

# **Functional Medicine University's Functional Diagnostic Medicine Training Program**

## **Module 1 \* Lesson 6**

### **Physical Exam & Associated Pathology Part I: General Survey & Vitals**

By Wayne L. Sodano, D.C., D.A.B.C.I., & Ron Grisanti, D.C., D.A.B.C.O., M.S.  
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## **The Comprehensive Physical Exam**

Most patients view the physical examination with some anxiety and feel vulnerable, yet they will appreciate your concern about their problem. With this in mind, it is important to have a systematic approach, examining each region of the body while sensing cues from the patient. A 'talking' exam; explaining what you are doing throughout the exam, helps to calm them.

### **Equipment for the Physical Exam**

- An ophthalmoscope and otoscope
- Penlight
- Tongue depressors
- A ruler and flexible tape measure, preferably marked in centimeters
- Thermometer
- A watch with a second hand
- A sphygmomanometer
- A stethoscope with the following characteristics:
  - Ear tips that fit snugly
  - Thick walled tubing as short as feasible to maximize the transmission of sound. (approx 30 cm (12"), if possible, and no longer than 38 cm (15"))
  - A bell and a diaphragm with a good changeover mechanism
- Gloves and lubricant for oral, vaginal, and rectal examinations
- Vaginal specula and equipment for cytological and bacteriological study
- A reflex hammer
- Tuning forks (one of 128 Hz and one of 512 Hz)
- Disposable objects for testing two-point discrimination
- Cotton for testing the sense of light touch
- Two test tubes (optional) for testing temperature sensation

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### **Techniques of Examination**

- Inspection
- Palpation
- Percussion
- Auscultation

### **Standard and Universal Precautions**

The Centers for Disease Control and Prevention (CDC) have issued several guidelines to protect patients and examiners from the spread of infectious disease. Standard precautions combine the major features of Universal Precautions and Body Substance Isolation and are based on the principal that all blood, body fluids, secretions, excretions, except sweat, non-intact skin, and mucous membranes may contain transmissible infectious agents.

Be sure that you have a copy of the Standard and Universal Precautions posted for employees and patients.

### **Principles of Test Selection and Use**

**Sensitivity:** The sensitivity of a test identifies the proportion of the population who test positive for a particular condition. The higher the percentage on a test result, the lower number of false negatives. 90% or greater is considered optimal.

**Specificity:** The specificity of a test identifies the proportion of the population who test negative for a particular condition. The higher the percentage on a test result, the lower number of false positives. 90% or greater is considered optimal.

### **Overview: The Physical Examination**

- General Survey
- Vital Signs
- Skin
- Head, Eyes, Ears, Nose, Throat (HEENT):
- Respiratory System
- Breast Examination
- Cardiovascular System
- Abdominal
- Nervous System
- Additional Examinations
  - Rectal Examination for men
  - Genital and Rectal Examination

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**Signs of Nutritional Deficiency & Excess**

System	Sign	Nutrient Deficiency/Excess ( <i>toxicities</i> )
Mouth	Glossitis	Riboflavin, niacin, biotin, vitamin B <sub>6</sub> , vitamin B <sub>12</sub> , folate, iron, zinc
	Angular stomatis, Cheilosis	Riboflavin, niacin, biotin, vitamin B <sub>6</sub> , iron
	Gingivitis and gingival bleeding	Vitamin C
	Parotid hyperplasia, dental erosions	Bulimia nervosa
Eyes	Xerophthalmia; night blindness, photophobia, xerosis, Bitot's spots, corneal ulceration	Vitamin A
	Diplopia	<b><i>Vitamin A toxicity</i></b>
	Nystagmus, deficit of lateral gaze	Thiamin
	Optic nerve atrophy; blindness	Vitamin B <sub>12</sub>
	Retinitis pigmentosa, visual deficits	Vitamin E
	Kayser-Fleischer ring, sunflower cataract	<b><i>Copper Toxicity</i></b>
	Discoloration, dullness, easily pulled out	Protein-energy malnutrition
	Alolpecia	Biotin deficiency; <b><i>Vitamin A toxicity</i></b>
Nails	Discolored or thickened	<b><i>Selenium toxicity</i></b>
	Spoon shaped (Koilonychia)	Iron
Skin	Seborrheic dermatitis	Vitamin B <sub>6</sub> , Zinc
	Slow healing wounds	Vitamin C, Zinc
	Erythematous or scaly rash	Niacin
	Perifollicular petechiae, hemorrhage	Vitamin C
	Easily bruised	Vitamin K
	Dry, flaky skin	Essential Fatty Acid
	Depigmentation	Protein-energy malnutrition
	Yellowish or orange discoloration	<b><i>Carotinoid excess</i></b>
	Anemic pallor	Vitamin B <sub>12</sub> , iron, folate
	Rapid heart rate, congestive heart failure	Thiamin
Cardiovascular	Heart failure, cardiomyopathy	Selenium
Gastrointestinal	Stomatitis, esophagitis, stomatitis	Niacin
Musculoskeletal	Proximal or generalized weakness, bone tenderness	Vitamin D
	Weakness	Hypophosphatemia, hypokalemia, protein energy malnutrition, hypomagnesemia
	Caropedal spasm	Hypocalcemia
	Muscle wasting	Protein-energy malnutrition
	Sensory neuropathy	Vitamin B <sub>12</sub>
Neurologic	Peripheral neuropathy	Vitamin B <sub>6</sub> , E, thiamin; excess of vitamin B <sub>6</sub>
	Delirium, changes in mental state	Thiamin, vitamin B <sub>6</sub> , B <sub>12</sub> , niacin, biotin, hypophosphatemia, hypermagnasemia
	Dementia	B <sub>12</sub> , thiamin, niacin

