



Presented by
Daniel Matranga

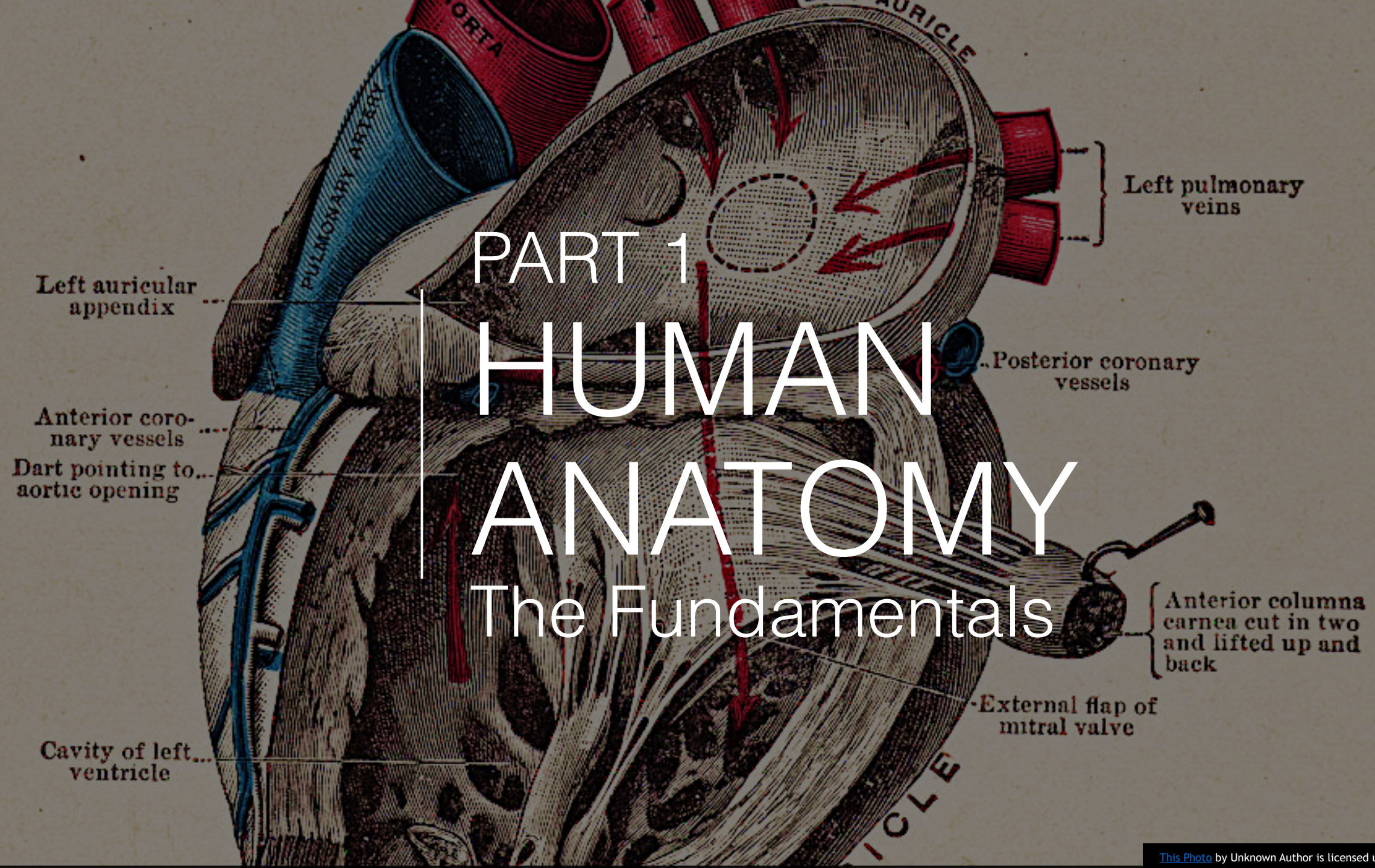
Fundamentals of Sound Personal Training

A person is performing a handstand in a gym. A coach is standing behind them, with their hands on the person's arms to provide support and guidance. The person is wearing a dark long-sleeved shirt, dark shorts, and a dark baseball cap. The coach is wearing a dark t-shirt and dark shorts. The background shows a gym setting with various equipment and other people in the distance.

Course Objectives

- Increase fundamental understanding of:
 - Anatomy and Biomechanics
 - 360 degree, joint by joint assessment.
 - Fundamental movement pattern coaching and execution.
 - Nutritional Prescription based on client's goals, needs, and preferences.
 - Energy systems.
 - Substrate utilization.
 - Breaking down the “diet space”.
 - Business systems and practices for career long success.
 - How to operate and effective, ethical and practical in person and virtual coaching business.

PART 1 HUMAN ANATOMY The Fundamentals



Why Mastering Anatomy is VITAL

- Anatomy (and the underlying physiology) connects ALL the dots together when it comes to providing solutions and troubleshooting issues that may arise when training clients.
- Understanding structural and functional anatomy is critical for being able to effectively assess clients, program for individual client variance, as well as progress and regress on the fly.
- Having a better understanding of anatomy will elevate the level of service you can provide to your clients and accelerate their results.
- Being able to provide education explanations as to **WHY** you programmed something, why ____ hurts, or why they don't feel ____ is a skill that will set you apart.
- Most trainers do NOT understand structural OR functional anatomy, they just know what movements work what muscles. This will set you apart tremendously.

Anatomy is ALL Connected. . .

All 11 bodily systems are highly interconnected... *FOR EXAMPLE:*

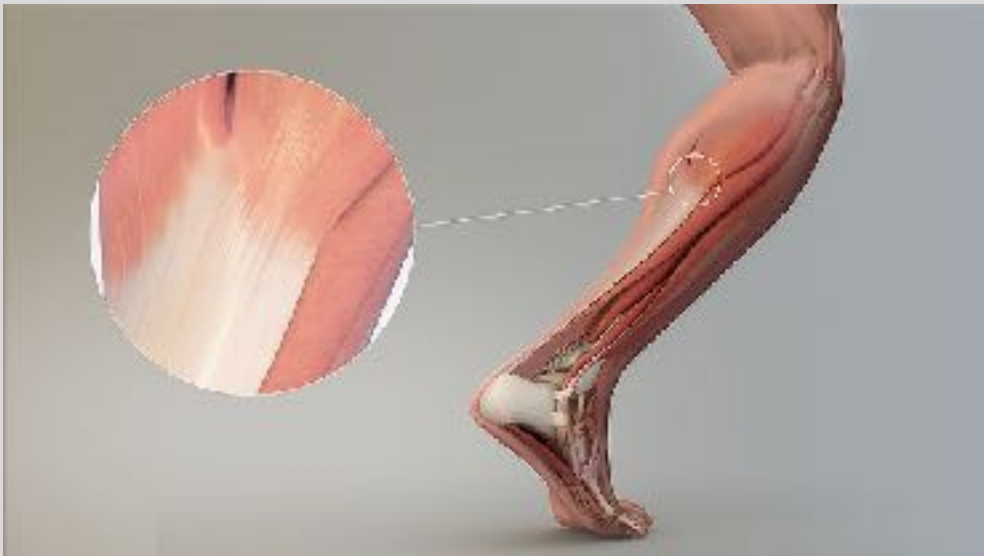
- *Muscles* act on *skeletal structures*. The introduction of load can illicit *endocrine responses* that have a regulatory affect on appetite and *digestion*.
- **KEY POINT:** Almost everything you do with a client has a multi-factorial affect on SEVERAL bodily systems.

• Primary Systems In This Course

- Muscular
- Skeletal
- Cardiorespiratory (circulatory + respiratory)
- Nervous
- Endocrine
 - Secondary systems that will be intertwined:
 - Digestive
 - Excretory
 - Reproductive
 - Immune
 - Integumentary

Anatomical Terminology (Part One)

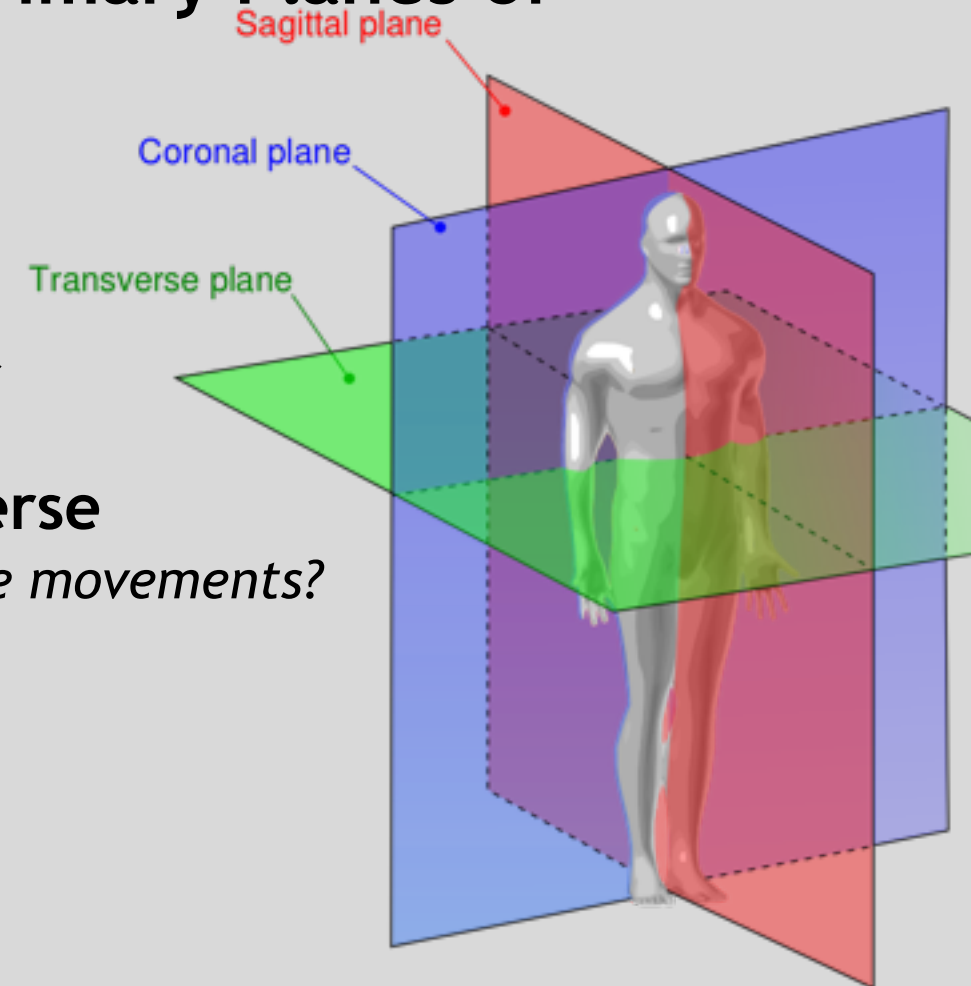
- **Two primary domains:**
 - **Structural** (bones, ligaments)
 - **Functional** (muscle, tendons, fascia)
 - *What's the difference?*



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- **Three Primary Planes of Motion**

- **Sagittal**
- **Frontal**
- **Transverse**
 - *Name movements?*



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Anatomical Terminology (Part Two)

