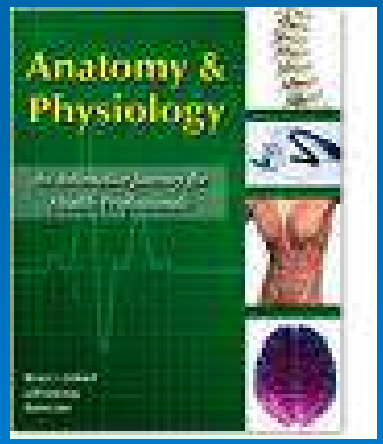
Anatomy, Physiology and Disease

Chapter 1

Learning the Language



Macroscopic Anatomy

- Also called gross anatomy
- Study of structures of the body visible to the eye
- Examples include:
  - Study of the skeletal system
  - Looking at an X-ray (radiograph)

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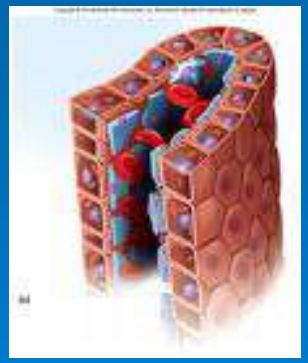
Anatomy

- Anatomy: study of internal and external structures of the human body
- Anatomy is a Greek word meaning "to cut apart"
- Specialties within field of anatomy include *microscopic anatomy* and *macroscopic (gross) anatomy*



Microscopic Anatomy

Macroscopic Anatomy

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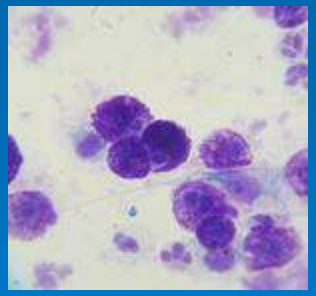
Microscopic Anatomy

- Study of structures that can only be seen and studied with a microscope
  - cytology: study of cellular structures
  - histology: study of tissue samples



Cytology: mast cell CA

Histology: testicular CA

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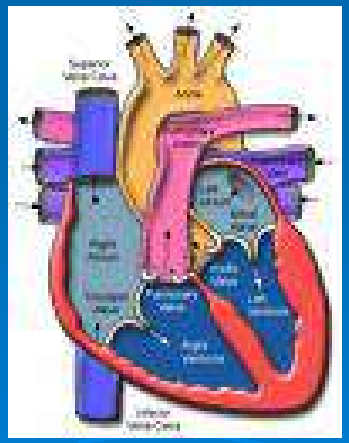
Physiology

- Focuses on function and vital processes of various structures making up the human body
- Closely related to anatomy because it is the study of how anatomical structures actually function



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Putting It All Together

- Anatomy focuses on structures and how something is put together
- Physiology is the study of how these different structures work together to make the body function as a whole
- Design of the structure is often related to its function

Putting It All Together

- Human anatomy and physiology (A&P) forms the foundation for all medical practice
- Medical treatment attempts to bring the body's structure and function back to normal A&P

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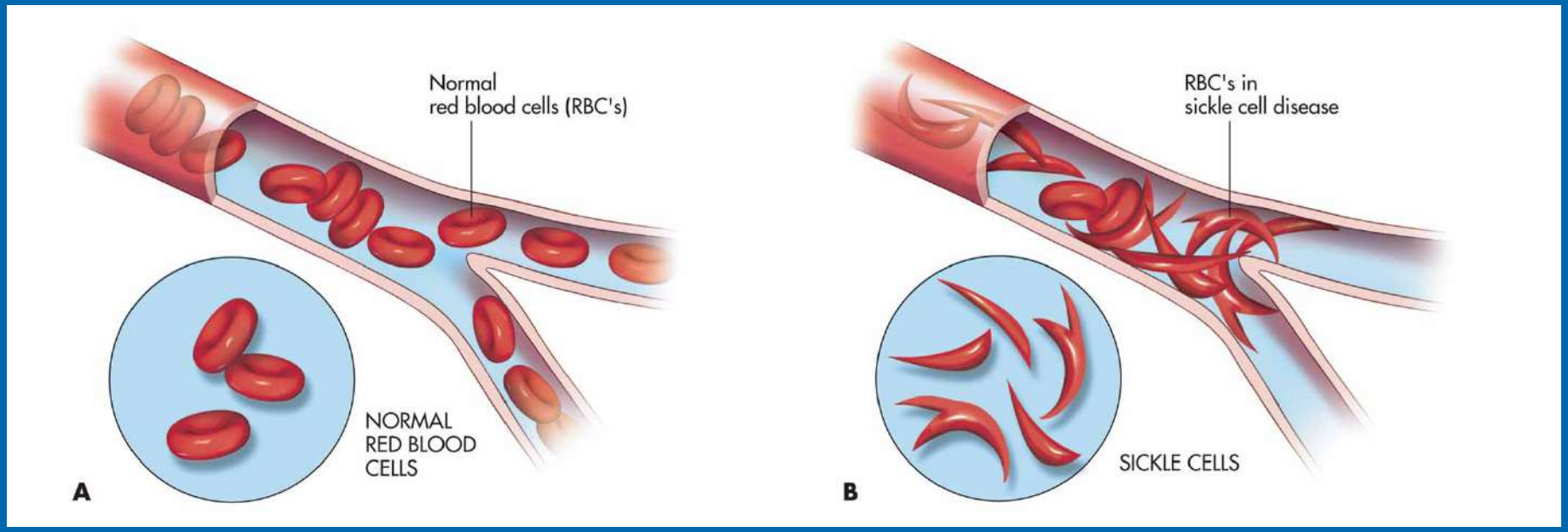

