative tests for lateral epicondylitis

Active resisted wrist extension with elbow extended (Cozen's test)
Passive wrist flexion and forearm pronation with elbow extended (Mill's test)
Active resisted third digit extension
Chair lift test (pinch lifting with extended elbow and pronated forearm)

Provocative tests for medial epicondylitis

Passive wrist extension and supination, with elbow extended

Special tests for neurological dysfunction

Tinel's sign at the ulnar groove/cubital tunnel

Elbow flexion test for ulnar neuritis

Elbow flexion for detection of ulnar nerve subluxation

Adjacent Body Regions

The physiatrist should recognize the inter-relationships of myofascial and neurological structures throughout the musculoskeletal system, as well as the potential for referred pain from adjacent body regions. As a rule, the physiatrist should exam the body regions above and below this region. Please refer to the appropriate list.

Functional Testing

As appropriate, the physiatrist should evaluate body region specific complaints in the context of integrated kinetic chain motion. Several Functional Tests have been described for this purpose. These are listed at the end of this document.

Wrist-Hand Region

Inspection

During the physical examination, the physiatrist should identify the items listed below. The physiatrist should adequately describe what he or she sees for the purposes of communication and documentation. The physiatrist should also understand the potential clinical relevance of any abnormal findings.

- Ecchymosis and edema
- Synovitis
- Lacerations
- Mallet deformity
- Swan neck deformity
- Boutonniere deformity
- Heberden's and Bouchard's nodes
- Ulnar drift of Rheumatoid arthritis
- Extensor tendon subluxation
- Dorsal subluxation of ulna
- Importance of comparing symmetry during inspection

Palpation

The physiatrist should palpate the following structures or areas for asymmetry, tenderness, and/or deformity. The physiatrist should adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings.

- Importance of comparing symmetry during palpation
- Anatomic snuff box – borders and contents (e.g., scaphoid)
- Ulnar snuffbox (area to palpate for triangular fibrocartilage complex - TFCC)
- Lunate (and area of scapholunate joint)
- Scaphoid tubercle
- Hook of hamate
- Pisiform (pisotriquetral joint)
- Distal radioulnar joint
- Metacarpophalangeal, proximal interphalangeal, and distal interphalangeal joints
 - Identification of effusions and synovitis
- Lister's tubercle
- Landmark for carpal tunnel injection
- Tendons
 - Flexor carpi ulnaris
 - Flexor carpi radialis
 - Palmaris longus (if present)
 - Tendons of all six dorsal (extensor) compartments
 - Identification of triggering of flexor tendons in distal palm

Range of Motion (ROM)

The physiatrist should assess the active and passive ranges of motion listed below. For active ROM, the physiatrist should appropriately position the patient and provide the patient with adequate instruction to perform the motion. When passive motion is appropriate, the physiatrist should appropriately position the patient in order to complete the testing. The physiatrist should adequately describe and document the findings, and also understand the potential clinical relevance of any abnormal findings.

Wrist flexion / extension	75–90 degrees
Radial deviation	15–25 degrees
Ulnar deviation	20–30 degrees
Finger flexor and extensor lags (in cm)	
Opposition lag (in cm)	
Normal finger alignment – with a closed hand all fingers point to pisiform	

Neurovascular Testing

Neurological testing includes a motor, sensory, reflex and vascular examination relevant to the regions. Adequate examination is predicated on an understanding of the regional peripheral and segmental anatomy. The physiatrist should understand the inter-relationship of the regional neuroanatomy to adjacent and distant musculoskeletal structures, be able to adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings.

Median Nerve

- Motor
 - Flexor digitorum profundus (C8-T1)
 - Flexor pollicis longus (C8-T1)
 - Abductor pollicis brevis (C8-T1)
- Sensory
 - Palmar radial 3 ½ digits

Radial Nerve

- Motor
 - Extensor indicis proprius (C8-T1)
- Sensory
 - Dorsal radial 3 ½ fingers (proximal to distal interphalangeal joints) (superficial radial nerve)

Ulnar Nerve

- Location in Guyon's canal
- Motor
 - First dorsal interosseus (C8-T1)
 - Abductor digiti minimi (C8-T1)
- Sensory
 - Palmar and dorsal ulnar 1 ½ fingers/hand
 - Dorsal ulnar cutaneous nerve innervation

