A&P KIT SET CONTENTS

METABOLIC
(1-a) Anabolism
(1-b) Catabolism
(1-c) Lipase
(1-d) Protease
(1-e) Amylase
(1-f) Sucrase
(1-g) Maltase
(1-h) Lactase
(1-i) Enzyme catalyst
(1-j) Cofactor
(1-k) Coenzyme
(1-l) Oxidation
(1-m) Anaerobic respiration
(1-n) Aerobic respiration
(1-o) Adenosine triphosphate (ATP)
(1-p) Pyruvic acid
(1-q) Urea
(1-r) Triglyceride
(1-s) Ketone
(1-t)Deoxyribonucleic acid (DNA)
(1-u) Riboneucleic acid (RNA)
(1-v) Uric Acid
(1-w) Lactic Acid
(1-x) Bicarbonate

ORGANELLE
(2-a) Cell membrane
(2-b) Tight junctions
(2-c) Desmosomes
(2-d) Gap junctions
(2-e) Cytoplasm
(2-f) Endoplasmic reticulum
(2-g) Ribosome
(2-h) Golgi apparatus
(2-i) Mitochondria
(2-j) Lysosomes
(2-k) Peroxisomes
(2-l) Centrosome
(2-m) Cilia
(2-n) Flagella
(2-o) Vesicles
(2-p) Microfilaments
(2-q) Microtubules
(2-r) Inclusions
(2-s) Nucleus
(2-t) Nuclear envelope
(2-u) Nuclear pores
(2-v) Nucleolus
(2-w) Chromatin
(2-x) Diffusion
(2-y) Facillitated diffusion
(2-z) Osmosis
(2-aa) Filtration
(2-bb) Active transport
(2-cc) Pinocytosis
(2-dd) Phagocytosis
(2-ee) Receptor mediated endocytosis
(2-ff) Exocytosis
(2-gg) Interphase
(2-hh) Karyokinesis
(2-ii) Cytokinesis
(2-jj) Cell differentiation

EPITHELIAL TISSUE
(2-kk) squamous epithelium
(2-ll) cuboidal epithelium
(2-mm) columnar epithelium
(2-nn) psuedostratified squamous epithelium
(2-oo) stratified squamous epithelium
(2-pp) stratified cuboidal epithilieum
(2-qq) stratified columnar epithelium
(2-rr) transitional epithelium

CONNECTIVE TISSUE
(2-ss) fibroblasts
(2-tt) macrophages
(2-uu) mast cells
(2-vv) collagenous fibers
(2-ww) elastic fiber
(2-xx) reticular fiber
(2-yy) loose fibrous connective tissue
(2-zz) adipose tissue
(2-aaa) dense fiberous connective tissue
(2-bbb) elastic connective tissue
(2-ccc) reticular connective tissue
(2-ddd) hyaline cartilage
(2-eee) elastic cartilage
(2-fff) fibrocartilage
(2-ggg) bone

MUSCLE TISSUE
(2-hhh) skeletal muscle tissue
(2-iii) smooth muscle tissue
(2-jjj) cardiac muscle tissue

NERVE TISSUE
(2-kkk) neurological cells

TEETH
(3-a) Gingiva
(3-b) Enamel
(3-c) Dentin
(3-d) Pulp cavity
(3-e) Root canal
(3-f) Alveolar process
(3-g) Periodontal ligament
(3-h) Cementum

SALIVARY GLAND
(4-a) Parotid gland
(4-b) Parotid duct (stenson's duct)
(4-c) Submandibular gland
(4-d) Whorton's duct
(4-e) Sublingual glands
(4-f) Rivinus's duct
(4-g) Serous cells
(4-h) Mucous cells
(4-i) Parasympathetic response
(4-j) Sympathetic response
(4-k) Tonsils
(4-l) Taste (gustatory) cell

STOMACH
(5-a) Pharynx
(5-b) Esophagus
(5-c) Esophageal sphincter
(5-d) Mucous membrane
(5-e) Gastric gland
(5-f) Mucous (goblet) cells
(5-g) Acetylcholine
(5-h) Histamine
(5-i) Lipase
(5-j) Chief (peptic) cells
(5-k) Hydrochloric acid
(5-l) Pepsinogen
(5-m) Parietal (oxyntic) cells
(5-n) Intrinsic factor
(5-o) Somatostatin
(5-p) Gastrin
(5-q) Pyloric Sphincter
(5-r) Leptin

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(6-a) Pancreatic acinar cells
(6-b) Acinar tubules
(6-c) Pancreatic duct
(6-d) Hepatopancreatic ampulla
(6-e) Hepatopancreatic sphincter (sphincter of Oddi)
(6-f) Pancreatic amylase
(6-g) Pancreatic lipase
(6-h) Trypsin
(6-i) Chymotripsin
(6-j) Carboxypeptidase
(6-k) Islets of langerhan
(6-l) Alpha cells (glucagons)
(6-m) Beta cells (insulin)
(6-n) Delta cells (somatostatin)

SMALL INTESTINE
(7-a) Duodenum
(7-b) Jejunum
(7-c) Ileum
(7-d) Mesentery
(7-e) Cholysistokinin
(7-f) Enterokinase
(7-g) Peptidase
(7-h) Nucleases
(7-i) Secretin
(7-j) Peyer's patches
(7-k) Villi/microvilli
(7-l) Lacteal
(7-m) Nerve fibers
(7-n) Brunner's glands
(7-o) Mucous cells
(7-p) Cellular turnover
(7-q) Intestinal glands
(7-r) Goblet cells
(7-s) Peristalsis

LARGE INTESTINE
(8-a) Orrifice of appendix
(8-b) Vermiform of appendix
(8-c) Illeocecal valve
(8-d) Cecum
(8-e) Ascending
(8-f) Hepatic flexure
(8-g) Transverse
(8-h) Spleenic
(8-i) Descending
(8-j) Sigmoid
(8-k) Rectum
(8-l) Anal canal
(8-m) Anus
(8-n) Rectal vein
(8-o) Mucous membrane
(8-p) Goblet cells
(8-q) Intestinal flora
(8-r) Gastrocoloc nerve reflex
(8-s) Parasympathetic reflex

LIVER
(9-a) Hepatic cells
(9-b) Kupffer cells
(9-c) Hepatic duct
(9-d) Common bile duct
(9-e) Macrophages
(9-f) Gallbladder
(9-g) Cystic duct
(9-h) Somatomedin
(9-i) Albumin
(9-j) Alpha globulins
(9-k) Prothrombin
(9-l) Thrombin
(9-m) Fibrinogen
(9-n) Fibrin
(9-o) Beta globulins
(9-p) Ferrin
(9-q) Bile salts
(9-r) Bile pigment
(9-s) Cholesterol
(9-t) Electrolytes
(9-u) Nattokinase

KIDNEY/BLADDER
(10-a) Cortical nephron
(10-b) Jaxtamedullary nephron
(10-c) Glomerular capillary
(10-d) Glomerular capsule
(10-e) Kidney stone
(10-f) Juxtaglomerular cells
(10-g) Transforming growth factor beta
(10-h) Erythropoietin
(10-i) Renin
(10-j) Ureters
(10-k) Micturition reflex
(10-l) Internal urethral sphincter
(10-m) External urethral sphincter
(10-n) Urethra
(10-o) Urethral glands

PINEAL
(11-a) Pinealocytes
(11-b) Interstitial Cells
(11-c) Perivascular Cells
(11-d) Phagocyte
(11-e) Pineal Neurons
(11-f) Peptidergic Cells
(11-g) Follicle
(11-h) Serotonin
(11-i) Melatonin
(11-j) Tryptophan
(11-k) Dimethyltryptamine
(11-l) Hydroxytryptophan

PITUITARY
(12-a) Neural Ectoderm
(12-b) Oral Ectoderm
(12-c) Median Eminence
(12-d) Pars Tuberalis
(12-e) Hypothalamic Input
(12-f) Melanocyte
(12-g) Pars Intermedia
(12-h) Neurohypophysis
(12-i) Somatotrope cells
(12-j) Lactotrope Cells
(12-k) Thyrotrope cells
(12-l) Corticotrope cells
(12-m) Gonadotrope cells
(12-n) Antidiuretic hormone
(12-o) Oxytocin
(12-p) Blood Supply

THYROID
(13-a) Thyroid Eithelial Cells
Parafollicular Cells
(13-b) T4
(13-c) T3
(13-d) Calcitonin
(13-e) Thyroglobulin
(13-f) PTH
(13-g) TGB
(13-h) TTR
(13-i) Blood Supply

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(14-a) Chromafin Cells
(14-b) Norepinephrine
(14-c) Epinephrine
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(14-e) Cortisol
(14-f) Androgens
(14-g) Angiotensin mechanism
(14-h) DHA
(14-i) Blood Supply

CARDIOVASCULAR
(15-a) Heart muscle
(15-b) Coronary arteries
(15-c) Cardiac veins
(15-d) Coronary sinus
(15-e) Pericardium
(15-f) Serous Fluid
(15-g) Right atrium
(15-h) Left atrium
(15-i) Interatrial septum
(15-j) Atrioventricular orifice (A-V valve)
(15-k) Superior vena cava
(15-l) Inferior vena cava
(15-m) Atrial cell
(15-n) Tricuspid valve
(15-o) Right ventrical
(15-p) Pulmonary valve
(15-q) Pulmonary artery
(15-r) Pulmonary veins
(15-s) Left atrium
(15-t) Bicuspid (mitral) valve
(15-u) Left ventrical
(15-v) Aortic valve
(15-w) Papillary muscles
(15-x) Chordae tendineae
(15-y) S-A node
(15-z) A-V node
(15-aa) A-V bundle
(15-bb) Accelerator nerves
(15-cc) Arteries
(15-dd) Arterioles
(15-ee) Capillaries
(15-ff) Venules
(15-gg) Veins
(15-hh) Precapillary sphincter
(15-ii) Barorecptor

LUNGS
(16-a) Septum
(16-b) Cilia
(16-c) Goblet cells
(16-d) Olfactory cells (nasal)
(16-e) Frontal sinus
(16-f) Ethmoidal sinus
(16-g) Sphenoidal sinus
(16-h) Maxillary sinus
(16-i) Nasopharynx
(16-j) Oropharynx
(16-k) Laryngopharynx
(16-l) Larynx
(16-m) Vocal cords
(16-n) False vocal cords
(16-o) Epiglottis
(16-p) Laryngeal cartilage
(16-q) Laryngeal muscles
(16-r) Trachea
(16-s) Respiratory bronchials
(16-t) Alveolar ducts
(16-u) Alveolar sacs
(16-v) Alveoli
(16-w) Capillary network
(16-x) Pulmonary artery
(16-y) Pulmonary vein
(16-z) Pleural sac
(16-aa) Diaphragm
(16-bb) Phrenic nerve
(16-cc) Surfactant cells
(16-dd) Pneumotaxic neuron
(16-ee) Phagocytic cells
(16-ff) Oxyhemoglobin
(16-gg) Carbaminohemoglobin

BRAIN
(17-a) Neural Tube
(17-b) Rhombomeres
(17-c) Mesencephalon Midbrain
(17-d) Pons Variolii
(17-e) Ventricular
(17-f) Cerebellum
(17-g) Cerebellum
(17-h) Cerebellum
(17-i) Cerebellum
(17-j) Cerebellum
(17-k) Medulla Oblongata
(17-l) Medulla Oblongata
(17-m) Tectum
(17-n) Cerebral Peduncle
(17-o) Epithalamus
(17-p) Thalamus
(17-q) Hypothalamus
(17-r) Subthalamus
(17-s) Basal Ganglia
(17-t) Rhinencephalon
(17-u) Frontal Lobe
(17-v) Temporal Lobe
(17-w) Parietal Lobe
(17-x) Occipital lobes
(17-y) Hippocampus
(17-z) Amygdala
(17-aa) Insular Cortex
(17-bb) Cingulate Cortex
(17-cc) Limbic

SPINAL CORD
(18-a) Dura mater
(18-b) Dural sinuses
(18-c) Pia mater
(18-d) Arachnoid mater
(18-e) Subarachnoid space
(18-f) Cerebral spinal fluid
(18-g) Choroids plexuses
(18-h) Fasciculus gracilis tract
(18-i) fasciculus cuneatus tract
(18-j) Spinalthalmic tracts
(18-k) Spinocerebellar tracts
(18-l) corticospinal tracts
(18-m) reticulospinal tracts
(18-n) rubrospinal tracts
(18-o) Sympathetic nerves
(18-p) Parasympathetic nerves
(18-q) Olfactory
(18-r) Optic
(18-s) Oculomotor
(18-t) Trochlear
(18-u) Trigeminal (ophthalmic)
(18-v) Trigeminal (maxillary)
(18-w) Trigeminal (mandibular)
(18-x) Abducens
(18-y) Facial
(18-z) Vestibulor branch
(18-aa) Cochlear branch
(18-bb) Glossopharyngeal
(18-cc) Vagus
(18-dd) Cranial branch
(18-ee) Spinal branch
(18-ff) Hypoglossal

NEURON
(19-a) Dentrites
(19-b) Axon
(19-c) Synaptic knobs
(19-d) Synaptic vesicles
(19-e) Neurotransmitters
(19-f) Neuromodulator
(19-g) Enkephalins
(19-h) Beta endorphine
(19-i) Substance P
(19-j) Myelin sheath
(19-k) Schwann cells
(19-l) Sensory neurons
(19-m) Interneurons
(19-n) Motor neurons

LYMPHATIC
(20-a) Lymphatic capillaries
(20-b) Lacteals
(20-c) Lymphatic vessels
(20-d) Lymph node
(20-e) Lymphocyte
(20-f) Collecting ducts
(20-g) Tonsils

THYMUS
(21-a) Thymosis

SPLEEN
(22-a) White pulp
(22-b) Red pulp
(22-c) Endogenous pyrogen
(22-d) Neutrophil
(22-e) Monocyte
(22-f) Macrophages