Normal RBCs

Sickle Cell Anemia

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What is Disease?

- Disease (meaning not at ease) is a condition in which the body fails to function normally.
- Homeostasis: body works to make things function smoothly and maintain balance
- Pathology is the study of disease characteristics, causes, and effects
- Pathophysiology is the study of abnormal body function

So, which is the smokers set of lungs?

End Of Slide

Terms Related to Disease

- Etiology: cause of the disease
- Epidemiology: *study* of the transmission, frequency of occurrence, distribution, and control of a disease

The Virus

The Fear

Reality

The world's concern

End Of Slide

Types of Diseases

- Idiopathic diseases: those for which the cause cannot be determined
- Communicable diseases: those that have potential to be spread from person to person
- "*Nosocomial*" infection: acquired while in a medical facility.

***M**ethicillin*
***R**esistent*
***S**taphylococcus*
***A**ureus*

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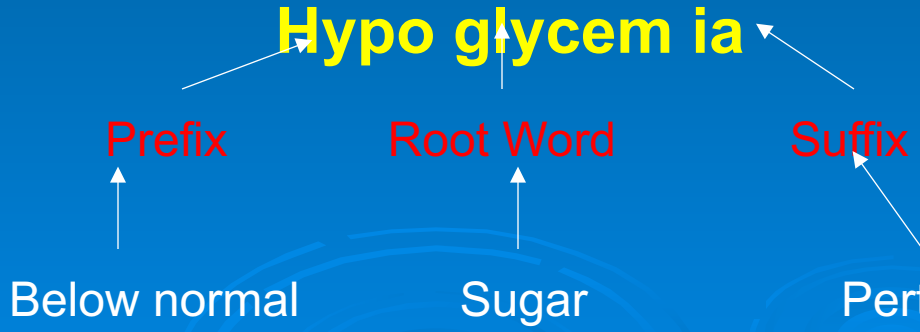
Medical Terminology

- Requires understanding of root terms, prefixes, and suffixes
- Word Root: a basic structure upon which to build
- Prefixes and suffixes are added to root words and can change or alter meaning