Segmental Sensory Points (after ASIA; see also Cervical Spine Region list – page 2)

- C6 Volar thumb
- C7 Dorsal forearm, dorsal and volar index / middle / ring finger
- C8 Pinky/small finger

Vascular

- Radial and ulnar pulses
- Digit capillary refill
- Allen's test (for radial and ulnar flow)
- Venous congestion

Special Testing

Special tests are used when appropriate to challenge the musculoskeletal system and assist in physical diagnosis. These tests are used when clinical circumstances suggest the presence of a specific injury or condition such as a ligamentous sprain, cartilage lesion, radiculopathy, neuropathy, or vascular disorder. As such, the physiatrist should recognize when special tests are indicated and demonstrate competency in the performance and interpretation of special tests within the clinical context. The physiatrist should adequately describe the results of the special test and appropriately document his or her findings.

Carpal tunnel syndrome

- Phalen's test
- Carpal tunnel compression test
- Tinel's sign over the median nerve

Miscellaneous

- Finkelstein's test (DeQuervain's tenosynovitis)
- Tinel's sign over superficial radial nerve
- Froment's sign for ulnar neuropathy

Adjacent Body Regions

The physiatrist should recognize the inter-relationships of myofascial and neurological structures throughout the musculoskeletal system, as well as the potential for referred pain from adjacent body regions. As a rule, the physiatrist should exam the body regions above and below this region. Please refer to the appropriate list.

Functional Testing

As appropriate, the physiatrist should evaluate body region specific complaints in the context of integrated kinetic chain motion. Several Functional Tests have been described for this purpose. These are listed at the end of this document.

Lumbar Spine Region

Inspection

During the physical examination, the physiatrist should identify the items listed below. The physiatrist should adequately describe what he or she sees for the purposes of communication and documentation, and should also understand the potential clinical relevance of any abnormal findings.

- Lordosis
- Scoliosis
- Kyphosis
- Atrophy
- Lumbar shift (or list)
- Pelvic obliquity
- Anterior or posterior pelvic tilt
- Leg length discrepancy (true versus apparent or functional)
- Hair tuft on back
- Step-off deformity
- Vascular trophic changes in the lower limbs
- Antalgic gait
- Trendelenburg gait (compensated versus uncompensated)
- Foot slap or foot drop gait
- Spastic gait
- Circumducted gait

Palpation

The physiatrist should palpate the following structures or areas for asymmetry, tenderness, and/or deformity. The physiatrist should adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings.

- Lumbar spine
 - Spinous processes
 - Vertebral interspinous spaces
 - Lateral masses
 - Sacrum (including sacral base)
 - Paraspinal muscles (bulk and tone)
- Pelvis (note overlap with Pelvis-Hip Region)
 - Iliac crest
 - Ischial tuberosity
 - Sciatic notch (location of sciatic nerve in proximity to piriformis muscle)
 - Anterior superior iliac spines
 - Posterior superior iliac spines
 - Coccyx
 - Pubic symphysis
 - Sacral sulci
 - Greater trochanter

Range of Motion (ROM)

The physiatrist should assess the active and passive ranges of motion listed below. For active ROM, the physiatrist should appropriately position the patient and provide the patient with adequate instruction to perform the motion. When passive motion is appropriate, the physiatrist should appropriately position the patient in order to complete the testing. The physiatrist should adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings.

- Lumbar Spine
 - Quantitative
 - Understand the importance of symmetry where appropriate
 - Understand the potential importance of painful motion arcs
 - Stork test (aka Z-joint or posterior element loading maneuvers)

Assess flexion, extension, side bending (lateral flexion)
The Modified Schober test may be used to quantify flexion
Assess rotation (predominantly thoracolumbar)

Qualitative

Lumbopelvic rhythm
Extension with rotation (intended to load the posterior elements)

Hip

See Pelvis-Hip Region list (page 18)

Neurovascular Testing

Neurological testing includes a motor, sensory, reflex and vascular examination relevant to the regions. Adequate examination is predicated on an understanding of the regional peripheral and segmental anatomy. The physiatrist should understand the inter-relationship of the regional neuroanatomy to adjacent and distant musculoskeletal structures, adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings.