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**General Survey, Vital Signs**

- General Survey
  - *The general survey begins with the moment you meet the patient.*
- Vital Signs
  - Blood pressure, heart rate, respiratory rate, and temperature

**Signs and Symptoms**

- Changes in weight
- Fatigue and weakness
- Fever, chills, night sweats
- Pain
  - Changes in weight
    - *Weight gain:* increased body fat and fluid retention.
    - *Weight loss:* diabetes mellitus, hyperthyroidism, adrenal insufficiency, chronic infections; malignancy depression, anorexia nervosa or bulimia, malabsorption.
    - *Rapid changes in weight:* suggests a change in body fluids, not tissue.
  - Fatigue and Weakness
    - *Fatigue* is a non-specific symptom and can have a number of causes (heart, lung, and liver disorders, and nutritional deficiencies, endocrine disorders, cancers, and medications).
    - *Weakness* suggests a loss of muscle mass (muscle wasting diseases, lack of exercise).
  - Fever, Chills, and Night Sweats
    - Recurrent shaking chills suggest infection.
    - Feelings of heat and sweating are also a symptom of menopause. Night sweats can occur in tuberculosis and cancer

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**General Survey**

- Apparent State of Health
  - Acutely or chronically ill, or frail
  - Healthy
- Level of Consciousness
  - Is the patient awake, alert, and responsive ?
- Signs of Distress
  - Heart or respiratory distress
  - Is the patient in pain?
  - Anxiety or depression
- Skin Color and Lesions
- Personal Hygiene
- Body and Breath Odors
  - Breath odors: gastrointestinal disorders, infections, and diabetes
- Posture and Gait
  - Tremors or other involuntary movements; paralyses
  - Proprioception
- Height
  - The patient's height is to be measured with shoes off
  - Height loss: disc degeneration, osteoporosis and vertebral compression fractures.
- Weight
  - Truncal obesity suggests metabolic syndrome and/or Cushing's disease (apple vs. pear shape)

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### Calculating the BMI

Methods to Calculate Body Mass Index (BMI)	
Unit of Measure	Method of Calculation
Weight in pounds, height in inches	(1) Body Mass Index Chart (2) $\left[ \frac{\text{Weight (lbs)} \times 700}{\text{Height (inches)}^2} \right]$
Weight in kilograms, height in meters squared	(3) $\frac{\text{Weight (kg)}}{\text{Height (m}^2\text{)}}$
Either	(4) "BMI Calculator" at web site <a href="http://www.nhlbisupport.com/bmi/bmicalc.htm">www.nhlbisupport.com/bmi/bmicalc.htm</a>

A Body Mass Index Table is an important tool in the evaluation and treatment of overweight and obesity, and may be obtained at: [www.nhlbi.nih.gov/guidelines/obesity/bmi\\_tbl.pdf](http://www.nhlbi.nih.gov/guidelines/obesity/bmi_tbl.pdf)

*Note:* There are separate BMI's available for adults and children.