- Inferior: Below
- Superior: Above
- Proximal: Close
- Distal: Far
- Anterior: Front
- Posterior: Back
- Deep: Deep
- Superficial: Surface
- Medial: Inward (from ML)
- Lateral: Outward (from ML)

Anatomical Terminology (Part Three)

- **Frontal Plane**

- A(b)duction
- A(d)duction
- Lateral Flexion

- **Sagittal**

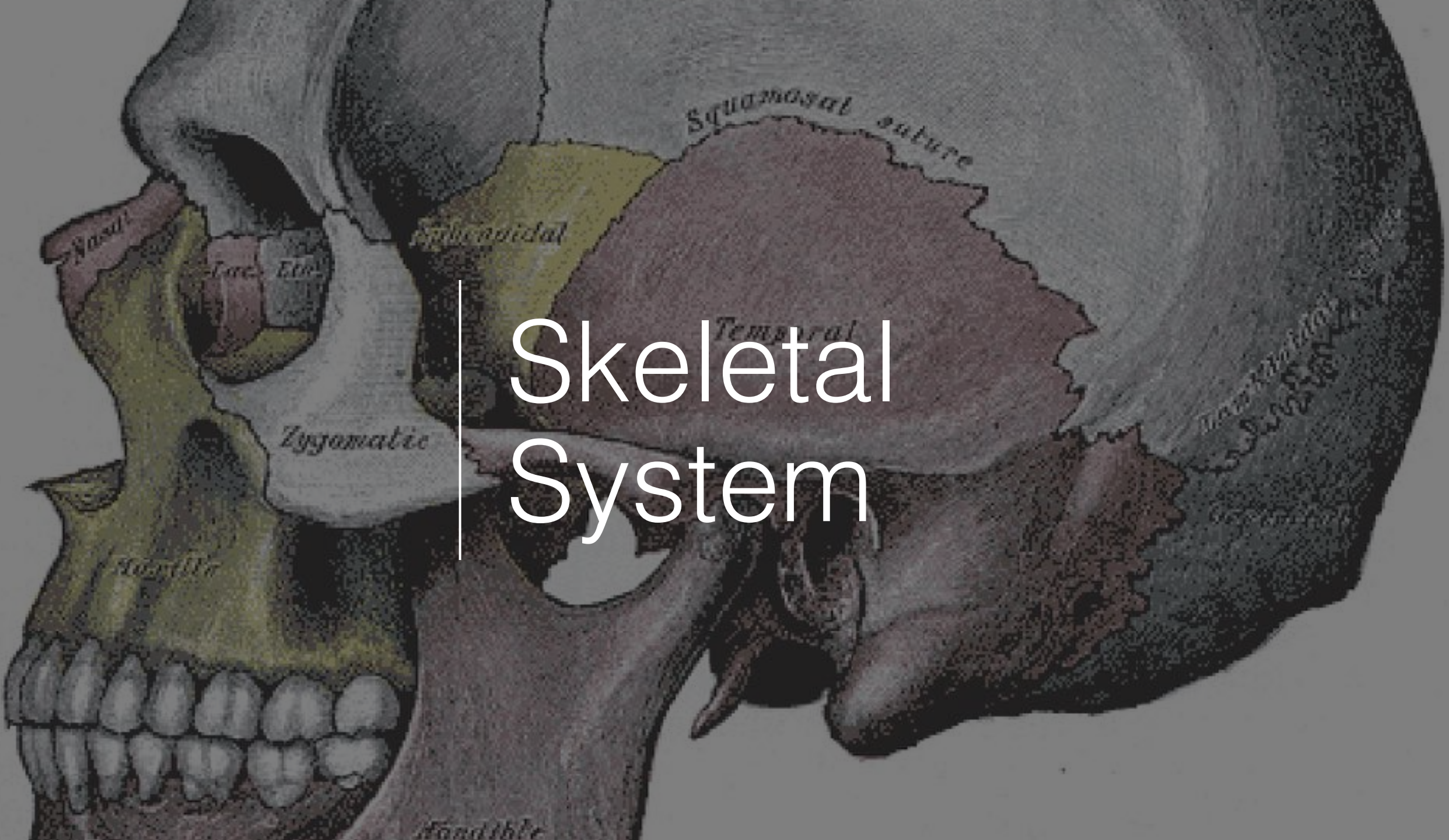
- Flexion
- Extension
 - (dorsi/plantarflexion)

- **Transverse**

- Rotation
- (pronation/supination)

- *How to remember*

- *Abduct = taking away*
- *Adduct = ADDing in*
- *Extending = Behind*
- *Flexing = In front*
- *Supination = Soup*
- *Plantarflexion = PLANTING foot*



Skeletal System

Squamosal suture

Sphenoid

Temporal

Zygomatic

Maxilla

Mandible

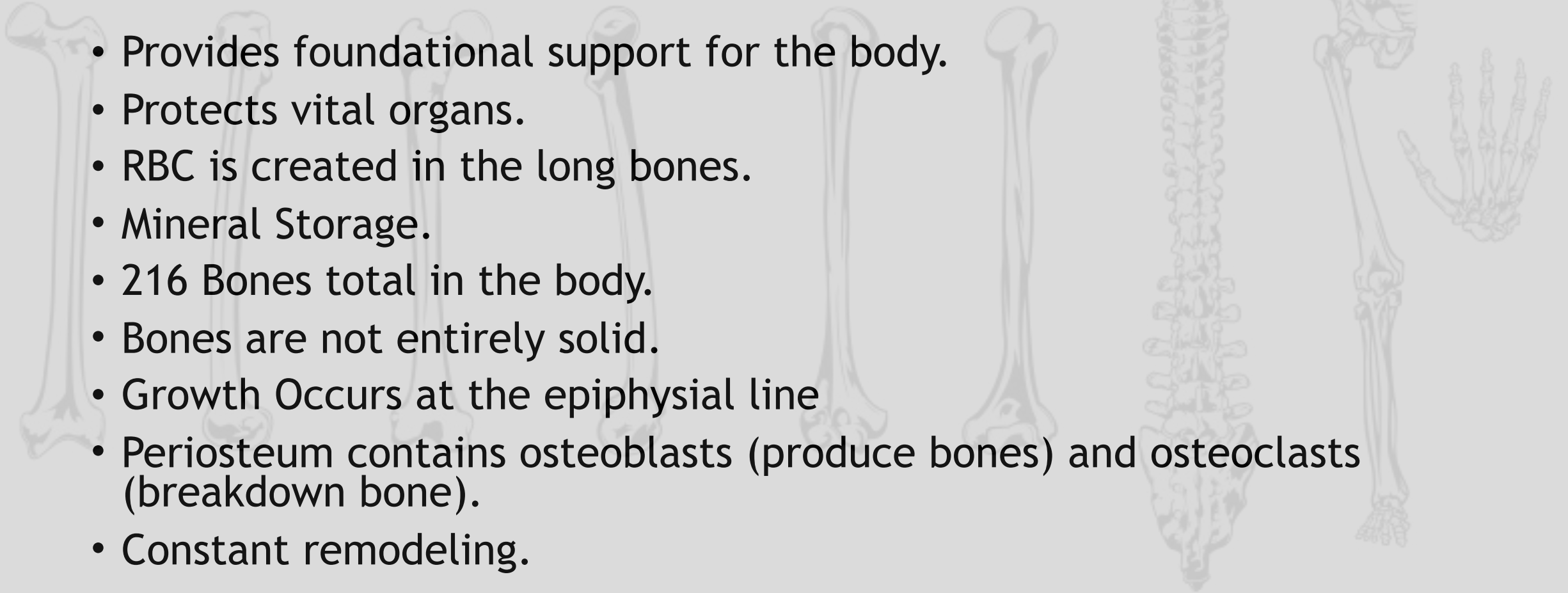
Nasal

Lacr.

Eth.

Skeletal System Breakdown

- Provides foundational support for the body.
- Protects vital organs.
- RBC is created in the long bones.
- Mineral Storage.
- 216 Bones total in the body.
- Bones are not entirely solid.
- Growth Occurs at the epiphysial line
- Periosteum contains osteoblasts (produce bones) and osteoclasts (breakdown bone).
- Constant remodeling.



Cartilage

- Non-contractile tissue composed of collagen and elastin.
- **THREE MAIN TYPES**
 - **Hyaline**
 - Helps bones move.
 - **Elastic**
 - Makes up unique structures (Nose, Larynx)
 - **Fibrocartilage**
 - Big time shock absorber (menisci and discs)

- Because cartilage is largely *avascular* it does **NOT** heal well at all.
- Clients will tell you that “I do not have any cartilage in my _____”.

• *What does this mean to you?*



Joints and Joint Types

- ***Two Primary Types***

- **Fibrous: Connected**

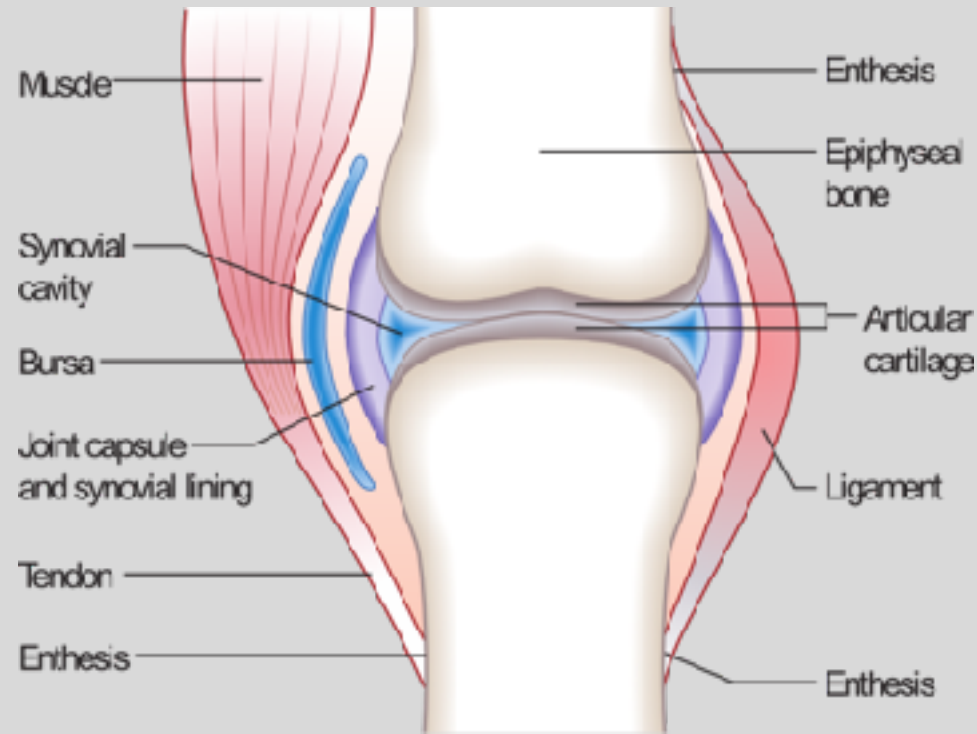
- Example: Suture in skull

- **Synovial:**

- Pretty much everything else

- **Types of Synovial Joints**

- Ball and Socket: Hip
 - Hinge: Knee and Elbow
 - Pivot: Radioulnar joint
 - Saddle: carpometacarpal
 - Gliding: AC joint
 - Condyloid: Metacarpal-phalangeal



