Breakthrough Ways To Stop Pain & Inflammation

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THEORY OF EVERYTHING

- Book, movie
- Albert Einstein
- Stephen Hawkings
- Ultimately proven wrong or not enough evidence
- Physicists are still chasing the dream of Albert Einstein and Stephen Hawking to capture the workings of the entire universe in a single equation.

- Do we have evidence for basic PILLARS OF HEALTH that are tangible and proven as correct in understanding?
- What evidence to we have?

SELF-SUFFICIENT SYSTEM

- USA contributes to 30% of the world's waste
- SWEDEN – Astonishing 99% recycling rate. Up from 96%.
- Close to zero waste.

SUMMARY

1. CONNECTIVE TISSUES
2. MUSCLES
3. INFLAMMATION

Connective Tissues

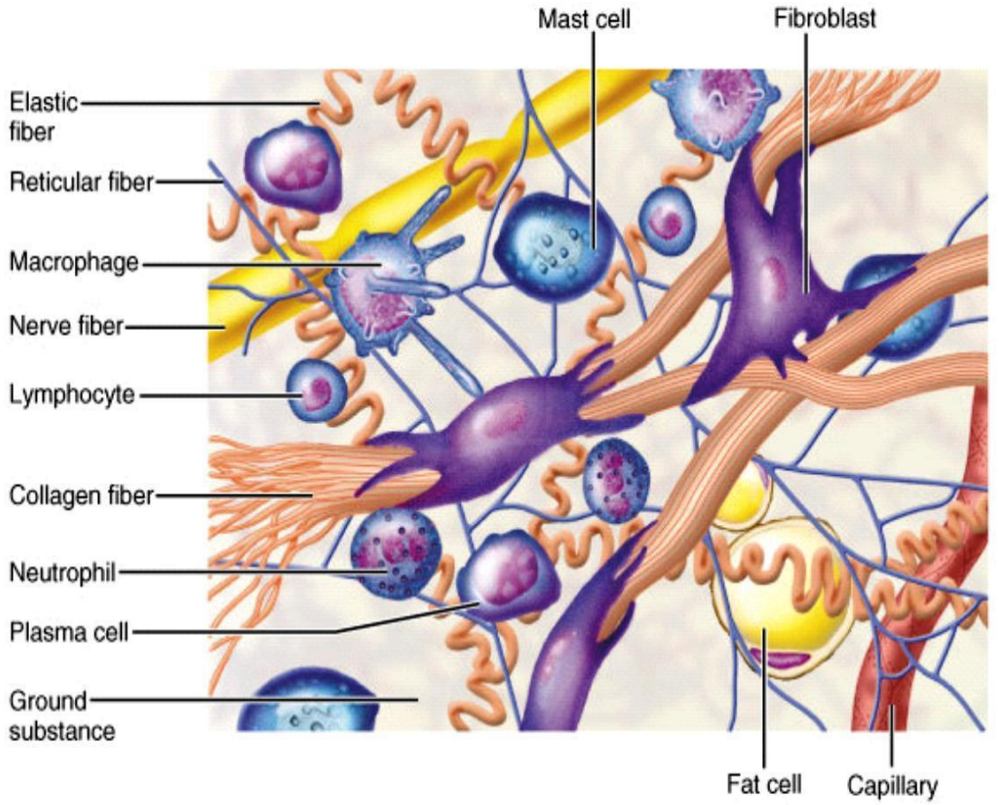
- Connective tissue is found everywhere in the body. It fills the spaces between organs and tissues and provides structural and metabolic support for other tissues and organs.

- Most abundant and widely distributed tissues
- Subtypes:
  - Fat tissue, dense fibrous tissue, cartilage, bone, blood, and lymph
- Functions
  - Binds together body tissues
  - Supports the body
  - Provides protection

Characteristics

- Variations in blood supply
  - Vascularized – contains a good blood supply
  - Avascular – poor blood supply, heal slowly (ex.tendons, cartilage)

- Made of
  1. Cells
  2. Ground substance
  3. Extracellular Matrix



Common embryonic origin:	**Mesenchyme**			
Cellular descendants:	Fibroblast	Chondroblast	Osteoblast	Hematopoietic stem cell
	Fibrocyte	Chondrocyte	Osteocyte	Blood cells* (and macrophages)
				
Class of connective tissue resulting:	Connective tissue proper	Cartilage	Osseous (bone)	Blood
Subclasses:	**1.** Loose connective tissue Types: Areolar, Adipose, Reticular **2.** Dense connective tissue Types: Regular, Irregular, Elastic	**1.** Hyaline cartilage **2.** Fibrocartilage **3.** Elastic cartilage	**1.** Compact bone **2.** Spongy (cancellous) bone	* *Blood cell formation and differentiation are quite complex. Details are provided in Chapter 17.*

BEAUTIFUL CHAOS!

"Make things as simple as possible, but not any simpler than that"

Albert Einstein

ALL THE SYSTEMS
Connecting the dots!