Classification of Overweight and Obesity by BMI		
	Obesity Class	BMI (kg/m <sup>2</sup> )
Underweight		< 18.5
Normal		18.5 – 24.9
Overweight		25.0 – 29.9
Obesity	I	30.0 – 34.9
	II	35.0 – 39.9
Extreme obesity	III	≥ 40

### Waist to Hip Ratio

- Is a marker for measuring body composition (Waist circumference divided by the hip circumference)
- Normal values:
  - Pre-puberty male and female < 1.0
  - Post puberty female < .8
  - Post puberty male < 1.0

### BIA (Bioelectrical Impedance Analysis)

- Assessing body composition by evaluating the differences in electrical conductivity of fat-free mass and fat.
- Standardized procedures must be used to obtain BIA measurements which include hydration status, food consumption, menstrual status, body position, recent physical activity, and room temperature.



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## **Blood Pressure**

- Selecting the correct blood pressure cuff
  - Width of the inflatable bladder of the cuff should be about 40% of upper arm circumference (about 12-14 cm in the average adult). For the obese arm, it is important to use a wide cuff (15 cm). If the arm circumference exceeds 41 cm, use a thigh cuff (18 cm wide).
  - For the very thin arm a pediatric cuff may be indicated
  - Length of inflatable bladder should be about 80% of upper arm circumference (almost long enough to encircle the arm)
  - *Note:* Make sure your instrument is properly calibrated – check manufacturer recommendation
- Getting Ready to Measure Blood Pressure
  - Patient should avoid smoking or drinking caffeinated beverages for 30 minutes before blood pressure is taken and should rest for at least 5 minutes prior to taking the pressure.
  - The examining room should be quiet and warm.
  - Be sure the patient's arm is free of clothing. Check the arm for lymphedema (commonly seen after axillary node dissection or radiation therapy)
  - Position the arm so that the brachial artery at the elbow is at heart-level.
  - If the brachial artery is much below heart level, the blood pressure will appear falsely high. Do not allow the patient to support their own arm which may raise the blood pressure.
  - Make sure the cuff is tightly fitted on the patient's arm and in good condition.
  - The lower border of the cuff should be about 1 inch above the antecubital fossa and centered over the brachial artery.
  - To determine how high to raise the cuff pressure, first estimate the systolic pressure by palpation
    - Use radial pulse
    - Inflate until it disappears
    - Read the pressure – deflate promptly
  - Add 30 mmHg to pressure reading (this avoids an auscultatory gap)
  - Pressure difference of more than 10-15 mmHg suggests arterial compression or obstruction on the side with the lower pressure.

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- Auscultatory Gap
  - Refers to the time in which sound is not heard when measuring the blood pressure, commonly occurring in hypertension and in aortic stenosis.
  
- Take the Reading
  - Place stethoscope over the brachial artery
  - Inflate cuff to determine level
  - Slowly deflate at a rate of 2-3 mmHg per second
  - Note the level at which you hear two consecutive beats (systolic pressure)
  - Continue to lower pressure until the sounds become muffled, then disappears
  - The disappearance point, which is usually only a few mmHg below the muffling point, enables the best estimate of true diastolic pressure in adults
  - In some people, the muffling point and the disappearance point are farther apart. Occasionally, as in aortic regurgitation, the sounds never disappear. If there is more than 10 mm Hg difference, record both figures.
  - Blood pressure should be taken in both arms at least once. Normally, there may be a difference in pressure of 5 mmHg and sometimes up to 10 mmHg. Subsequent readings should be made on the arm with the higher pressure.
  - Pressure difference of more than 10-15 mmHg suggests arterial compression or obstruction on the side with the lower pressure.
  
- Subclavian Steal Syndrome
  - Refers to retrograde flow in the vertebral artery due to an ipsilateral subclavian artery stenosis
  - The subclavian artery stenosis results in lower pressure in the distal subclavian artery. As a result, blood flows from the contralateral vertebral artery to the basilar artery, and then in a retrograde direction down the ipsilateral vertebral artery, away from the brain stem. Reversed vertebral artery flow, although it may have deleterious neurologic effects, serves as an important collateral artery for the arm in the setting of a significant stenosis or occlusion of the subclavian artery.
  - Most common cause is atherosclerosis
  - More common on the left side
  - Other causes
    - Cervical rib
    - Takayasu arteritis (rare vasculitis/damages aorta unknown cause)
    - Thoracic outlet

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- Subclavian Steal Syndrome (con't)
  - Signs and symptoms
    - Presyncope (dizziness)
    - Syncope
    - Neurologic deficits
    - Blood pressure differential between the arms
  - Differential diagnosis
    - Stroke
  - Diagnostic tests
    - Doppler ultrasound
    - CT angiography
    - Angiogram
- Leg Pulses and Pressures
  - To rule out peripheral artery disease and/or coarctation of the aorta, two observations should be made.
    - Compare the volume and timing of the radial and femoral pulses
    - Compare blood pressures in the arm and leg

*Note:* A femoral pulse that is smaller and later than the radial pulse suggests coarctation of the aorta or occlusive aortic disease. Blood pressure is lower in the legs than in the arms in these conditions.