STRUCTURAL
(23-a) Acytylcholine
(23-b) Acetylcholinesterase
(23-c) Hemocytoblast (stem cell)
(23-d) Osteoclast
(23-e) Lysosomal enzymes
(23-f) Osteoblast
(23-g) Epiphyseal disk
(23-h) Erythroblasts
(23-i) Hydroxyapatite
(23-j) Synovial fluid
(23-k) Myoglobin

MALE REPRODUCTION
(24-a) Teste
(24-b) Seminiferous tubules
(24-c) Interstitial cells
(24-d) Epididymis
(24-e) Vas deferens
(24-f) Seminal vesicle
(24-g) Prostate gland
(24-h) Bulbourethral gland
(24-i) Semen
(24-j) Scrotum
(24-k) Penis
(24-l) Dartos muscle
(24-m) Prepuce
(24-n) Vascular spaces
(24-o) Inhibin
(24-p) Testosterone
(24-q) DHT

FEMALE REPRODUCTIVE
(25-a) Ovary
(25-b) Oocyte
(25-c) Follicle cells
(25-d) Granulosa cell
(25-e) Theca interna
(25-f) Corpus luteum
(25-g) Estrogen
(25-h) Progesterone
(25-i) Uterine (fallopian) tube
(25-j) Uterus
(25-k) Uterus lining
(25-l) Cervix
(25-m) Vaginal orifice
(25-n) Vestibular glands
(25-o) Zygote
(25-p) Placenta
(25-q) hCH
(25-r) Placental lactogen
(25-s) Relaxin
(25-t) hMH
(25-u) Alveolar glands
(25-v) Myoepithelial cells
(25-w) Lactiferous duct
(25-x) Nipple

SKIN
(26-a) Epidermis
(26-b) Dermis
(26-c) Hypodermis
(26-d) Melanocytes
(26-e) Hair follicle
(26-f) Dermal blood vessels
(26-g) Hair papilla
(26-h) Arrector pili muscle
(26-i) Nail (finger)
(26-j) Sebaceous glands
(26-k) Eccrine glands
(26-l) Apocrine glands
(26-m) Pore
(26-n) Sensory nerve fiber
(26-o) Meissner's corpuscles
(26-p) Pacinian corpuscles
(26-q) Thermoreceptors

EYES
(27-a) Eyelid[palpebra]
(27-b) Conjunctiva
(27-c) Lacrimal gland
(27-d) Canaliculi
(27-e) Puncta
(27-f) Lacrimal sac
(27-g) Nasolacrimal duct
(27-h) Eye muscles
(27-i) Cornea
(27-j) Sclera
(27-k) Choroids coat
(27-l) Ciliary body
(27-m) Ciliary muscles
(27-n) Iris
(27-o) Aqueous humor
(27-p) Canal of schlemm
(27-q) Retina
(27-r) Macula lutea
(27-s) Fovea centralis
(27-t) Rods
(27-u) Rhodopsin
(27-v) Opsin
(27-w) Transducin
(27-x) Phosphodiesterase
(27-y) Retinal
(27-z) Cones
(27-aa) iodopsin
(27-bb) Optic disk
(27-cc) Optic nerve
(27-dd) Vitreous humor
(27-ee) Lysozyme

EARS
(28-a) Auricle (pinna)
(28-b) External auditory meatus
(28-c) Ceruminous glands
(28-d) Tympanic membrane
(28-e) Tympanic cavity
(28-f) Eustachian tube
(28-g) Malleus
(28-h) Incus
(28-i) Stapes
(28-j) Oval window
(28-k) Tympanic reflex
(28-l) Perilymph
(28-m) Scala vestibule
(28-n) Endolymph
(28-o) Cochlea
(28-p) Stereocilia
(28-q) Semicircular canals
(28-r) Vestiblule
(28-s) Basilar membrane
(28-t) Organ of corti

BLOOD CELLS
(29-a) Erythrocyte
(29-b) Neutrophil
(29-c) Eosinophil
(29-d) Basophil
(29-e) Prostaglandin D2
(29-f) Leukotrienes
(29-g) Monocyte
(29-h) Heparin
(29-i) Histamine
(29-j) Lymphocyte
(29-k) T lymphocytes
(29-l) Helper T cells
(29-m) CD4
(29-n) Th1
(29-o) Th2
(29-p) Cytotoxic T cells
(29-q) Natural killer cell
(29-r) Perforin
(29-s) Suppressor T cell
(29-t) Interleukin 1
(29-u) B lymphocytes
(29-v) Immunoglobulin G (IgG)
(29-w) Immunoglobulin A (IgA)
(29-x) Immunoglobulin M (IgM)
(29-y) Immunoglobulin D (IgD)
(29-z) Immunoglobulin E (IgE)
(29-aa) Megakaryocytes
(29-bb) Thrombocytes

METABOLIC

(1-a) Anabolism	Metabolic reactions that combine smaller molecules to create larger molecules (rebuilding). This is required for cellular growth and repair. If this vial is weak, the body is not able to store energy (probably related to glucogen processing in the liver). It may also be an imbalance of the sympathetic nerves. Acidosis is generally a by-product of sympathetic nerve imbalance starting at 3 a.m. Eat more alkaline forming foods.
(1-b) Catabolism	Metabolic reactions that break larger molecules into smaller molecules (breaking down; removing waste). If this vial tests weak, enzyme or catalyst reactions may not be occurring. It may be a parasympathetic response, which would indicate an over alkaline condition, starting at 3 p.m. Eat more acid forming foods, not majoring in refined sugar, meat or dairy.
(1-c) Lipase	Fat splitting enzyme.
(1-d) Protease	Protein splitting enzyme.
(1-e) Amylase	Starch splitting enzyme.
(1-f) Sucrase	Sugar splitting enzyme for sucrose.
(1-g) Maltase	Sugar splitting enzyme for maltose
(1-h) Lactase	Sugar splitting enzyme for lactose.
(1-i) Enzyme catalyst	All cells contain the enzymes needed to help the metabolic reaction. If this vial tests weak, the person has some catalyst enzyme missing, probably above and beyond the ones listed above. This would be a cellular enzyme, not one that needs identification. Track this vial to the system being affected and clear that system (make a remedy).
(1-j) Cofactor	This vial relates to minerals needed to help enzymes bind to the molecules they need to act upon. TL this vial to nutrition kit (mineral section)
(1-k) Coenzyme	This vial relates to vitamins needed to help an enzyme complete its metabolic functions. TL this vial to the nutrition kit (vitamin section)
(1-l) Oxidation	This happens when glucose molecules are burned by cells to create energy (used to promote cellular metabolism). Oxidation creates heat and light in the body.
(1-m) Anaerobic respiration	When a glucose molecule breaks down in the cystol of the cell (without oxygen present) a series of reactions called glycolysis divide the glucose molecule into carbon atoms, water and energy (ATP). The enzymes required for respiration are contained in the mitochondria.
(1-n) Aerobic respiration	Oxygen is available in the mitochondria and molecules of glucose reach their final form of carbon dioxide, water molecules and energy (ATP). The oxygen required for respiration are contained in the mitochondria.
(1-o) Adenosine triphosphate (ATP)	This is the energy released during cellular respiration, primarily aerobic respiration in the presence of oxygen. These molecules are available as energy for metabolic reactions. The body cannot maintain healthy cells if there is not enough ATP as it is needed for all metabolic processes.
(1-p) Pyruvic acid	This is what is created when the body metabolizes glucose. It is a waste product, but used by the liver to create acetyle coenzyme A. This vial would indicate a liver weakness; inability to convert pyruvic acid.
(1-q) Urea	A by-product of protein metabolism. This vial indicates that there is too much protein for the liver to synthesize or the kidneys are not able to excrete it (generally it's a sign of liver dysfunction).
(1-r) Triglyceride	This vial means there are too many fats in the body not being metabolized or converted to energy or a storable form. This is a sign of liver weakness as it is the liver's job to do this.
(1-s) Ketone	This is a waste product created in lipid (fat) metabolism. It is excreted by the lungs and the kidneys.
(1-t)Deoxyribonucleic acid (DNA)	The information that instructs a cell to synthesize a particular protein or to perform a specific task is held in the DNA strand. If the DNA is somehow defective, all cells made from that DNA strand will also be defective. DNA is a protein. You may track cellular actions or functions to this vial to see if they are weak on a genetic level (hardware default).
(1-u) Riboneucleic acid (RNA)	DNA carries the information needed for cellular function, but RNA is what the body uses to carry those instructions out by binding to the DNA and exposing the gene. It is kind of a mediator between DNA and the actual cell processes. RNA is an enzyme. Consider this the software program.
(1-v) Uric Acid	Humans excrete a nitrogenous waste called uric acid. It is the product of nucleic acid, not protein, metabolism. Uric acid is a potent antioxidant and thus can protect cells from DNA damage, but levels cannot get too high or it may contribute to the formation of kidney stones by forming needlelike crystals in one or more joints producing the excruciating pain of gout. Uric acid is the whitish material that bird poop leaves on statues.

(1-w) Lactic Acid	Lactic acid accumulates in skeletal muscles during extensive anaerobic exercise, causing temporary muscle pain. Lactic acid is quickly removed from muscles when they resume aerobic metabolism. Lactic acid fermentation performed by lactic acid bacteria is responsible for the sour taste of old milk and is used in the production of dairy products such as cheese, yogurt, and kefir. Lactic acid fermentation also gives the sour taste to fermented vegetables such as traditionally cultured sauerkraut and pickles and many fermented starches such as poi. Lactic acid can be used as a food additive where it acts as an acidity regulator. In the food industry it is produced by heating and fermenting carbohydrates in milk whey, potatoes, cornstarch, or molasses. It is used in sweets, dressings, soft drinks (sometimes beer), infant formulas, and confectionary. Lactic acid is also the result of malolactic fermentation, a process used in winemaking to convert sharp-tasting malic acid into the gentler lactic acid. It is also interesting to note that all panic attacks and severe anxiety results from high levels of lactic acid. If you can find what spikes the acid levels, you can control the anxiety (keep in mind the cause may be emotional patterns.)
(1-x) Bicarbonate	Metabolic alkalosis occurs as a consequence of a loss of H+ from the body or a gain in HCO3-. In its pure form, it manifests as alkalemia (pH higher than 7.40). As a compensatory mechanism, metabolic alkalosis leads to alveolar hypoventilation with a rise in arterial carbon dioxide tension (PaCO2), which diminishes the change in pH that would otherwise occur. The first clue to metabolic alkalosis is often an elevated bicarbonate concentration that is observed when serum electrolytes are obtained. Remember that an elevated serum bicarbonate concentration may also be observed as a compensatory response to primary respiratory acidosis. However, a bicarbonate concentration greater than 35 mEq/L is almost always caused by metabolic alkalosis. The generation of metabolic alkalosis occurs with the loss of acid, the gain of alkali, or the contraction of the extracellular fluid compartment with a consequent change in bicarbonate concentration. The kidneys usually have an enormous capacity to excrete excess bicarbonate generated and to restore normal acid-base balance by the following mechanisms: (1) less reabsorption of bicarbonate because infused sodium bicarbonate (NaHCO3) leads to volume expansion, which reduces reabsorption of sodium ions and bicarbonate in the proximal tubule, and (2) bicarbonate secretion by B-type intercalated cells in the collecting duct that exchange bicarbonate for chloride via the apical chloride/bicarbonate (Cl-/HCO3-) countertransporter. Therefore, to sustain metabolic alkalosis, the kidneys must participate to maintain the alkalosis by overriding these mechanisms. Check the hydrochloric acid (stomach), kidney, adrenal and intestinal vials if trouble continues.

CELLULAR

ORGANELLE	All the components that make up the cell are considered an organelle.
(2-a) Cell membrane	This is the boundary surrounding the cellular contents; it is an active part of metabolic function. If it cannot hold the contents in the cell, the cell dies. The membrane is selectively permeable, meaning it allows some contents in and not others.
(2-b) Tight junctions	Junctions that fuse so that cells will bind together. These junctions form the lining of the intestine.
(2-c) Desmosomes	Junctions that "spot weld" cells; you would find this on the outer skin layer.
(2-d) Gap junctions	Junction gaps in cells that allow flow between cells, generally found in the heart and digestive tract.
(2-e) Cytoplasm	A clear jelly-like solution inside the organelle that houses cellular contents.
(2-f) Endoplasmic reticulum	Transports materials within the cell, provides attachment for ribosomes and synthesize (convert) lipids into a usable or storable form.
(2-g) Ribosome	Synthesize (convert) proteins into a usable or storable form.
(2-h) Golgi apparatus	Packages and modifies protein molecules for transport and secretion (separate sugar molecules from protein molecules and release them into the cell or outside the cell).
(2-i) Mitochondria	Release energy from food molecules and transform energy into usable form (energy = ATP).
(2-j) Lysosomes	Contain enzymes capable of digesting worn cellular parts or substances that enter cells. Consider these the garbage disposal on a cellular level.
(2-k) Peroxisomes	Contain enzymes called peroxidases which catalyze metabolic reactions that cause hydrogen peroxide. This is toxic to cells, so it also releases catalase to decompose the H^2O^2. It helps synthesize bile acids used in fat digestion, break down long fatty acid chains, degradation of rare biochemicals and detoxify alcohol. Weakness here means too many chemicals are in the body with liver and kidney weakness.
(2-l) Centrosome	Helps distribute chromosomes to new cells during cell reproduction and initiates formation of cilia.

