

INTRODUCTION

□ TERMINOLOGY

Anatomical Position

- Head/gaze/toes anterior
- Arms adj to side, palms facing anterior
- Lower limbs close with feet parallel

Anatomical Planes

- Median: vertical down middle of body
- Sagittal: Vertical planes parallel to median
- Coronal (frontal): vertical planes 90deg to median (ie ant/post)
- Transverses: horizontal plane

Relationships

Superior	nearest the vertex (topmost cranium)
Inferior	nearest the sole
Cranial	towards the head
Caudal	towards the feet
Posterior (dorsal)	nearest the back
Anterior (ventral)	nearest the front
Rostral	towards rostrum (beak) used in brain
Medial	Nearest the median plane
Lateral	furthest from median plane
Dorsum	superior or posterior surface protrusion ¹
Palmar & Plantar surface	opp dorsum

¹Incl back of hand, top of foot

Laterality

- Bilateral: left and right
- Ipsilateral: same side
- Contralateral: opp side

Movement

Flexion	Decreasing angle ^{1,2}
Extension	Increase angle ²
Plantarflexion	Extension at the ankle
Dorsiflexion	Flexion at ankle
Abduction	Away from body ^{3,4}
Adduction	Towards body ^{3,4}
Circumduction	Flex/Ext/Ab/Add
Rotation	Tuning on longitudinal axis
Pronation	Rotation of radius medially
Supination	Rotation of radius laterally
Eversion	Sole away from median
Inversion	Sole towards median
Opposition	Digital pads closer
Reposition	Reverse opposition
Protrusion	Ant movement
Retrusion	Post movement
Protraction	Anterolateral movement
Retraction	Posterolateral movement
Elevation	Sup movement
Depression	Inf movement

¹Usually anterior

²Thumb rotated 90° in neutral ∴ flex/ext occurs in frontal plane

³In relation to median plane or 2nd toe

⁴Thumb rotated 90° in neutral ∴ ab/adduction occurs in sagittal plane

□ INTEGUMENTRY SYSTEM

Tension lines (of Langerhans)

- Spiral longitudinally (transversers in neck and trunk)
- Parallel to flexor creases in joints

□ FASCIAS

- Retinaculum:** condensation of deep fascia near joints to prevent bow stringing
- Bursae:** closed sacs of serous membrane
- Visceral vs Parietal** layers

□ SKELETAL SYSTEM

Cartilage

- Semirigid connective tissue for flexibility
- Avascular (simple diffusion only)
- Perichondrium** is a thin fibrous covering

Bone

- Hard connective tissue
- Periosteum** is a thin fibrous covering (except articular surfaces)
 - Allows tendinous attachment
 - Allows bone growth

Types of Bones

- Compact** (around outside)
- Spongy** (middle) unless medulla present

Classification of Bones

Long	Tubular
Short	Cuboid (tarsals, carpals)
Flat	Protection
Irregular	Other
Sesamoid	Within tendons

Bone Markings/Formations

Capitulum	Small, round, articular head
Condyle	Paired rounded articular area
Crest	Ridge of bone
Epicondyle	Eminence sup to condyle
Facet	Smooth flat area for bony articulation
Foramen	Passage through bone
Fossa	Depressed area
Groove	Depression in bone
Head	Large, round, articular end

Line	Linear elevation
Malleolus	Rounded process
Notch	Indentation of bone
Protuberance	Projection of bone
Spine	Thorn like process
Trochanter	Large blunt elevation
Trochlea	Spool-like articular process or pulley
Tubercle	Small raised eminence
Tuberosity	Large rounded elevation

Bone Development

- Originate from **mesenchyme** then differentiate via

Intramembranous Ossification

- Membranous bone formation from foetus

Endochondral Ossification

- Cartilaginous bone formation
- Replaced by bone in life

Steps in endochondral ossification

- Mesenchyme → chondroblasts
- Cartilage calcifies
- Periosteal capillaries grow into calcification
- Periosteal bud** forms (osteoblast + periosteal capillaries)
- Primary Ossification Centre** forms (distal active ends are **metaphysis**)
- Secondary Ossification Centres** form elsewhere (distal active ends are **epiphysis**)
- Epiphyseal** plate intersects during bone growth
- Fusion of epiphysis & metaphysis signals complete lengthening

□ JOINTS

SYNOVIAL
Joint capsule
Lined by synovial membrane or
Articular cartilage
Contains synovial fluid
FIBROUS
Untied by fibrous tissue
Syndesmosis: fibres cover like a sheet
eg sutures of cranium, dentoalveolar syndesmosis
CARTILAGINOUS
Hyaline or fibrocartilage
Primary (synchondrosis): temporary unions ¹
Secondary (symphysis): union through fibrocartilage eg IV disc