JNCVII Blood Pressure Classification – Adults Older Than 18 Years		
Category	Systolic (mm Hg)	Diastolic (mm Hg)
Normal	< 120	< 80
Prehypertension	120 – 139	80 – 89
Hypertension		
Stage 1	140 – 159	90 – 99
Stage 2	≥ 160	≥ 100
Note that the blood pressure goal for patients with hypertension, diabetes, or renal disease is < 130/80.		

### **Heart Rate and Rhythm**

- If the rhythm is regular and the rate seems normal, count the rate for 30 seconds and multiply by 2. The range of normal is 50-90 beats per minute.
- Recommended Grading of Pulses
  - 3+ Bounding
  - 2+ Brisk, expected (normal)
  - 1+ Diminished, weaker than expected
  - Absent, unable to palpate
- Abnormalities
  - Small Weak Pulses
    - A decreased stroke volume, hypovolemia, and increased peripheral resistance.
  - Large Bounding Pulses
    - fever, anemia, hyperthyroidism, aortic regurgitation
    - decreased compliance of aortic walls

### **Respiratory Rate and Rhythm**

- Observe the *rate*, *rhythm*, and *effort* of breathing. Count the number of respirations in 1 minute either by visual inspection or using the stethoscope by listening over the patient's trachea. Respiration is normally ~14 - 20 breaths per minute in the adult, and up to 44 in infants
- Abnormalities
  - *Slow Breathing (Bradypnea)*
    - Slow breathing could be secondary to a number of causes such as diabetic coma, drug-induced respiratory depression, and increased intracranial pressure.
  - *Rapid Shallow Breathing (Tachypnea)*
    - Rapid shallow breathing has a number of causes, including restrictive lung disease, pleuritic chest pain, and an elevated diaphragm.
  - *Obstructive Breathing*
    - In obstructive lung disease, expiration is prolonged because narrowed airways increase the resistance to air flow. Causes include asthma, chronic bronchitis, and COPD.
  - *Rapid Deep Breathing (Hyperpnea, Hyperventilation)*
    - Rapid deep breathing has several causes, including exercise, anxiety, and metabolic acidosis.

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### **Temperature**

- The average *oral temperature* is usually at 98.6° F. The temperature is usually lower in the morning and higher in the evening. *Rectal temperatures* are higher than oral temperatures by an average of 0.7 to 0.9°F. *Axillary temperatures* are lower than oral temperatures by approximately 1° and are generally less accurate.
- Fever or pyrexia refers to an elevated body temperature. *Hyperpyrexia* refers to extreme elevation in temperature, above 106°F, while *hypothermia* refers to an abnormally low temperature, below 95°F rectally.
- Causes of fever include infection, trauma, cancer, blood disorders, drug reactions, and immune disorders (autoimmune disease).

### **Mental Health Disorders and Unexplained Symptoms**

- Approximately 20% of primary care outpatients have mental disorders.
- Terminology
  - Level of consciousness :
    - The patient's alertness or state of awareness of the environment.
  - Attention
    - The ability to focus or concentrate over time on one task or activity.
  - Memory
    - The process of registering or recording information. *Recent or short-term memory* covers minutes, hours, or days; *remote or long term memory* refers to intervals of years.
  - Orientation
    - Awareness of person, place, and time.
  - Affect
    - Demeanor, tone of voice, and facial expression
  - Mood
    - A sustained emotion

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**Mental Health Disorders and Unexplained Symptoms (Terminology) con't**

- From a functional medicine perspective a patient's mental status may be attributed to systemic yeast, toxins, and nutritional deficiencies, of which you will be learning about throughout this course.

*Note: It is important that you remain compliant with state regulations in regard to scope of practice. Because the scope varies from state to state, it is important that you check with your board before performing any procedure in which you are in doubt.*

**References**

*All reference material is listed at the conclusion of the Physical Examination and Associated Pathology lessons.*