Motor

Manual muscle testing

L1,2,3	Hip flexion (iliopsoas muscle)
L2,3,4	Hip adduction (adductor muscle group)
L2,3,4	Knee extension (quadriceps muscle group)
L4-5	Ankle dorsiflexion (anterior tibialis muscle)
L5	Great toe dorsiflexion (extensor hallucis longus muscle)
L5-S1	Ankle inversion (posterior tibialis muscle)
L5-S1	Ankle eversion (peroneus longus muscle)
L5-S1	Hip abduction (gluteus medius muscle, gluteus minimus muscle, tensor fascia lata muscle)
L5-S1	Hip extension (gluteus maximus muscle, hamstring muscle group- hamstrings not S1 dominant as a group)
L5-S1	Knee flexion (hamstring muscle group)
S1-2	Ankle plantarflexion (gastrocnemius-soleus muscle group)

Functional muscle testing

Heel raises (number of times can rise onto toes)
Heel walking
Squats (arising from a chair)
Single leg squats
Trendelenburg sign

Sensory

Segmental: L1-S1 dermatomes/sensory points (after ASIA)

L1	Groin, upper thigh
L2	Mid-thigh
L3	Lower thigh
L4	Medial malleolus
L5	Great toe, in-step of foot
S1	Lateral foot
S2	Posterior knee
S3-5	Peri-anal

Peripheral

Femoral nerve innervation
Obturator nerve innervation
Saphenous nerve innervation
Sural nerve innervation
Peroneal nerve innervation
Tibial nerve innervation

Reflexes

- Muscle stretch reflexes
 - Patellar (L3-L4)
 - Medial hamstring (**L5-S1**)
 - Achilles (**S1-S2**)

Cutaneous

- Superficial abdominal (T7-L1 segmental)
- Beevor's sign (T5-L1 segmental)
- Cremasteric (L1-L2)
- Anal wink (S3-S5)

Upper motor neuron signs

- Babinski response
- Ankle clonus
- Spasticity

Vascular

- Pulsatile abdominal masses (aneurysm)
- Femoral pulse and bruits
- Pedal pulses
 - Dorsalis pedis
 - Tibialis posterior
- Capillary refill

Special Testing

Special tests are used when appropriate to challenge the musculoskeletal system and assist in physical diagnosis. These tests are used when clinical circumstances suggest the presence of a specific injury or condition such as a ligamentous sprain, cartilage lesion, radiculopathy, neuropathy, or vascular disorder. As such, the physiatrist should recognize when special tests are indicated and demonstrate competency in the performance and interpretation of special tests within the clinical context. The physiatrist should adequately describe the results of the special test and appropriately document his or her findings.

Spine motion testing

- Modified Schober test

Neurodynamic testing

- Sitting slump test (*with relief-type maneuvers, i.e., head/neck extension*)
- Straight leg raise test
- Crossed straight leg raise
- Bowstring test
- Prone knee bending test (also called Nachla's test, reverse straight leg raise, or femoral nerve stretch test)

Tests for sacroiliac joint pathology (more SI Joint tests in Pelvis-Hip section of this document)

- Patrick's test (aka FABERE (flexion-abduction-external rotation-and extension) test or figure four test)
- Gaenslen's test

Tests for leg length discrepancy

- "True" leg length measurement
- Standing (functional) leg length

Non-physiologic testing

- Hoover test
- Waddell signs
 - Superficial or wide-spread pain
 - Simulation testing
 - Distraction test

Regional disturbances—give way weakness, non-anatomic sensory changes
Overreaction

Adjacent Body Regions

The physiatrist should recognize the inter-relationships of myofascial and neurological structures throughout the musculoskeletal system, as well as the potential for referred pain from adjacent body regions. As a rule, the physiatrist should exam the body regions above and below this region. Please refer to the appropriate list.

Functional Testing

As appropriate, the physiatrist should evaluate body region specific complaints in the context of integrated kinetic chain motion. Several Functional Tests have been described for this purpose. These are listed at the end of this document.

