



Possibility of Leveling Anatomy and Physiology (and incorporating Anatomy/Physiology into Medical Biology) **3 Tier System**

By Rhian Purdy, RAHSI Science Curriculum Resource Instructor

An Introduction:

Over the course of a student's academic career when interested in healthcare, he or she is best prepared by taking several courses that cover the foundation of Anatomy and Physiology. Thus, the benefit of a Health Pathway; through a sequence of courses, a pathway program can build layers upon layers of similar content. College A&P has proven to be a stumbling block for many students. High school students need increased chances to prepare for this rigorous college course in order to stay committed to a healthcare training program and ultimately career. Allowing them exposure to the curriculum before college, in my opinion, is the job of the high school Health Pathway.

While A&P curriculum can extend into deep territory, such as Cadaver Anatomy and Physiology in Medical School, the same basic concepts and basic anatomy is shared by all courses. We would like to share the following "best practice" model for existing and aspiring Health Pathway programs, to help interested teachers build an A&P tier. A tier presents options for a pathway to provide multiple exposure opportunities over the course of a high school sequence. It also serves a variety of students at their current knowledge levels. Because there are no Advanced Placement or specific California science standards for A&P, you have the freedom to develop a sound curriculum that meets the needs of your students, both now and long-term.

Tier 1: Anatomy and Physiology for beginners, English language learners, or an academically challenged group. [A&P in Med Bio]

Anatomy and Physiology takes a comprehensive look at an overwhelming amount of information. If being presented to students for the first time, it can be very challenging. There are several texts that offer an overview of all the content areas without going into depth in certain areas. In other words, we have discovered texts that offer a great look into anatomy while covering some physiological concepts only briefly. They serve as a great place to start in getting students ready for college-level Anatomy and Physiology. It is to students' advantage that Health Pathway educators weave in clinical applications to each human system. [Note that human systems are covered in Medical Biology; refer to www.RAHSI.org/teachcouns.htm for more information.] This way, students will have an idea of how the curriculum can be applied in future healthcare fields. Here are some suggested resources:

- "Mini Martini" *Anatomy and Physiology for Emergency Care*

- Martini's *Clinical Issues in Anatomy* (ISBN # 0-8053-7218-0)*
- Mader's *Human Biology Lab Manual*
- Drewes and Milligan's *How to Study Science*
- Brady's *Emergency Care*

Tier 2: Anatomy and Physiology for future healthcare workers at a college-preparatory level. [Refer to Pathology Apps below]

Anatomy and Physiology curriculum can be taught as a healthcare application *and* as a major emphasis throughout an entire course. Extra resources may be obtained online and through local healthcare providers to enhance and apply curriculum. My favorites include X-Rays, medical case studies (privacy-protected, of course), ECG strips, stethoscopes, and sphygmomanometers. [Also, hospitals and other providers periodically replace old equipment with technological advancements, such as lightboxes to read X-Rays. Develop a relationship with your local health providers to be their Health Pathway of choice when looking for recipients of such donations.] Suggested resources:

- Tier 1 textbooks
- CPR for Professionals and First Aid (refer to www.RAHSI.org/teachcouns.htm for more information)

Tier 3: Anatomy and Physiology for advanced students at a college level.

Anatomy and Physiology at a college level is comprehensive and challenging. It is possible to match your local colleges' rigor in high school A&P. The advantage of exposing students to identical college curriculum is that they are not in college yet. You will be providing them with crucial study skills and safety nets that will not necessarily be available to them in college. Such exposure will help your students gain an advantage in their higher education especially by increasing their retention and recall, which they will need to rely upon in the fast-paced college environment. Keep in mind that most college Anatomy and Physiology courses incorporate lab sections and lab-practical exams. A&P Lab can prove very difficult for students that have never had the experience of being held accountable for their practical skills. Therefore, it is also to their advantage for high school A&P to weave in clinical applications of the material while covering each human system. Our suggested resources:

- Martini's *Fundamentals of Anatomy and Physiology*
- Martini's *Clinical Issues in Anatomy* (ISBN # 0-8053-7218-0)*
- Marieb and Mitchell's *Human Anatomy and Physiology Lab Manual*
- Drewes and Milligan's *How to Study Science*
- Brady's *Emergency Care*
- Lange's *Case Files Physiology* (ISBN # 0-07-144575)*
- Merck Manual of Diagnosis and Therapy

*Note that these ISBNs have been provided due to their absence on the accompanying *Textbook Resources for Health Pathway Instructors* document (available at www.RAHSI.org/teachcouns.htm). ISBNs can change with future editions; check online and with your local textbook-publisher representative for details.



Applications of Pathology in the Human Systems (integrating Pathology into Anatomy and Physiology curriculum)

By Rhian Purdy, RAHSI Science Curriculum Resource Instructor

An Introduction:

Anatomy and Physiology curriculum can be taught and applied to healthcare fields as a major emphasis throughout the entire course. Extra resources may be obtained online and through local healthcare providers to enhance and apply curriculum. My favorites include X-Rays, medical case studies (privacy-protected, of course), ECG strips, stethoscopes, and sphygmomanometers. Here are some suggested resources for texts:

- “Mini Martini” *Anatomy and Physiology for Emergency Care*
- Martini’s *Clinical Issues in Anatomy* (ISBN # 0-8053-7218-0)*
- Mader’s *Human Biology Lab Manual*
- Drewes and Milligan’s *How to Study Science*
- Brady’s *Emergency Care*
- CPR for Professionals and First Aid (refer to www.RAHSI.org/teachcouns.htm for more information)

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1: Skeletal

Spinal abnormalities:

Kyphosis, lordosis, scoliosis

Pathology:

Gout, arthritis, R club foot, cranial fusion, rickets, classifications of breaks, concave chest, osteosarcoma, osteopenia, osteoporosis, Paget’s disease, tendonitis, bursitis, fibromyalgia, carpal tunnel syndrome, marfan syndrome, osteogenesis imperfecta

Types of treatment:

Splinting, casting, traction, special tests for tendons/ligaments, total joint replacement

Clinical applications:

Bone density test, CT, X-Ray, MRI, arthroscopy, arthrocentesis

2: Muscular

Sprain vs. strain, myasthenia gravis, necrotizing fasciitis, tetanus, bruise, myomas, polio, botulism

Clinical applications:

Special tests (multiple sclerosis, muscular dystrophy, e.g.), first aid bandage/direct pressure, splints, RICE “Rest Ice Compression Elevation,” massage, cold/hot application

3: Nervous

Polio myelitis, black widow toxin, huntington chorea, meningitis, seizures, migraines, Guillian Barre Syndrome, dementia, Parkinson Disease, narcolepsy, turrets syndrome, spinabifida, rabies, meningitis, shingles, concussion, subdural hemotoma, hydrocephalus, Tay-Sachs Disease, meningiomas, spinal trauma, amnesia

Clinical applications:

Lumbar puncture, cranial nerve tests, glasgow, PERL, Cincinnati stroke code, CT, MRI, angio, acupuncture, EEG, PET, CSF analysis, reflex tests

Eye:

Glaucoma, pink eye, scleritis, diplopia, blepharitis, macular degenerative disease, floaters, exophthalmos, cross-eyed, lazy eye

Refractive errors & correction:

Myopia, hypermyopia, cataracts, laser keratotomy

Clinical applications:

Eye slit lamp machine, eye charts

Ear:

Otosclerosis, deafness, vertigo, hearing tests

Clinical applications:

Otoscope

4: Endocrine

Hypo/hyperthyroidism, graves, acromegaly, dwarfism, gigantism, diabetes, metabolic disorders

Clinical applications:

Blood panel for hormonal levels and electrolytes, radioactive iodine uptake test, MRI of pituitary

5: Integumentary

Skin Cancers:

Solar keratosis, melanoma, Kaposi sarcoma (HIV specific), squamous vs. basal cell cancer, psoriasis, eczema, cellulitis, pressure ulcers, parasitic skin infections, scleroderma, acne, degrees of burns, hirsutism, warts, abscess, surface skin lesions (normal vs. abnormal), ichthyoids, alopecia, leprosy, scurvy

Clinical applications:

Curettage, debriedment, identification of DCAP-BTLS "Deformities, Contusions, Abrasions, Punctures, Burns, Lacerations, Swelling," hyperbarics for wound treatment

6: Circulation

Heart attack, congestive heart failure, hyper/hypotension, anemia, atherosclerosis vs. arteriosclerosis, peripheral vascular disease, embolism, DVT, hemorrhage, hyperlipidemia, varicose veins, brady/tachy asystole, Vfib, Afib, arrhythmia, carditis, cardiomyopathy, coronary artery disease, shock, edema, aneurysm, vasculitis, sickle cell, leukemia

Clinical applications:

CPR, cath(eter) lab, AED, angiograms, cardiac enzyme indicators of MI, sonogram for valve checks, blood panel injection sites, blood thinners, components of blood heart and lung machine, shygmanometers, pulse points, direct pressure first aid, venography, doppler, stress test, hematocrit

7: Respiration

COPD, emphysema, cystic fibrosis, environmental alveolar damage, lung cancer, pneumonia, SARS, pneumothorax, pulmonary embolism, laryngitis, bronchitis, sinusitis, rhinitis, flu, hantavirus, anthrax

Breathing disorders:

SIDS, apnea, dyspnea, asthma

Clinical applications:

Pulmonary function test, spirometer, pulse oximetry, intubation, ventilator, trachostomy, bronchoscopies, breathing treatments, positions for breathing difficult, arterial blood gas, auscultate lung sounds, hyperbarics, thoracentesis, sputum test

8: Digestion

Ulcers, pyloric stenosis, diverticulitis, colon cancer, pancreatic cancer, gall stones, hepatitis, cirrhosis, Crohn's disease, hemorrhoids, hernias, gingivitis, cavities, oral cancer, diabetes, obesity, poisoning, aphagia/dysphagia, cholecystitis, emesis, cleft palate, parasitic disease, vitamin deficiency, esophageal varices, lactose intolerance, constipation, diarrhea

Clinical applications:

Colostomy bags, gastric bypass, tube feedings, herbal remedy

9: Excretion

Renal failure, cystitis, incontinence, polycystic kidneys, electrolyte imbalance, nephritis

Clinical applications:

Dialysis, urinalysis, catheters, intake vs. output

10: Immune

HIV, lupus, rheumatoid arthritis, infectious disease, allergies, anaphylaxis, tonsillitis, lymphedema, appendicitis, splenomegaly, mononucleosis, vitiligo

Clinical applications:

Wrights staining and leukocyte identification, vaccines, bacteriology, parasitic/viral/bacterial/fungal disease, prick test, biopsy, TB skin test, white blood cell (WBC) differentiation and count

11: Reproduction

Sterility issues, chromosomal damage, prenatal care, STDs, fetal development, menses

Clinical applications:

Ultrasound, amniocentesis, fetal monitor, breast exam, testicular exams, PAP smear, mammography, cervical biopsy, hormonal blood tests, semen analysis, Alpha Fetal Protein "AFP" tests for neural tube defects, karyotyping

Recommendations for Competencies:

Microscope skills, microorganisms identification, medical terminology, abbreviations, vital signs, communication skills, CPR/First Aid, AED certification, EKG proficiencies, pulse, blood pressure, slide staining and mounting, bacteriology plating, analyzing lab results for interpretation, blood-typing identification, dissection skills, suturing, radiology reads, differential diagnosis, case studies.

Refer to www.RAHSI.org/teachcouns.htm for curriculum-supplement links, medical dictionaries, etc. Also, www.RAHSI.org/students.htm for Cool Science Websites, including games.