(2-m) Cilia	Propel fluids over cellular surface (environmental chemicals destroy them).
(2-n) Flagella	These are long cilia; there is one per cell. They form the tail of the sperm cell enabling it to move.
(2-o) Vesicles	Contain various substances that recently entered the cell and store and transport newly synthesized molecules. Think of them as the distribution center.
(2-p) Microfilaments	Support cytoplasm and help move substances and organelles within the cytoplasm.
(2-q) Microtubules	Help maintain the structure of the cell.
(2-r) Inclusions	Stored nutrients in a cell (glycogen, lipids, melanin, etc.) If this tests weak, the cells are not getting enough nutrition to sustain health.
(2-s) Nucleus	Directs the activity of the cell.
(2-t) Nuclear envelope	Maintains the integrity of the nucleus and controls the passage of materials between the nucleus and cytoplasm.
(2-u) Nuclear pores	Channels in the nuclear envelope that allow dissolved substances to pass in and out of the nucleus, primarily the passage of messenger RNA.
(2-v) Nucleolus	Site of ribosome formation.
(2-w) Chromatin	Contains cellular information for synthesizing proteins needed in carrying on life processes, primarily DNA. Chromatin is made of DNA wrapped in protein molecules called histones that protect the DNA from getting "cut up" by enzymes. If this vial tests weak, enzymes have probably gotten through the protective histone covering and cells are dying.
(2-x) Diffusion	Example: exchange of oxygen and carbon dioxide. Cells are not releasing waste.
(2-y) Facillitated diffusion	Example: glucose moving through a cell membrane so the cell can convert it to energy (ATP).
(2-z) Osmosis	Example: water is not entering the cell.
(2-aa) Filtration	Example: molecules leaving blood capillaries.
(2-bb) Active transport	Example: movement of various ions and amino acids through the cell membranes. Active transport is how nutrition reaches the cell.
(2-cc) Pinocytosis	When the cell membrane engulfs minute droplets of liquid from surroundings.
(2-dd) Phagocytosis	When the cell membrane engulfs solid particles from surroundings. Example: white blood cell engulfing a bacterial cell.
(2-ee) Receptor mediated endocytosis	When the cell membrane engulfs selected molecules combined with receptor proteins. Example: cell removing cholesterol-containing LDL particles from its surroundings.
(2-ff) Exocytosis	Vesicles fuse with membrane and release contents outside the cell. Example: protein secretion; neurotransmitter release.
(2-gg) Interphase	The time when a cell duplicates its contents so it will have enough to divide equally. S phase is the DNA duplication period, G1 and G2 phases describe the time it duplicates all the other items.
(2-hh) Karyokinesis	The part of mitosis where the nucleus (DNA) divides.
(2-ii) Cytokinesis	The part of mitosis where the cytoplasm (main body) of a cell divides.
(2-jj) Cell differentiation	When cells divide, they are duplicates of the parent cell, but they become the kind of cell needed by activating specific genes needed to make that cell the kind of cell needed by the body. Thus a cell would activate neurotransmitters if it was to become a nerve cell, etc. The DNA in the cell, divided in karyokinesis, is responsible for cell differentiation.
EPITHELIAL TISSUE	Protect, secrete, absorb and excrete; they cover the body surfaces and compose glands.
(2-kk) squamous epithelium	Air sacs of lungs, walls of capillaries, linings of blood vessels and lymph vessels contain these cells.
(2-ll) cuboidal epithelium	Surface of the ovaries, linings of kidney tubules and ducts of certain glands contain these cells.
(2-mm) columnar epithelium	Linings of the uterus and organs of the digestive tract contain these cells.
(2-nn) psuedostratified squamous epithelium	Lining of respiratory passages and reproductive tract contain these cells.
(2-oo) stratified squamous epithelium	Outer layer of skin, linings of the mouth cavity, throat, vagina and anal canal are made of these cells.
(2-pp) stratified cuboidal epithilieum	Lining of the large sweat glands ducts, salivary glands and the pancreas are made of these cells.
(2-qq) stratified columnar epithelium	These cells are located in the male urethra and parts of the pharynx.
(2-rr) transitional epithelium	These cells are located in the inner lining of the urinary bladder and passageways of the urinary tract.
CONNECTIVE TISSUE	Bind, support, protect, fill spaces, store fat, produce blood cells; found throughout the body.
(2-ss) fibroblasts	Secrete proteins that become fibers.

(2-tt) macrophages	Clear foreign particles from tissues by phagocytosis (engulfing foreign particles).
(2-uu) mast cells	Release substances that may help prevent blood clotting and promote inflammation.
(2-vv) collagenous fibers	Maintain structural integrity. Cartilage is made of this. See structural.
(2-ww) elastic fiber	Provide elastic quality to parts that stretch.
(2-xx) reticular fiber	Form supportive networks within tissues.
(2-yy) loose fibrous connective tissue	Bind organs together, hold fluids; found beneath the skin, between muscles, beneath epithelial tissues.
(2-zz) adipose tissue	Protects, insulates and stores fat; found beneath the skin, around the kidneys, behind the eyeballs and on the surface of the heart.
(2-aaa) dense fiberous connective tissue	Bind organs together; found in tendons, ligaments and dermis.
(2-bbb) elastic connective tissue	Provides elastic quality; found in connecting parts of the backbone and in walls of the arteries and airway passages.
(2-ccc) reticular connective tissue	Supports; found in the walls of the liver, spleen and lymphatic organs.
(2-ddd) hyaline cartilage	Supports, protects and provides framework; found at the ends of bones, nose and the rings in the walls of respiratory passages.
(2-eee) elastic cartilage	Supports, protects and provides flexible framework; found in the framework of the external ear and part of the larynx.
(2-fff) fibrocartilage	Supports, protects and absorbs shock; found between bony parts of backbone, parts of pelvic girdle and the knee.
(2-ggg) bone	Supports, protects and provides framework; found in the skeleton and the middle ear (osseus bones).
MUSCLE TISSUE	Used for movement; attach to bones, found in the walls of hollow internal organs and the heart.
(2-hhh) skeletal muscle tissue	Usually attached to bones.
(2-iii) smooth muscle tissue	Found on the walls of hollow internal organs.
(2-jjj) cardiac muscle tissue	Found in the heart muscle.
NERVE TISSUE	See neurons in neurological section.
(2-kkk) neurological cells	Found in the brain, spinal cord and peripheral nerves, they provide a kind of cell-to-cell communication in the nerves and connect nerves to blood vessels helping to supply nutrients from the blood to the nerves.

TEETH

(3-a) Gingiva	Refers to the gums in the mouth.
(3-b) Enamel	The hard enamel on the surface of the tooth.
(3-c) Dentin	The hard substance below the enamel which makes up most of the tooth.
(3-d) Pulp cavity	Contains blood vessels, nerves and connective tissue; found at the center of the tooth.
(3-e) Root canal	The area that carries the blood vessels to the pulp.
(3-f) Alveolar process	The socket of the tooth.
(3-g) Periodontal ligament	The ligament that holds the tooth firmly in the bone socket.
(3-h) Cementum	The area surrounding the root of the tooth.

SALIVARY GLAND

(4-a) Parotid gland	Produces saliva high in amylase (a carbohydrate splitting enzyme). They are located in front of and somewhat below each ear between the skin of the cheek and the masseter muscle
(4-b) Parotid duct (stenson's duct)	Allows saliva produced in parotid gland to enter the mouth.
(4-c) Submandibular gland	Secrete serous cells (see below), they are located in the floor of the mouth on the inside surface of the lower jaw.
(4-d) Whorton's duct	Duct that allows submandibular secretions into the mouth; they open under the tongue, near the frenulum.
(4-e) Sublingual glands	Secrete mucous cells.
(4-f) Rivinus' duct	Release sublingual gland secretions throughout the mouth.

(4-g) Serous cells	Secrete a watery fluid containing amylase, a digestive enzyme that acts as the first step in carbohydrate digestion.
(4-h) Mucous cells	Secrete a thick liquid called mucus which helps to bind food particles together and acts as a lubricant for swallowing.
(4-i) Parasympathetic response	Increases saliva production from cephalic action (thought).
(4-j) Sympathetic response	Inhibits saliva production from releasing in the presence of cephalic action (thought).
(4-k) Tonsils	Partially encapsulated lymphatic glands in the throat (see lymph for further TL).
(4-l) Taste (gustatory) cell	Those cells that make up the taste buds. Taste buds are on the sides of papillae (the tiny pink bumps you see on your tongue) with taste pores containing taste cells and taste hairs. Each of us has about 10,000 taste buds able to detect sweet (front of tongue), sour (sides of tongue), salty (entire border of tongue) and bitter (back of tongue).

STOMACH

(5-a) Pharynx	The opening in the back of the mouth before the esophagus.
(5-b) Esophagus	A hollow tube which uses a peristaltic wave to take food from the mouth to the stomach.
(5-c) Esophageal sphincter	Keeps contents of the stomach from coming back up into the esophagus/throat/mouth (located at the top of the stomach).
(5-d) Mucous membrane	Lining of the stomach.
(5-e) Gastric gland	Releases gastrin, mucous cells, chief cells and parietal cells in the stomach.
(5-f) Mucous (goblet) cells	Release mucus to protect the stomach lining and releases acetylcholine which counteracts somatostatin (histamine increases gastric juice production).
(5-g) Acetylcholine	Counteracts somatostatin.
(5-h) Histamine	Stimulates release of gastric juice.
(5-i) Lipase	Secreted in the gastric juice as a buffer for acid and for continuation of carbohydrate metabolism.
(5-j) Chief (peptic) cells	Release hydrochloric acid and pepsinogen.
(5-k) Hydrochloric acid	Released by chief cells; used to digest protein after it is converted to pepsin.
(5-l) Pepsinogen	An enzyme released by chief cells to convert hydrochloric acid to pepsin, the usable molecules for protein digestion.
(5-m) Parietal (oxyntic) cells	Release intrinsic factor and somatostatin.
(5-n) Intrinsic factor	Released by oxyntic cells for B12 absorption.
(5-o) Somatostatin	Released by oxyntic cells to counteract acidity in the stomach if it gets too high. This vial indicates acid is too high in the stomach.
(5-p) Gastrin	Generally a sign of overeating or not chewing enough, released to increase gastric juice production.
(5-q) Pyloric Sphincter	Valve that keeps contents of small intestine from coming up into the stomach.
(5-r) Leptin	Leptin is a protein hormone produced by adipose (fat) tissue. Its main receptors seem to be the hypothalamus. Leptin is released by fat cells in amounts mirroring overall body fat stores. Thus, circulating leptin levels give the brain a reading of energy storage for the purposes of regulating appetite and metabolism. Normally, leptin's function is to reduce appetite and induce fat burning (among many other functions). That is what high leptin signaling in a brain would do. Low leptin (in the brain) is an indication to eat more and store more fat (to successfully reproduce and to live long enough to do so). Leptin is also regulated (downward) by melatonin during the night. In short, this vial indicates that you probably like to eat too much!

PANCREASE NOTE: cholysistokinin made by the small intestine initiates secretion of pancreatic juice.

(6-a) Pancreatic acinar cells	Make pancreatic juice; the bulk of the pancreas is made of acinar cells.
(6-b) Acinar tubules	Transport the pancreatic juice from the acinar cells to the pancreatic duct.
(6-c) Pancreatic duct	Release pancreatic secretions into the hepatopancreatic ampulla, the acinar tubules empty into it. It runs the length of the pancreas catching the secretions carried by the acinar tubules.
(6-d) Hepatopancreatic ampulla	Release pancreatic secretions into the hepatopancreatic sphincter.
(6-e) Hepatopancreatic sphincter (sphincter of	Release pancreatic secretions into the small intestine. If this is weak, there may be gallstones blocking it or scar tissue.

Oddi)	
(6-f) Pancreatic amylase	Used to digest carbohydrates.
(6-g) Pancreatic lipase	Used to digest fat.
(6-h) Trypsin	Secreted by the pancreas, it is used to split proteins, but it is not activated until enterokinase in the small intestine acts on it.
(6-i) Chymotripsin	Secreted by the pancreas, it is used to split proteins, it is activated by trypsin.
(6-j) Carboxypeptidase	Secreted by the pancreas, it is used to split proteins, it is activated by trypsin.
(6-k) Islets of langerhan	Secrete alpha, beta and delta cells.
(6-l) Alpha cells (glucagons)	Secrete glucagons, a protein that stimulates the liver to break down glycogen into glucose. It also converts noncarbohydrates, such as amino acids into glucose if too much protein is supplied or not enough sugar is supplied in the diet. Glucagon also stimulates the breakdown of fats into fatty acids. Alpha cells will become over stimulated if the blood sugar gets too low because they are stimulated to release extra glucagon so the liver will produce glucose (blood sugar). Thus alpha cell weakness can be a sign of low blood sugar.
(6-m) Beta cells (insulin)	Secrete insulin, which instructs the liver to convert glucose to glycogen so there won't be too much sugar in the blood (opposite of glucagons; alpha cells). Weakness indicates blood sugar is too high; not digesting or eating too much sugar. Check amylase levels and liver health as the primary factor.
(6-n) Delta cells (somatostatin)	Regulates glucagons and insulin levels so the body will maintain a constant blood sugar level.

SMALL INTESTINE

(7-a) Duodenum	First part of the small intestine tube.
(7-b) Jejunum	Second part of small intestine tube.
(7-c) Ileum	Third part of small intestine tube.
(7-d) Mesentery	Peritoneum that contains the blood vessels, nerves and lymphatic vessels that run to (supply) the small intestine.
(7-e) Cholysistokinin	Triggers the hepatopancreatic sphincter to open long enough for a squirt of bile to be released into the small intestine (in the presence of fat and proteins).
(7-f) Enterokinase	Released by mucous cells to activate trypsin (protein splitting) from the pancreas.
(7-g) Peptidase	Secreted by mucous cells to convert peptides into amino acids.
(7-h) Nucleases	Used to alkalize the chyme that came from the stomach.
(7-i) Secretin	Released to help neutralize acidic contents (alkalizer).
(7-j) Peyer's patches	Partially encapsulated lymph nodules in the ileum (see lymph).
(7-k) Villi/microvilli	Absorb nutrients and deliver them into the blood stream, contain enzymes on the cell tips.
(7-l) Lacteal	Lymphatic capillaries that absorb nutrition, mostly fatty acids, to be transported to tissues.
(7-m) Nerve fibers	Trigger hormone release, monitor intestinal environment.
(7-n) Brunner's glands	Secrete mucous cells.
(7-o) Mucous cells	Release amylase and help rebuild the intestinal lining.
(7-p) Cellular turnover	Epithelial cells are replaced every 3-6 days in the small intestine. If they are not, dead cells accumulate in the intestine blocking absorption of nutrients.
(7-q) Intestinal glands	Secrete a watery fluid that traps nutrients and floats them to villi for absorption. Weakness here may indicate dehydration.
(7-r) Goblet cells	Secrete mucous to protect the intestinal wall. Weakness indicates over acidity in SI.
(7-s) Peristalsis	The movement of the intestine to keep the chyme moving. Weakness indicates nerve dysfunction, lack of exercise or lack of fiber.