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Ligaments and Tendons

• Ligaments

- Non-contractile
- Connect **bone to bone**
- Densely populated with mechanoreceptors (balance + stability)
- Common Ligaments: UCL, ACL, MCL.
- Take a LONG time to recover.
- Once torn, generally need to be replaced.
- Hypermobility clients BEWARE

• Tendons

- Contractile (big force producer)
- Connects **muscle to bone** (you can remember this because it produces force)
- **GTO**: sits between tendon and muscle, prevents damage via inhibition. Load sensitive.
- Explosive athletes have **BIG TIME** tendon activity.
- Hypomobility clients BEWARE



Muscular System

Acromion

Spine of Scapula

DELTOIDEUS

PARASPINOSUS

RHOMBOIDEUS MINOR
RHOMBOIDEUS MAJOR

Spine of Scapula

TERES MAJOR
TERES MINOR

Lumbodorsal

SERRATUS ANTERIOR

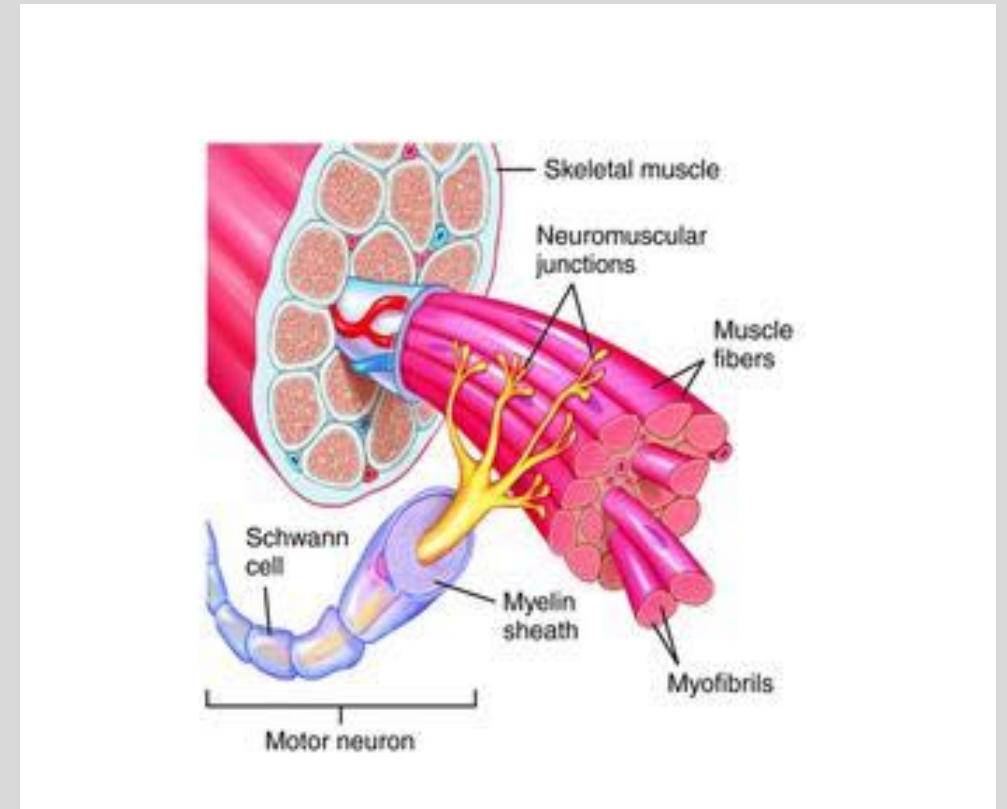
9th Rib

10th

Muscles do more than movement...

- Other than contributing to voluntary motion, the muscular system plays a role in:
- Circulation
- Respiration
- Digestion
- Urination
- Vision

There are over 600 muscles in the body that contribute to motion alone.



Muscular System Key Terminology

- **Action:** What a muscle's function is. When a muscle shortens, what is happening at the joints it has action on.
- **Insertion:** Where a muscle "attaches". Often distal to the origin.
- **Origin:** Where a muscle "starts" relative to the body. Often proximal to the insertion.
- **Agonist:** The primary muscle involved in a joint action. Often called the "prime mover".
- **Antagonist:** Works in opposition of the prime mover.
- **Synergist:** Actively assists the prime mover when it comes to force production via stabilization.
- **Sarco:** "*muscle*"

Muscle Structure (Largest to Smallest)

- **Muscle Belly:** The entire mass of a muscle. Wrapped in connective tissue. Contains muscle fibers.
- **Muscle Fiber:** Second largest units. Comprised of myofibril.
- **Myofibril:** Structural component of the muscle fiber. Comprised of various sarcomeres.
- **Sarcomere:** Smallest unit of the muscle fiber. Contains the contractile fibers of actin, myosin, and titin.
- **Actin + Myosin:** Primary fibers responsible for muscles power-stroke. These little guys make it all happen with the “sliding filament” theory.

Muscle Fibers have THREE PRIMARY TYPES

- **Skeletal Muscle:**
 - Voluntary movement.
 - Must be initiated by the nervous system.
 - Often called “striated” due to unique appearance from actin and myosin heads.
 - EG. Biceps
- **Cardiac Muscle:**
 - Non-Voluntary (thankfully)
 - Contains intercalated discs.
 - EG. Heart
- **Smooth Muscle:**
 - Non-Voluntary
 - Most densely located in the digestive, excretory and reproductive system.
 - EG. Blood Vessels

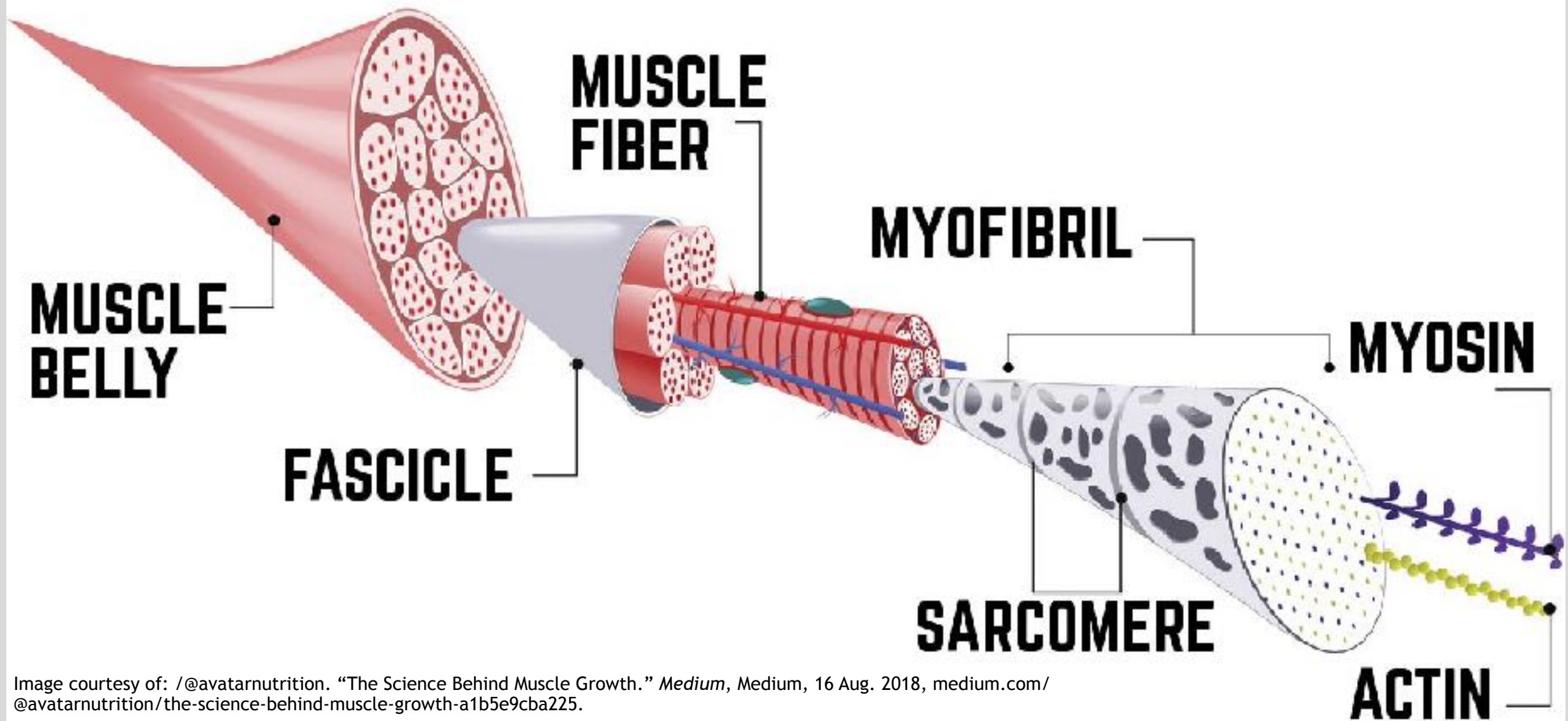
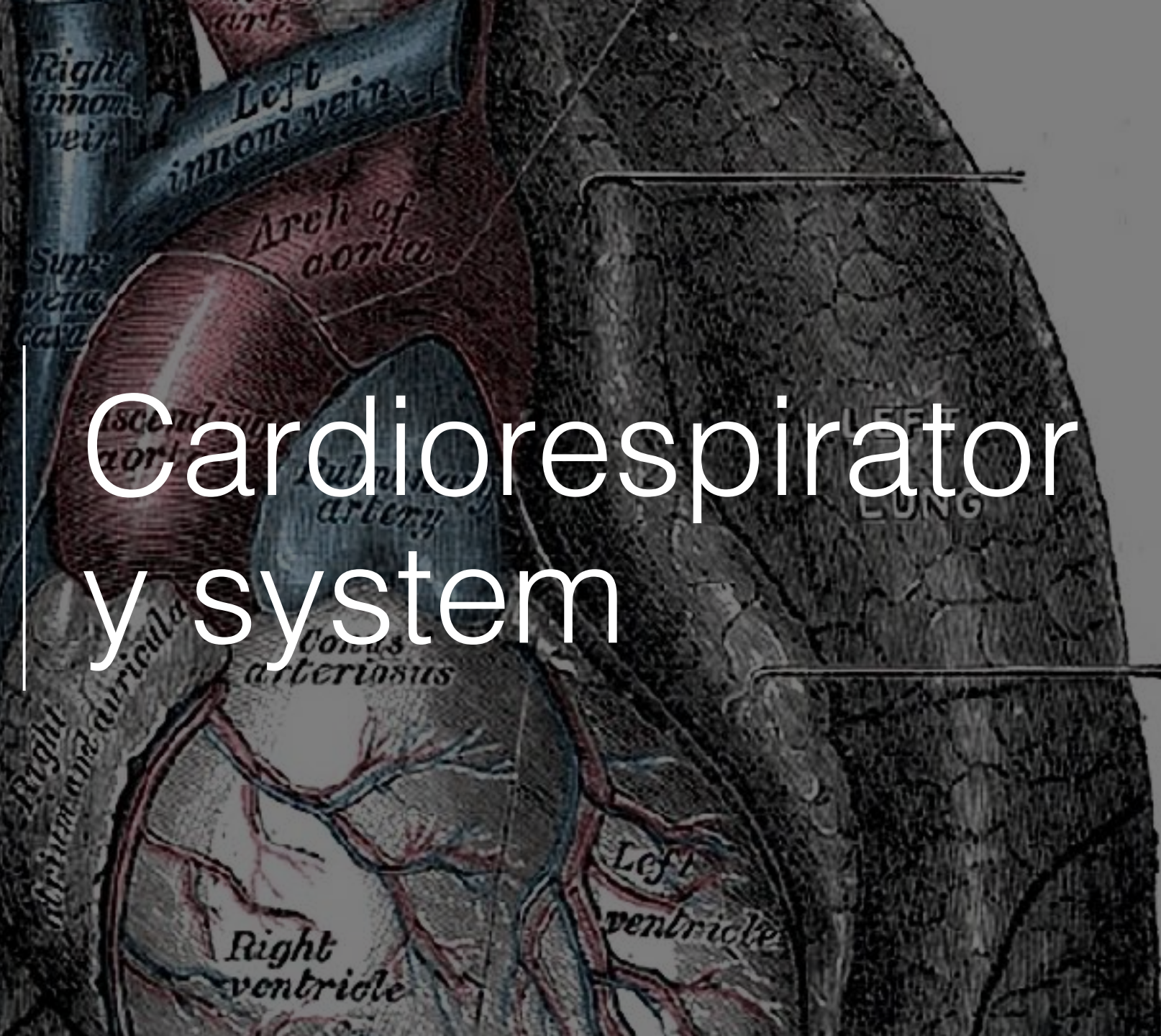


