

Phase 1 syllabus (PTS-approved)



Introduction

Dear Phase 1s,

Welcome to Sheffield Medical School!

Below is a checklist of key topics covered in Phase 1 which was written by Jon Emberey, a previous medical student, on behalf of the Sheffield Medical School Peer Teaching Society. This was written as a rough guide for your learning and covers most topics which are broken down into systems. DO NOT PANIC and feel like you must know everything perfectly- Jon has highlighted the ones he thinks are key but feel free to include any other topics you think are important. Your lecturers will also often stress key points they think are likely to come up in your exams and these should therefore be focused on.

Please also use the Peer Teaching Website (<https://www.peerteaching.co.uk>) for useful resources, revision aids and information or for contact information.

Good luck and enjoy every minute of your time here!

Melanie Coulson

Co-President (2018-19)
Peer Teaching Society

IMMS 1

CELLS

- Organelles - mitochondria, rough/smooth endoplasmic reticulum, golgi apparatus, vesicles, cytoskeleton, storage (lipofuscin, lipid, glycogen)
- Cell membranes - structure, molecules and function
- Membrane proteins (transporters - facilitated diffusion etc. , anchors - desmosomes etc. , receptors - types, enzymes)
- Endocytosis
- Movement across membranes - simple diffusion, facilitated diffusion, active transport

HOMEOSTASIS

- Homeostasis definition
- Cell communication methods (autocrine, paracrine, endocrine) - positive and negative feedback
- Water distribution
- Water homeostasis and dehydration (regulatory hormones, sources of water, fluid loss) + definitions osmosis, osmolality, osmotic pressure, oncotic pressure
- Water excess and oedema - normal, inflammatory, venous, lymphatic
- (Hyper/hypo)natraemia, (hyper/hypo)kalaemia, (hyper/hypo)calcaemia

MOLECULAR BUILDING BLOCKS (This section should be familiar from A-level)

- Carbohydrates and glycosidic bond
- Lipids
- Nucleotides
- Amino acids and peptide bond
- Protein structures - primary, secondary, tertiary, quaternary
- Functions of enzymes and co-enzymes
- Forces - e.g. Van der Waals, hydrogen bonding

DNA/RNA (This section should be familiar from A-level)

- Structure of DNA and RNA
- DNA replication (semi-conservative)
- Production of proteins (transcription and translation)
- Mis-sense, non-sense

MITOSIS/MEIOSIS

- Cell cycle
- Identifiable via light microscopy
- Stages (+ a key fact about each)
- Abnormalities (e.g. by non-disjunction) - numerical and structural
- Gametogenesis and Mendel's second law
- Gonadal mosaicism

GENETIC DISEASES

- Phenotype vs genotype
- Spectrum - mendelian or multifactorial disease
- Karyotypes
- Autosomal (dominant/recessive), sex linked (x-linked) and interpretation of genetic pedigrees (with examples of conditions)
- Lyonisation
- Dominant negative effect
- Knudson's 2 hit hypothesis
- Multifactorial diseases
- Concepts - penetrance, variable expression, sex limitation (BRCA)

IMMS 2

METABOLISM

- Metabolism (definition)
- Energy values from different fuel types (carbohydrate, protein, lipid, alcohol)
- Energy storage (glycogen@muscle/liver, fats, proteins)
- Total energy spend per day (BMR, activity, diet) and influencing factors (age etc.)