1. STRUCTURAL DAMAGE
2. NITRIC OXIDE
3. GLYCOBIOLOGY & GLYCOCALYX
4. **SULPHATED COMPONENTS**

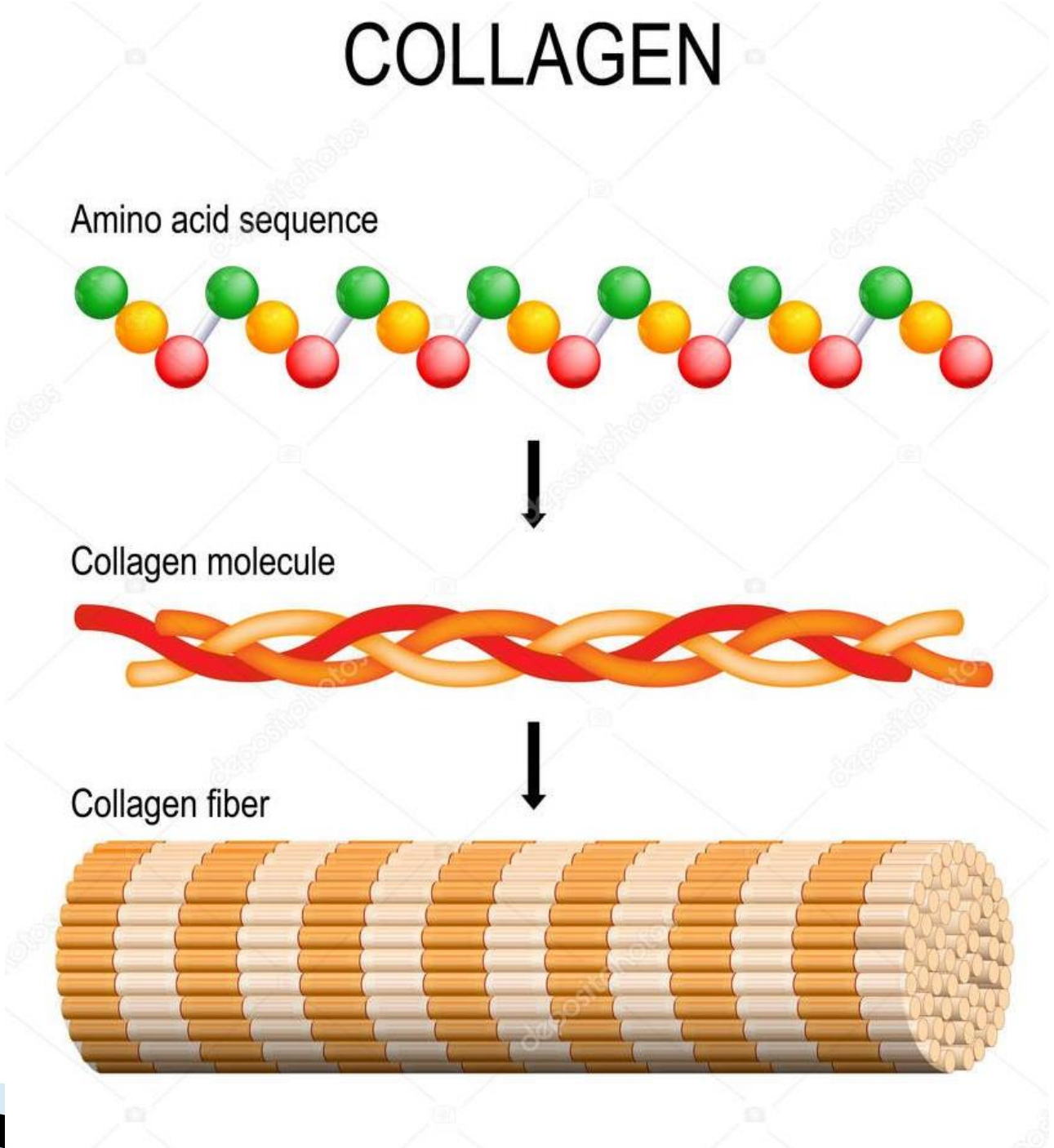
COLLAGEN – YOUNG vs OLD/DAMAGED

1. Primary structure

2. 3 polypeptides coil to form Tropocollagen

3. Tropocollagens bind together to form a fibril

4. Many fibrils bind together to form a collagen fiber



Many types of Collagen

Type	Location	Type	Location
I	Skin, Bone, Tendon (Non cartilage)	XV	Associated with collagens close to basement membranes
II	Cartilage, Vitreous humor	XVI	Many tissues
III	Extensible conn. Tissue (skin, lung, vascular system viz. Artery)	XVII	Epithelia, Skin hemidesmosomes
IV	Basement membrane	XVIII	Close structural homologue of XV
V	Along with Type-I	XIX	Rare, Rhabdomyosarcoma
VI	Muscle	XX	Corneal epithelium
VII	Dermal epidermal junction	XXI	Many Tissues
VIII	Endothelium	XXII	Tissue junctions
IX	Along with type II	XXIII	Limited in tissues, mainly transmembrane and shed forms
X	Hypertrophic cartilage	XXIV	Developing cornea, Bone
XI	Along with type II	XXV	Brain
XII	Along with type I	XXVI	Testis, Ovary
XIII	NM Junction & Skin	XXVII	Embryonic Cartilage
XIV	Along with type I	XXVIII	BM Around Schwann cells

Collagen vs Elastin

Collagen: Hydrolyzed vs Gelatin vs Peptides

- Full-length collagens are broken down into collagen peptides in a process known as collagen hydrolysis.
- Collagen peptides are the constituent of hydrolyzed collagen.
- Hydrolyzed collagen is the final product of the complete hydrolysis of collagen.
- Partial hydrolysis of collagen makes gelatin.
- The main feature of hydrolyzed collagen is its ability to be readily absorbed by the digestive system when compared to regular collagen protein or even gelatin.

Glycosaminoglycans (GAGs)

- 10% of the extracellular matrix
- Unbranched, polysaccharide chains
- One sugar residue is always an amino sugar
- (ex. N-acetylglucosamine)
- The other sugar residue is usually glucuronic acid or iduronic acid
- GAGs are
  - highly negatively charged (attract cations like sodium)
  - Inflexible
  - Strongly hydrophilic

4 main groups of GAGs

1. Hyaluronic acid
   - most simple, as it does not contain sulfated sugars
   - Longest chain
   - Made by an enzyme complex at the cell surface