Image courtesy of: /@avatarnutrition. "The Science Behind Muscle Growth." *Medium*, Medium, 16 Aug. 2018, medium.com/@avatarnutrition/the-science-behind-muscle-growth-a1b5e9cba225.

RIGHT
LUNG



Right
innom.
vein

Left
innom. vein

Arch of
aorta

Sup.
vena
cava

Cardiorespirator y system

LEFT
LUNG

Right
atrium and
auricula

Conus
arteriosus

Right
ventricle

Left
ventricle

The Foundational System for Health

- Heart disease accounts for over 610,000 deaths per year.
- Heart disease is the leading cause of death for both men and women.



Race of Ethnic Group	% of Deaths
American Indians or Alaska Natives	18.4
Asians or Pacific Islanders	22.2
Non-Hispanic Blacks	23.8
Non-Hispanic Whites	23.8
All	23.5

Metrics of HEALTH (Part One)

Blood Pressure Categories



BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120 – 129	and	LESS THAN 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130 – 139	or	80 – 89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER
HYPERTENSIVE CRISIS (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120

Metrics of HEALTH (Part Two)

The role of exercise capacity in the health and longevity of centenarians

Massimo Venturelli, Federico Schena, and Russell S. Richardson

[Additional article information](#)

- VO2 max is also strongly correlated with health and longevity. While access to VO2 max testing equipment is likely difficult for most trainers, the data on this slide shows the importance of having a well trained aerobic system.
- *Why NOT make this a focal point of your clients home program - especially when working with GEN-POP?*

Progressive reductions in lung function, maximal oxygen uptake, maximal strength, and sarcopenia, are just some examples of the multi-factorial decline in physical function that is typically associated with ageing. Although other age-related factors that may be more difficult to target with exercise such as orthopedic issues and cognitive deterioration do play a significant role, the scientific literature underlines the positive effects of exercise on the physical capacity and longevity of extremely old people such as centenarians. Recognizing the strong relationship between ageing, exercise capacity, and independence, understanding the physiological basis of this multi-factorial decline has important practical significance in terms of identifying methods by which an independent lifestyle can be maintained.

How to Apply Cardiovascular (aerobic) Training

- **Walking**
- **Jogging**
- **Hiking**
- **Swimming**
- **Rowing**
- **Running**
- **Circuit Training**

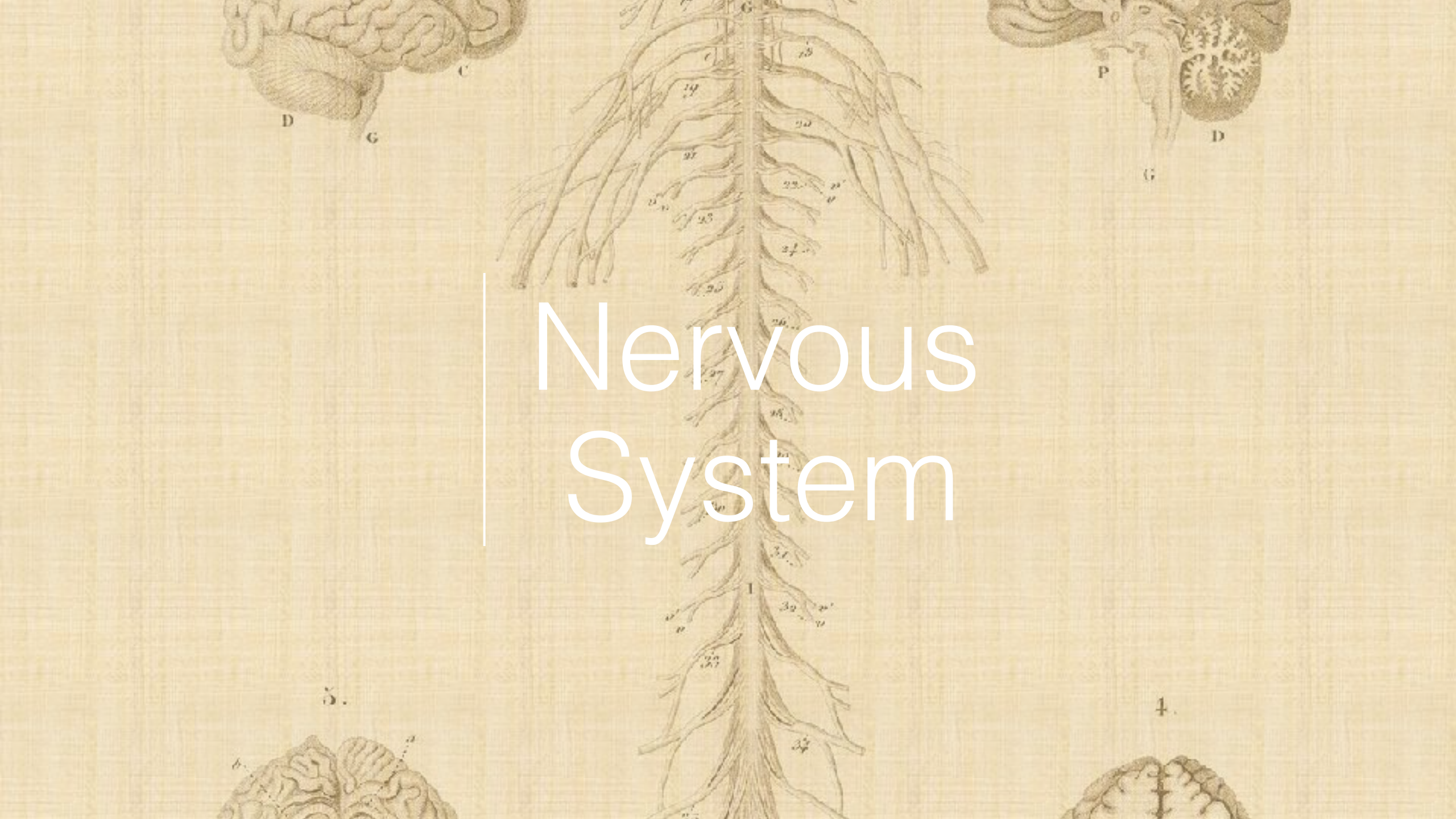
- How **NOT** to apply **AEROBIC** training

- *Sprinting*
- *Cross-fit*
- *F-45*

While these are excellent exercise modalities in their own right, they are more ANAEROBIC in nature and a trainer should prioritize developing the aerobic system first.

How Much Cardio?

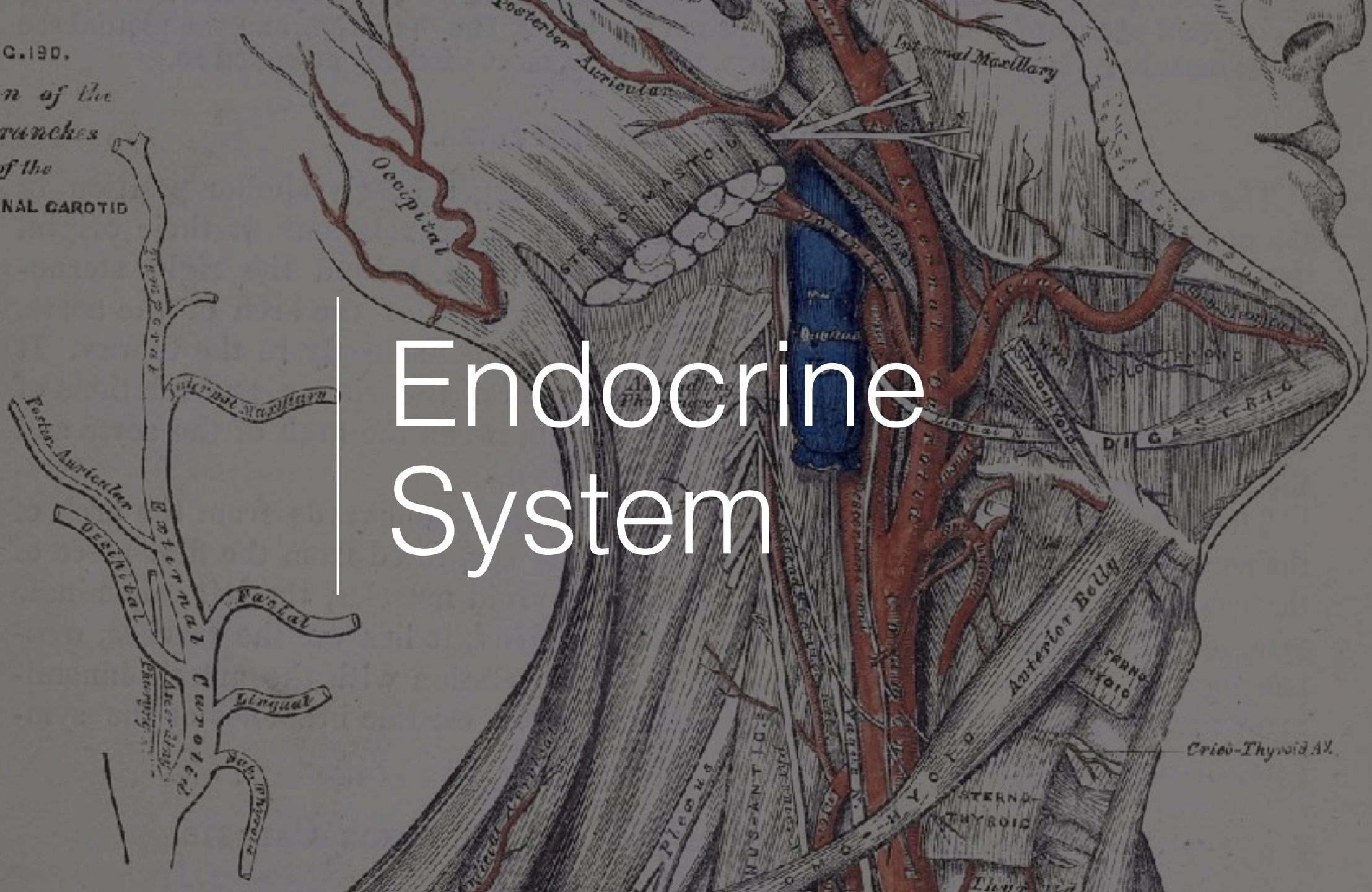
- I like to aim for **90-150** minutes/week of low intensity aerobic systems training/week.
- This can look a variety of different ways:
 - *15 minutes pre/post workout 5x/week.*
 - *3-5 30 minute walks after dinner.*
 - *One long hike.*
 - *ETC.*
- **HOW MUCH CARDIO YOU PROGRAM SHOULD FOLLOW THE F.I.T.T. PRINCIPLE!**
- Once a **healthy blood pressure** has been established, and the client is able to perform moderate **aerobically demanding** tasks with relative ease how much cardio they do becomes up to **you and them.**
- **By establishing a good aerobic base for your client you are:**
 - Increasing their recovery.
 - Improving their fitness.
 - Minimizing their risk of CVD.
 - Increasing their longevity.