ATP

- ATP-ADP cycle
- Methods of regenerating ATP (energy source, glycolysis, Krebs's, oxidative phosphorylation, substrate level phosphorylation, via electron transport chain)
- Electron accepting coenzymes
- Glycolysis (highlight steps 1 and 3) - mnemonics, substrates and enzymes, why inhibited by acidosis
- Krebs's cycle - location, mnemonics etc.
- Oxidative Phosphorylation - location, electron transport chain
- Total ATP made from one molecule of glucose (34 ATP - debatable)

FATTY ACID OXIDATION/ KETONES

- Examples of fatty acids
- Main energy supply - beta oxidation with the carnitine shuttle (give an example e.g. palmitic acid)
- Ketogenesis at hepatocytes
- Use of ketones for energy @ low fat state

ACID/BASE/BUFFER

- Definitions
- pH
- Henderson-Hasselbach equation
- H⁺ control - blood/tissue buffer, CO₂ removal @ lungs, renal excretion
- Buffers (bicarbonate, protein, haemoglobin)
- Acidosis/Alkalosis and compensation (metabolic - slow, respiratory - quick)
- Anion gap

OXYGEN TOXICITY

- Reactive oxygen species (exogenous/endogenous)
- Formation of reactive oxygen species - e.g. at oxidative phosphorylation
- Benefits of ROS - respiratory burst
- Haber-Weiss and Fenton's reaction
- Defense against oxygen toxicity - enzymes (superoxide dismutase, catalase, glutathione peroxidase), antioxidant vitamins, cell compartmentalisation, repair

HISTOLOGY

- Recognising stains
- Recognising different types of epithelia

CARDIOVASCULAR

ANATOMY

- Anatomy of the heart (chambers and vessels) and surrounding tissue
- Heart margins
- Heart surfaces
- Auscultation of valves
- Mediastinum (middle, superior, inferior)
- Coronary arteries
- Referred heart pain
- Aortic arch (divisions and landmarks)
- Pericardium (sinuses and vessels)
- Path of the vagus and phrenic nerves

CARDIAC CYCLE

- The pressure changes that occur in the ventricles as related to the action of the valves, flow of blood and ECG (Wigger's diagram)
- Systole - isovolumetric ventricular contraction, ventricular emptying - including pressure changes
- Diastole - isovolumetric ventricular relaxation, ventricular filling - including pressure changes
- Starling's law of the heart
- Duration of systole and diastole
- Effect of sympathetic and parasympathetic nervous system (force, cardiac output, heart rate)

CARDIAC CONTRACTION

- Molecular myocardial contraction
- Excitation contraction coupling
- Actin, myosin and

CIRCULATION

- General structure and function of circulatory system (arteries, veins, capillaries etc)
- Differentiation between pulmonary and systemic circulation

EQUATIONS

- Stroke volume
- LV filling pressure
- Mean arterial pressure
- Cardiac output - and how to measure this
- Ohm's law and vessel resistance
- Poiseuille and blood flow
- Pulse pressure

DEFINITIONS

- Preload, afterload, contractility, elasticity, compliance, resistance

CONTROL OF THE CARDIOVASCULAR SYSTEM

- How blood pressure is generated
- Intrinsic and extrinsic mechanisms that regulate cardiac output
- Intrinsic and extrinsic mechanisms that regulate peripheral resistance
- Blood pressure control by regulation of cardiac output and peripheral resistance

CENTRAL CIRCULATION CONTROL

- Effectors
- Vasoconstrictors and vasodilators
- Baroreceptors and chemoreceptors
- Nervous system involvement

PERIPHERAL CIRCULATION CONTROL

- Vasoconstrictors and vasodilators (local, neural, hormonal)
- Flow control (hyperaemia - active and reactive, intrinsic autoregulation, myogenic autoregulation)

ELECTRICAL CONDUCTION

- ECG (PQRST) trace with timings and definitions
- Conduction pathway
- Action potential and propagation (ionic basis of both cardiac and pacemaker action potentials)
- Myocyte membrane pumps
- 12 lead ECG

BLOOD

- Composition (and effect of anaemia)
- Red blood cells and their physiological function
- White blood cells and their physiological function
- Platelets and their physiological function (simply)
- Soluble plasma proteins
- *Haemostasis mechanisms - platelet plug and coagulation cascade (again simply)
- Blood typing and transfusions
- Rhesus D - particularly sensitisation in pregnancy of rhesus negative mothers