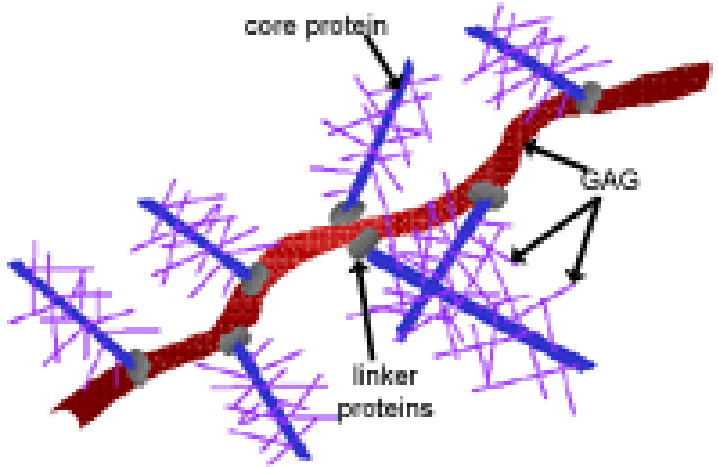
2. Chondroitin sulfate

3. Heparin sulfate

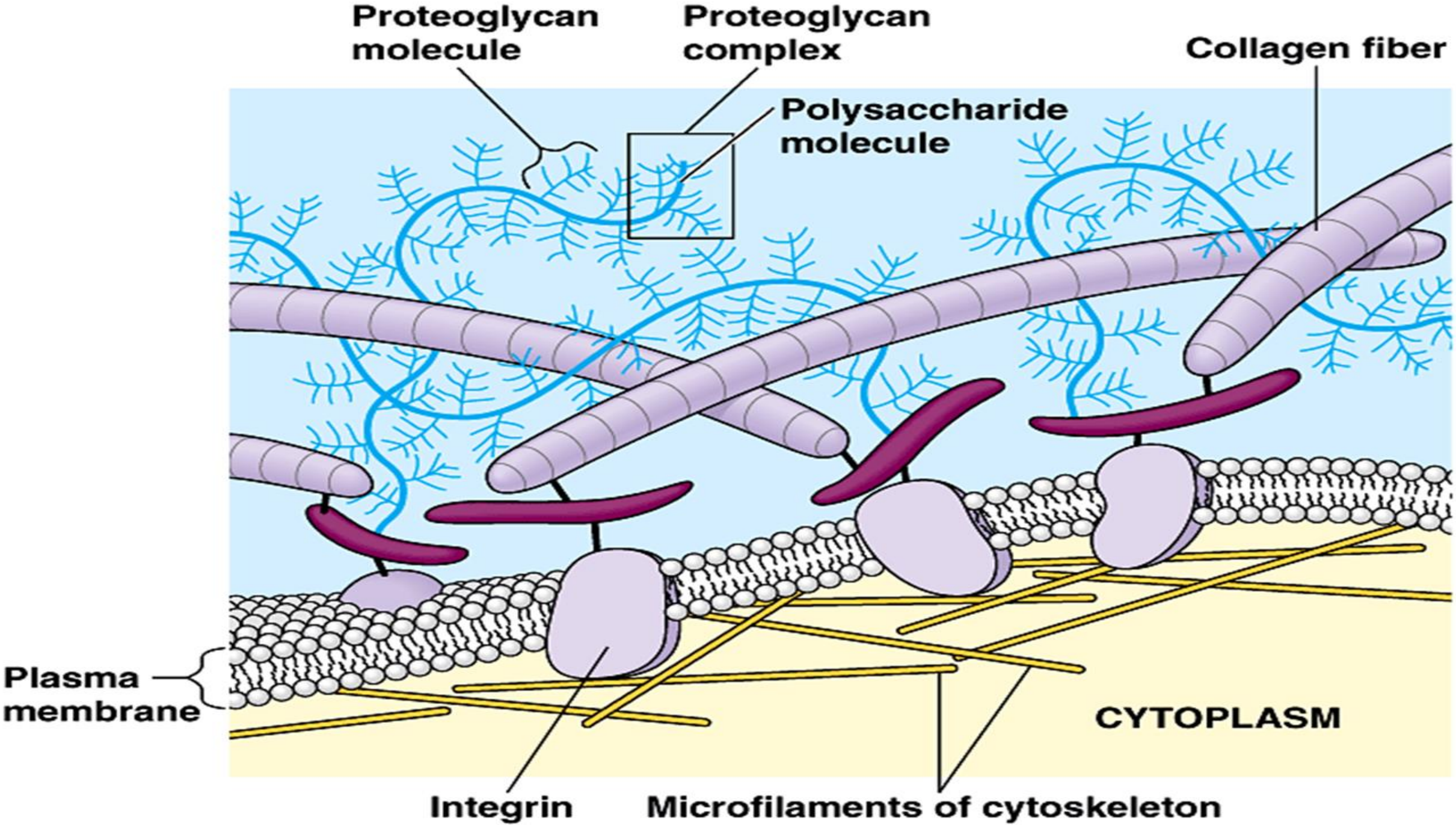
4. Keratin sulfate

- Sulfated
- Complex
- Small
- Secreted by the cell
- Always found attached to a protein forming a **proteoglycan**

Proteoglycans



- They are Glycosaminoglycans that are attached to a ‘core’ protein
- All GAGs except hyaluronic acid attach to a protein in this way
- They form pores of different sizes to regulate the sizes of molecules that move through the matrix
- One important proteoglycan is aggrecan, which is a major component of cartilage



Cartilage Nutrients

- Chondroitin Sulfate (Purified)
  - Use with disc and ligament injury, mitral valve prolapse, cartilage problems, free radical problems, to increase the total white blood count, and in any tissue where a lack of elasticity is a known problem (vessel, artery, heart valves, etc.).
  - Biotics purified CS is predigested and readily absorbed over 90% vs 5% with other commercial, non-purified forms.

  - Purified Chondroitin Sulfates
  - Chondro-Plus (no Glucosamine)
  - ChondroSamine Plus (Glucosamine HCl)
  - ChondroSamine-S (Glucosamine Sulfate)
  - Osteo-B II
  - Osteo-B Plus

Cartilage Nutrients

- Glucosamine Sulfate or HCl
  - Stimulates chondrocytes to generate ground substance, chondroitin. Use together with purified chondroitin sulfates for added cartilage healing.

  - CondroSamine-Plus (Glucosamine HCl)
  - ChondroSamine-S (Glucosamine sulfate)

  Products should be considered for osteo and rheumatoid arthritis, joint inflammation, cartilage repair and any other condition where increased sulfur intake is needed. Contains components extracted from shrimp and crab shells and should not be used by patients who are allergic to these foods.

Cartilage Nutrients

- **CHONDRO PLUS** – Source of manganese, purified chondroitin sulfates and vitamin B-12 (synergist to manganese). Excellent for ligament, disc and cartilage support, athletic injuries, long-term preventive support for athletes or people engaged in strenuous activity.

- In acute situations and with disc lesions add **Intenzyme Forte** and **Carbamide Plus** (addresses inflammation and helps to disperse edematous fluid normally present with disc injury).

Cartilage Nutrients

- CARBAMIDE PLUS –**Carbamide Plus** is a combination of Carbamide (USP urea) along with herbal diuretics and enzymatically processed organic beet, tillandsia (Silver Spanish Moss), rice bran along with vitamins, minerals, amino acids, molasses, SOD and catalase.
- Carbamide reduces the electrical conductivity of water and will denature proteins.
- This causes the release of free calcium phosphate into the blood which reacts with sodium bicarbonate to provide calcium bicarbonate an important blood buffer.

Cartilage Nutrients

- Proteins – proteins with AA needed for cartilage repair
  - Amino Sport
  - Whey Protein Isolate
  - Hydrolyzed Collagen Protein
  - Optimal Collagen

- Sulfur – MSM, Garlic Plus
  - If **MSM** or other sulfur containing products causes stomach distress, this is generally an indication of hypochlorhydria.
  - Always use **Mo-Zyme** with **MSM**; molybdenum activates **MSM** in the system.

Cartilage Nutrients

- EFAs
- Vitamin C – promotes cartilage and connective tissue regeneration
- Copper – needed for repair
- Manganese –
  - part of various enzymes involved in cartilage and bone production
  - Plays an essential role in incorporating calcium into growing bones
  - Effectively reduces the loss of bone mass

Bone Support

- Osteo-B II – bone formula without Cu
- Osteo-B Plus – contains Cu
- Optimal EFAs Caps – support healing and reduces inflammation
- Additional:
  - Vitamin D, Ca, Mg, Vitamin K, Trachea glandular

Bone Fracture Healing

- Intenzyme Forte – reduces swelling, inflammation; removes cell debris
- Osteo B II or Osteo B Plus
- Vitamins D and K
- Also Ca and Mg, if needed

- Bone Pain and Inflammation
  - Optimal EFAs Caps, Vit D, Bio-Allay, KappArest,
  - Intenzyme Forte