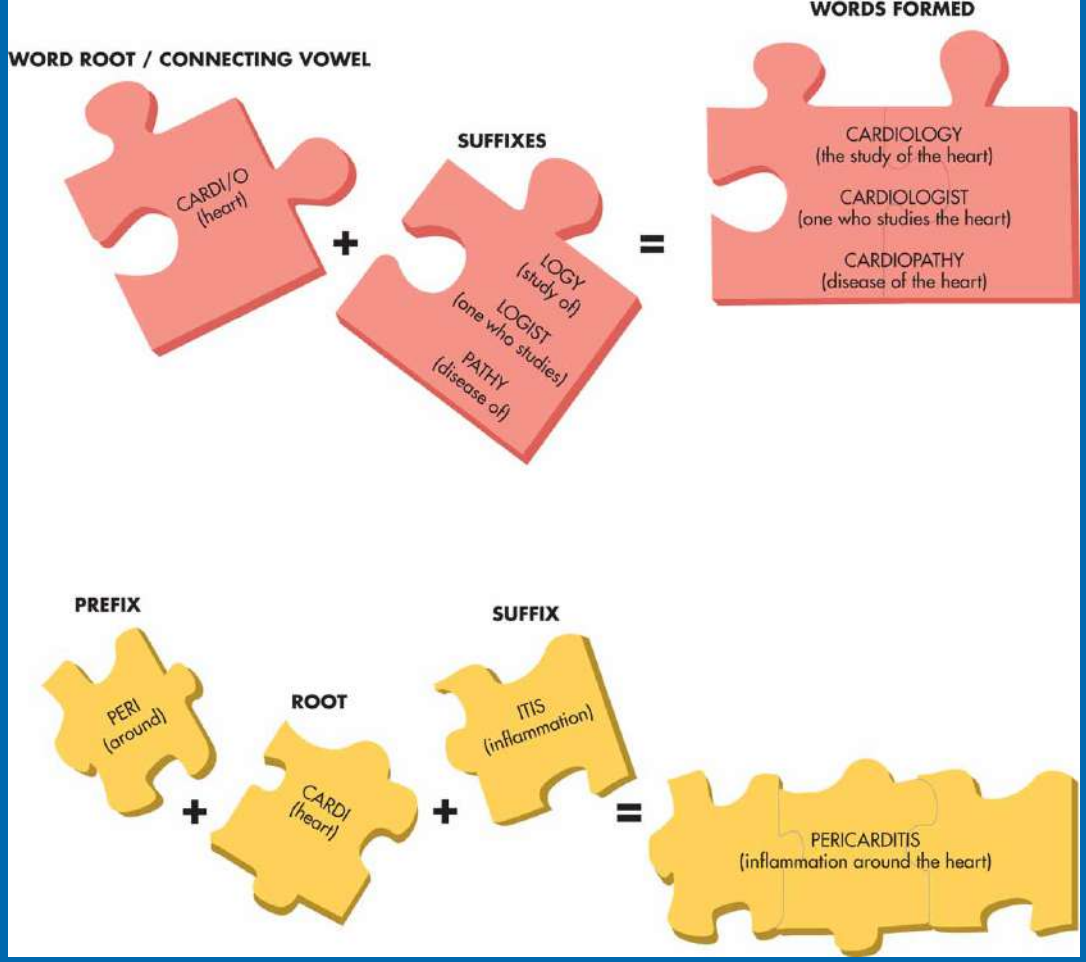


Figure 1-2 How prefixes and suffixes can be combined with a word root to form many medical terms.

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TABLE 1–1 Common Combining Terms

WORD ROOT/ COMBINING FORM	MEANING
abdomin/o	abdomen
aden/o	gland
angi/o	vessel
arthr/o	joint
cardi/o	heart
col/o	colon
cyan/o	blue
cyt/o	cell
derm/o	skin
erythr/o	red
gastr/o	stomach
glyc/o	sugar
hemat/o, hem/o	blood
hepat/o	liver
hist/o	tissue
hydr/o	water
leuk/o	white
mamm/o	breast
nephr/o	kidney
neur/o	nerve
oste/o	bone
path/o	disease
phag/o	to swallow
phleb/o, ven/o	vein
rhin/o	nose

Table 1-1 Common Combining Terms

End Of Slide

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TABLE 1–2 Common Prefixes

PREFIX	MEANING
a or an	without
acro	extremities
brady	slow
dia	through
dys	difficult
electro	electric
endo	within
epi	upon or over
hyper	above normal
hypo	below normal
macro	large
micro	small
peri	around
sub	under, below
tachy	fast

Table 1-2 Common Prefixes

End Of Slide

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TABLE 1–3 Common Suffixes

SUFFIX	MEANING
-al, ic	Pertaining to or related to
-algia	Pain
-cyte	Cell
-ectomy	Surgical removal of, or excision
-gram	Actual record
-graphy	Process of recording
-ist	One who specializes
-itis	Inflammation of
-megaly	Enlargement of
-ologist	One who studies
-ology	Study of
-oma	Tumor
-otomy	Cutting into
-ostomy	Surgically forming an opening
-pathy	Disease
-penia	Decrease or lack of
-phobia	Fear of
-plasty	Surgical repair
-scope	Instrument to view or examine

Table 1-3 Common Suffixes

End Of Slide

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TABLE 1–4 Common Medical Abbreviations