Pelvis-Hip Region

Inspection

During the physical examination, the physiatrist should identify the items listed below. The physiatrist should adequately describe what he or she sees for the purposes of communication and documentation, and should also understand the potential clinical relevance of any abnormal findings.

- Atrophy or fasciculations in muscle structures
- Trendelenberg gait (compensated and uncompensated)
- Antalgic gait
- Level of iliac crests (pelvic obliquity)
- Level of anterior superior iliac spines (ASIS)
- Level of posterior superior iliac spines (PSIS)
- Anterior and posterior pelvic tilt
- Level of gluteal folds
- Level of ischial tuberosities
- Level of popliteal creases

Foot pronated or supinated statically and dynamically (see also Ankle-Foot Region list – page 24)

- In-toeing or out-toeing and possible causes
 - Femoral version
 - Muscle imbalance
 - Tibial torsion

Palpation

The physiatrist should palpate the following structures or areas for asymmetry, tenderness, and/or deformity. The physiatrist should adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings.

- Iliac crests
- Anterior superior iliac spines (ASIS)
- Symphysis pubis
- Adductor muscle group, particularly adductor longus muscle tendon
- Greater trochanter
- Hip joint location
- Tendon of iliopsoas muscle in vicinity of hip joint
- Inguinal ligament
- Femoral triangle, including femoral artery and proximity to femoral nerve
 - Inguinal lymph nodes
 - Hernia
- Tensor fascia lata muscle
- Sartorius muscle
- Gluteus medius muscle
- Gluteus maximus muscle
- Piriformis muscle
- Area of sciatic nerve in vicinity of piriformis muscle
- Posterior superior iliac spines (PSIS)
- Ischial tuberosities
- Hamstring tendons
- Sacrum, sacral sulcus, and posterior sacroiliac ligaments (over sacroiliac joint)
- Sacral foramen
- Coccyx

Range of Motion (ROM)

The physiatrist should assess the active and passive ranges of motion listed below. For active ROM, the physiatrist should appropriately position the patient and provide the patient with adequate instruction to perform the motion. When passive motion is appropriate, the physiatrist should appropriately position the patient in order to complete the testing. The physiatrist should be able to adequately describe and document the findings, and also understand the potential clinical relevance of any abnormal findings.

Lumbar spine motions
See Lumbar Spine Region list (page 14)

Hip joint
Understand the importance of symmetry
Understand the potential importance of painful motion arcs
Assess flexion, extension, abduction, adduction, lateral (external) rotation, and medial (internal) rotation

Neurovascular Testing

Neurological testing includes a motor, sensory, reflex and vascular examination relevant to the regions. Adequate examination is predicated on an understanding of the regional peripheral and segmental anatomy. The physiatrist should understand the inter-relationship of the regional neuroanatomy to adjacent and distant musculoskeletal structures, adequately describe and document the findings, and also understand the potential clinical relevance of any abnormal findings.

Motor

L1,2,3	Hip flexion (iliopsoas muscle)
L2,3,4	Hip adduction (adductor muscle group)
L2,3,4	Knee extension (quadriceps muscle group)
L5-S1	Hip abduction (gluteus medius muscle, tensor fascia lata muscle)
L5-S1	Hip extension (gluteus maximus muscle, hamstring muscle group- hamstrings not S1 dominant as a group)
L5-S1	Knee flexion (hamstring muscle group)

Sensory

Dermatomal or sensory point testing for T11-L3, S2-S4
Segmental
Anterior femoral cutaneous nerve innervation
Lateral femoral cutaneous nerve innervation
Ilioinguinal nerve innervation
Genitofemoral nerve innervation
Obturator nerve innervation
Posterior femoral cutaneous nerve innervation

Reflexes

Not applicable

Vascular

Femoral pulse, including palpation for aneurysm and bruits
Distal vascular exam as indicated (edema, venous stasis)

Special Testing

Special tests are used when appropriate to challenge the musculoskeletal system and assist in physical diagnosis. These tests are used when clinical circumstances suggest the presence of a specific injury or condition such as a ligamentous sprain, cartilage lesion, radiculopathy, neuropathy or vascular condition. As such, the physiatrist should recognize when special tests are indicated and demonstrate competency in the performance and interpretation of special tests within the clinical context. The physiatrist should adequately describe the results of the special test and appropriately document his or her findings. The physiatrist should keep in mind that the special tests may lack evidence based reliability and validity testing.