MUSCLES

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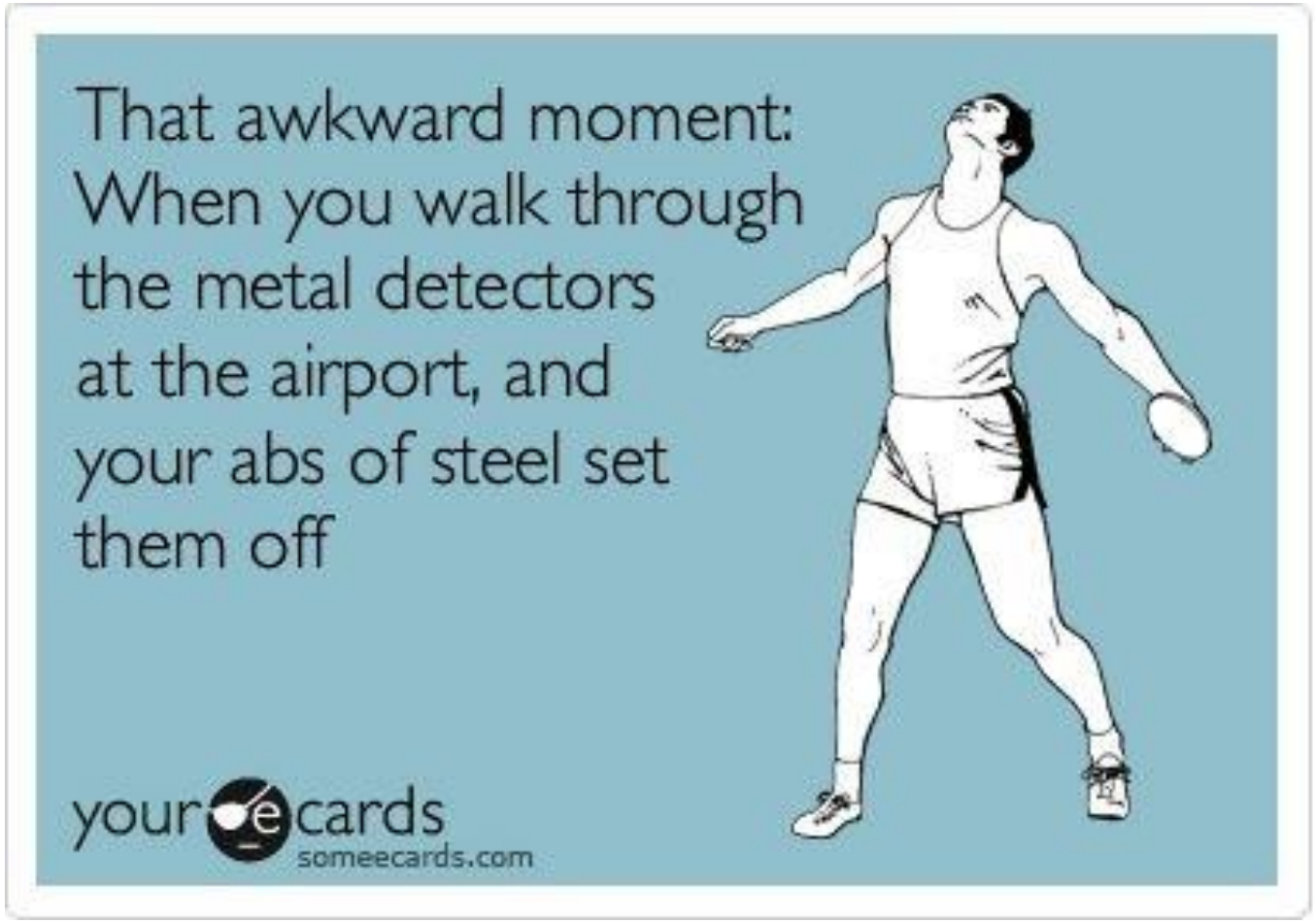
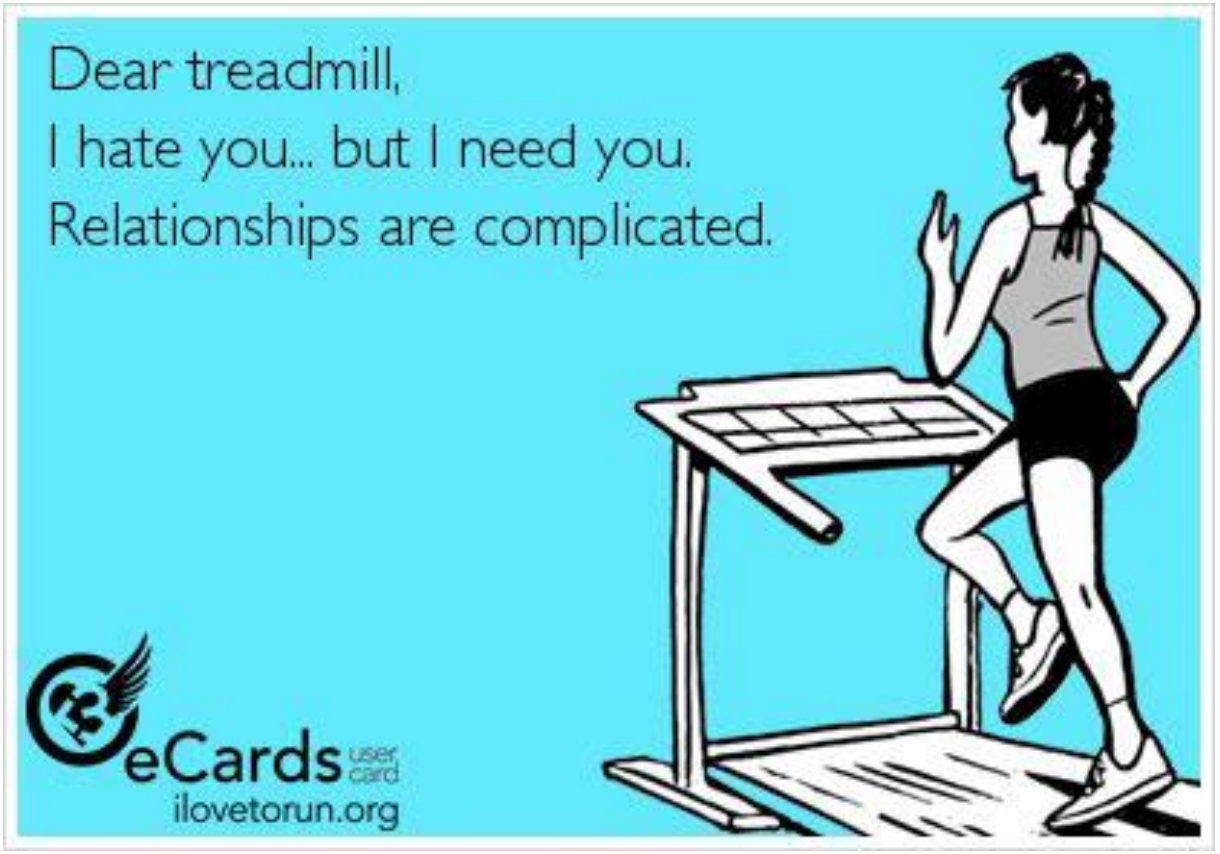

That awkward moment:
When you walk through the metal detectors at the airport, and your abs of steel set them off
yourecards
someecards.com