ABBREVIATIONS	MEANING
A&P	anatomy and physiology
ACLS	advanced cardiac fife support
b.i.d.	twice a day
BM	bowel movement
BP	blood pressure
CA	cancer
CAD	coronary artery disease
CBC	complete blood count
CPR	cardiopulmonary resuscitation
CVA	cerebral vascular accident (stroke)
CXR	chest X-ray
Dx	diagnosis
GI	gastrointestinal
ICU	intensive care unit
IM	intramuscular
IV	intravenous
MI	myocardial infarction (heart attack)
NPO	Latin *nil per os*, which means "nothing by mouth"
P.O.	orally
p.r.n.	when needed
Q	every
SOB	shortness of breath
STAT	Latin *statim*, which means "immediately"
t.i.d.	three times a day
ER/ED	emergency room/emergency department

Note: ER was popularized by the television show of the same name. However, in actuality it is really a whole department and not just a room, so most prefer the abbreviation ED, which stands for Emergency Department.

Table 1-4 Common Medical Abbreviations

End Of Slide

The Metric System

- ***Mathematical language*** of science
- Two major measurement systems used in world today…
  - United States Customary System (USCS): used in United States
  - Système International (SI): also called Metric System, based on the power of ten.

Metric System cont"d

- Units of measurement based on units that relate to each other by powers of 10
  - Length: millimeters (mm), centimeters (cm)
  - Weight: kilograms (kg), grams (g)
  - Volume: milliliters (ml), liters (L)
  - Calculations only require moving decimal point to left or right (multiplying or dividing by 10, 100, 1000, etc.)

3.8 L = 1 gal 3800cc = 1 gal

0.95 L = 1 qrt 946cc = 1 qrt

Metabolism

- Refers to all chemical operations going on within the body
  - Requires various nutrients
  - Produces waste products
  - Includes all life-sustaining reactions within the body
- Two types: anabolism and catabolism
- Fever is common disease process that will speed up metabolism

Anabolism

- Process of simple compounds being built up and then used to manufacture materials for growth, reproduction, and repair
- Building phase of metabolism
- Example: assembly of simple amino acids to form complex proteins

Catabolism

- Process by which complex substances are broken down into simpler substances
- Breaking down phase of metabolism
- Example: breakdown of food into simpler chemical building blocks for energy
- Abnormal and extreme example: starvation victim whose body will "feed upon itself" by actually consuming own body's tissues

Catabolic foods

Helps to burn fats!

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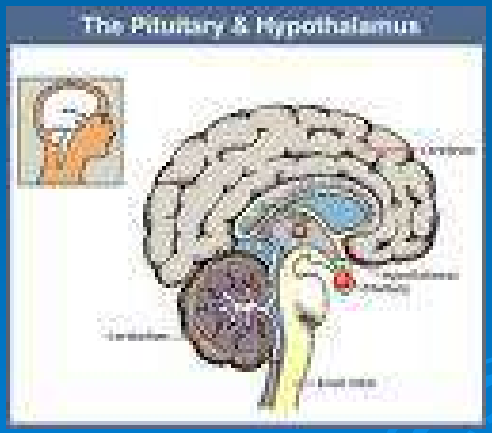
Homeostasis

- Homeostatic regulation refers to adjustments made in human organism to maintain a stable internal environment
  - Example, a thermostat is a homeostatic control in a home
- Survival depends on ability to maintain homeostasis



Negative Feedback Loop

- Continuous feedback loop to determine what required action is needed
- If feedback opposes the stimulus, it is a negative feedback loop
- Hypothalamus in the brain uses a negative feedback loop to control body temperature and maintain homeostasis
- Example: thermostat triggering heater on and off to maintain set temperature