Tests for muscle tightness or pathology in lumbopelvic region
Modified Thomas test (Rectus Femoris contracture test)
Iliopsoas muscle
Rectus femoris muscle
Ely's test
Ober's test
Piriformis test
Popliteal angle measurement

Tests for regional neurological involvement

- Straight leg raise

- Prone knee bending test (also called Nachlas test, reverse straight leg raise, or femoral nerve stretch test)

Tests for intra- or peri-articular hip joint pathology

- FABERE test (aka flexion-abduction-external rotation and extension test, Patrick's test, or figure four test)

- Stinchfield test (examiner resists hip flexion at 20-30 degrees flexion with patient in a supine position)

- Quadrant (hip scouring) test

- Axial hip distraction

Tests for sacroiliac joint involvement

- SI Compression

- SI gapping or distraction

- Gaenslen's test

- FABERE test (aka flexion-abduction-external rotation-and extension test, Patrick's test, or figure four test)

- Gillet

- Sitting flexion test

- Standing flexion test

- Shear test

- Palpation

Tests for leg length discrepancy

- "True" leg length measurement (direct tape measurement method)

 - ASIS to MM or LM of the tibia

 - Umbilicus or xiphisternum to MM of the tibia

- Standing (functional) leg length (indirect method)

 - Iliac crest palpitation with use of lift blocks or book correction

Miscellaneous tests

- Fulcrum test (for femoral stress fracture)

- Hop test (single leg or double leg, e.g., for stress fracture)

Adjacent Body Regions

The physiatrist should recognize the inter-relationships of myofascial and neurological structures throughout the musculoskeletal system, as well as the potential for referred pain from adjacent body regions. As a rule, the physiatrist should exam the body regions above and below this region. Please refer to the appropriate list.

Functional Testing

As appropriate, the physiatrist should evaluate body region specific complaints in the context of integrated kinetic chain motion. Several Functional Tests have been described for this purpose. These are listed at the end of this document.

Knee Region

Inspection

During the physical examination, the physiatrist should identify the items listed below. The physiatrist should adequately describe what he or she sees for the purposes of communication and documentation. The physiatrist should understand the potential clinical relevance of any abnormal findings.

- Genu varum
- Genu valgum
- Genu recurvatum
- Evidence of trauma
- Scars
- Abrasions and laceration
- Ecchymosis
- Edema or effusion
- Deformity of patella, femur or tibia
- Gait for symmetry or antalgia
- Posterolateral thrust
- Ankle-Foot pronation
- Ankle-Foot supination
- Pes planus and pes cavus
- Calcaneovalgus
- Squat and rise
- Squinting patella and grasshopper patella (sign)

Palpation

The physiatrist should palpate the following structures or areas for asymmetry, tenderness, and/or deformity. The physiatrist should adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings. The physiatrist should note that some of these structures are not directly palpable, but one can palpate in the region of these structures.

- Quadriceps tendon
- Vastus medialis
- Adductor tubercle
- Medial patellofemoral retinaculum
- Medial patellar facet
- Medial plica
- Medial femoral condyle
- Lateral patellofemoral articulation
- Lateral patellar facet
- Lateral femoral condyle
- Infrapatellar fat pad
- Prepatellar bursa
- Patellar tendon
- Tibial tubercle
- Tibial plateaus
- Medial collateral ligament
- Tibiofemoral joint line
- Fibular head
- Iliotibial band
- Gerdy's tubercle
- Hamstring tendons
- Gastrocnemius-soleus muscle
- Popliteal fossa
- Popliteal (or Baker's) Cyst
- Popliteal tendon insertion region
- Important bursa: suprapatellar, prepatellar, infrapatellar, pes anserine
- Important neural structures: common peroneal nerve at fibular head, tibial nerve in the popliteal fossa, saphenous nerve at medial knee

Range of Motion (ROM)

The physiatrist should assess the active and passive ranges of motion listed below. For active ROM, the physiatrist should appropriately position the patient and provide the patient with adequate instruction to perform the motion. When passive motion is appropriate, the physiatrist should appropriately position the patient in order to complete the testing. The physiatrist should adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings.