Nervous System

FIG. 190.

Plan of the
Branches
of the
EXTERNAL CAROTID



Endocrine System

Hormones

- *“a regulatory substance produced in an organism and transported in tissue fluids such as blood or sap to stimulate specific cells or tissues into action (oxford dictionary definition).”*
- *“That shit 95% of trainers think they know but they do NOT know and get in a TON of trouble when they start playing god (danny matranga definition)”*
- The endocrine system is involved HEAVILY in every other system in the body.
- Hormonal issues are **COMMON** when working with general population clients. From thyroid to diabetes, from PCOS to hypogonadal old men - you are going to see a LOT of hormone stuff.
- It is **NOT** Your job to diagnose, fix, or treat hormonal problems.
- **YOUR JOB** is to start the dialogue, educate your client, and respect the endocrine system while you work to optimize the human.

Hormones You should be aware of

- **Insulin/Glucagon:** Manage blood glucose
- **Testosterone:** Primary androgen
- **Estrogen and Estradiol:** Big players in female and male physiology
- **Thyroid:** Metabolism regulator
- **Cortisol:** Big time stress hormone
- **Melatonin:** Circadian regulator
- **Catecholamines:** Stress hormone(s)
- **Aldosterone:** fluid regulator

Exercise and Hormones

- **Exercise has the ability to DIRECTLY and INDIRECTLY effect:**
 - Testosterone
 - Insulin
 - Glucagon
 - Thyroid
 - Growth Hormone
 - Catecholamines
 - IGF
 - BDNF

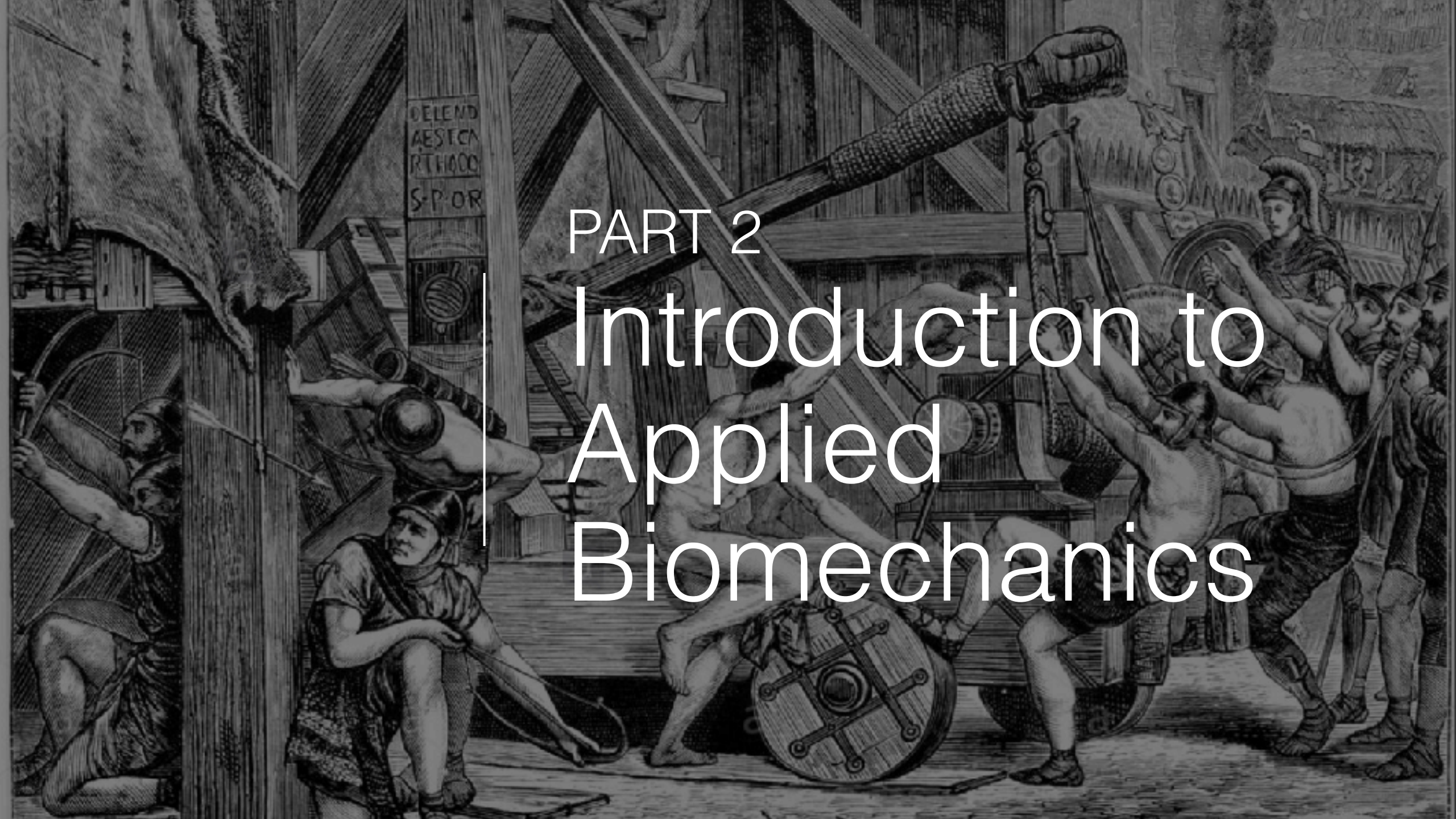


Tying it all
together . . .

VIVITUR IN
GENIO,
MORTUUS NISI
SIT ERGONE.

- Understand that as a trainer, even though exercise primarily affects the skeletal and muscle system you are “tinkering” with EVERY system in the body.
- This effect only increases as you start addressing nutrition and lifestyle.
- Use your wide angle and your zoom lens as a coach.
- With great power comes great responsibility.