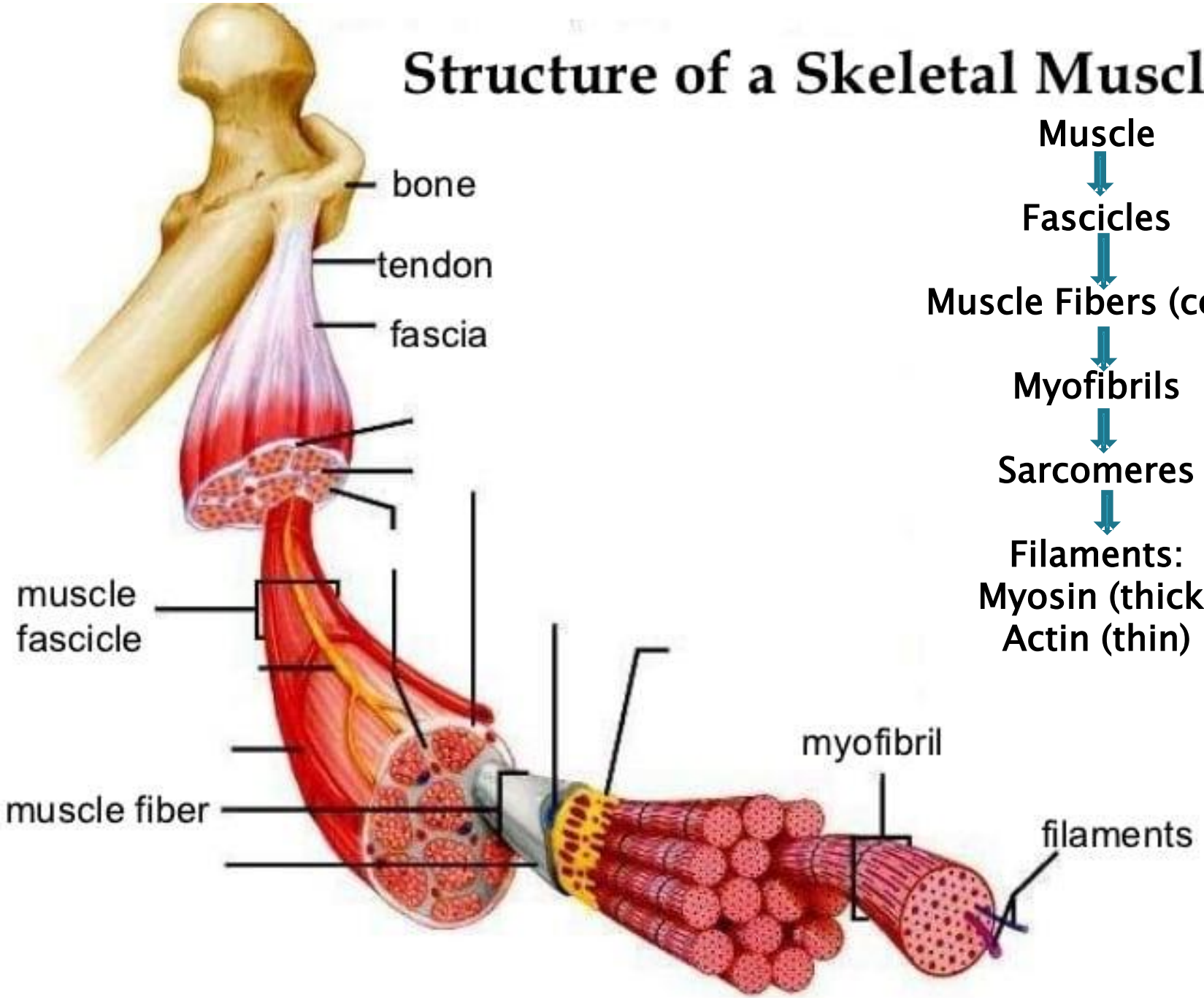

Dear treadmill,
I hate you... but I need you.
Relationships are complicated.
eCards user card
ilovetorun.org

Muscle Tissue

- Three types:

1. Skeletal
   - Voluntary muscle, striated with many nuclei
   - Found in limbs, trunk of body, jaws, face, eyes, etc
2. Cardiac
   - Makes up the myocardium, striated
   - Involuntary (controlled by autonomic nervous system)
3. Smooth
   - Found in digestive tract, bladder, ducts, arteries, veins to regulate internal processes
   - Involuntary (under the control Autonomic Nervous System)

Structure of a Skeletal Muscle



Muscle

↓

Fascicles

↓

Muscle Fibers (cells)