LARGE INTESTINE

(8-a) Orrifice of appendix	The mouth of the appendix.
(8-b) Vermiform of appendix	The finger-like projection in the cecum part of the intestine.
(8-c) Illeocecal valve	The valve that separates the small and large intestine.
(8-d) Cecum	A small area in the beginning of the colon where the appendix is.
(8-e) Ascending	The section that moves from the hip area to the right, upper abdominal area.
(8-f) Hepatic flexure	The colon makes a turn behind the liver (hepatic flexure).
(8-g) Transverse	The part of the colon that moves across the abdomen behind the lower ribs.
(8-h) Spleenic	The part of the colon that makes a turn behind the spleen (spleenic flexure) toward the descending colon.

(8-i) Descending	The part of the colon that moves down toward the left hip.
(8-j) Sigmoid	The colon then makes an S-shape called the sigmoid colon.
(8-k) Rectum	The rectum becomes the anal canal for a few centimeters before it ends with the anus.
(8-l) Anal canal	The last few inches of the colon.
(8-m) Anus	The end of the colon, where it opens to the outside, may be weak from surgical cut or anal intercourse (very negative to the body).
(8-n) Rectal vein	Inflammation causes hemorrhoids.
(8-o) Mucous membrane	Lines the intestine; weakness indicates over acidity; a great place for hosting microorganisms.
(8-p) Goblet cells	Secretes mucous to protect colon walls, controls pH. If weak, indicates over acid, overworking.
(8-q) Intestinal flora	Helps break down cellulose (fiber) and helps to synthesize vitamins like K, B12, thiamine and riboflavin.
(8-r) Gastrocoloc nerve reflex	Reflex that stimulates colon movement. Weakness indicates a lack of fiber, flora, bile, etc.
(8-s) Parasympathetic reflex	Weakness here indicates a nerve weakness or impulse from the brain.

LIVER

(9-a) Hepatic cells	Make bile and perform all tasks required by the liver.
(9-b) Kupffer cells	Remove bacteria from the blood by phagocytosis.
(9-c) Hepatic duct	Ducts used to transport secretions from hepatic cells.
(9-d) Common bile duct	Tubes that carry bile to the cystic duct.
(9-e) Macrophages	Consume old, red blood cells.
(9-f) Gallbladder	Sac that holds bile made from the liver.
(9-g) Cystic duct	Tube that connects the gallbladder to the common bile duct.
(9-h) Somatomedin	Hormone released when GH (growth hormone) signals from pituitary stimulate growth of cartilage.
(9-i) Albumin	Albumin makes up 60% of the total plasma protein, synthesized by the liver and used as a transport system and is very important for maintaining osmotic pressure (if globulins are also weak, edema is generally present).
(9-j) Alpha globulins	Synthesized by the liver for transport of fat to the cells (a good thing), this vial may test if there is infection.
(9-k) Prothrombin	An alpha globulin produced by the liver, carried in the plasma. It is needed to make thrombin for clotting.
(9-l) Thrombin	Converted from prothrombin for blood clotting, it works by catalyzing a reaction that fragments fibrinogen.
(9-m) Fibrinogen	Stimulated by thrombin, it is needed for blood coagulation, converts to fibrin. Makes up 4% of blood plasma, it is essential to blood coagulation.
(9-n) Fibrin	Created from fragments of fibrinogen, it creates a kind of mesh that blocks blood from escaping a wound.
(9-o) Beta globulins	Synthesized by the liver for transport of fat and fat soluble vitamins to the cells.
(9-p) Ferrin	The form of iron stored in the liver.
(9-q) Bile salts	Digestive aid, absorbs fatty acids, breaks up fat globules and absorbs cholesterol and vitamins A,D E, K. Weak test indicates fats are not digesting.
(9-r) Bile pigment	Consumed red blood cells (bilirubin, biliverdin) make bile pigment. Weakness indicates red blood cells are not decomposing properly (cause of jaundice).
(9-s) Cholesterol	Needed for production of bile. If this tests weak, not enough good fats or too many bad fats are being ingested.
(9-t) Electrolytes	Indicates that dehydration or mineral deficiency is present.
(9-u) Nattokinase	The enzyme that works to dissolve blood clots.

KIDNEY/BLADDER

(10-a) Cortical nephron	Cells that filter blood in the kidneys, these are in the renal cortex (surface of the kidney).
(10-b) Jaxtamedullary nephron	Cells that filter blood in the kidneys, these are in the renal medulla.
(10-c) Glomerular capillary	This is the capillary inside the glomular capsule that excretes waste into the glomular capsule to be removed as urine.
(10-d) Glomerular capsule	Waste from the blood comes through the glomerular capillary into the glomerular capsule to be sent to the bladder.

(10-e) Kidney stone	Presence of calcium oxalate, calcium phosphate, uric acid, magnesium.
(10-f) Juxtaglomerular cells	Controls aldosterone levels in adrenals.
(10-g) Transforming growth factor beta	Protein released when kidney is injured in physical trauma, its presence creates scar tissue. If no physical trauma has occurred, it may be a history of blood pressure or blood sugar imbalance. Pressure ruptures capillaries in kidney/nephrons causing the release of this hormone. Excessive sugar can do the same thing over a period of time.
(10-h) Erythropoietin	Hormone secreted to regulate rate of red blood cell formation in bone marrow.
(10-i) Renin	Enzyme secreted to regulate blood pressure.
(10-j) Ureters	Tubes that take filtered waste of blood from the kidney to the bladder.
(10-k) Micturition reflex	Activates contraction of detrusor muscle, the muscle that allows urine to exit on conscious thought.
(10-l) Internal urethral sphincter	Allows urine to enter the bladder from the ureter.
(10-m) External urethral sphincter	Relaxes on conscious thought to release urine.
(10-n) Urethra	Carries urine from the bladder to the outside of the body.
(10-o) Urethral glands	Secrete mucous in urethra to keep pH normal.

PINEAL

(11-a) Pinealocytes	Pinealocytes are the main cells of the pineal gland. They produce and secrete melatonin. Pinealocytes have an organelle called synaptic ribbon; this is considered to be a specific marker for pinealocytes. Some of the enzymes of the pinealocytes include 5-HT N-acetyl transferase and 5-hydroxyindole-O-methyltransferase which are used to convert serotonin to melatonin.
(11-b) Interstitial cells	Cells that make up he pineal gland. These cells are found in other parts of the body (like the testicles) and there, they are responsible for producing testosterone. You will find that weakness in this area will more than likely reflect weakness in the testicles as well. Correction of the pineal should correct the male issue though.
(11-c) Perivascular cells	Cells that make up he pineal gland. Weakness in these cells found in the central nervous system is associated with myelin degradation (multiple sclerosis).
(11-d) Phagocyte	Cells that make up he pineal gland. These cells ingest foreign particles, dead tissue, bacteria and other waste.
(11-e) Pineal.neurons	Cells that make up the pineal gland.
(11-f) Peptidergic cells	Cells that make up the pineal gland.
(11-g) Follicle.nutrition	Brain sand, acervuli and corpora arenacea make up the follicles that make up the nervous tissue of the pineal gland. They are composed of the nutrients -calcium phosphate, -calcium carbonate, -magnesium phosphate, -ammonium phosphate.
(11-h) Serotonin	Hormone secreted by pineal for pain, intuition and emotional completeness.
(11-i) Melatonin	Synthesized from serotonin for sleep, SAD and the pituitary. It also plays a role in circadian rhythms.
(11-j Tryptophan	Trp is a precursor for serotonin (a neurotransmitter), melatonin (a neurohormone), and niacin. The functional group of Trp is indole; see that article for more on its chemical properties. Tryptophan has been implicated as a possible cause of schizophrenia in people who cannot metabolize it properly. When improperly metabolized it creates a waste product in the brain which is toxic and causes hallucinations and delusions. Trp has also been indicated as an aid for schizophrenic patients.
(11-k) Dimethyltryptamine	Several highly speculative and as yet untested hypotheses suggest that endogenous DMT, produced in the human brain, is involved in certain psychological and neurological states. As DMT is highly probably naturally produced in small amounts by the human organism, some believe it plays a role in dreaming, near-death experiences and other mystical states. It has been speculated by the researcher Jace Callaway that DMT might be connected with visual dreaming. It is also speculated that DMT can be found in elevated amounts during times of visual dreaming or after near-death experiences.
(11-l) 5-hydroxytryptophan	5-HTP (5-Hydroxy-tryptophan) is decarboxylated to the neurotransmitter serotonin (5-HT) by the enzyme aromatic-L-amino-acid decarboxylase.

PITUITARY

(12-a) Neural ectoderm	Tissue that makes up the posterior lobe.
(12-b) Oral ectoderm	Tissue that makes up the anterior lobe.

(12-c) Median eminence	The piece of tissue that physically connects the pituitary to the brain (hypophyseal stalk).
(12-d) Pars tuberalis	Wraps the pituitary stalk.
(12-e) Hypothalamic input -TRH,-CRH,-DA,-GnRH -GHRH	The hypothalamus makes most of the hormones in the pituitary and sends them through the input.
(12-f) Melanocyte-stimulating hormone	MSH stimulates the production and release of melanin by melanocytes in the skin in hair. These are responsible for pigment color, what essentially make one race a different color from another.
(12-g) Pars intermedia -basophils -chromophobes -colloid cysts	The boundary between the anterior and posterior pituitary. It is responsible for making MSH-(12f.)
(12-h) Neurohypophysis	Also known as pars nervosa, it is known as the originating location for ADH, Oxytosin, Prolactin and Grown Hormone.
(12-i) Somatotrope cells	Release somatotropin (STH) or growth hormone (GH). GH is a protein that stimulates cells to increase in size and divide more rapidly; it enhances the movement of amino acids through cell membranes and increases the rate of protein synthesis. It also decreases the rate at which cells utilize carbohydrates and increases the rate at which they use fats.
(12-j) Lactotrope cells	Secrete prolactin (PRL). It promotes milk production and involved with the secretion of estrogen and progesterone. In males, it decreases Luteinizing Hormone (LH) because it may decrease production of male sex hormones. Too much prolactin in a man could make him infertile.
(12-k) Thyrotrope cells	Thyroid stimulating hormone (TSH). TSH is a glycoprotein that controls certain secretions from the thyroid gland. It can stimulate growth of the thyroid but too much TSH can lead to enlargement or goiter.
(12-l) Corticotrope cells	Secrete adrenocorticotropic hormone (ACTH), a peptide that controls secretions from the cortex of the adrenal gland.
(12-m) Gonadotrope cells	Secrete follicle stimulating hormone (FSH) and luteinizing hormone (LH). FSH is responsible for growth and development of egg-cell-containing follicles in the ovaries. It also stimulates estrogen. In males, FSH stimulates the initial production of sperm cells in the testes at puberty. LH promotes secretion of male and female hormones, but it is primarily used during pregnancy.
(12-n) Antidiuretic hormone	ADH, also known as Vasopressin, produces its antidiuretic effect (decreases urine formation) by causing the kidneys to reduce the amount of water they excrete and uptake it back into the blood stream to feed the cells. It can also raise the blood pressure by acting as a vasoconstrictor, thus the name vasopressin.
(12-o) Oxytocin	OT is used for fluid balance, but primarily responsible for uterine muscle and vaginal stretching during pregnancy, cervical dilation and third stage of labor contractions. It contracts cells in the breast to bring milk from the glands to the ducts and finally release it from the breast- usually stimulated by sucking on the nipple. This hormone is essential after birthing so blood vessels become closed to prevent hemorrhage. It plays a role in orgasms. Induced for feelings of love and maternal instinct. It generates feelings of trust. Known to reduce pain, cortisol and anxiety. Reduces withdrawal symptoms.
(12-p) Blood supply -hypophyseal artery -hypophyseal vein	The blood supply to the pituitary comes from the hypophyseal artery and secretes its hormones into the hypophyseal vein.

THYROID

(13-a) Thyroid epithelial cells & parafollicular cells	Produce calcitonin, T3 and T4 with the help of iodine and tyrosine.
(13-b) T4 (tetraiodothyronine)	T4, also called thyroxine, increases the rate of energy released from carbohydrates. It increases the rate of protein synthesis, accelerates growth and stimulates activity in the nervous system.
(13-c) T3 (triiodothyronine)	T3 does the same but it is five times more potent (even though thyroxine accounts for 95% of the thyroid hormones found in the blood).
(13-d) Calcitonin	A thyroid hormone secreted by the extrafollicular cells. It lowers blood calcium and phosphate ion concentrations by inhibiting release of calcium and phosphate ions from bones (a good thing), and by increasing the rate at which calcium and phosphate ions are deposited in bones.
(13-e) Thyroglobulin	Bind to hormones to store them in colloid (thyroid tissue).
(13-f) (PTH) Parathormone	PTH, or parathormone, increases blood calcium ion concentration and decreases blood phosphate ion concentration through actions in the brain, kidneys and intestines. It influences osteoclast and

	osteoblast activity (see structural section) and stimulates absorption of calcium ions from food in the intestine by influencing metabolism of vitamin D. It also causes the kidneys to conserve blood calcium ions and release more phosphate ions in the urine. The amount of calcium ions available in the blood regulates the release of PTH. Excess calcium ions (high PTH secretion overstimulates osteoclasts) in the blood creates weak muscle contractions and sluggish reflexes. Low calcium ions (low PTH secretion reduces osteoclast) in the blood may create tetanic contractions and the person could die from failure to breathe.
(13-g) (TBG) Thyroxine-binding globulin	Thyroxine-binding globulin (TBG) is one of three proteins responsible for carrying the thyroid hormones thyroxine (T4) and 3,5,3'-triiodothyronine (T3) in the bloodstream, along with transthyretin and albumin. TBG has the highest affinity for T4 and T3, but is present in the lowest concentration of the three proteins. Despite its low concentration, TBG carries the majority of T4 in serum. Due to the very low serum concentration of T4 & T3, TBG is rarely more than 25% saturated with ligand. Unlike transthyretin and albumin, TBG has a single binding site for T4/T3. Genomically, TBG is a serpin, although it has no inhibitory function like many other members of this class of proteins. TBG is synthesized primarily in the liver as a 54 kDa protein.
(13-h) (TTR) Transthyretin	Transthyretin (TTR) is a serum and cerebrospinal fluid carrier of the thyroid hormone thyroxine (T4). It functions in concert with two other proteins, thyroxine-binding globulin (TBG) and albumin in a system where TBG possesses the highest affinity, yet lowest plasma concentration, TTR has a lower affinity, yet higher concentration, and albumin is the poorest binder, but has a much higher plasma concentration. TTR also acts as a carrier of retinol (vitamin A) through an association with retinol binding protein (RBP). TTR is known to be associated with the amyloid diseases senile systemic amyloidosis (SSA), familial amyloid polyneuropathy (FAP), and familial amyloid cardiomyopathy (FAC). TTR was originally called prealbumin because it ran faster than albumin on electrophoresis gels.
(13-i) Blood Supply -thyroid artery> superior:inferior -external carotid -subclavian artery -thyroid ima artery -vein>superior,middle, inferior	The thyroid gland is supplied by two arteries: the superior and inferior thyroid arteries. The superior thyroid artery is the first branch of the external carotid, and supplies mostly the upper half of the thyroid gland, while the inferior thyroid artery is the major branch of the thyrocervical trunk, which comes off of the subclavian artery. In 10% of people, there is also a thyroid ima artery that arises from the brachiocephalic trunk or the arch of the aorta. Lymph drainage follows the arterial supply. There are three main veins that drain the thyroid. The superior, middle and inferior thyroid veins.