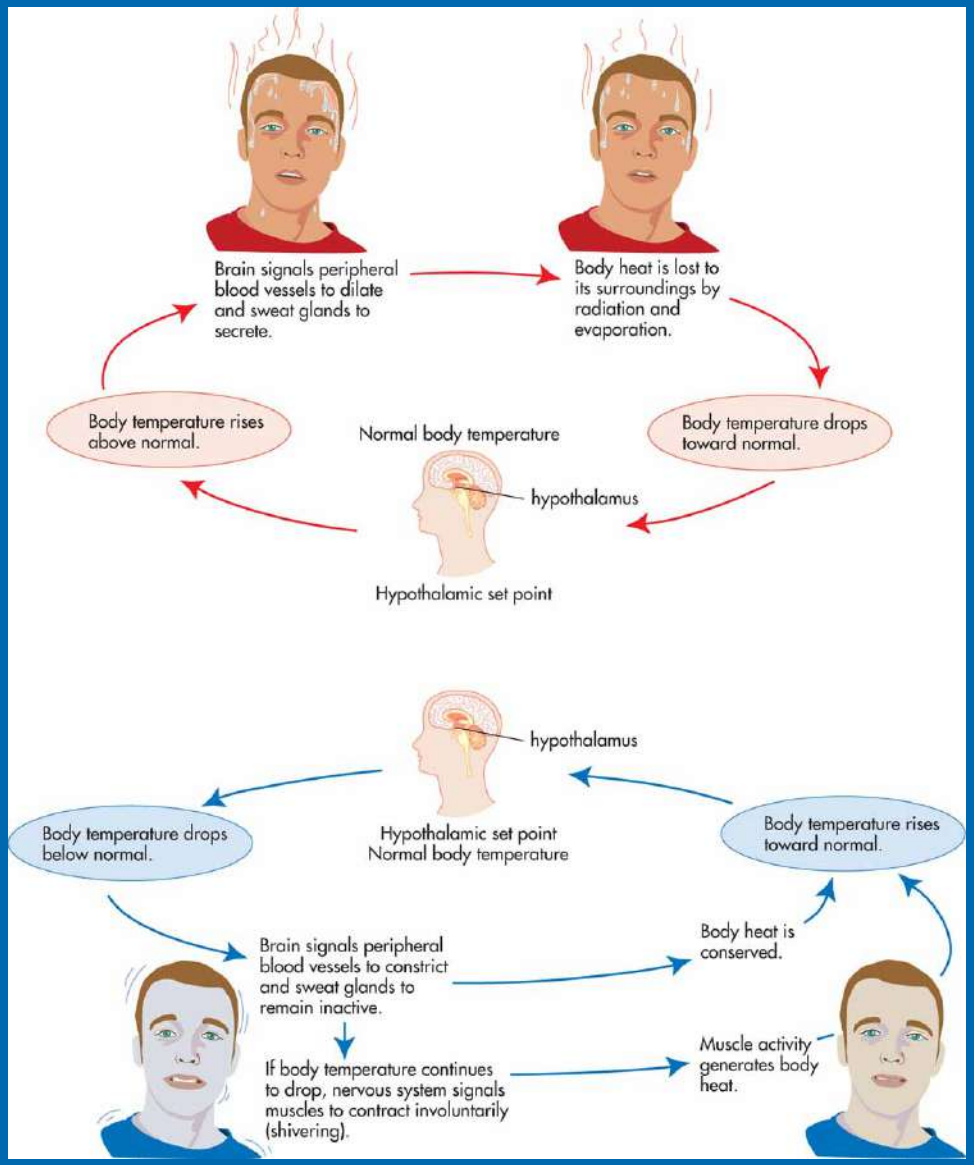


Figure 1-3 The homeostatic control of normal body temperature (37°C or 98.6°F).

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Positive Feedback

- Process known as a vicious cycle
- Does not maintain homeostasis
- Often harmful if cycle cannot be broken
- Example: recurrent contraction of uterus during childbirth

Disease Concepts

- Signs – objective, measurable indicators of illness
  - Examples: fever, change in color
  - Vital signs: signs vital to life
    - Pulse
    - Blood Pressure
    - Temperature
    - Respiratory Rate