↓

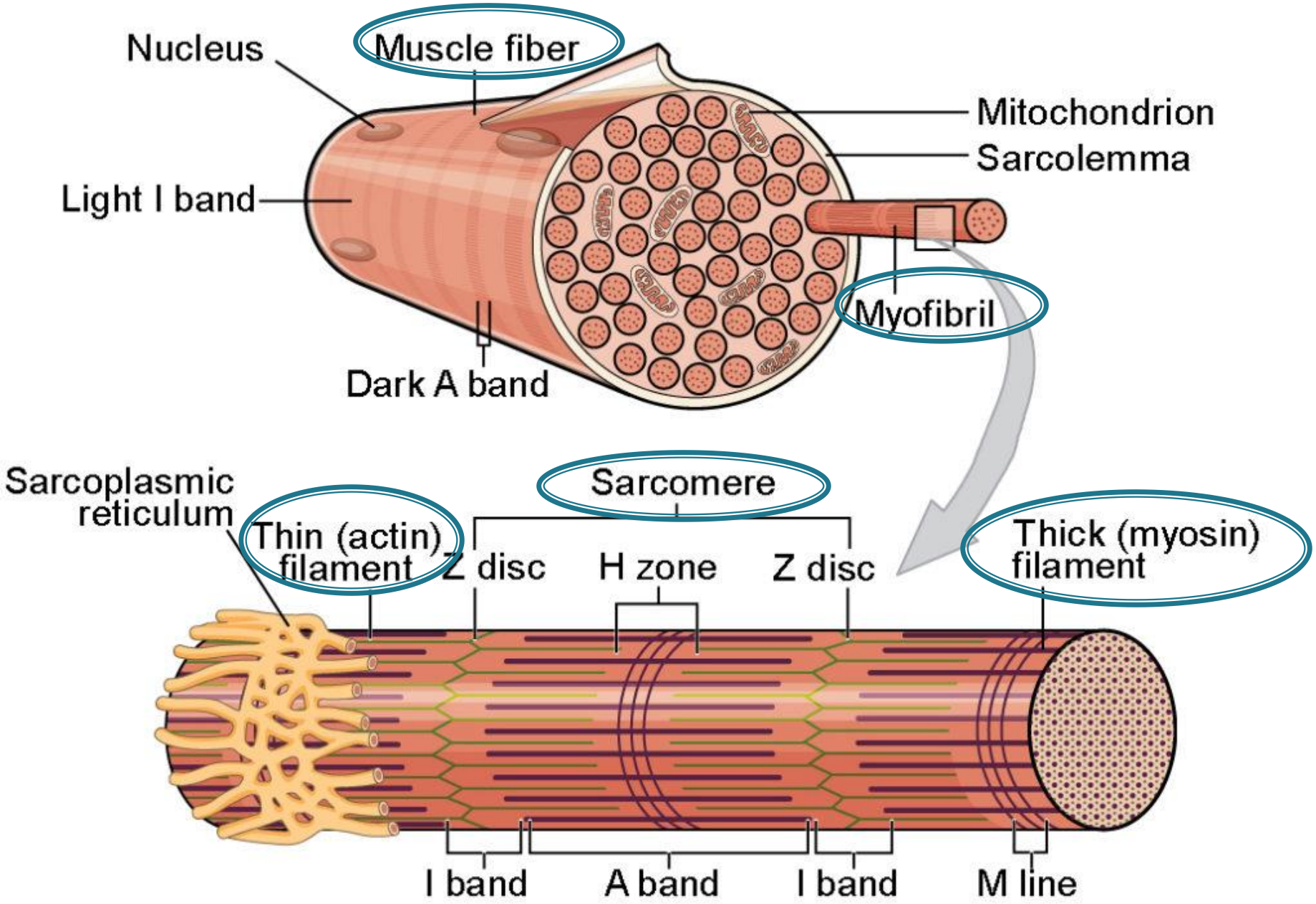
Myofibrils

↓

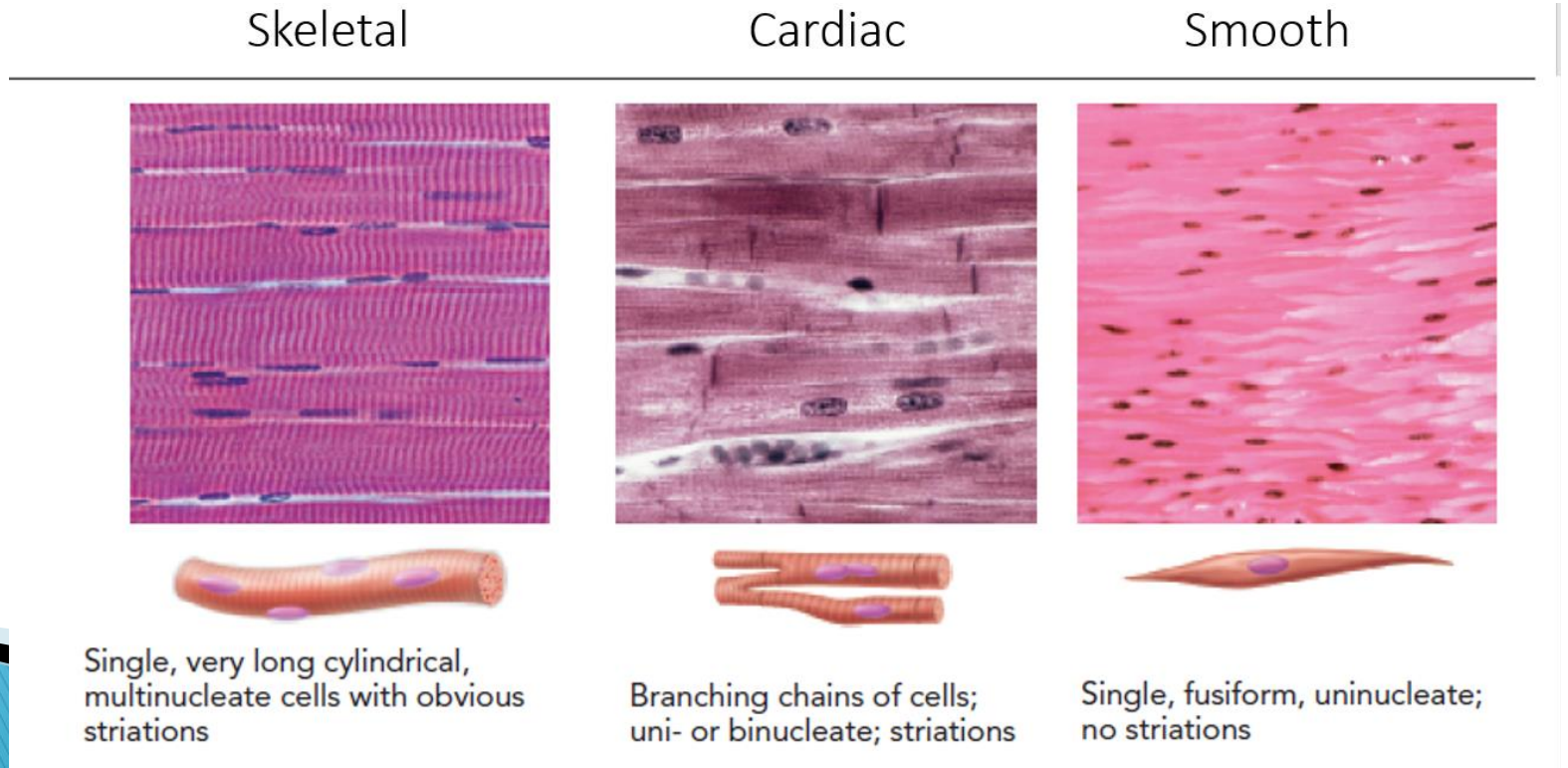
Sarcomeres

↓

Filaments:
Myosin (thick)
Actin (thin)


Nucleus
Muscle fiber
Mitochondrion
Sarcolemma
Light I band
Myofibril
Dark A band
Sarcoplasmic reticulum
Sarcomere
Thin (actin) filament
Z disc
H zone
Z disc
Thick (myosin) filament
I band
A band
I band
M line

Muscle type	Structural elements	Function	Location
Skeletal	Long cylindrical fiber, striated, many peripherally located nuclei	Voluntary movement, produces heat, protects organs	Attached to bones and around entry & exit sites of body (e.g., mouth, anus)
Cardiac	Short, branched, striated, single central nucleus	Contracts to pump blood	Heart
Smooth	Short, spindle-shaped, no evident striation, single nucleus in each fiber	Involuntary movement, moves food, involuntary control of respiration, moves secretions, regulates flow of blood in arteries by contraction	Walls of major organs and passageways



EXERCISE, MOVEMENT

- Dr. Ben Levine, 25 years study: Exercise 2-3 times had NO EFFECT at all on aging effect. Absolute minimum 4-5 a week.

- 5 TRAINING ZONES
- **Training zones** measure the **intensity** at which your body is using its aerobic metabolism system to produce energy from fat and glycogen.
- Zone 2 exercise is fine.

HOPE MOLECULES

- Hope molecules,' **scientifically known as MYOKINES, are a class of cytokines and growth factors released by the skeletal muscle cells that link muscles, movement, moods, emotions, and the brain.** More than 650 molecules have been identified as belonging to the class of myokines thus far
- ORGANOKINES
- Adipokines, hepatokines, batokines, osteokines, and myokines. Research data reveals that the organokines are essential for maintaining whole-body metabolism through autocrine, paracrine, and endocrine pathways and can be used as valuable biomarkers for monitoring various organs' physiologic and metabolic responses to mechanical loading.
- **Muscle–bone crosstalk by organokines—the new "hope molecules"**
- https://www.jwfo.org/article/S2212-4438(22)00013-3/abstract

Muscle Metabolism: Energy

- Muscular activity accounts for much of the body's energy consumption.
- ATP is used for:
  - Contractile process
  - Restoration of intracellular Ca levels
  - Maintenance of ion gradients
- Muscles keep a reserve of carbohydrate in the form of glycogen, which is ready fuel for both aerobic and anaerobic metabolism.
- Decreased ATP availability or inhibition of any associated enzyme will cause a decrease in muscle force production.