Knee Flexion	135 degrees
Knee Extension	0–15 degrees

Neurovascular Testing

Neurological testing includes a motor, sensory, reflex and vascular examination relevant to the regions. Adequate examination is predicated on an understanding of the regional peripheral and segmental anatomy. The physiatrist should understand the inter-relationship of the regional neuroanatomy to adjacent and distant musculoskeletal structures, adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings.

Motor

L1,2,3	Hip flexion (iliopsoas muscle)
L2,3,4	Hip adduction (adductor muscle group)
L2,3,4	Knee extension (quadriceps muscle group)
L4-5	Ankle dorsiflexion (anterior tibialis muscle)
L5	Great toe dorsiflexion (extensor hallucis longus muscle)
L5-S1	Ankle inversion (posterior tibialis muscle)
L5-S1	Ankle eversion (peroneus longus muscle)
L5-S1	Knee flexion (hamstring muscle group)
S1-2	Ankle plantarflexion (gastrocnemius-soleus muscle)

Sensory

Segmental

Dermatomes or sensory points for L1-S2

Peripheral

Obturator nerve innervation
Saphenous nerve innervation
Superficial and deep peroneal nerve innervation
Anterior femoral cutaneous nerve innervation
Lateral femoral cutaneous nerve innervation
Posterior femoral cutaneous nerve innervation

Reflexes

Adductor (L2,3,4)
Patellar (L3-4)
Medial hamstring, tibialis posterior (L5-S1)
Achilles (S1-2)

Vascular

Popliteal artery palpation, including assessment for aneurysm
Regional vasomotor or sudomotor changes
Distal exam as indicated (edema, venous stasis)

Special Testing

Special tests are used when appropriate to challenge the musculoskeletal system and assist in physical diagnosis. These tests are used when clinical circumstances suggest the presence of a specific injury or condition such as a ligamentous sprain, cartilage lesion, radiculopathy or neuropathy. As such, the physiatrist should recognize when special tests are indicated and demonstrate competency in the performance and interpretation of special tests within the clinical context. The physiatrist should adequately describe the results of the special test and appropriately document his or her findings.

Muscle length-tension testing

- Modified Thomas test
- Popliteal angle
- Ely's test
- Ober's test
- Gastrocnemius and Soleus

Effusion

- Patellar ballotement
- Bulge sign

Patellofemoral Joint

- Vastus medialis activation
- Medial and lateral patellar glides
- Passive patellar tilt test (PPTT)
- Patellar grind (Clark sign)
- Patellar apprehension (Fairbank's sign)

Medial and lateral collateral ligaments (at 0 and 30 degrees of knee flexion)

- Valgus stress test
- Varus stress test

Anterior cruciate ligament

- Anterior drawer
- Lachman test
- Pivot shift

Posterior cruciate ligament

- Sag sign
- Posterior drawer

Meniscal provocation tests

- Hyperflexion test/squat test (Childress' test)
- Bounce test
- McMurray's test

Distal iliotibial band syndrome

- Noble's compression test

Special neurological tests

- Babinski response
- Femoral nerve stretch test (also known as prone knee bend, reverse straight leg raise, or Nachlas' test)
- Straight leg raise
- Slump test
- See Lumbar Spine Region list (page 14) for more

Miscellaneous

- Hop Test (single leg or double leg, e.g., for stress fracture)

Adjacent Body Regions

The physiatrist should recognize the inter-relationships of myofascial and neurological structures throughout the musculoskeletal system, as well as the potential for referred pain from adjacent body regions. As a rule, the physiatrist should exam the body regions above and below this region. Please refer to the appropriate list.

Functional Testing

As appropriate, the physiatrist should evaluate body region specific complaints in the context of integrated kinetic chain motion. Several Functional Tests have been described for this purpose. These are listed at the end of this document.

Ankle-Foot Region

Inspection

During the physical examination, the physiatrist should identify the items listed below. The physiatrist should adequately describe what he or she sees for the purposes of communication and documentation. The physiatrist should also understand the potential clinical relevance of any abnormal findings.