HISTOLOGY

- Types of muscle and defining features (branching etc)
- Structure and histology of arteries, capillaries and veins and how this relates to function
- Intercalated discs
- Purkinje fibres
- Recognising cells in the blood - especially different types of white blood cell

EMBRYOLOGY

- Heart fields and what they develop into
- Stages of formation of the heart - heart tube, cardiac looping, cardiac septation
- Sinus venosus, primary atrium, primary ventricle, bulbus cordis, truncus arteriosus
- Vasculogenesis
- Aortic arches and what they develop into
- Fetal circulation changes that occur at birth

RESPIRATORY

ANATOMY

- Sinuses, nasopharynx, oropharynx, laryngopharynx
- Larynx - single and double cartilages and position
- Pharyngeal constrictors, the carotid sheath and the pharynx
- Thyroid - structure, blood supply and position
- Anterior triangle of neck
- Vagus branches - superior and recurrent laryngeal and the cough reflex
- Airways - trachea to alveoli - structure, function and innervation
- Hilum of the lung
- Diaphragm - caval opening, oesophageal hiatus, aortic hiatus
- Azygous and hemiazygous veins
- Surface markings on chest and lines (midsternal etc)
- Ribcage and intercostal muscles
- Physical process of breathing - vertical, anteroposterior, transverse movement to expand chest cavity
- Lobes of the lungs, fissures, surface markings of lungs and pleural cavity

THE RESPIRATORY PUMP

- Muscles involved, nerves involved, pleura
- Lung statics and the effect of transpleural pressure
- Inspiration
- Expiration

CONTROL OF RESPIRATION

- Controller - Effector - Sensor loop
- Pontine and medullary respiratory sensors
- Mechano and chemo receptors - SASR, RASR, C-Fibres J etc.
- Respiratory drive - central and peripheral
- Alveolar recruitment

GAS EXCHANGE

- Surface area of lungs
- Concept of ventilation/perfusion matching/mismatch
- Layers for gas exchange (7)

OXYGEN DISSOCIATION CURVE

- Concept of haemoglobin saturation and effect of pH and temperature

EQUATIONS

- Dalton's law
- Boyle's law
- Henry's law
- Alveolar gas equation
- Laplace's law and the action of surfactant (T2 pneumocytes)

ACID/BASE BALANCE

- Acid/base dissociation equation (bicarb)
- Henderson-Hasselbalch equation
- Respiratory acidosis/alkalosis and compensation

HYPOXIA AND HYPERCAPNIA

- Defining pressure of arterial oxygen and carbon dioxide
- · Cause of hypoxia
- T1/2 respiratory failure
- · Cause of hypercapnia

SPIROMETRY

- Flow/volume curve
- Volume/time curve
- The really important one which shows tidal volume and all other bits - give volumes and definitions
- Airways obstruction
- Airways restriction

VASCULAR PHYSIOLOGY

- Pulmonary versus systemic circulation - characteristics of vessels
- Different conditions for vasodilation and vasoconstriction in pulmonary/systemic blood vessels

THE AGING LUNG

- Effect of aging on the lung, gas exchange, immunity and response

HYPERSENSITIVITY

- Gell and coombs classification and typical diseases
- The effect of histamine in T1 reactions
- Mechanism of anaphylaxis and acute inflammation - inhale antigen -> ... histamine release -> bronchoconstriction and mucus hypersecretion

AIRWAY TONE

- Bronchoconstriction
- Bronchodilation
- Nicotinic and muscarinic receptors
- Sympathetic stimulation
- Parasympathetic stimulation

HOST DEFENSE

- Mechanisms - innate immunity, epithelial barrier, muco-ciliary escalator etc
- Respiratory/alveolar epithelium - with type 1/2 pneumocytes
- Coughing process
- Mucus composition
- Alveolar macrophage in pulmonary host defense - development and function
- Brief adaptive immunity - T and B lymphocytes

EXTREME CONDITIONS

- Effect of diving on physiology
- Effect of altitude on physiology

HISTOLOGY

- Respiratory epithelium and goblet cells
- Nose and olfactory epithelium
- Differentiating between airways - e.g. presence of collagen
- Type 2 pneumocyte