Muscle Healing Nutrients

- Cytozyme-H – heart glandular for healing heart and skeletal muscles. Prime supplement for any muscular tissue damage.
- Gammanol Forte with FRAC – Promotes growth and repair through IGF
- Bio-Anabolic Pack – Broad-spectrum formula for lean body mass, muscle, bone and cartilage healing
- CoQ-Zyme 100 Plus – supports energy metabolism

Muscle Healing Nutrients

- Bio-3B-G – B vitamins for Krebs cycle support, energy metabolism, and reduction of lactic acid buildup
- Amino Sport – Ensures sufficient amino acids for anabolic and energy metabolism, stimulation of endogenous growth hormone, and tissue repair
- Whey Protein Isolate – High-quality protein powder for muscle health, energy production, and promotion of growth and repair

Short-duration, high-intensity exercise

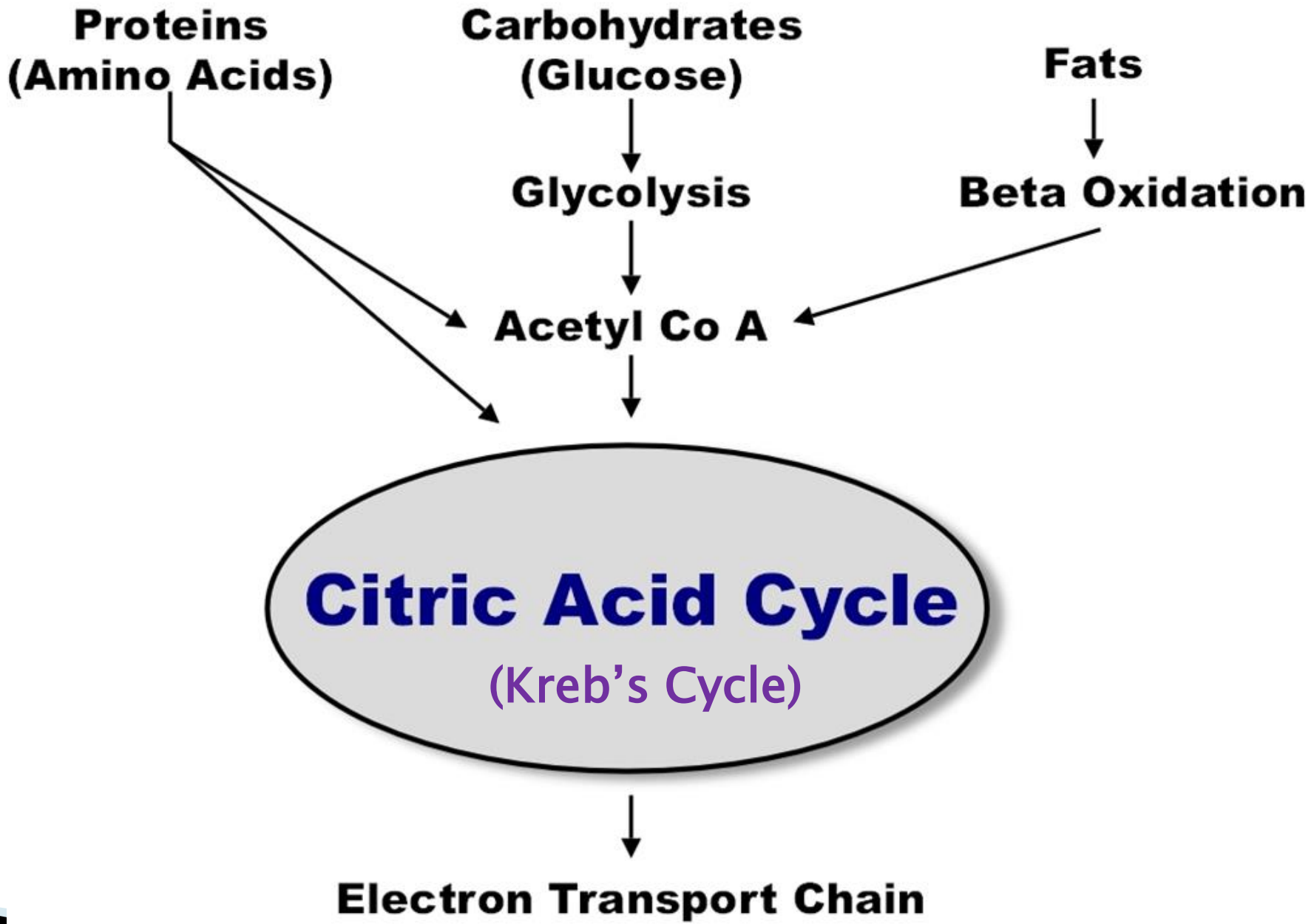
6 seconds	10 seconds	30–40 seconds	End of exercise
ATP stored in muscles is used first.	ATP is formed from creatine phosphate and ADP (direct phosphorylation).	Glycogen stored in muscles is broken down to glucose, which is oxidized to generate ATP (anaerobic pathway).	

Prolonged-duration exercise

Hours
ATP is generated by breakdown of several nutrient energy fuels by aerobic pathway.

Nutrients to support energy from fats

- L-Carnitine
  - Vegans/Vegetarians benefit from l-carnitine
  - Heavy meat eaters who take l-carnitine have increased inflammation
- B2 (Riboflavin)
  - Bio-GGG-B – portion of B vitamins particularly useful for supporting fat metabolism, skin and nerve health, and parasympathetic functioning
  - Bio-B Complex – higher doses of all B vitamins
  - Bio-B 100 – balanced profile of B vitamins, B&G cofactors
- B3 (Niacin)
- B5 (Pantothenic Acid)
- Coconut oil – SCFAs stimulate fat metabolism


Proteins
(Amino Acids)
Carbohydrates
(Glucose)
Fats
Glycolysis
Beta Oxidation
Acetyl Co A
Citric Acid Cycle
(Kreb's Cycle)
Electron Transport Chain

Energy Metabolism

- Proteins are broken into Amino Acids and utilized at various points in the Citric Acid or Krebs Cycle

- Assure adequate protein digestion is taking place, i.e. HCL

Citric Acid Cycle Nutrients

B vitamins are crucial for entry of pyruvate into the Krebs Cycle

- B1 “B” (Thiamine) – Bio-3BG
- B2 “G”(Riboflavin) – Bio-GGG-B
- B3 (Niacinamide) – Niacin 100
- Pantothenic acid – Bio B Compex, Bio-B100
- B6 (Pyridoxine) – B6 phosphate, Bio-GGG-B
- Manganese – Mn-zyme
- Lipoic Acid
- Biotin
- Magnesium – Mg-Zyme or Mg-Orotate 500
- Phosphorus – Super Phosphozyme

Electron Transport Chain Nutrients

- Coenzyme Q10 (CoQ-Zyme 100 plus)
  - Key enzyme in oxidative reactions in mitochondrial membranes which generate ATP
  - Declines with age and with oxidative damage
- Iron (Fe-Zyme)
  - Critical mineral metabolite and oxidizer for energy metabolism
- Copper
- Phosphorus (Super Phosphozyme)
  - key constituent of the ATP molecule