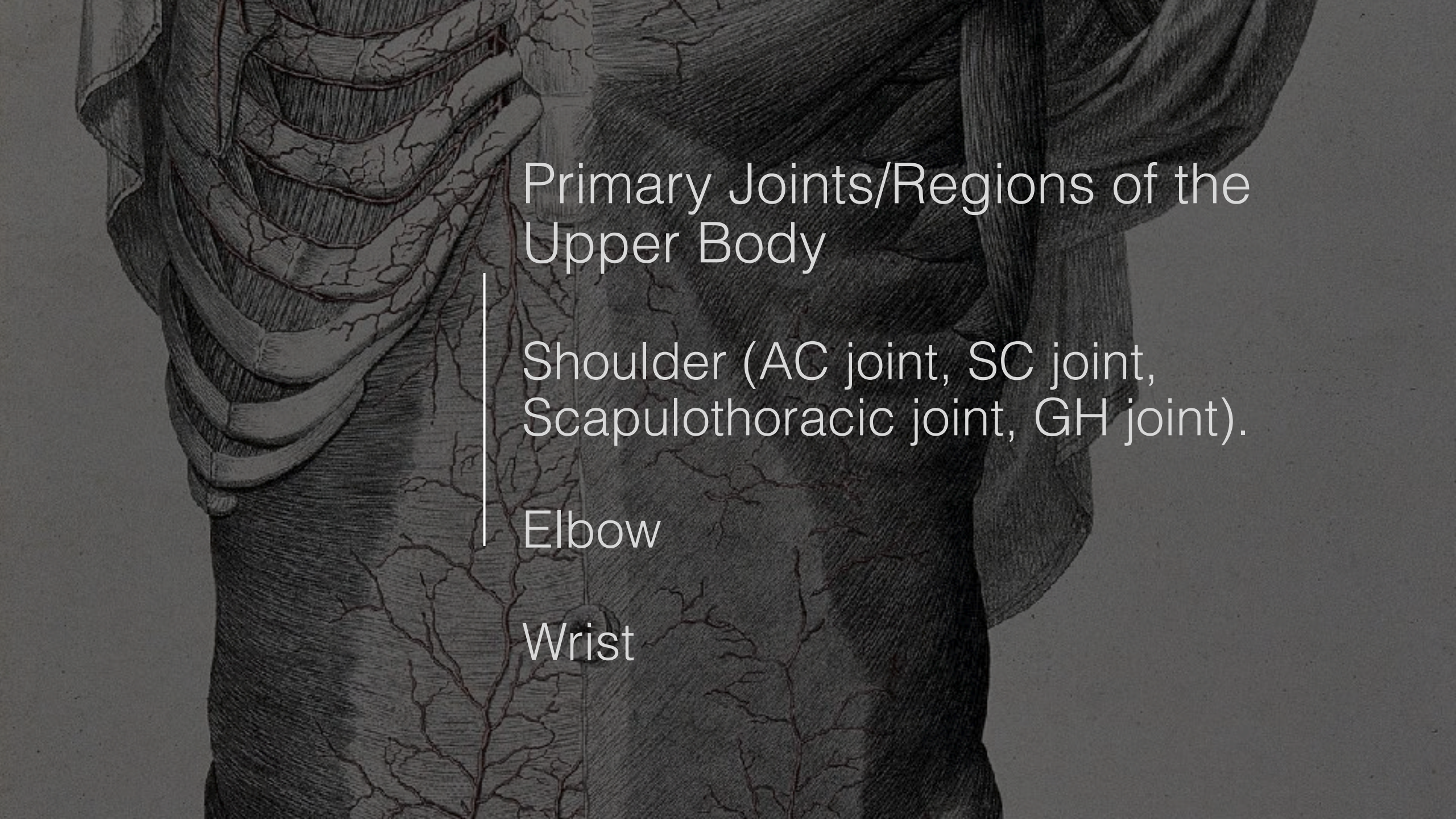




DELEND
AESTON
RTHOOD
S-P-OR

PART 2

Introduction to Applied Biomechanics

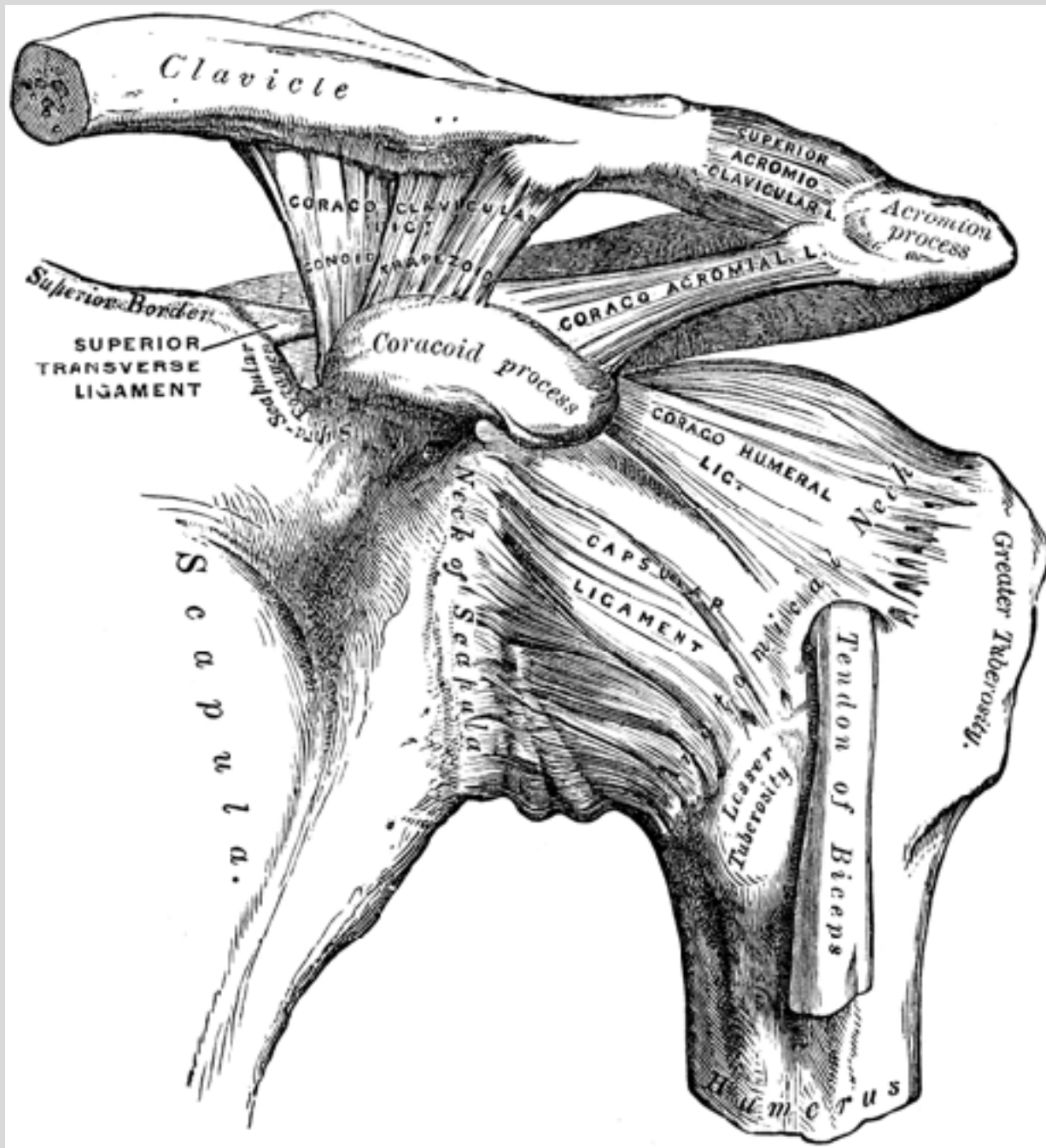
An anatomical illustration of the human upper body, showing the skeletal structure of the shoulder, elbow, and wrist. The illustration is rendered in a dark, textured style, possibly using charcoal or a similar medium. The shoulder region is the most prominent, showing the scapula, clavicle, and humerus. The elbow joint is clearly visible, showing the humerus and ulna. The wrist joint is also depicted, showing the radius and ulna. The overall composition is a vertical view of the right side of the upper body.

Primary Joints/Regions of the Upper Body

Shoulder (AC joint, SC joint, Scapulothoracic joint, GH joint).

Elbow

Wrist



Shoulder

Comprised of four joints

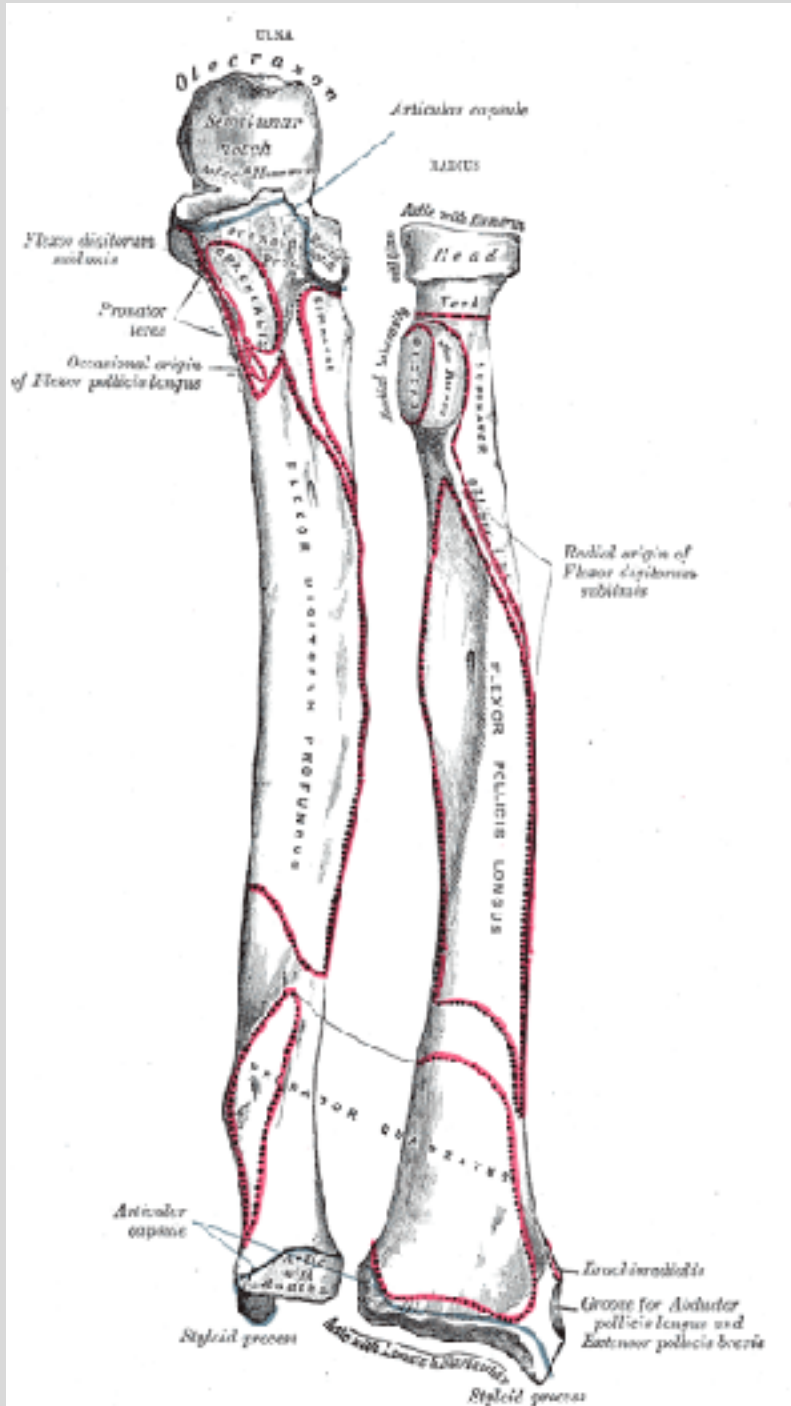
- Acromioclavicular (AC), Sternoclavicular (SC), Glenohumeral (GH), and the Scapulothoracic ("kinda")
- Primary functions are flexion, extension, adduction, abduction, internal and external rotation

Primary Musculature:

- Deltoid
- Upper Trapezius
- Middle Trapezius
- Lower Trapezius
- Lats
- Pectorals
- Serratus Anterior
- Biceps
- Triceps
- Rotator Cuff (SITS)
- Teres
- Rhomboids

Common Issues for Clients

- Generally related to mobility



Elbow

- Comprised of two primary bones.
- Radius (thumb side)
- Ulna (pinky side)
- Primarily acts as a hinge, but there are some elements of rotation (pronation/supination)