- Antalgic gait
- Swelling (focal or diffuse)
- Foot type
 - Neutral
 - Pes cavus
 - Pes planus
- Deformity
 - Hallux valgus
 - Tailor's bunion
 - Hammer toe
 - Claw toe
 - Mallet toe
 - "Too many toes sign" (excessive pronation; viewed from behind)
- Callus pattern
- Skin lesions (blisters, ulcers, warts, fungus)
- Subungual hematoma

Palpation

The physiatrist should palpate the following structures or areas for asymmetry, tenderness, and/or deformity. The physiatrist should adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings. The physiatrist should understand that some of these structures are not directly palpable, but one may palpate in the region of these structures for the purpose of diagnosis.

- Bony structures
 - Lateral malleolus
 - Medial malleolus
 - Calcaneus
 - Medial calcaneal tubercle
 - Insertion of Achilles tendon on posterosuperior calcaneus
 - Talar dome
 - Navicular bone and tuberosity
 - Cuboid bone region
 - Medial cuneiform
 - Metatarsal shafts, heads, and bases
 - Base of the fifth metatarsal and tuberosity
 - Proximal fibula and fibular head
- Ligamentous and articular structures
 - Anterior talofibular ligament
 - Posterior talofibular ligament
 - Calcaneofibular ligament
 - Deltoid ligament complex
 - Anterior talocrural joint / anterior distal tibiofibular ligament
 - Talonavicular joint
 - Calcaneocuboid joint
 - 1st metatarsophalangeal joint capsule
- Muscle-tendon units and insertions
 - Peroneus brevis and longus
 - Anterior tibialis
 - Posterior tibialis
 - Flexor hallucis longus
 - Flexor digitorum longus

Gastrocnemius-soleus muscle and Achilles tendon
 Extensor digitorum brevis
 Extensor digitorum longus

Miscellaneous structures

Plantar fascia
 Calcaneal fat pad
 Retrocalcaneal bursa
 Superficial peroneal nerve
 Tibial nerve (tarsal tunnel)
 Dorsalis pedis and posterior tibialis pulses
 Sinus tarsi

Range of Motion (ROM)

The physiatrist should assess the active and passive ranges of motion listed below. For active ROM, the physiatrist should appropriately position the patient and provide the patient with adequate instruction to perform the motion. When passive motion is appropriate, the physiatrist should appropriately position the patient in order to complete the testing. The physiatrist should adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings.

Ankle dorsiflexion	
Knee straight	20 degrees
Knee flexed	20 degrees
Ankle plantarflexion	50 degrees
1 st metatarsophalangeal joint	
Dorsiflexion	60–90 degrees
Plantarflexion	45 degrees
Foot inversion and eversion	(qualitative)

Neurovascular Testing

Neurological testing includes a motor, sensory, reflex, and vascular examination relevant to the regions. Adequate examination is predicated on an understanding of the regional peripheral and segmental anatomy. The physiatrist should understand the inter-relationship of the regional neuroanatomy to adjacent and distant musculoskeletal structures, adequately describe and document the findings, and should also understand the potential clinical relevance of any abnormal findings.

Motor

L4-5	Ankle dorsiflexion (anterior tibialis muscle)
L5	Great toe dorsiflexion (extensor hallucis longus muscle)
L5-S1	Ankle inversion (posterior tibialis muscle)
L5-S1	Ankle eversion (peroneus longus muscle)
S1-2	Ankle plantarflexion (gastrocnemius-soleus muscle)

Sensory

Segmental

Dermatomes or sensory points for L4-S2

Peripheral

Saphenous nerve innervation
 Sural nerve innervation
 Superficial peroneal nerve innervation
 Deep peroneal nerve innervation
 Tibial nerve innervation
 Medial calcaneal nerve innervation
 Medial and lateral plantar nerve innervation

Reflexes

Posterior tibialis (**L5-S1**)
 Achilles (**S1-2**)
 Babinski response

Vascular

- Dorsalis pedis (anterior tibial) pulse
- Posterior tibial pulse
- Capillary refill
- Venous varicosities
- Lymphedema

Special Testing

Special tests are used when appropriate to challenge the musculoskeletal system and assist in physical diagnosis. These tests are used when clinical circumstances suggest the presence of a specific injury or condition such as a ligamentous sprain, cartilage lesion, radiculopathy, neuropathy, or vascular disorder. As such, the physiatrist should recognize when special tests are indicated and demonstrate competency in the performance and interpretation of special tests within the clinical context. The physiatrist should adequately describe the results of the special test and appropriately document his or her findings.