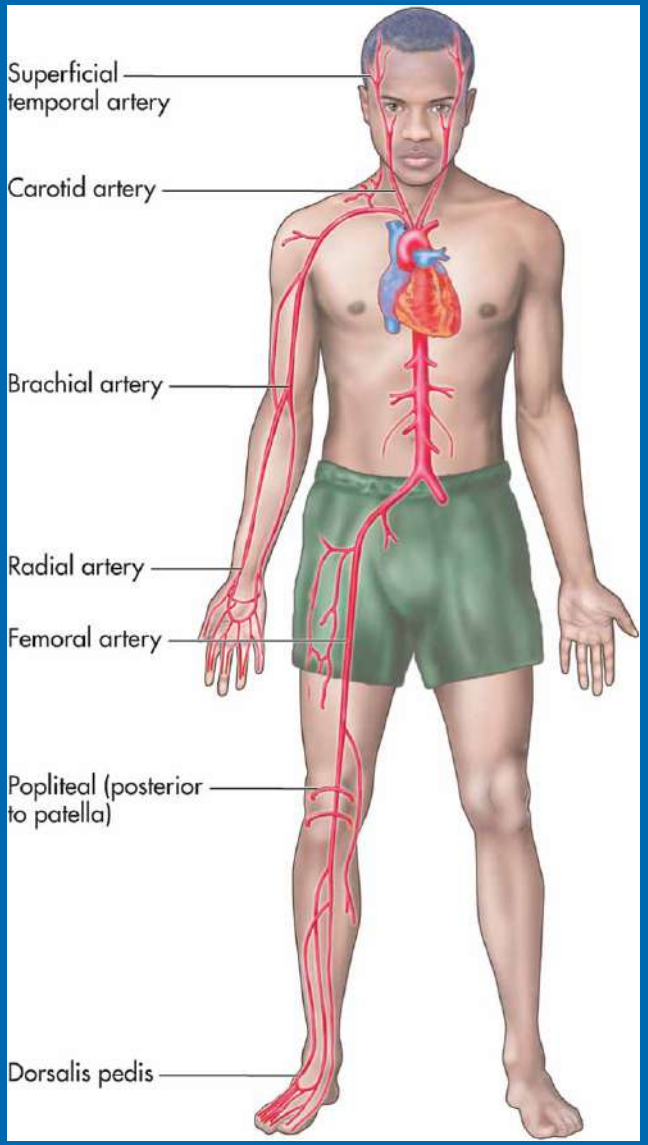

Figure 1-4 A health care professional taking a radial pulse and common pulse points.

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Disease Concepts cont'd

- Symptoms: subjective indicators of illness that are perceived only by the patient
  - Examples: pain, dizziness, itchiness
- Syndrome: a specific grouping of signs and symptoms related to a specific disease
  - Example: Downs Syndrome signs and symptoms include sloping forehead, low set ears, short broad hands, mild-to-moderate mental retardation, and often, cardiac valvular disease

Down Syndrome

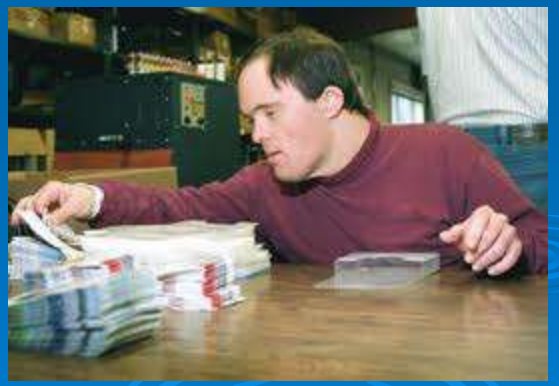
- Etiology: trisomy 21- a chromosomal disorder- extra 21st chromosome.
- S/S:

  1. cognitive disabilities such as low IQ, about 50.

  2. physical disabilities: sm chin, round face, oversized tongue, almond shape eyes, shorter limbs, single transverse palmar crease, poor muscle tone

  D/X: Identified while pregnant with amniocentesis or post partum (birth).
- Rx: disease prevention & early diagnosis of major health problems.

Down Syndrome Examples



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Complications

Malignancies: leukemia most common
Hypothyroidism: low levels of thyroid
Gastrointestinal: GERD, constipation
Infertility: poor spermatogenesis
Neurological: epilepsy, Alzheimer's disease
Ophthalmologic (eye) & Otolaryngology (ENT: ear, nose & throat) problems.
Average Life Span: 49 years

Disease Concepts cont'd

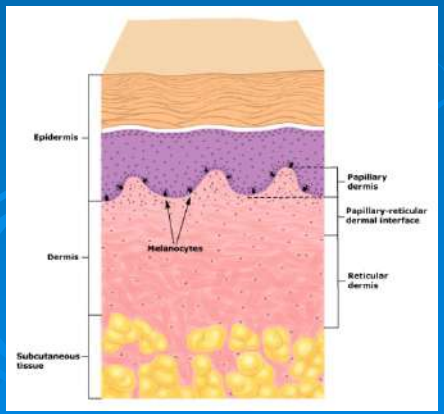
- Diagnosis: identification of disease determined by studying patient's signs, symptoms, history, and results of diagnostic tests
- Prognosis: prediction about outcome of a disease
- Acute conditions: rapid onset of signs and symptoms
- Chronic conditions: gradual onset of symptoms over a long period of time