Primary Musculature

- Biceps
- Triceps
- Brachialis
- Brachioradialis
- Anconeus

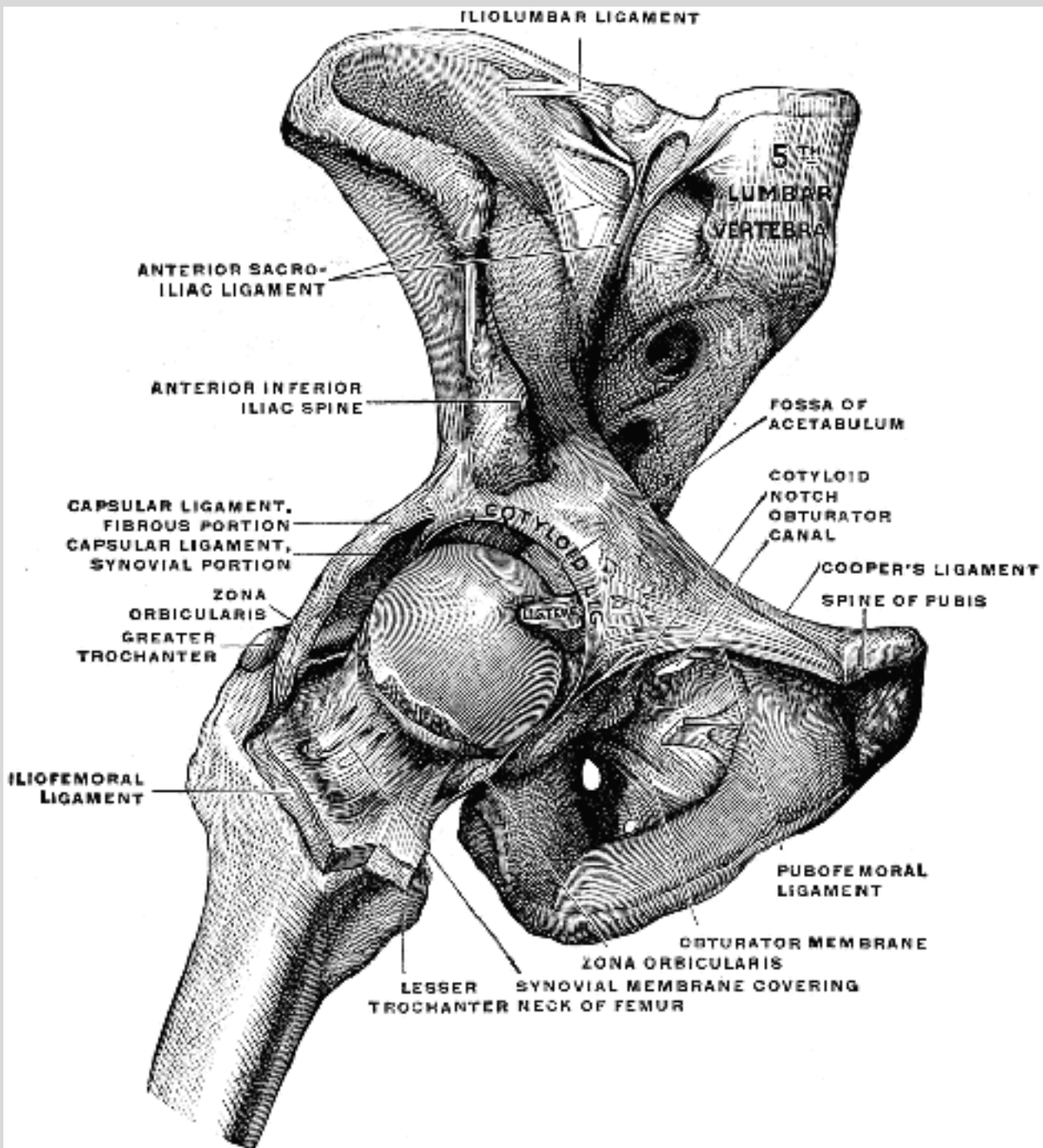
Common Issues for Clients

- Tendinopathies/Epicondylitis



Primary Joints and Regions of the Lower Body

Hip
Knee
Ankle



HIP

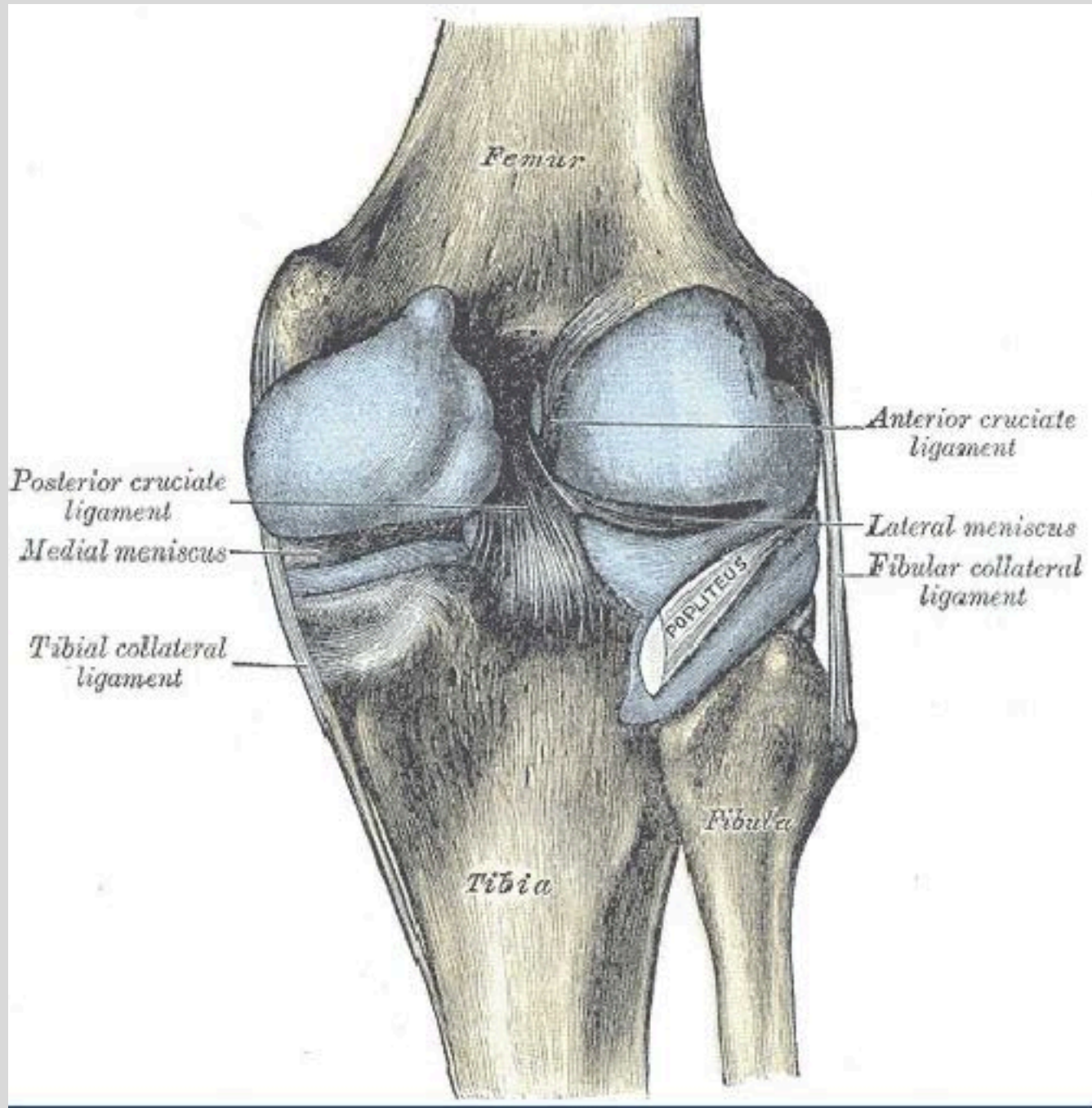
- Best example of a true ball and socket.
- Head of the femur inserts into the pelvis at the acetabulum.

Primary Musculature

- Gluteal Complex
- Hamstrings
- Quadriceps
- Piriformis
- Iliacus/Psoas
- TFL

Common Issues for Clients

Bursitis



KNEE

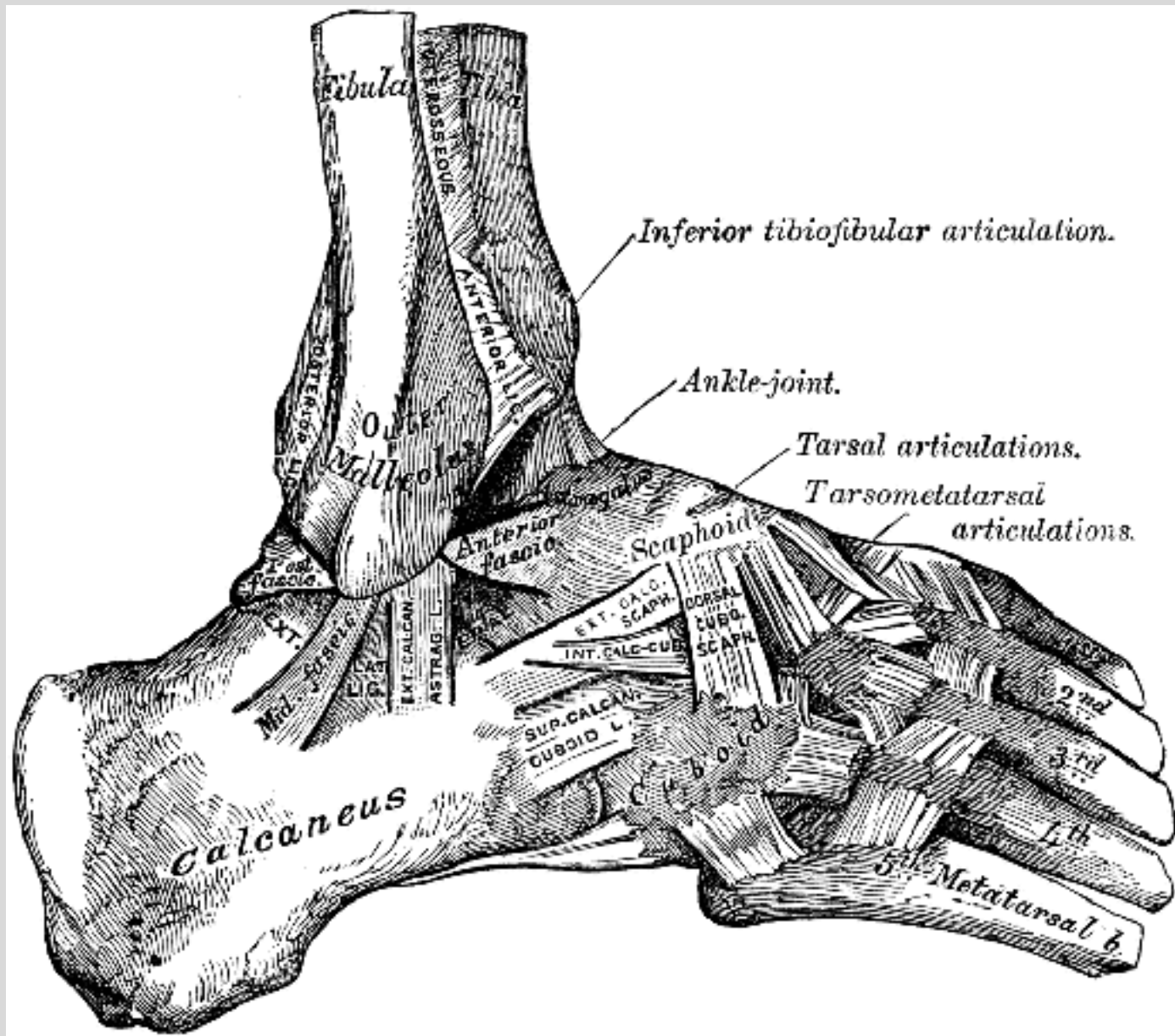
- Intersection of the femur, tibia, fibula and patella.
- Acts as a hinge.