ADRENAL

(14-a) Chromafin cells - neuroendocrine>chromafin_cells -splanchnic nerve	Produces norepinephrine (tyrosine is converted to dopa, dopa to dopamine and dopamine to norepinephrine).
(14-b) Norepinephrine	Converted from dopa to increase blood pressure, force cardiac muscle contraction, elevate blood pressure, increase breathing rate and decrease digestive ability. Although the hormones are almost identical, the adrenal will usually secrete 80% epinephrine. Sympathetic nerve impulses trigger release of these hormones, generally by way of the hypothalamus in response to stress. The first reaction is the oxidation into Dihydroxyphenylalanine (L-DOPA), followed by decarboxylation into the neurotransmitter dopamine, and the final β-oxidation into norepinephrine.
(14-c) Epinephrine	Synthesized from norepinephrine to do the same as norepinephrine. Phenylalanine and tyrocine are used to form 4-(1-hydroxy-2-methylamino-ethyl)benzene-1,2-diol
(14-d) Aldosterone -zona glomerulosa -cytokines -plasma potassium	Helps to regulate the concentration of mineral electrolytes, chiefly sodium and potassium. More specifically, it causes the kidney to conserve sodium ions and release potassium ions. Juxtaglomerular cells from the kidney are primarily responsible for aldosterone levels, but renin (indirectly) contributes to it as well.
(14-e) Cortisol -zona fasciculate -glucocorticoids	Also known as hydrocortisone, helps relieve pain, effects glucose metabolism keeping the glucose concentration in the blood stable between meals, which means it can inhibit the synthesis of protein (allowing for more glucose in the blood) or promote release of fatty acids as an energy source or even stimulate the liver to make glucose from noncarbohydrate sources. Energy is very important if the body decides to "get up and go" because aldosterone has been released. Cortical cells responsible for the production of glucocorticoids are the

	primary effectors of adrenocorticotropic hormone (ACTH). The hypothalamus secretes corticotropin-releasing hormone which stimulates the anterior pituitary gland to release ACTH; another hypothalamic hormone, arginine vasopressin (AVP) augments ACTH secretion, with the two together stimulating larger release than ACTH in isolation. ACTH acts on the adrenal cortex to stimulate the release of glucocorticoids. This three-organ endocrine system is commonly called the hypothalamic-pituitary-adrenal axis.
(14-f) Androgens -zona reticularis - dihydrotestosterone DHT - dehydroepiandrosterone DHEA - androstenedione	Male hormones produced by the adrenal glands, but some of them are converted to estrogen by the skin, liver and adipose tissue. These are very important to the reproductive system, female sex drive and sexual development. Cells of the zona reticularis provide a secondary source of androgens such as testosterone, dihydrotestosterone (DHT), androstenedione, and dehydroepiandrosterone (DHEA). These enhance muscle mass, stimulate cell growth, and aid in the development of the secondary sexual characteristics.
(14-g) Angiotensin mechanism -angiotensinogen> AngiotensinI>angeotensinII	Lung related sodium/potassium balance. It is partially regulated by balance of renin in the kidneys (which is signaled if arterial pressure gets too high, meaning danger of blood pressure related symptoms).
(14-h) DHA - dehydropiandrosterone	Essential for normal growth and development of central nervous system and brain cells which consists of about 40% in the grey matter). Essential in the last trimester of pregnancy and early infancy for normal brain development. Facilitates normal growth and development of the brain, nerves, eyes (particularly the retina), and semen throughout the life cycle. Improves clinical symptoms of depression and schizophrenia, improves hypertension, lowers blood pressure and improves clinical symptoms of MS, Parkinson and senility.
(14-i) Adrenal artery	Supplies blood to the adrenal glands.

CARDIOVASCULAR

(15-a) Heart muscle	The outer epicardium, middle myocardium and inner endocardium (lines the heart muscle and the valves and veins) work as the three heart muscles to pump blood.
(15-b) Coronary arteries	Arteries that carry oxygenated blood into the capillaries of the heart muscle.
(15-c) Cardiac veins	Veins that bring blood from the capillaries in the heart muscle to the coronary sinus.
(15-d) Coronary sinus	Vein that supplies blood returning from the heart muscle to the right atrium, where all used blood enters the heart on its way to the lungs.
(15-e) Pericardium	The lining of the heart that contains serous fluid allowing the heart to expand without friction.
(15-f) Serous Fluid	Produced by the pericardium membrane.
(15-g) Right atrium	Receives blood returning from the tissues of the body (low oxygen blood).
(15-h) Left atrium	Receives oxygenated blood from the lung.
(15-i) Interatrial septum	Separates the right and left atrium, the upper chambers of the heart.
(15-j) Atrioventricular orifice (A-V valve)	Allows 70% of blood to pass from atrium to ventrical (only 30% passes through the tricuspid valve and mitral valve).
(15-k) Superior vena cava	Large vein that supplies blood to the right atrium from body tissues.
(15-l) Inferior vena cava	Large vein that supplies blood to the right atrium from body tissues.
(15-m) Atrial cell	A hormone released (atrial natriuretic peptide 'ANP') to inhibit secretion of renin from kidneys and aldosterone from adrenal. This is released when increasing blood stretches the heart muscle.
(15-n) Tricuspid valve	Valve allowing blood to move from the right atrium to the right ventrical. Valve is made of three cusps.
(15-o) Right ventrical	Receives blood from the right atrium.
(15-p) Pulmonary valve	Valve that separates the right ventrical from the pulmonary arteries.
(15-q) Pulmonary artery	Splits into two branches and takes blood from the right ventrical a short distance to the lung.
(15-r) Pulmonary veins	Bring new, oxygenated blood from lungs to the left atrium (there are two veins coming from each lung).
(15-s) Left atrium	Receives new, oxygenated blood from the lungs.
(15-t) Bicuspid (mitral) valve	Allows blood to pass from left atrium (upper chamber) to left ventrical (lower chamber).
(15-u) Left ventrical	Receives blood coming from the left atrium.
(15-v) Aortic valve	Allows blood to pass from the left ventrical to the aorta.
(15-w) Papillary muscles	Muscles which contract to keep the heart valves shut (originate from the ventricular side of the valve).
(15-x) Chordae tendineae	Fiberous strings which attach to the cusps (valves) of the papillary muscles.
(15-y) S-A node	Initial impulse for cardiac conduction, primarily for atrial chambers.

(15-z) A-V node	Continue S-A impulse for muscle contraction of the heart that travel through A-V bundle.
(15-aa) A-V bundle	A group of fibers for conduction of the A-V impulses.
(15-bb) Accelerator nerves	Sympathetic (accelerator) and parasympathetic (decelerate) nerves that connect to S-A and A-V nodes (controlled in the medulla oblongata part of the brain).
(15-cc) Arteries	Carry blood away from the heart at relatively high pressure (lined by endothelium that make it strong enough, yet elastic enough to stretch during each ventrical contraction when the artery fills with blood).
(15-dd) Arterioles	Smaller versions of arteries.
(15-ee) Capillaries	Smaller versions of arterioles that deliver oxygen and nutrition to cells.
(15-ff) Venules	Microscopic blood vessels that take used blood to the veins.
(15-gg) Veins	Carry used blood back to the heart (appear blue through the skin).
(15-hh) Precapillary sphincter	Smooth muscle cells around arterioles contract or relax to allow blood to flow into branching capillaries.
(15-ii) Baroreceptor	Special nerve cells called baroreceptors are located in the wall of the heart auricles, vena cava, aortic arch and carotid sinuses, and are specialized to monitor changes in blood pressure. If the receptors sense a rise in blood pressure, then, through a negative feedback loop, the heart will slow down to compensate. If they sense a drop in pressure, the heart will speed up.

LUNGS

(16-a) Septum	Divides nasal cavity
(16-b) Cilia	Tiny hairs that move waste particles out of lung into pharynx.
(16-c) Goblet cells	Release mucous to trap particles of waste.
(16-d) Olfactory cells (nasal)	The nerve receptors that allow smell (about 12 million).
(16-e) Frontal sinus	In the frontal bone above each eye and near the midline.
(16-f) Ethmoidal sinus	Located in the ethmoid bone on either side of the upper portion of the nasal cavity.
(16-g) Sphenoidal sinus	Located in the sphenoidal bone above the posterior portion of the nasal cavity.
(16-h) Maxillary sinus	Located in the maxillary bones next to the nasal cavity (on each side) extending to the roots of the upper teeth. Weak test here may be indication of cavitation.
(16-i) Nasopharynx	Contains auditory tube which connects to middle ear.
(16-j) Oropharynx	Passage for food and air.
(16-k) Laryngopharynx	Passage for food only.
(16-l) Larynx	Passage for air, made of cartilage and elastic tissue.
(16-m) Vocal cords	Vibrate to create speech.
(16-n) False vocal cords	Area around vocal cords (often swell, impairing vocal cord function).
(16-o) Epiglottis	Flap that closes when swallowing to prevent food from entering lungs.
(16-p) Laryngeal cartilage	Form much of the structure of the passage and opening of vocal cords.
(16-q) Laryngeal muscles	Control movement and closure of laryngeal parts.
(16-r) Trachea	Connects larynx to bronchial branches.
(16-s) Respiratory bronchials	Beginning of gas exchange for blood.
(16-t) Alveolar ducts	Extending tubules from respiratory bronchiols
(16-u) Alveolar sacs	Outpouching of the alveolar ducts.
(16-v) Alveoli	Final part of exchange from oxygen to carbon dioxide on a cellular level.
(16-w) Capillary network	Covers the surface of alveoli allowing exchange of oxygen and carbon dioxide.
(16-x) Pulmonary artery	Brings old, used, blood to alveolar to release carbon dioxide into lung.
(16-y) Pulmonary vein	Takes new, oxygenated blood to heart to be pumped through body.
(16-z) Pleural sac	Sac filled with fluid surrounding each lung to prevent friction during inhalation (expansion).
(16-aa) Diaphragm	Muscle responsible for breathing (respiration).
(16-bb) Phrenic nerve	Initiates contraction of diaphragm.
(16-cc) Surfactant cells	Secrete surfactant which keeps surface tension sufficient so alveolar sacs don't collapse. If weak, not enough oxygen is being inhaled.
(16-dd) Pneumotaxic neuron	Transmission from brain to control breathing rate
(16-ee) Phagocytic cells	Control passages between alveoli of bacteria, airborne agents, etc.
(16-ff) Oxyhemoglobin	Weakness indicates oxygen is not binding with hemoglobin.
(16-gg)	Too much carbon monoxide in the body.