Leg/Foot alignment (with subtalar joint in neutral position)

- Lower leg/rearfoot
- Forefoot/rearfoot
- First ray position

Ligamentous stability

- Anterior drawer
- Inversion stress tests (aka talar tilt)
- Squeeze test for syndesmosis
- External rotation stress test for syndesmosis

Miscellaneous tests

- Thompson's test (for Achilles tendon)
- Metatarsal head medial-lateral compression (Morton's neuroma)
- Tinel's sign over peripheral nerves
- Peroneal tendon subluxation provocation

Shoe inspection

- Wear pattern (outsole)
- Midsole deformity
- Breakdown in the upper

Adjacent Body Regions

The physiatrist should recognize the inter-relationships of myofascial and neurological structures throughout the musculoskeletal system, as well as the potential for referred pain from adjacent body regions. As a rule, the physiatrist should exam the body regions above and below this region. Please refer to the appropriate list.

Functional Testing

As appropriate, the physiatrist should evaluate body region specific complaints in the context of integrated kinetic chain motion. Several Functional Tests have been described for this purpose. These are listed at the end of this document.

Functional Tests

Functional testing provides an opportunity to assess multiple joint and muscle motions in an integrated pattern. The physiatrist may choose functional tests based upon the patient's complaints and activity demands, as well as the specific goals of the physiatric evaluation. Consequently, functional test movements may include activities of daily living (i.e., dressing, ambulation), work related motions (i.e. lifting or pushing) or sports specific activities (i.e., running, throwing a baseball). The following tests represent some of the more common functional tests that have been utilized by physiatrists in the clinical setting. The list is not comprehensive as an unlimited number of functional tests are possible by combining different starting positions, motions, movement speeds, resistance, and environmental conditions. Although roughly divided into upper body and lower body regions for descriptive purposes, by nature these functional motions involve virtually all aspects of the kinetic chain.

Upper Body Region

- Donning / Doffing a shirt
- Reaching forward, overhead and behind one's back
- Bring hand to mouth
- Sitting push-up/press up
- Wall push up
- Opening / Closing a door handle
- Grips (power grip, precision grip [chuck pinch, lateral key pinch, tip pinch])
- Throwing or catching a baseball / football or medicine ball
- Swinging a tennis racket / golf club
- Striking a volleyball

Lower Extremity Region

- Donning / Doffing pants
- Biomechanical correct squat
- Perform a plank or bridge exercise
- Lifting objects off of floor/ table / shelf
- Descending and Ascending stairs
- Gait Analysis including speed
- Chair Stand (single or multiple)
- Timed Up and Go (Rise from chair, walk and return)*
- Short Physical Performance Battery (Gait speed, chair rise, and standing balance)*
- Proprioception / Neuromuscular control
 - Single leg stance eyes open
 - Single leg stance eyes closed
 - Single leg squat, including stepdown
 - Single leg toe raise
- Hop test (single leg or double leg) for distance
- Single leg hop in multiple directions
- Backwards walking/running
- Carioca
- Running in a straight line
- Running and cutting maneuvers, including figure 8s
- Vertical jump
- Kicking a soccer ball / football

*Validated for the geriatric population

References

1. Guralnik JM, et al. A short physical performance battery assessing lower extremity function: Association with self-reported disability and prediction of mortality and nursing home placement. J Gerontol 1994; 49:M85-M94.
2. Complete information about the Short Physical Performance Battery (SPPB), including the testing protocol and scoring sheet, is included in a CD that may be obtained from the National Institute on Aging by contacting Joyce Simms at simmsj@nia.nih.gov.
3. Podsiadlo D, et al. The "Timed Up & Go": a test of basic functional mobility for frail elderly persons. J Am Geriatr Soc 1991; 39:142-48.
4. Tinetti ME. Preventing falls in elderly persons. N Engl J Med 2003; 348:42-9.