Primary Musculature

- Quadriceps
- Hamstrings
- Gastrocnemius
- Adductors
- Abductors
- (Glutes/stabilize)

Common Issues for Clients

- MCL/ACL/Meniscus
- “Cranky Knee”
- Crepitus



Foot and Ankle

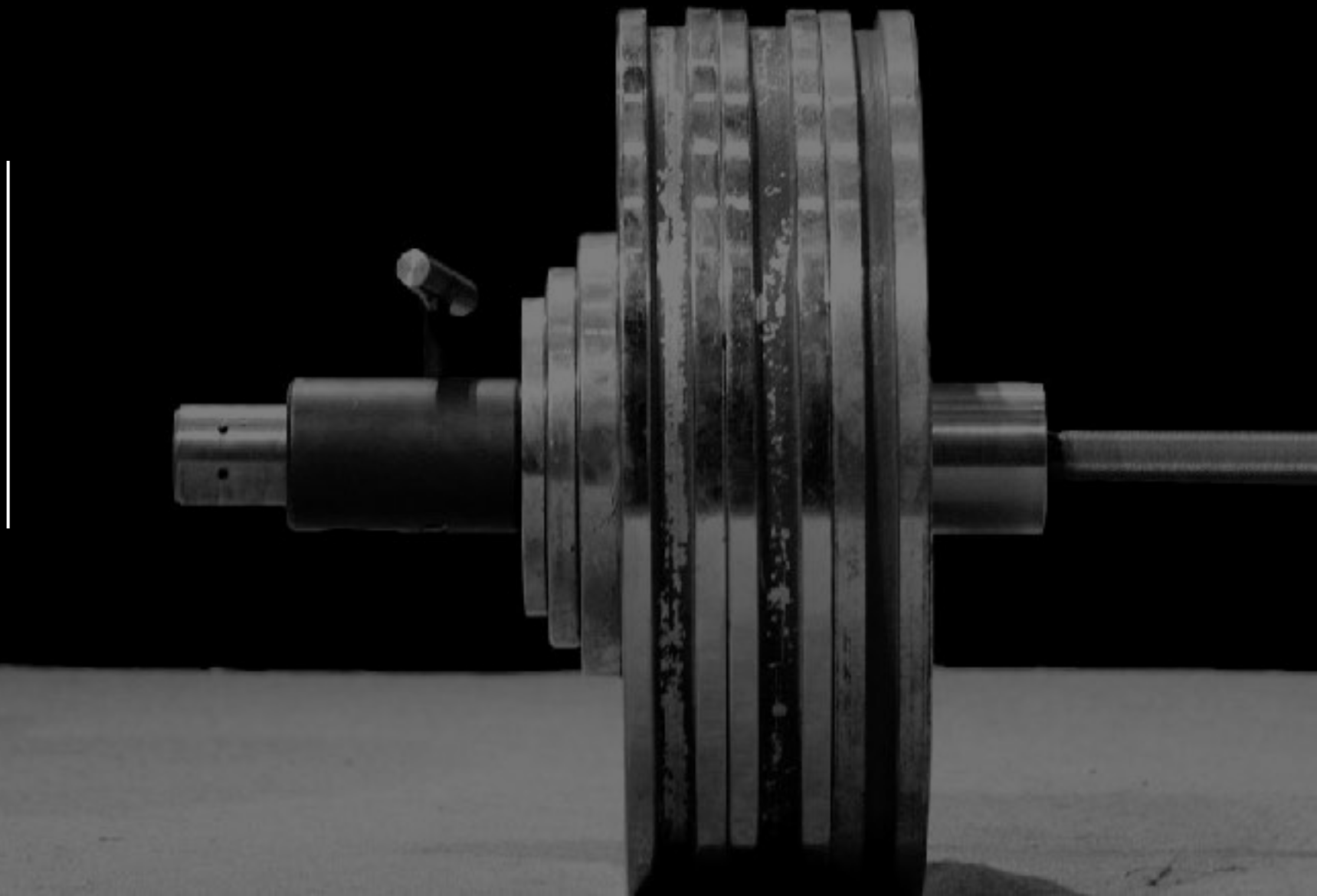
- The foot has 26 bones and a jumble of over 100 muscles, tendons, and ligaments (simply put, its pretty congested in there).
- Mobility of the toes and ankle are integral for big movements like squats and lunges.

Common Issues for Clients

- Plantar fasciitis
- Foot/Ankle mobility restrictions.

PART 3

Principles of Proper Programming



Exercise Variables

- The primary exercise variables a trainer will manipulate with their client on a day to day basis are:
 - **Intensity** (load on the actual movement/bar/%1RM)
 - **Volume** (sets x reps x weight *OR* the amount of work allocated to a specific movement(s) for a given session).
 - **Work/Rest** periods
 - **Tempo/Velocity**

Exercise Variables Cont.

- While intensity, volume, work periods, and tempos are often things applied across a training block *and* session to session, there are a few more things to consider with clients:
 - **Frequency:** this variable is vital when tailoring a program to a clients needs and recoverability.
 - Example: Training a muscle three times per week instead of one time per week.
 - **Resistance and Strength profiles:** these are effective ways to select exercises for certain clients.
 - Example: Selecting a cable lateral raise over a dumbbell lateral raise to try to match the resistance and exercise profiles.
 - **Muscle action:** Another nuanced tactic to get the most out of a given exercise.
 - Example: Focusing on the eccentric portion of a biceps curl.

The relationship between Intensity and Volume

- Volume and Intensity should be *INVERSLY* applied in programming for a client.
 - As intensities (weight) increase, volume (number of reps and overall work done) should decrease to offset cumulative fatigue and better match the bodies natural recovery response.
 - On the other end, as loads and intensities decrease one can naturally raise sets and reps.
 - It is possible to train with “*intensity*” (working hard and putting forth quality effort) without training with a high “intensity” (relative working weight set to set).

How to Prioritize Exercises?

- Large, multi-joint movements should proceed smaller, single-joint resistance training movements.
- Isolation movements that compliment the larger lifts should generally proceed those that do not.
 - Example: If benching is the main movement, cable flies might proceed triceps extension.
- When selecting between two multi-joint movements, the one with the highest CNS demand, volume **AND/OR** volume load should go first.
 - Example: Heavy 5x5 squats before heavy 5x5 OHP.

How Many Sets/Workout

- While data would support high set volumes being beneficial for a well-trained lifter, when training general population prioritizing intensity and quality may be better for some.
- With general population fat-loss clients, PRIORITIZE bigger lifts and progress them OFTEN.
- When training total body I like to split upper and lower body movements up with a 50/50 split and aim for somewhere between 10-20 sets.
- When training upper body I generally like to split it 60/40 pull/push.
 - I tend to opt for horizontal pulls over vertical pulls, but it is a very close split.

How Many Sessions Per Week?

- I have found that in my time as a trainer **1-3 sessions/week** tends to be the sweet spot.
- The emphasis of the session must **compliment** not compete with the clients “homework”/independent workouts.
- Program highly technical, high fatigue, high risk movements when you can supervise.
- Program mobility, aerobic systems training, isolated hypertrophy work on independent workouts.
- *Stretching your clients is boring for both you and them, them getting injured performing a movement they are not competent at without your supervision is negligent. Maximize your time together.*

How to Optimize Session Time

• 50 minute session

- Client performs aerobic warmup for 5 minutes (10 minutes *PRIOR* to session).
- Client performs individualized mobility program (5 minutes *PRIOR* to session).
- 15-20 minutes allocated to 1-2 primary compounds lifts.
- 15-20 minutes allocated to accessory work.
- 10-15 minutes allocated to isolated postural, hypertrophy, or “weak spot work”
- 5-10 minutes of **FUN!**
- Send em’ home.

• 30 minute session

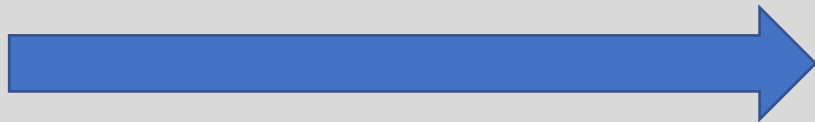
- Client performs aerobic warmup for 5 minutes (10 minutes *PRIOR* to session).
- Client performs individualized mobility program (5 minutes *PRIOR* to session).
- 10-15 minutes allocated to 1-2 primary compounds lifts (superset contrasting if possible)
- 10-15 minutes allocated to accessory work (supersets, “smart” circuits) if possible.
- 5-10 minutes of **FUN!**
- 10-15 minutes allocated to isolated postural, hypertrophy, or “weak spot work” ***ON THEIR OWN.***

From The Trenches Technique #1

“S.M.A.R.T” Circuits

- **Specific** to the client.
 - **Metabolic** in nature.
 - **Assessable** movements.
 - **Repeatable** (not boring).
 - **Times/Tempos** (provide variety).
- Mrs. Jones
 - 5’8
 - 35 lbs. overweight
 - Primary goal is weight loss
 - Has a “cranky knee”
 - Wants to build her glutes
 - Wants to “tone” her back and her arms.

EXAMPLE



S.M.A.R.T. Circuit Example

- A1. Barbell Hip Thrust x 12
 - A2. Two DB Alternating Arm Bent Over Row x 8/8
 - B1. KB swing x 10
 - B2. straight arm pull-down x 10
 - B3. DB triceps kickback x 10
 - C1. Lateral Wall Ball 6/6
 - C2. 15 calorie row machine
- *15 minute AMRAP following 10 minutes of structured deadlifts. Allows for 5 minutes of fun. She will probably complete 2-3 rounds.*

BREAKDOWN

- A1. Barbell Hip Thrust x 12
 - A2. Two DB Alternating Arm Bent Over Row x 8/8
 - B1. KB swing x 10
 - B2. straight arm pull-down x 10
 - B3. DB triceps kickback x 10
 - C1. Lateral Wall Toss 6/6
 - C2. 15 Calorie Row Machine
- A1. Glute Dominant Hip Extension movement (little demand on low back)
 - A2. Unilateral movement to address any imbalances at the upper back/shoulder and hit back/biceps.
 - B1. Hamstring/Glute dominant hip extension to support the knee.
 - B2. Lats/Triceps.
 - B3. Isolated Triceps (built in recovery prior to metabolic portion).
 - C1. Semi-Explosive transverse plane movement.
 - C2. Aerobic/Anaerobic work (caloric expenditure) gets her sweating.

From The Trenches Technique #2

Antagonist Function Paired Sets

- To perform AFP sets select TWO compound exercises from different hemispheres of the body with contrasting functions (if possible)
- This helps manage local fatigue while ensuring global output.
- Do NOT do this with maximal loads.
- 6-20 rep sets.
- Examples:
 - Hinge variation and OHP (Lower body pull + upper body push)
 - Row variation + Lunge (Upper body pull + unilateral lower body)
 - Barbell Squat + Renegade Row (lower body push + unilateral upper body pull)

Why AFP sets?

- AFP sets do NOT replace traditional strength training.
 - The primary function of AFP sets is to enhance the volume of work being put out.
 - AFP sets work great as accessory work following the primary focus of the session.
- ***How are they different from supersets?***
 - Supersets are designed to enhance LOCAL fatigue generally within one muscle group or region. AFP sets are designed to do the opposite.

Stealing From . . . CROSSFIT?

- There are some elements of CrossFit that I REALLY like. There are some elements that are absolutely insane.
 - The key thing when borrowing from other modalities, whether its powerlifting, bodybuilding, or CrossFit is to meet the needs of the CLIENT, not the ideology of the coach.
- **YES**
 - EMOM's
 - Times AMRAPs
 - METCONS
 - **NO**
 - High rep olympic lifting
 - Olympic lifting in general is very technical for 95% of the clients you will train.
 - Paleo
 - Reebok (jk).

“Coach, my _____ hurts today...”

- It can be extremely difficult for coaches to make programming **adjustments on the fly**.
- Common reasons for adjustments may be:
 - Client did not sleep well.
 - Client just doesn't have “it”.
 - Client is dealing with pain.
 - Client is under-fed for the pre-programmed demands of the session.
- **EASY ON THE FLY ADJUSTMENTS**
 - Train the same pattern, modify the volume or intensity.
 - Train less technically demanding variations of the same programmed movements.
 - Work on the “*STUFF*” that you normally skip out on. (mobility, priming).
 - Some times talking works just fine (nutrition, programming, lifestyle).