Carbaminohemoglobin	

BRAIN

(17-a) Neural Tube -gastrulation>ectoderm	The neural tube is the embryonal structure that gives rise to the brain and spinal cord. In gestation, the human neural tube gives rise to three vesicles: the rhombencephalon, the mesencephalon and the prosencephalon. Formation of the neural tube is the result of an invagination of the ectoderm following gastrulation. This process is induced by signaling molecules produced in the notochord and basal plate. Normally the closure of the neural tube occurs around the 30th day after fertilization. However, if something interferes and the tube fails to close properly, a neural tube defect will occur. Among the most common tube defects are anencephaly, encephalocele, and spina bifida. The incidence of neural tube defects is 2.6 in 1,000 worldwide. Pregnant women taking medication for epilepsy have a higher chance of having a child with a neural tube defect.
(17-b) Rhombomeres -rh1.2.3.4.5.6.7 -isthmus	This vial indicates that the problem began during the developmental stage before birth. In the human embryo we can distinguish eight rhombomeres, from caudal to rostral: Rh7 - Rh1 and the isthmus (the most rostral rhombomere). Rhombomeres Rh.7 to Rh.4 form the myelencephalon, and rhombomeres Rh.3 to Rh.1 form the metencephalon. The myelencephalon forms the medulla in the adult brain; contains a portion of the fourth ventricle as well as the glossopharyngeal nerve (CN IX), vagus nerve (CN X), accessory nerve (CN XI), hypoglossal nerve (CN XII), and a portion of the vestibulocochlear nerve (CN VIII). The metencephalon is composed of the pons and the cerebellum; contains a portion of the fourth ventricle; and the trigeminal nerve (CN V), abducens nerve (CN VI), facial nerve (CN VII), and a portion of the vestibulocochlear nerve (CN VIII).
(17-c) Mesencephalon >midbrain	The mesencephalon is the developmental part of the midbrain. If this vial shows up, the problem began during the developmental stage of the brain. The mesencephalon is the middle of three vesicles that arise from the neural tube that forms the brain. The mesencephalon caudally adjoins the pons and rostrally adjoins the diencephalon. The mesencephalon is considered part of the brain stem or the midbrain in mature human brains; the mesencephalon becomes the least differentiated from both its developmental form and within its own structure, among the three vesicles.
(17-d) Pons variolii -transverse pontine fibres -pontine arteries	A knob on the brain stem which is part of the autonomic nervous system and relays information between the cerebellum and cerebrum. Some believe it is involved in the process of dreaming. It is formed by transverse pontine fibres and the pontine arteries supply most of its blood supply.
(17-e) Ventricular system -cerebral aqueduct -obex	The left and right lateral ventricles, the third ventricle and the fourth ventricle are cavities in the brain filled with cerebrospinal fluid. CFS entering the fourth ventricle through the cerebral aqueduct, also called the mesencephalic duct, to the obex and can exit to the subarachnoid space of the spinal cord through two lateral foramina of Luschka and a single midline foramen of Magendie. The cerebral aqueduct connects the third ventrical and the thalamus. Blockage of this duct causes hydrocephalus, or excessive cranial pressure from excessive spinal fluid.
(17-f) Cerebellum>anatomy -anterior lobe -posterior lobe -flocculonodular lobe -fissures* **(17-g) Cerebellum>blood** -superior cerebellar artery* -anterior cerebellar artery* -posterior cerebellar artery* **(17-h) Cerebellum>cells** -granule cells -golgi cells -purkinje cells -stellate cells -basket cells	Patients with cerebellar dysfunction experience problems in walking, balance, and accurate hand and arm movement. Recent brain imaging studies using functional magnetic resonance imaging (fMRI) show that the cerebellum is important for language processing and selective attention. Neuropsychiatric disorders such as dyslexia and autism appear to be associated with a deficiency in the cerebellum, which may also play a role in the development of certain ataxias, including a form of cerebral palsy. Spinocerebellar ataxia patients suffer cerebellar degeneration. It is believed that Opsoclonus myoclonus syndrome is caused by an autoimmune attack on the cerebellum among other brain regions. Patients with cerebellar lesions (injuries) typically exhibit deficits during movement execution. For example, they show "intention tremors"—a tremor occurring during movement rather than at rest, as seen in Parkinson's Disease. Patients may also show dysmetria, i.e., an overestimation or underestimation of force, resulting in overshoot or undershoot when reaching for a target. Another common sign of cerebellar damage is an inability to perform rapid alternating movements. The anterior and medial aspects of the cerebellum represent information ipsilaterally; thus, damage to this region on one side affects the movement on the same side of the body. The posterior and lateral aspects of the cerebellum represent information bilaterally; damage to this region has been shown to impair sensory–motor adaptation, while leaving motor control unaffected. In certain instances, a patient experiences a focal lesion. Such localized lesions cause a wide variety of symptoms related to their location in the cerebellum. A striking example is archicerebellar lesions, which cause motor symptoms not unlike those seen

(17-i) Cerebellum>fibers -afferent fibers -climbing fibers -parallel fibers -mossy fiber*	during intoxication: uncoordinated movements, swaying, unstable walking, and a wide gait. To avoid suspicion by the police of public drunkenness, American patients who suffer archicerebellar lesions carry identification cards written by their physicians, indicating their medical condition. A lesion to the paleocerebellum causes severe disturbance in muscle tone and bodily posture, resulting in weakness to the side of the body opposite the lesion. A neocerebellar lesion is associated with deficits in skilled voluntary movement, such as playing the piano. A lesion to the intermediate zone causes problems with fine-tuning and corrective movements. Patients with this type of lesion who hold their fingers in front of them have great difficulty in moving those fingers together. Patients with a lesion to the lateral zone have difficulty in controlling fine muscle movements and exhibit symptoms similar to those of patients with an intermediate zone lesion. Alcohol abuse is also a common cause of cerebellar lesions. Alcohol abuse can lead to thiamine deficiency, which in the cerebellum will cause degeneration of the anterior lobe. This degeneration leads to a wide, staggering gait but does not affect arm movement or speech.
(17-j) Cerebellum>inputs -gabaergic -glutamatergic	
(17-k) Medulla oblongata>cells -corticospinal fibres -olivary nuclei	To control autonomic functions (such as breathing and heartbeat) To relay nerve messages from the brain to the spinal cord Processing of inter-aural time differences for sound localization (olivary nuclei) Function control of sneeze-, cough-, swallow-, suck-reflex and of vomiting.
(17-l) Medulla oblongata>blood -vertebral artery -anterior spinal artery	The anterior spinal artery supplies the whole medial part of the medulla oblongata. A blockage (such as in a stroke) will injure the pyramidal tract, medial lemniscus and the hypoglossal nucleus. This causes a syndrome called medial medullary syndrome. The posterior inferior cerebellar artery, a major branch of the vertebral artery, supplies the posterolateral part of the medulla, where the main sensory tracts run and synapse. (As the name implies, it also supplies some of the cerebellum.) The vertebral artery supplies an area between the other two main arteries, including the nucleus solitarius and other sensory nuclei and fibres. Lateral medullary syndrome can be caused by occlusion of either the PICA or the vertebral arteries.
(17-m) Tectum -inferior colliculi -superior colliculi	The tectum is part of the midbrain that controls auditory and visual responses. It is located in the dorsal region of the mesencephalon (midbrain). It is composed of the inferior colliculi and the superior colliculi.
(17-n) Cerebral peduncle -substantia nigra -pretectum	The cerebral peduncle, by most classifications, is everything in the mesencephalon (midbrain) except the tectum. The substantia nigra (pars compacta, pars reticulate) is a portion of the midbrain thought to be involved in certain aspects of movement and attention and is closely associated with motor system pathways of the basal ganglia. Dopamine produced in the subtantia nigra plays a role in motivation and habituation of species from humans to the most elementary animals such as insects. Pretectum is a structure located in the midbrain. It receives binocular input from the eyes and is involved with the pupillary light reflex. The pretectum, after receiving binocular input, outputs to the Edinger-Westphal nucleus, which is a pre-ganglionic nucleus also located in the midbrain. The Edinger-Westphal nucleus projects onto the ciliary ganglion, whose output controls pupillary diameter (mydriasis or myosis).
(17-o) Epithalamus -epiphysis -habenula -stria medullaris	The epithalamus is a dorsal posterior segment of the diencephalon (a segment in the middle of the brain also containing the hypothalamus and the thalamus) which includes the habenula, the stria medullaris and the pineal body (epiphysis). Its function is the connection between the limbic system to other parts of the brain. Some functions of its components include the secretion of melatonin by the pineal gland, and the regulation of hunger and thirst by the habenula.
(17-p) Thalamus -nuclear group~ -metathalamus -thalmic reticular nucleus	The thalamus is relay that simply relays signals from auditory, somatic, visceral and visual regions of the peripheral nervous system. It I also associated with arousal, in terms of waking up—getting going; motivated.
(17-q) Hypothalamus -optic chiasm -supraoptic region -infundibulum -tuber cinereum -tuberal region -mammillary bodies -mammillary region -tuberoinfundibular	In the anatomy of mammals, the hypothalamus is a region of the brain located below the thalamus, forming the major portion of the ventral region of the diencephalon and functioning to regulate certain metabolic processes and other autonomic activities. The hypothalamus links the nervous system to the endocrine system by synthesizing and secreting neurohormones often called releasing hormones because they function by stimulating the secretion of hormones from the anterior pituitary gland — among them, gonadotropin-releasing hormone (GnRH). The neurons that secrete GnRH are linked to the limbic system, which is very involved in the control of emotions and sexual activity. The hypothalamus is also the area of the brain that controls body temperature, hunger and thirst, and circadian cycles. The hypothalamus connects to the pituitary

pathway	gland via the tuberoinfundibular pathway.
(17-r) Subthalamus -zona incarta -globus pallidus -luy's body -caudate nucleus -putamen -telencephalon	It is important for regulating movements produced by skeletal muscles. It is, not surprisingly, interconnected with other structures important in movement, such as the basal ganglia and substantia nigra. The bulk of the subthalamus is made up of the subthalamic nucleus and another gray matter component is the zona incerta. There are also several fiber bundles in the subthalamus. They are the: subthalamic fasciculus, lenticular fasciculus, and ansa lenticularis.
(17-s) Basal ganglia -globus pallidus -striatum -subthalamic nucleus -putamen	Associated with motor and learning functions. Widely part of most brain functions, so there is not much definitive to say. Involved in control of head and eye movement, dopamine production. The basal ganglia and cerebellum are large collections of nuclei that modify movement on a minute-to-minute basis. Motor cortex sends information to both, and both structures send information right back to cortex via the thalamus. (Remember, to get to cortex you must go through thalamus.) The output of the cerebellum is excitatory, while the basal ganglia are inhibitory. The balance between these two systems allows for smooth, coordinated movement, and a disturbance in either system will show up as movement disorders. Think of the basal ganglia as the brakes. If you want to sit still, the basal ganglia must be activated. Parkinson's disease Huntington's disease and other "involuntary" movements are associated with basal ganglia.
(17-t) Rhinencephalon -olfactory bulb -piriform cortex -anterior olfactory nucleus -olfactory tract	Involved with the sense of smell and mediates higher emotions patterns/expressions.
(17-u) Frontal lobe -motor cortex -frontal gyri -central sulcus	Frontal lobes have been found to play a part in impulse control, judgment, language, memory, motor function, problem solving, sexual behavior, socialization and spontaneity. Frontal lobes assist in planning, coordinating, controlling and executing behavior. People who have damaged frontal lobes may experience problems with these aspects of cognitive function, being at times impulsive; impaired in their ability to plan and execute complex sequences of actions; perhaps persisting with one course of action or pattern of behavior when a change would be appropriate (perseveration). Dopamine-sensitive neurons in the cerebral cortex are found primarily in the frontal lobes. The dopamine system is associated with pleasure, long-term memory, planning and drive. Dopamine tends to limit and select sensory information arriving from the thalamus to the forebrain. Poor regulation of dopamine pathways has been associated with schizophrenia. The so-called executive functions of the frontal lobes involve the ability to recognize future consequences resulting from current actions, to choose between good and bad actions (or better and best), override and suppress unacceptable social responses, and determine similarities and differences between things or events.
(17-v) Temporal lobe -lateral sulcus -fusiform gyrus -wernicke's area -broca's area -arcuate fasciculus	The temporal lobes are part of the cerebrum. They lie at the sides of the brain, beneath the lateral or Sylvian fissure. Seen in profile, the human brain looks something like a boxing glove. The temporal lobes are where the thumbs would be. Behind (posterior to) the temporal lobes is the occipital lobe, where visual information first reaches the cortex. Above and to the rear are the parietal lobes. The temporal lobes enclose the hippocampi and amygdalae. The functions of the left temporal lobe are not limited to low-level perception but extend to comprehension, naming, verbal memory and other language functions.The underside (ventral) part of the temporal cortices appear to be involved in high-level visual processing of complex stimuli such as faces (fusiform gyrus) and scenes (parahippocampal cortex). Anterior parts of this ventral stream for visual processing are involved in object perception and recognition. The medial temporal lobes (near the sagittal plane that divides left and right cerebral hemispheres) are thought to be involved in episodic/declarative memory.
(17-w) Parietal lobe -broca's area	The central sulcus separates the parietal lobe from the frontal lobe, and the parieto-occipital sulcus separates the parietal and occipital lobe. The parietal lobe can be subdivided into the superior parietal lobule and the inferior parietal lobule with the two separated by the intraparietal sulcus. The parietal operculum forms the superior wall of the sylvian fissure.
(17-x) Occipital lobe -striate cortex -cerebral fissure -calcarine sulcus -ventral stream	Each visual cortex receives raw sensory information from the outside half of the retina on the same side of the head and from the inside half of the retina on the other side of the head. If one occipital lobe is damaged, the result can be homonomous vision loss from similarly positioned "field cuts" in each eye. Occipital lesions can cause visual hallucinations. Lesions in the parietal-temporal-occipital association area are associated with color agnosia, movement agnosia, agraphia

-dorsal stream -posterior cerebral artery	and alexia.
(17-y) Hippocampus -granule cells -pyramidal cells -place cells -perforant path -cingulum path -schaffer collaterals -subiculum	Forms part of the limbic system. Psychologists and neuroscientists dispute the precise role of the hippocampus, but generally agree that it has an essential role in the formation of new memories about personally experienced events (episodic or autobiographical memory). Some researchers prefer to consider the hippocampus as part of a larger medial temporal lobe memory system responsible for general declarative memory (memories which can be explicitly deep inside the medial temporal lobes, the hippocampi seem to be particularly important for memory function, and they also seem to play a part in controlling spatial behavior. It is also known to work as a cognative map of sorts, meaning it helps with a sense of direction and orientation. Weakness of the hypocampus responds well to exercise, particularly in memory complaints.
(17-z) Amygdala -basolateral complex -centromedial nucleus -cortical nucleus	Forms part of the limbic system and is linked with both fear responses and pleasure. The basolateral complex receives input from the sensory systems and is necessary for fear conditioning. The centromedial nucleus is the main output for the basolateral complex and is involved in emotional arousal. It sends outputs to the hypothalamus for activation of the sympathetic nervous system, the reticular nucleus for increased reflexes, the trigeminal nerve and facial nerve for facial expressions of fear, and the ventral tegmental area, locus ceruleus, and laterodorsal tegmental nucleus for activation of dopamine, norepinephrine and epinephrine. The cortical nucleus is involved in olfaction and pheremone processing. It receives input from the olfactory bulb and olfactory cortex. Its size is positively correlated with aggressive behavior across species. In humans it is the most sexually dimorphic brain structure, and shrinks by more than 30% in males upon castration.
(17-aa) Insular cortex -lateral fissure	Part of the limbic system. Overall, the insula is believed to process convergent information to produce an emotionally relevant context for sensory experience, such as disgust and feelings of unease. More specifically, the anterior insula is related more to olfactory, gustatory, vicero-autonomic, and limbic function, while the posterior insula is related more to auditory-somesthetic-skeletomotor function. Functional imaging experiments have revealed that the insula has an important role in pain experience. The insula is well situated for the integration of information relating to the affective and reactive components of pain as part of the circuitry related to fear avoidance.
(17-bb) Cingulate cortex -	Part of the limbic system. Not much known yet, but is thought to be involved with rendering new memories permanent.
(17-cc) Limbic~ -cingulate gyrus -fornicate gyrus	Form part of the limbic system. The fornicate gyrus is known to release chemicals that allow sexual stimulation in the early 20's for men and 30's for women.