INFLAMMATION

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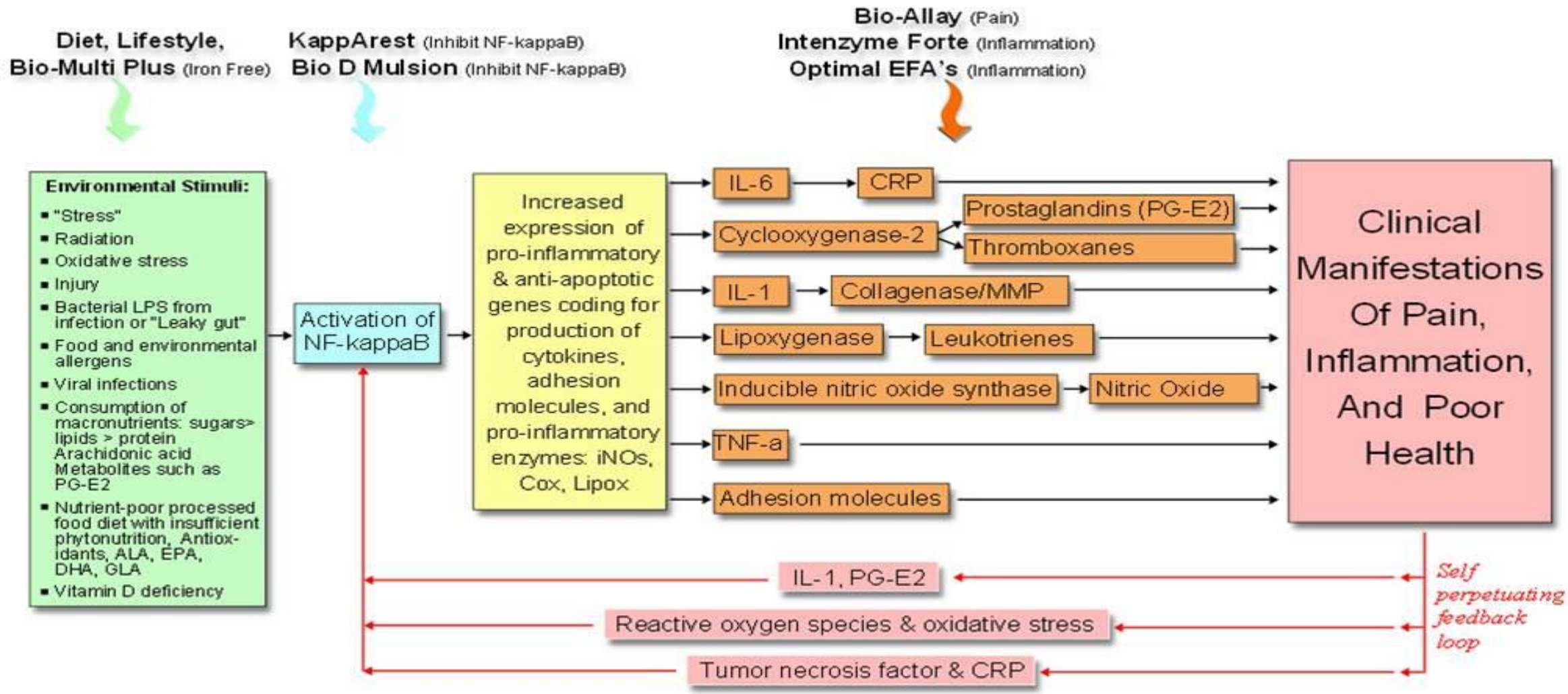
INFLAMMATION SUMMARY

1. PROTEOLYTIC ENZYMES – INTENZYME FORTE
2. NF KAPPA B – KAPPAREST
3. EICOSANOIDS – BIOMEGA
4. SUPPORTING NUTRIENTS

The BioChemical Process Of Inflammation & Pain



Traditional Treatment Options

Acetaminophen *(Tylenol, Aspirin Free Excedrin)* • **Nonsteroidal anti-inflammatory drugs** *(NSAIDs; aspirin, Motrin, and Aleve)*
Corticosteroids *(Cortaid and Cortizone)* • **Opioids** • **Antidepressants** • **COX-2 inhibitors** *(Vioxx, Bextra, Celebrex, etc.)*

The above was excerpted & adapted from Integrated Orthopedics by Dr. Alex Vasquez

Inflammation Support

- During acute inflammation, the goal is to reduce swelling while supporting the body's efforts to rid itself of damaged tissue and decayed materials.

- As healing proceeds, we shift focus to support repair and rebuilding of damaged tissue.

Inflammation Nutrition

- Proteolytic enzymes digest cellular debris, extracellular proteins, clotting and fibrous material. They are most effective in an acute condition but also useful in chronic conditions. They also increase effectiveness of other anti-inflammatories and other analgesic products when used together.


Intenzyme Forte™
DIETARY SUPPLEMENT WITH
PROTEOLYTIC ENZYMES
BIOTICS RESEARCH®
50 TABLES


Bromelain Plus CLA™
DIETARY SUPPLEMENT
BIOTICS RESEARCH®
100 TABLETS

Eicosanoids

- Eicosanoids are signaling molecules made by oxidation of twenty-carbon essential fatty acids, (EFAs).
- They exert complex control over many bodily systems, mainly in inflammation or immunity, and as messengers in the central nervous system
- The networks of controls that depend upon eicosanoids are among the most complex in the human body

- There are four families of eicosanoids:
  1) Prostaglandins
  2) Prostacyclins
  3) Thromboxanes
  4) leukotrienes

- For each, there are two or three separate series, derived either from an ω-3 or ω-6 EFA. These series' different activities largely explain the health effects of ω-3 and ω-6 fats

- Eicosanoids derive from either omega-3 (ω-3) or omega-6 (ω-6) EFAs. The ω-6 eicosanoids are generally pro-inflammatory; ω-3s are much less so.
- Anti-inflammatory drugs such as aspirin and other NSAIDs act by downregulating eicosanoid synthesis.
- Eicosanoids are not stored within cells, but are synthesized as required. They derive from the fatty acids that make up the cell membrane and nuclear membrane

- Eicosanoid metabolism requires:
- Ca
- Mg
- Zn
- Thiamin B1
- Niacin B3
- Pyridoxine B6
- Vitamin C
- Vitamin E

Nutraceutical Analgesics

- Bio Allay – botanical anti-inflammatory
- KappArest – downregulates NF-kappaB
- Bio D Mulsion Forte
- ResveraSirt-HP – modulates pain mediators
- Bio-FCTS – bioflavonoids block arachidonic acid cascade and pro-inflammatory metabolites
- Inositol – used for nerve pain i.e. sciatica and neuralgias

KAPPAREST

- A key goal with nutritional therapy in chronic inflammation is to downregulate pro-inflammatory NF-kappaB
- Supportive foods/herbs/nutrients:
  - Lemon, curcumin, ginger, green tea extract, flavonoids, resveratrol
  - KappArest
  - ReserveraSirt-HP
  - Optimal EFAs
  - Bio D Mulsion Forte – body pain is a cardinal symptom of vitamin D deficiency

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