¹eg epiphyseal plate

- Plane**
 - Gliding/sliding
 - Flat bones/surfaces
 - Tight joint capsule
 - eg AC joint
- Hinge**
 - Flexion/Extension
 - Jt capsule thin/lax ant/post
 - Collateral ligaments
 - eg elbow
- Saddle**
 - Abduction/adduction/flex/ext
 - Circumduction
 - eg CMCJ of 1st
- Condyloid**
 - Abduction/adduction/flex/ext
 - But movt in 1 plane better
 - eg MCPJ
- Ball & Socket**
 - Ad/Ab/Flex/Ext/Rotation
 - eg hip
- Pivot**
 - Rotation around central axis
 - eg atlanto-occipital joint

INTRODUCTION

MUSCLES

Types

- Skeletal
- Smooth
- Cardiac

CARDIOVASCULAR

Types

- | | | |
|-------------|-------|-------------------|
| Arteries | Coats | Tunica intima |
| Veins | | Tunica media |
| Capillaries | | Tunica adventitia |

LYMPHOID

Lymphoid Organs

- Thymus
- Red marrow
- Spleen
- Tonsils
- Nodes

Right Lymphatic Trunk

- Drains from RUQ of body incl R UL
- Enters R venous angle

Left Lymphatic Trunk

- Drains rest
- Enters L venous angle

NERVOUS SYSTEM

CENTRAL NERVOUS SYSTEM

- Bodies within grey matter
- Tracts within white matter

PERIPHERAL NERVOUS SYSTEM

- Myelinated vs Unmyelinated

Nerve Unit

- Bundle of nerve fibres
- Connective Tissue
- Vasa vasorum (blood vessels)

Connective tissue covering

- Endoneurium:** thin, innermost
- Perineurium:** dense, encloses single fascicle
- Epineurium:** very dense, encloses bundle of fascicles

- Ganglion: collection of ell bodies outside of CNS

Types of Nerves

1. CRANIAL NERVES

- Exit through cranium
- CN I-XII (NB XI from spinal cord not brain)
- Sensory ganglion associated with sensory nerves (not CN I or II)
- Innervation zones of skin are more discrete

2. SPINAL (segmental) NERVES

- Arise from cord (31 pairs)
- Exit cord foramina as **rootlets**
- Converge to form Anterior/Posterior Roots
 - Anterior: motor fibres (body in ant horn)
 - Posterior: sensory fibres (body in dorsal root ganglion)
- Reunite before IV foramina exit as mixed nerve
- Divides immediately into Anterior/Posterior Rami

Anterior

- Supply everything posterior doesn't
- Ant rami destined for trunk are indep of one another
- Ant rami destined for limbs usually merge sup/inf as somatic nerve plexus

Posterior

- Synovial Joints of Vertebral column, deep muscles of back, overlying skin
- Do not merge to form somatic nerve plexus

Dermatomes/Myotomes

- Unilateral innervation of muscle/skin segments
- At least 2 segments need to be interrupted to produce "numbness"

Types of Fibres

1. SOMATIC

- General sensory fibres (eg nociceptors, proprioception)
- Somatic motor fibres are voluntary (ie skeletal)

2. VISCERAL... aka AUTONOMIC NERVOUS SYSTEM

- Visceral sensory: hollow viscous incl blood vessels
- Visceral motor: smooth muscle and glands
- Have pre-postsynaptic neurons

Autonomic Nervous System (subset of visceral)

Sympathetic

- aka Thoracolumbar
- Norepinephrine driven
- Presynaptic cell body in grey matter (**JML**) T1-L2/3 **somatotopical** (ie head superior)
- Exit cord via **anterior root** (since they are motor nerves) then enter **ant rami**
- Ant rami** → **sympathetic trunk** via **white rami communicantes**

Destiny of axons that enter sympathetic trunk

Synapse in Trunk → **ascending, descending or staying at the same level**

- synapse with **paravertebral ganglia**
- grey rami communicantes
- ant/post rami → organ

NB **Superior paravertebral ganglion** at base of skull Leaves ganglion and forms periarterial plexus that follow carotid artery to head to innervate bloods vessels, sweat glands of head/face

Non synapsing in Trunk Stay same level exit as **splanchnic nerves** then synapsing on **prevertebral ganglia** → organ

Splanchnic N	Level	Ganglion	Organ
Cardiopulmonary	C4-T5	Cardiac	Heart
		Pulmonary	Lungs
		Oesophageal	Oesophagus
Greater	T5-9	Celiac	liver, gallbladder, stomach, pancreas, spleen
		Lesser	T10
Least	T11		
Lumbar	L1-2	Sup Mesenteric	Intestines
		Inf Mesenteric	Bladder Genitalia

¹Suprarenal has postsynaptic body within viscera (doesn't synapse in coeliac ganglion)

NB for every presynaptic fibre there are 30 postsynaptic fibres (ie presynaptic fibres enter symph trunk at one level and exit at EVERY level)

Parasympathetic aka Crainiosacral

Nerves	Course	Distribution
Cranial	CN III, VII, IX, X 4 discrete ganglia ¹ → target organ	everything except GIT past left colic flexure and pelvis
Sacral	S2-4 ant roots → splanchnic nerves → postsynaptic bodies on organ	Everything past left colic flexure and pelvis

¹Ciliary (pupils), Pterygopalatine (lacrimial), Otic (parotid), Submandibular (submandibular, submental)