Disease Concepts cont'd

- Remission: period of time when signs and symptoms of chronic disease disappear
- Relapse: recurrence of a disease
- Exacerbation: "flare-up" of signs and symptoms
- Terminal disease: one with a prognosis of death

Body's Defense System

- Disease can result from pathogenic (disease producing) microorganisms invading body through openings referred to as portals of entry
- Body Barriers: first line of defense
  - Example: skin
    - Provides mechanical barrier (if unbroken)
    - Slightly acidic, which makes environment inhospitable to some pathogens



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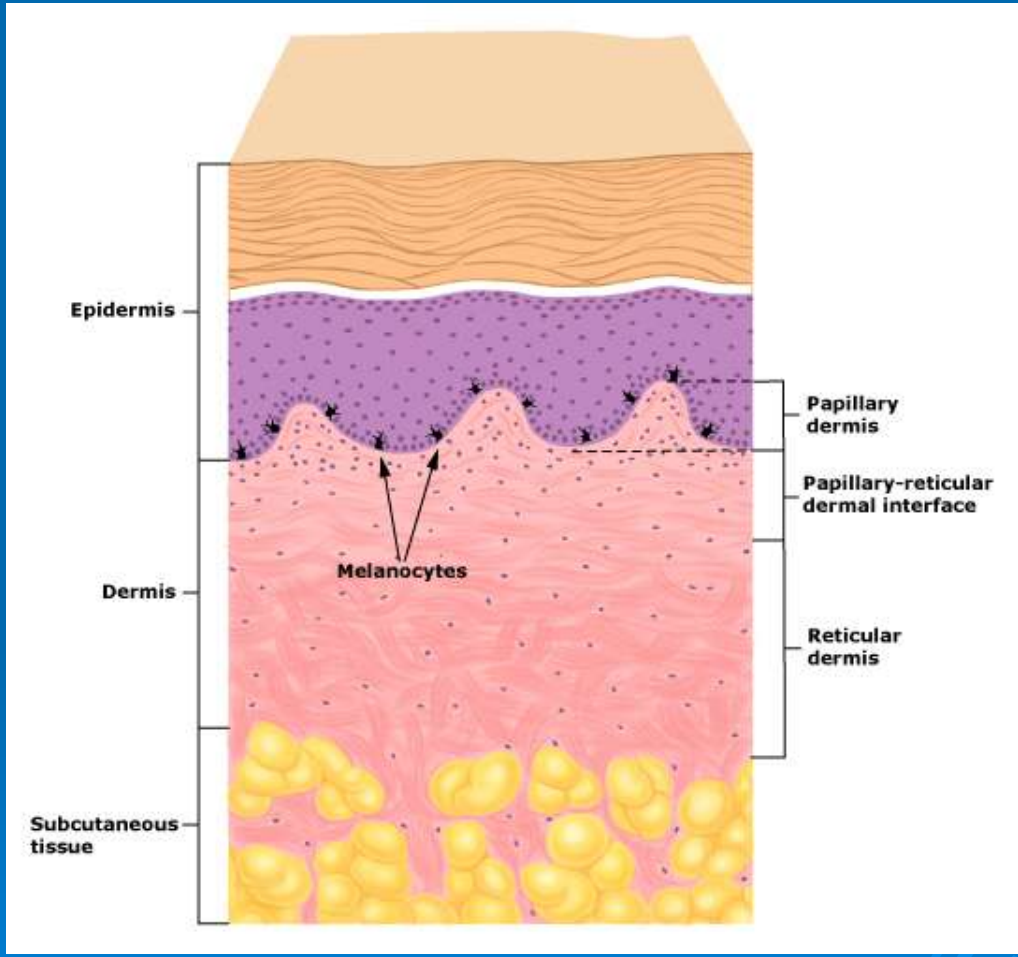
Skin



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Body's Defense System con't

- Immune response: kicks in if pathogens get past barriers
  - Microscopic body cells activate
    - Some attack and "eat" pathogens
    - Some release powerful chemicals that disintegrate pathogens

Body's Defense System con't

- Inflammatory response – occurs whenever body tissues are injured
  - Possible triggers: physical injury, intense heat, chemical irritation, reaction to invading "pathogens."
  - Signs and symptoms: redness, increased temperature at affected site, swelling (edema), pain
  - Has protective function: Isolates injured area, Increases blood flow to restore normal function