SPINAL CORD

(18-a) Dura mater	The outermost layer of the spinal cord, made of connective tissue and many blood vessels and nerves.
(18-b) Dural sinuses	The dura mater splits into layers in some areas of the head creating dural sinuses where venous blood returns from the brain to vessels leading to the heart.
(18-c) Pia mater	Dura mater surrounds the spinal cord and attaches to it at intervals known as pia mater (denticulate ligaments).
(18-d) Arachnoid mater	Between the dura mater and pia mater is the arachnoid mater.
(18-e) Subarachnoid space	It surrounds the brain and spinal cord creating a subarachnoid space which contains cerebralspinal fluid.
(18-f) Cerebral spinal fluid	Cerebralspinal fluid bathes the brain.
(18-g) Choroids plexuses	Capillaries from the pia mater that secrete cerebralspinal fluid.
(18-h) Fasciculus gracilis tract	Conduct sensory impulses associated with the senses of touch, pressure and body movement from skin, muscles, tendons and joints to the brain.
(18-i) fasciculus cuneatus tract	Conduct sensory impulses associated with the senses of touch, pressure and body movement from skin, muscles, tendons and joints to the brain.
(18-j) Spinalthalmic tracts	Conduct sensory impulses associated with the senses of pain, temperature, touch and pressure from the various body regions to the brain.
(18-k) Spinocerebellar tracts	Conduct sensory impulses needed for the coordination of muscle movements from muscles of the lower limbs and trunk to the cerebellum.
(18-l) corticospinal tracts	Conduct motor impulses associated with voluntary movements from the brain to various skeletal

	muscles.
(18-m) reticulospinal tracts	Conduct motor impulses associated with the maintenance of muscle tone and the activity of sweat glands from the brain.
(18-n) rubrospinal tracts	Conduct motor impulses associated with muscular coordination and the maintenance of posture from the brain.
(18-o) Sympathetic nerves	Help regulate autonomic nervous functions (generally activate). It generally starts at 3 a.m. and creates acidosis which leads to increased adrenaline, thyroxin, FSH, mineral corticoids, increased lecithin and blood glucose. While this sounds good, increased activity for prolonged periods of time will exhaust the related systems and appear as deficiencies, dilation of arteries, body agitation, fatigue, inflammation, elevated histamine and psychological depression. Increased mental activity (overbalanced), dilated pupils, thick saliva and physical exhaustion after little physical work are signs of increased sympathetic nerve response.
(18-p) Parasympathetic	Help regulate autonomic nervous functions (generally inhibit).
(18-q) Olfactory	Sensory fibers transmit impulses associated with the sense of smell.
(18-r) Optic	Sensory fibers transmit impulses associated with the sense of vision.
(18-s) Oculomotor	Motor fibers transmit impulses to muscles that raise the eyelids, move the eyes, adjust the amount of light entering the eyes and focus the lenses.
(18-t) Trochlear	Motor fibers transmit impulses to muscles that move the eyes.
(18-u) Trigeminal (ophthalmic)	Sensory fibers transmit impulses from the surface of the eyes, tear glands, scalp, forehead and upper eyelid.
(18-v) Trigeminal (maxillary)	Sensory fibers transmit impulses from the upper teeth, upper gum, upper lip, lining of the palate and skin of the face.
(18-w) Trigeminal (mandibular)	Sensory fibers transmit impulses from the scalp, skin of the jaw, lower teeth, lower gum and lower lip.
(18-x) Abducens	Motor fibers transmit impulses to muscles that move the eyes.
(18-y) Facial	Sensory fibers transmit impulses associated with taste receptors of the anterior tongue; motor fibers transmit impulses to muscles of facial expression, tear glands and saliva glands.
(18-z) Vestibulor branch	Sensory fibers transmit impulses associated with the sense of equilibrium.
(18-aa) Cochlear branch	Sensory fibers transmit impulses associated with the sense of hearing.
(18-bb) Glossopharyngeal	Sensory fibers transmit impulses from the pharynx, tonsils, posterior tongue and carotid artery.
(18-cc) Vagus	Somatic motor fibers transmit impulses to muscles associated with speech and swallowing; automatic motor fibers transmit impulses to the viscera of the thorax and abdomen.
(18-dd) Cranial branch	Motor fibers transmit impulses to muscles of the soft palate, pharynx and larynx.
(18-ee) Spinal branch	Motor fibers transmit impulses to muscles of the neck and back.
(18-ff) Hypoglossal	Motor fibers transmit impulses to muscles that move the tongue.

NEURON

(19-a) Dentrites	Tentacles that branch off the nucleus of a neuron. It provides receptive surfaces for other neurons.
(19-b) Axon	A single cylindrical process that conducts nerve impulses away from the cell body.
(19-c) Synaptic knobs	The rounded ends on the end of an axon that transmit impulses to other neurons.
(19-d) Synaptic vesicles	The membranous sacs on synaptic knobs that release neurotransmitters.
(19-e) Neurotransmitters	Released from synaptic vessels to affect other neurons (the amount of neurotransmitters released is directly linked with the amount of calcium available).
(19-f) Neuromodulator	Substances that alter a neuron's response to a neurotransmitter or block the release of a neurotransmitter.
(19-g) Enkephalins	Neuropeptide in the brain and spinal cord that bind to opiate receptors in the brain to relieve pain sensations.
(19-h) Beta endorphine	Has much the same action as enkephalines but it is much more potent.
(19-i) Substance P	Neurotransmitters that transmit pain receptors (opposite of beta endorphins and enkephalines)
(19-j) Myelin sheath	A membrane that serves as a sheath for the axon.
(19-k) Schwann cells (neurilemmal sheath)	A Membrane that provides a kind of sheath over the axon/myelin sheath.
(19-l) Sensory neurons	Conduct nerve impulses from receptors in peripheral body parts into the brain or spinal cord.
(19-m) Interneurons	Transmit nerve impulses between neurons within the brain and spinal cord.
(19-n) Motor neurons	Conduct nerve impulses from the brain or spinal cord out to effectors (muscles or glands).

LYMPHATIC

(20-a) Lymphatic	Absorb fluid from interstitial spaces.

capillaries	
(20-b) Lacteals	Lymphatic capillaries in small intestine (villi).
(20-c) Lymphatic vessels	Transport lymphatic fluid from lymphatic capillaries to lymphatic nodes and then on to larger vessels.
(20-d) Lymph node	Contain lymphocytes (and make them) and macrophages
(20-e) Lymphocyte	Cells in lymph nodes that attack infecting viruses, bacteria and other parasitic cells brought to the nodes in lymphatic fluid.
(20-f) Collecting ducts	The thoracic duct and right lymphatic duct empties lymph fluid into the left and right subclavian vein.
(20-g) Tonsils	Act as ducts to deliver toxic lymph fluid to the throat to be swallowed and acted upon by the stomach acids.
THYMUS	Gland that baby sits lymphocytes until they mature and are released as T lymphocytes for immune functions.
(21-a) Thymosis	Hormone secreted by thymus to mature lymphocytes.
SPLEEN	Giant lymph node for blood.
(22-a) White pulp	Islands of tissue inside the spleen that contain many lymphocytes.
(22-b) Red pulp	Islands in the spleen that provide color, lymphocytes and macrophages and remove old, red blood cells.
(22-c) Endogenous pyrogen	Substance released by lymphocytes to increase temperature of the body to reduce iron and kill off pathogens (causes fever).
(22-d) Neutrophil	Engulfs and digests infectious particles.
(22-e) Monocyte	Engulfs and digests infectious particles.
(22-f) Macrophages	Cells in the lymph nodes that engulf and destroy foreign substances, damaged cells and cellular debris by eating them and decomposing them with special enzymes contained inside the cells. They are attracted by monocytes in areas of infection.

STRUCTURAL-

(23-a) Acytylcholine	Released by nerves to create muscle impulses. Note that the problem may be with the acytylcholine receptor as in the case of nerve gas myasthenia gravis, which debilitates acytylcholine.
(23-b) Acetylcholinesterase	Decomposes the action of acetylcholine.
(23-c) Hemocytoblast (stem cell)	Makes red and white blood cells in the bone marrow (may not be able to without B12 from intrinsic factor in stomach and folic acid).
(23-d) Osteoclast	Secrete an acid to dissolve bone so that osteoblasts can rebuild it and new, strong bones are always available to support the body. High blood calcium inhibits osteoclast activity and calcitonin from thyroid stimulates osteoblasts to form bone tissue.
(23-e) Lysosomal enzymes	Digest the particles in the acid secreted by the osteoclasts. If this tests weak in addition to osteoclast, the body is dissolving bone and not digesting the dissolved particles.
(23-f) Osteoblast	Cells within bone that replace the bone being dissolved and digested by the osteoclasts. Low calcium levels signal the parathyroid to activate osteoclast activity to break down bone tissue in order to release calcium.
(23-g) Epiphyseal disk	This is what is used to start new bone growth, but thyroid hormone is required to replace cartilage, so weakness here may indicate premature ossification or halting of bone growth.
(23-h) Erythroblasts	Formed from hemocytoblasts (stem cells in bone marrow) which can synthesize hemoglobin molecules by dividing into erythrocytes. If these are weak, hemoglobin is probably weak.
(23-i) Hydroxyapatite	A type of calcium phosphate that makes up 70% of intracellular bone matrix.
(23-j) Synovial fluid	A fluid secreted by the synovial membrane. Used for protection between joints.
(23-k) Myoglobin	Combines with oxygen for storage in the muscles. Deficiency can create cramping.

MALE REPRODUCTIVE- NOTE: Hormones secreted by the anterior pituitary regulate sex hormones; parasympathetic regulates dilation of arteries for stimulation, adrenals are involved in androgen release from adipose tissue.

(24-a) Teste	Male reproductive organ that produces hormones.
(24-b) Seminiferous tubules	Produce sperm cells.
(24-c) Interstitial cells	Produce and secrete male sex hormones; promoted by pituitary hormones.
(24-d) Epididymis	Store and mature sperm cells and convey sperm cells to vas deferens.

(24-e) Vas deferens	Conveys sperm cells to ejaculatory duct.
(24-f) Seminal vesicle	Secrete an alkaline fluid containing nutrients and prostaglandins; fluid helps neutralize acidic semen.
(24-g) Prostate gland	Secretes an alkaline fluid that helps neutralize acidic semen and enhances motility of sperm cells.
(24-h) Bulbourethral gland	Secretes fluid that lubricates the end of the penis.
(24-i) Semen	If this vial comes up the person may be allergic to others orgasmic juice (most likely it is carrying a DCA toxin).
(24-j) Scrotum	Encloses and protects testes.
(24-k) Penis	Conveys urine and semen to outside of body through the urethra.
(24-l) Dartos muscle	Muscle which contracts the scrotum to bring it closer or further from the body for temperature purposes (sperm cannot live in too hot of an environment.
(24-m) Prepuce	Layer of skin covering the glans (head) of the penis. This is often removed in a surgical procedure called circumcision.
(24-n) Vascular spaces	These swell when parasympathetic impulses dilate arteries to penis causing erection. Also make sure parasympathetic tests well.
(24-o) Inhibin	Produced by testes to inhibit production of LH and FSH from pituitary.
(24-p) Testosterone	Stimulates formation of male reproductive organs, causes testes to descend into the scrotum, causes enlargement of testes, increased body hair, thickening of vocal cords, thickening of skin, increased bone and muscular growth, stimulates sexual activity in portions of the brain.
(24-q) Dihydrotestosterone	DHT (dihydrotestosterone) is the most potent naturally occurring androgen and is produced from free testosterone through the action of 5-alpha-reductace. 5-alpha-reductace concentrations are highest in the peripheral tissues (genital skin and hair follicles). Male and female pattern hair loss is thought to be due to the effects of DHT on genetically predisposed hair follicles. Binding of DHT to the hair follicle results in gradual miniaturization of the hair and eventual hair loss. DHT is primarily responsible for the physical changes that occur during male sexual maturation and is thought to be proportionally correlated to sex drive as well as erectile capabilities in men. In addition, DHT has been associated with benign prostate hypertrophy (BPH) and prostate cancer.

FEMALE REPRODUCTIVE-

(25-a) Ovary	Creates egg cells and releases hormones.
(25-b) Oocyte	These are acted upon by sperm to develop an embryo; released when a follicle ruptures.
(25-c) Follicle cells	Mature to become egg cells. They also combine with theca cells to form corpus luteum.
(25-d) Granulosa cell	Found in the follicle, they produce and secrete estrogen.
(25-e) Theca interna	Ovarian cells that secrete precursor cells for testosterone needed to produce estrogen.
(25-f) Corpus luteum	The corpus secretes most of the estrogen and progesterone during the cycle.
(25-g) Estrogen	Produced primarily by the ovaries in stimulus from the pituitary, estrogen stimulates enlargement of the female reproductive organs, development of the breast and ductile system of the mammary gland, deposition of adipose tissue in the breast, thighs and buttocks (this makes women soft and cuddly) and increases vascularization of skin.
(25-h) Progesterone	Promotes changes that occur in the uterus during the female reproductive cycle, affects the mammary glands, and help regulate secretions of gonadotropins from the pituitary.
(25-i) Uterine (fallopian) tube	Carries egg cell from ovary to uterus.
(25-j) Uterus	A place where the egg cell can mature and be nourished
(25-k) Uterus lining	Endometrium, myometrium, perimetrium.
(25-l) Cervix	The lower third of the uterus.
(25-m) Vaginal orifice	Opening to the outside.
(25-n) Vestibular glands	Secretes mucus for lubrication.
(25-o) Zygote	The first cell of an embryo, created when the chromosomes of the egg and sperm combine. Genetic weaknesses may be seen if this tests weak.
(25-p) Placenta	Attaches embryo to uterine wall and exchanges nutrients, gases and waste between embryonic blood and maternal blood.
(25-q) hCH	Human chorionic gonadotropin is released for the first two to four months of pregnancy to keep estrogen from flushing the uterus (spontaneous abortion).
(25-r) Placental lactogen	Secreted by placenta to stimulate breast development; stimulates enlargement of the breasts during pregnancy (estrogen stimulates ductile development and progesterone stimulates mammary

	gland development).
(25-s) Relaxin	Helps relax the ligaments so the birth canal will open easier (secreted by the corpus luteum).
(25-t) hMH	Human menopausal gonadotropin
(25-u) Alveolar glands	Produce milk (prolactin from pituitary signals production but placental progesterone inhibits secretion until after birth).
(25-v) Myoepithelial cells	Eject milk from the alveolar glands.
(25-w) Lactiferous duct	Duct that leads to the nipple from the alveolar glands.
(25-x) Nipple	Allows exit of milk from the breast.