EMBRYOLOGY

- Respiratory diverticulum and lung buds
- Stages of development - embryonic, pseudo-glandular, canalicular, saccular, alveolar
- Foetal circulation and effect of first breath (e.g. shuts foramen ovale, ductus arteriosus constriction)
Type 2 pneumocyte production and premature babies

GI

ANATOMY

- Structure of GI tract - layers, glands, plexi
- Surface markings of abdomen
- Rectus sheath and muscles of anterior abdomen
- Peritoneal cavity and greater/lesser omentum
- Anatomy of stomach, blood supply
- Anatomy of duodenum (4 sections)
- Coeliac trunk
- Epiploic foramen
- Retroperitoneal organs
- Anatomy of small and large gut including blood supply

SWALLOWING

- Muscles involved
- Phases - voluntary, involuntary
- Gag reflex

SALIVA

- Composition, pH, function
- Salivary glands - plus structures and innervation
- Acinar cells and ducts - ion transport

DIET AND FUELS

- BMR definition
- Stores of fuels
- Macromolecules
- Energy requirement at different tissues (and fuels used)
- Vitamins (sources and deficiency)

PHYSIOLOGY OF STOMACH

- Anatomy of stomach and defense
- Cell types of gastric pits and glands
- Gastric acid secretion and regulation (cephalic, gastric, intestinal)
- Protease secretion
- Gastric motility, peristalsis and emptying (plus mechanisms)
- Defense against acid secretion

INTESTINAL PHYSIOLOGY

- Water distribution
- Ion transport at intestines (Na^+ , K^+ , Cl^- , HCO_3^-)
- Which part of gut are different vitamins absorbed

DIGESTION AND ABSORPTION

- Carbohydrate and starch - D isomers, pancreatic amylase, alpha-dextrin
- Proteins - zwitterions, hormones, endopeptidases and exopeptidases, absorption at small intestine
- Lipids - cholesterol, bile salts, micelles, chylomicrons

EATING

- Malnutrition
- MUST
- BMI

HISTOLOGY

- General epithelia (mouth to anus)
- Taste buds and tongue
- Types of gland (serous/mucus)
- Stomach - parietal and chief cells
- Duodenum, jejunum, ileum, colon - specific cells/plexi and villi/crypts
- Appendix

EMBRYOLOGY

- Oropharyngeal and cloacal membranes
- Boundaries of foregut/midgut/hindgut
- Pharyngeal arches
- Development of oesophagus
- Development of stomach - growth and rotation
- Midgut elongation, herniation, rotation, retraction
- Hindgut and formation of anorectal canal

LIVER AND FRIENDS

ANATOMY

- Anatomy of the liver - lobes and ligaments (anterior, superior, posterior views)
- Impressions on the liver
- Calot's triangle
- Portal system
- Liver lobules, acini, sinusoids
- Anatomy of pancreas and relations to vessels, organs
- Anatomy of gall bladder and the biliary tree

LIVER STORAGE

- Fat soluble vitamins
- Iron metabolism (ferritin) and vitamins (B12, A, D)
- Metabolism, plasma proteins, defense

LIVER DETOXIFICATION

- Xenobiotics
- Oxidation, reduction, hydrolysis, glucuronidation
- Phase 1 and phase 2 reactions
- Cytochrome P450

PRODUCTION OF PROTEINS

- Albumin - and its function
- Clotting factors
- Complement factors
- Protein turnover and degradation

NITROGEN BALANCE

- Glucose/Alanine cycle
- Urea cycle

FAT METABOLISM

- Energy reserves of body
- Cholesterol, lipoproteins and beta-oxidation
- Enzymes - lipoprotein lipase, hepatic lipase etc
- Hepatic metabolism of lipids

GALL BLADDER

- Production and concentration of bile
- Bilirubin and enterohepatic secretion of bile salts