Inflammation

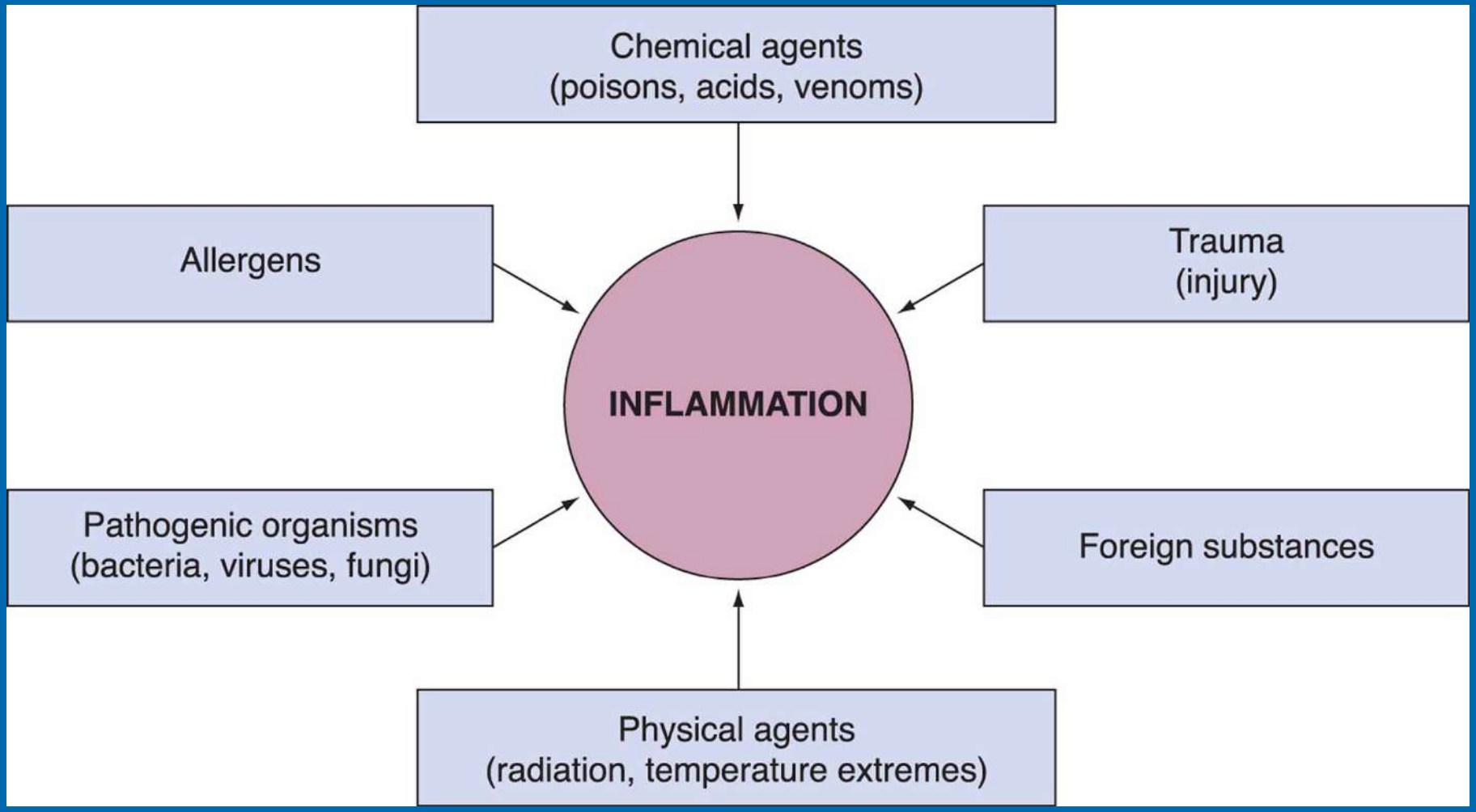

Figure 1-5 Agents capable of stimulating an inflammatory response.

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Routes of Disease Transmission

- Vectors: when disease is spread by insect, or other non-human animal
- Contact transmission
  - Direct contact: when a person becomes sick due to direct contact with a contagious body fluid
  - Indirect contact: when a person becomes sick due to contact with a contaminated object

Routes of Disease Transmission (cont'd)

- Common vehicles: when consumable goods (such as food) become contaminated
- Airborne spread: when droplets containing a pathogen spread through the air

How To Prevent Infection

- Universal Precautions: set of standard actions/procedures designed to prevent transmission of disease between patient and health care provider
- Wash hands….wash hands…wash hands!!!!!!!

Just use plain soap!!!

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