SKIN

(26-a) Epidermis	Outer layer of skin made of dead cells.
(26-b) Dermis	Cells divide and reproduce in dermis pushing old cells to surface.
(26-c) Hypodermis	Connects skin to tissues underneath.
(26-d) Melanocytes	Produce the dark pigment in skin called melanin.
(26-e) Hair follicle	The part of the hair that divides to make new epidermal cells.
(26-f) Dermal blood vessels	In the dermal part of the skin, they bring blood to each hair root.
(26-g) Hair papilla	The connective tissue that holds the blood vessels near the root of the hair.
(26-h) Arrector pili muscle	The muscle that causes goose bumps.
(26-i) Nail (finger)	Formed from epithelial cells that divide and become keratinized as they extend away from the root. Dermal blood vessels feed these too.
(26-j) Sebaceous glands	Groups of specialized epithelial cells which produce globules of fatty material called sebum. Overactive glands cause acne (too much fat in liver).
(26-k) Eccrine glands	The most common sweat gland. It helps regulate temperature in the body and help secrete urea and uric acid. Excess sweating on the palms may be caused by nervous tension and excess sweating in various areas is the body's natural way of helping to detoxify waste (no scent).
(26-l) Apocrine glands	These are the sweat glands that have a scented secretion.
(26-m) Pore	The opening on the skin for hair follicles and gland secretions.
(26-n) Sensory nerve fiber	Sensory receptors in the skin, primarily between epithelial cells.
(26-o) Meissner's corpuscles	Sensory receptors in the skin, primarily located in areas like lips, fingertips, palms, soles, nipples and genitals where light touch may be used. This is also used for determining texture.
(26-p) Pacinian corpuscles	Sensory receptors in deeper tissue like the hands, feet, penis, clitoris, urethra, breasts and in tendons of muscles and ligaments of joints.
(26-q) Thermoreceptors	Temperature receptors in the skin.

EYES

(27-a) Eyelid[palpebra]	The eyelid contains four layers: skin, the thinnest skin on the body, muscle, connective tissue and conjunctiva.
(27-b) Conjunctiva	Mucous membrane that lines the inner surfaces of the eyelids and folds back to cover the anterior surface of the eyeball, except for the central portion called the cornea.
(27-c) Lacrimal gland	Secretes tears continuously to keep eye moist.
(27-d) Canaliculi (inferior and superior)	Collect tears that come across the eye.
(27-e) Puncta	Opening to canaliculi
(27-f) Lacrimal sac	Tears that enter the canaliculi rund down into the lacrimal sac.
(27-g) Nasolacrimal duct	The lower part of the lacrimal sac that empties into the nose.
(27-h) Eye muscles	These must work in unison or a person will have double vision or a lazy eye. Muscles include: orbicularis oculi, levator palpebrae, superior rectus, inferior rectus, medial rectus, lateral rectus, superior oblique, inferior oblique, ciliary muscles, circular muscles, radial muscles.
(27-i) Cornea	A transparent window (the part you see bulging out of the socket) helps focus entering light rays.
(27-j) Sclera	The white part of the eye, primarily used for attaching muscles to the eye.
(27-k) Choroids coat	A coat around the eye that brings blood and nourishment to the eye.
(27-l) Ciliary body	Allows focus of close and far if suspensory ligaments and ciliary muscles are healthy.
(27-m) Ciliary muscles	Control suspensory ligaments allowing the ciliary body to focus on objects either near (tighter muscles) or far away.
(27-n) Iris	Located between the cornea and the lens.

(27-o) Aqueous humor	A watery fluid secreted by cells on the ciliary body. It supplies nutrients and maintains the shape of the front of the eye.
(27-p) Canal of schlemm	The chambers that allow the aqueous humor to leave the iris and enter veins to provide room for new, nutrient rich fluid.
(27-q) Retina	Contain visual receptors (photoreceptors). The retina contains five layers of cells which pass information to the optic nerve and then the brain: receptor cells, bipolar neurons, ganglion cells, horizontal cells and amacrine cells.
(27-r) Macula lutea	A yellowish spot in the center of the retina.
(27-s) Fovea centralis	A spot inside the macula that provides the sharpest vision.
(27-t) Rods	One hundred million rods (a kind of photoreceptor) in the eye are much more sensitive to light than cones, thus provide vision in dim light. They provide outlines rather than detailed images.
(27-u) Rhodopsin	Also known as visual purple, this is a light sensitive pigment in rods that break down (into opsin) in the presence of light.
(27-v) Opsin	It is broken down from rhodopsin (along with retinal) and becomes an active enzyme.
(27-w) Transducin	An enzyme activated by opsin.
(27-x) Phosphodiesterase	An enzyme activated from transducin.
(27-y) Retinal	Synthesized from vitamin A, this and opsin are created when rhodopsin breaks down.
(27-z) Cones	Three million cones (a kind of photoreceptor) in the eye detect color and create the sharpness or detail of an image. There are three kinds of cones and the ones used in the dark determine the color you see (erythrolabe = red light waves, chlorolabe = green light waves, cyanolabe = blue light waves).
(27-aa) iodopsin	A light sensitive pigment of cones.
(27-bb) Optic disk	The area where the retina and all its nerve fibers join the optic nerve. The central artery and vein that run to the eye (ciliary body) pass through the disk.
(27-cc) Optic nerve	Main nerve that runs from the eye to the brain. Person may not have depth and distance perception if this is weak, specifically if the optic chiasma is weak.
(27-dd) Vitreous humor	A jellylike fluid that helps maintain the shape of the internal eye structure.
(27-ee) Lysozyme	Secreted by the eye to fight off bacteria.

EARS

(28-a) Auricle (pinna)	External part of ear that is seen as a funnel-like structure on the side of the head.
(28-b) External auditory meatus	External auditory canal that leads inward.
(28-c) Ceruminous glands	Modified apocrine glands that secrete ear wax in the auditory canal to keep particles from entering the ear.
(28-d) Tympanic membrane	Eardrum (located at the end of the auditory canal) that reproduces the vibrations of sound detected from external sources.
(28-e) Tympanic cavity	Air-filled space that separates the external and internal ear, it also connects to the Eustachian tube.
(28-f) Eustachian tube	Connects the middle ear to the throat; helps maintain equal pressure in the ear.
(28-g) Malleus	The malleus is a tiny bone attached to the eardrum and when the eardrum vibrates, the malleus vibrates in unis on creating the incus to vibrate.
(28-h) Incus	The incus is a tiny bone in the ear that passes the vibrational movement created by the malleus on to the stapes
(28-i) Stapes	The movements of the stapes act like a piston in the oval window moving fluid that stimulates hearing receptors. These three bones work as amplifiers.
(28-j) Oval window	The opening that the stapes moves in amplifying the vibration and sending it on to the perilymph.
(28-k) Tympanic reflex	This is an automatic reflex that uses the *tensor tympani muscle* and the *stapedius muscle* to close the ear when loud noises are detected. It can only do this during slow rising noises though.
(28-l) Perilymph	Receives vibrations and sends it on to the scala vestibule.
(28-m) Scala vestibule	Receives vibrations and sends them on to the endolymph.
(28-n) Endolymph	Send vibrations on to the hearing receptors.
(28-o) Cochlea	Functions in hearing.
(28-p) Stereocilia	Little hairs that respond to various frequencies.
(28-q) Semicircular canals	Provide equilibrium.
(28-r) Vestibule	Between the above two helps with hearing and equilibrium, release neurotransmitters.

(28-s) Basilar membrane	Able to detect variations in frequencies (2-3 thousand is common, but 20-20,000 is detectable by the human ear).
(28-t) Organ of corti	Contains 16,000 hearing receptor cells.

BLOOD CELLS

(29-a) Erythrocyte	Red blood cell.
(29-b) Neutrophil	White blood cell (granulocyte) phagocytizes small particles.
(29-c) Eosinophil	White blood cell (granulocyte) kills parasites and helps control inflammation and allergic reaction.
(29-d) Basophil	White blood cell (granulocyte) releases anticoagulant, heparin and histamine.
(29-e) Prostaglandin D2	Released by mast cells and basophils in the presence of an allergy bad enough to create anaphylactic shock.
(29-f) Leukotrienes	Released by mast cells and basophils in the presence of an allergy bad enough to create anaphylactic shock.
(29-g) Monocyte	White blood cells (agranulocyte) phagocytize large particles.
(29-h) Heparin	Prevent intravascular blood clot formation secreted by basophils.
(29-i) Histamine	Dilate blood vessels to increase circulation secreted by basophils, also helps counteract excess IgE (anaphylactic shock).
(29-j) Lymphocyte	This is a general category including B and T lymphocytes, which are white blood cells that work as part of the immune system.
(29-k) T lymphocytes	Lymphocytes that have matured in the thymus. If they test weak, the thymus is not healthy enough to nourish them (thymosin deficiency) or they are not being produced by the bone marrow.
(29-l) Helper T cells	Activate B cells by releasing cytokins.
(29-m) CD4	A kind of helper T cell that is the prime target of HIV.
(29-n) Th1	A kind of helper T cell protects against HIV.
(29-o) Th2	A kind of helper T cell increases susceptibility of HIV.
(29-p) Cytotoxic T cells	Release cytotoxic T cells.
(29-q) Natural killer cell	Release cytotoxic T cells.
(29-r) Perforin	A substance released by cytotoxic T cells and natural killer cells that eliminate tumor cells and cells infected with viruses.
(29-s) Suppressor T cell	Released when infection is under control to stop production of B and T cells. When it does not stop, autoimmune problems begin.
(29-t) Interleukin 1	Activates T cells, released by the skin and lungs, indicates the presence of environmental toxins.
(29-u) B lymphocytes	Constitute 20 – 30% of T lymphocytes. These may test weak if there is intestinal infection or infection in the bone. They produce antibodies. IgD activates B cells.
(29-v) Immunoglobulin G (IgG)	Immunoglobulin G (IgG) makes up about 80% of the antibodies in the body. It is found primarily in plasma and tissue fluids and is particularly effective against bacteria, viruses and toxins an activates a group of enzymes called compliment. This vial tends to indicate new infection, IgM indicates old infection.
(29-w) Immunoglobulin A (IgA)	Immunoglobulin A (IgA) makes up about 13% of the antibodies in the body. It is found primarily in breast milk, nasal fluid, gastric juice, intestinal juice, bile and urine.
(29-x) Immunoglobulin M (IgM)	Immunoglobulin M (IgM) develops in the blood in response to contact with certain antigens in food or bacteria. It makes up about 6% of antibodies and activates compliment as well. This vial tends to indicate old infection in the body, IgG indicates new infection.
(29-y) Immunoglobulin D (IgD)	Immunoglobulin D (IgD) is found on the surfaces of most B cells. It is important to activating B cells.
(29-z) Immunoglobulin E (IgE)	Immunoglobulin E (IgE) appears in exocrine secretions along with IgA. It is associated with allergic reactions and can cause severe inflammation (anaphylactic). Strong test indicates either presence of flat worms or round worms or a severe allergy that could cause anaphylactic shock (which may be due to the presence of the worms). If it is an allergy and not worms, this vial should test strong with histamine, prostaglandin D2 or leukotrienes.
(29-aa) Megakaryocytes	Make platelets (thrombocytes).
(29-bb) Thrombocytes	Platelets that are created when megakaryocytes pass through the lungs and shatter into pieces called platelets. Help control blood loss from broken vessels.

Growth variations

T1 Fibroma	Tumor of connective tissue.
T2 Chondroma	Tumor of cartilage.
T3 Chordoma	Tumor of tissue of charda dorsalis.
T4 Osteoma	Tumor of bone.
T5 Myxoma	Tumor of mucous tissue.
T6 Lipoma	Tumor of fat tissue.
T7 Angioma	Tumor of blood vessel.
T8 Lymphoma	Tumor of lymphatic tissue.
T9 Sarcoma	Tumor (cellular) composed of anaplastic tissue of any of the above types.
T10 Laiomyoma	Tumor of smooth muscle tissue.
T11 Rhabdomyoma	Tumor of striated muscle tissue.
T12 Neuroma	Tumor of nerve fibers.
T13 Neuroma Gnaglionare	Tumor of nerve fibers and ganglion cells.
T14 Glioma	Tumor of glia tissue.
T15 Neuro Epithelioma	Tumor of neuro epithelion.
T16 Papilloma	Tumor of pavement epithelium with supporting tissue in normal arrangement.
T17 Adenoma	Tumor (benign) of glandular epithelium with supporting tissue in normal arrangement.
T18 Carcinoma	Tumor of glandular epithelium in a typical arrangement.

T19 **Carcinoma** **Epithelioma**	Tumor of epithelium in a normal arrangement.
T20 **Carcinoma** **epidermoid**	Tumor of epithelium in a normal arrangement.
T21 **Simple** **Mixed**	Tumor with more than one type of neoplastic tissue, named according to composition, as Chandro-Epithilium, Adenosarcoma.
T22 **Teratoma**	Tumor composed of tissues and organs of one, two, or three germinal layers, mono dermal, bi-dermal, or tri-dermal types.
T23 **Embryoma**	Tumor composed of tissue from three germinal layers in more or less orderly imitation of a fetus.