EXOCRINE PANCREAS

- Phases of secretion - buffer, enzyme
- Secretion of bicarbonate
- Control of secretion - stimulation and inhibition

EMBRYOLOGY

- Liver bud formation
- Formation of liver and gallbladder (pars hepatica/pars cystica)
- Involvement of duodenal rotation in positioning
- Formation of the pancreas

HISTOLOGY

- Lobules

Sinusoids and sinusoidal macrophages

Hepatocyte ultrastructure

Portal triads

Exocrine pancreas and pacinian corpuscle

Pancreatic ducts

Gallbladder

NEURO 1

ANATOMY OF THE BRAIN

- Lobes, gyri, sulci laterally, medially, superiorly, inferiorly
- Location of primary areas e.g. Broca's, Wernicke's, motor cortex etc. and function
- Concept of dominance
- Sensory/motor homunculi
- Ventricles and flow of CSF
- Anatomy of the corpus callosum
- Anatomy of the midbrain, pons, medulla

SKULL

- Anatomy of the skull
- Cranial foramen and structures

CEREBRAL VASCULATURE

- Meninges
- Blood brain barrier
- Arterial supply to the brain
- Circle of willis
- Which lobes are supplied by, anterior, middle and posterior cerebral arteries
- Berry aneurysms and stroke
- Venous drainage/sinuses
- CSF brain barrier
- Cavernous sinus structures

CRANIAL NERVES

- Location and function

SPINAL ANATOMY

- Anatomy of spine - spinous process, transverse process, foramen at Cervical, Thoracic , Lumbar
- Intervertebral discs and ligaments of the spine
- Muscles of the spine
- Conus medullaris, cauda equina and filum terminale

SPINAL COLUMN AND ASCENDING/DESCENDING PATHWAYS

- White/grey matter and tracts
- Anatomy of spinal column
- Dorsal column, medial lemniscus
- Spinothalamic pathway
- Corticospinal pathway
- Brown-Sequard

FLOOR OF FOURTH VENTRICLE AND BRAINSTEM

- Anatomy, nuclei as seen in a posterior view of the brainstem

EMBRYOLOGY

- Neurulation
- Formation of ventricles
- Prosencephalon (forebrain), mesencephalon (midbrain), rhombencephalon (hindbrain) and their divisions and formation

MEMORY

- Types of memory
- Locations - prefrontal cortex, amygdala, hippocampus, parietal lobe, anterior cingulate gyrus

This is not an official University document. It was made by a student as a simple review of the study material. Beware of any potential inaccuracies.

NEURO 2

AXONS AND AXONAL TRANSMISSION

- Structure of an axon
- Neurotransmitter release
- Axonal and synaptic impulse
- Types of synapse - excitatory, inhibitory, modulatory
- Action potentials of a neuron

PAIN

- Definitions of nociceptive and neuropathic pain
- Anaesthetics and analgesics
- C nerve fibres and A delta fibres
- Periaqueductal gray
- Substance P
- Melzack-wall pain gate
- Areas of pain recognition - prefrontal, amygdala, anterior cingulate gyrus, sensorimotor cortex
- Descending pain pathways
- Action of opioids

NEUROMUSCULAR JUNCTION, MUSCLE SPINDLES AND TENDON GOLGI BODIES

- Mechanism of neuromuscular transmission
- Motor end plates / motor unit
- Tendon golgi - structure, innervation, mechanism
- Muscle spindle - structure, innervation, mechanism
- Motor control - voluntary and involuntary
- Stretch, withdrawal, inverse stretch, clasp knife reflexes
- Muscular weakness (upper motor neuron, lower motor neuron, neuromuscular junction)

VISION

- Visual fields and pupillary pathways - hemianopias etc
- The eye - anatomy
- Layers of the retina
- Ocular muscles and their innervation

AUDITORY SYSTEMS

- Auditory conduction
- Vestibulo-cochlear system
- Function of the vestibular system
- Organ of Corti
- I'M AUDITORY - auditory pathways

BASAL GANGLIA AND LIMBIC SYSTEM

- Anatomy, location and structure - lobes and fissures, coronal and horizontal view
- Rostral (inhibitory) and caudal (excitatory) groups
- Function
- Interaction with striatum and substantia nigra
- Limbic system - structure, function and Papez circuit

CEREBELLUM

- Structure, anatomy and function
- Modification of motor neurons
- Inputs and outputs of the cerebellum
- Communication - mossy fibres, climbing fibres, purkinje fibres, and the cerebellar peduncles
- Symptoms of cerebellar damage

SUGER 1

ANATOMY

- Anatomy of the inguinal canal - borders and structures (esp. spermatic cord), inguinal herniation
- Anatomy of the testicles
- Anatomy of the kidney and adrenal glands
- Blood flow in the kidneys
- Ureteric narrowings
- Branches of the abdominal aorta
- Anatomy of the posterior abdominal wall and the lumbar plexus
- Anatomy of the bladder
- Anatomy of female genitalia - uterus, vagina, external
- Anatomy of male genitalia - testicles, penis, prostate, ejaculatory duct
- Pelvic floor muscles
- UG triangle

RENAL PHYSIOLOGY (note this section is quite a lot of physiology)

- GFR
- Filtration and pressures at the glomerulus - including calculations
- Filtration barrier
- Concepts of osmolality and osmolarity
- Structure of a nephron
- Ion and water transport at the nephron
- Effect of angiotensin 2, parathyroid hormone, aldosterone, atrial natriuretic peptide, vasopressin
- Urinary buffers and the law of mass action - ammonium and phosphate buffers and site of action

ACIDOSIS/ALKALOSIS

- Respiratory/metabolic acidosis/alkalosis and renal/respiratory compensation

RENAL ENDOCRINOLOGY

- RAAS
- Structure of the adrenal glands and hormone production - androgens, mineralocorticoids, glucocorticoids
- Function of cortisol
- Function of adrenaline and alpha/beta receptors at body
- Hormone receptor locations, secondary messenger theory and action of hormones at cell membrane, cytoplasm and nucleus
- EPO

SKIN

- Layers of the skin
- Junctions and adhesion molecules
- The skin as a barrier - brick wall model
- Effect of increased/decreased adhesion
- Effect of raised/lowered pH on skin
- Red/itchy/dry skin - physiological causes of
- Hair follicle and acne

EMBRYOLOGY

- Development of the kidney - pronephros, mesonephros, metanephros (and the ureteric bud)
- Mullerian and Wolffian ducts

SUGER 2

PITUITARY ENDOCRINOLOGY

- Purpose of the endocrine system
- Types of hormones (x2) - make at response, release at response
- Negative and positive feedback loops
- Differences between the anterior and posterior pituitary gland
- Axis of the anterior and posterior pituitary gland - oxytocin, vasopressin, ACTH, TSH, LH, GH, prolactin

PANCREATIC ENDOCRINOLOGY

- Cell types of the Islets of Langerhans and hormones - insulin, glucose, somatostatin
- Mechanism of insulin secretion
- Action of insulin at cells - mobilisation of GLUT-4
- Physiological response to raised/lowered glucose

THYROID ENDOCRINOLOGY

- Anatomy of the thyroid
- Production of T3 and T4
- Function of the thyroid and thyroxine

PREGNANCY AND MENSTRUAL CYCLE

- Hormonal changes - the different hormones produced during pregnancy and their actions
- Maternal adaptations - cardiovascular, veins, skin
- Initiation of labour - hormonal involvement
- Layers of the uterus and cervical ripening
- The placenta - hormones, function, structure and development
- Follicular development
- The menstrual cycle - follicular phase, ovulation and luteal phase
- Hormonal levels during the menstrual cycle (and identification from graph)
- Fertilisation and implantation

REPRODUCTION

- SRY gene, MIF, dihydrotestosterone
- Meiosis
- Oogenesis, spermatogenesis, spermiogenesis
- Hypothalamic-pituitary-gonadal axis
- Changes at puberty
- Blood testes barrier
- Physiological changes at menopause

CONTINENCE AND MICTURITION

- Control of micturition
- Mechanisms of voiding and storage

HISTOLOGY

- Histology of the nephron
- Histology of the spermatic cord - seminiferous tubule, epididymis, vas etc.
- Histology of the urethra and prostate
- Histology of vaginal epithelial squames
- Proliferative and secretory endometrium
- Corpus luteum
- Anterior and posterior pituitary gland, pineal gland, parathyroid, thyroid (follicular cells and c cells), pancreatic islets and suprarenal cortex and medulla
Parathyroid

- Pancreatic islets
- Suprarenal cortex and medulla
- Leydig cells
- Hairy skin, epithelial layers
- Breast tissue (lactating and non-lactating), lactiferous duct

EMBRYOLOGY

- Genital development - the indifferent stage
- Primordial germ cell migration
- Development of the testes
- Development of external genitalia
- Uterine development from the Mullerian duct and formation of the vagina
- Development of the bladder and urethra

MSK

ANATOMY - muscles, innervations and actions

- Muscles and innervations of the anterior/medial thigh - femoral triangle, quadriceps
- Gluteal region and posterior thigh - including pelvis and greater/lesser sciatic foramen
- Anterior and lateral leg - including blood supply, the patellar, tibia, fibular
- The foot - dorsal and plantar aspects, particular attention to the bones
- Lower limb joints - hip, knee, ankle, Hilton's law
- Blood supply of the lower limb
- Shoulder and back - rotator cuff and motions
- Posterior aspect of the arm and the scapula
- The axilla and the brachial plexus
- Anterior aspect of the arm
- Forearm and the cubital fossa - paths of the radial and ulnar arteries
- The hand - carpal bones, **innervation**, superficial palmar arch, carpal tunnel, muscles
- Myotomes of the arms and legs
- Joints of the upper limb - elbow, wrist, finger

BONES

- Function of bone
- Types of bone - primary, secondary, long, short, flat, irregular, sesamoid
- Endochondral ossification
- Intramembranous ossification
- The axial and appendicular skeleton
- The physiological response of bone to activity levels, strain and bone loss/formation
- Calcium homeostasis at the kidney, gut and bone - including sources of calcium and absorption at the gut
- The absorption of vitamin D

HORMONES

- The actions and axis of parathyroid hormone, and calcitonin

FRACTURE AND HEALING

- Site, pattern, angulation, joint, skin
- The process of healing - haematoma, inflammation, repair, remodelling

LIGAMENTS AND TENDONS

- Composition and hierarchy (tropocollagen -> ... tendon)
- Collagen synthesis
- Differences between ligament and tendon
- Fibrous and fibrocartilaginous insertion into entheses
- Types of joint (and functional classification) plus examples of each
- Composition of hyaline cartilage
- Classes of synovial joint

THE CELLS OF BONE

- Osteoclasts, osteoblast, osteocyte - function and maturation
- Remodelling of bone - breakdown by collagenases and MMPs
- Rank signalling system
- The concept of coupling and balance in osteoblast/osteoclast communication

HISTOLOGY

- Types of muscle - smooth, skeletal, cardiac and their structure
- Skeletal muscle terminology - sarcomere -> epimysium
- Sarcomere structure and recognition of bands

- Skeletal muscle types - 1, 2a, 2b
- Sharpey's fibers
- Muscle spindle
- Recognising cartilage - hyaline, elastic, fibrous
- Structure and organisation of primary and secondary bone - Haversian canal etc.
- Recognising structures in mineralised and decalcified bone
- Recognising osteoblasts and osteoclasts
- Endochondral ossification and zone of hyperplasia etc.
- Developing membrane bone

PUBLIC HEALTH

2 public health documents exist for phase 1a and 1b from previous years. Content for this talk should follow these. If you are keen to teach this session please e-mail me and I will send you the documents.