ALI 334: STRESS
THE FIRE WITHIN US

UNDERSTANDING CHRONIC STRESS

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OBJECTIVE OF THIS COURSE

1. What is stress? Difference between acute and chronic stress
2. Identify Chronic stress: Are we all suffering from it?
3. How does mental stress (thoughts) affect physical body (cause disease)
   - Chronic Inflammation: Fire caused by chronic stress
     - What is inflammation
     - Relationship between disease and inflammation
4. How do we manage this stress & reduce its effects on our body
   - Body
     - ❑ foods that tame the fire-ANTI INFLAMMATORY DIET
     - ❑ BRAIN GUT CONNECTION
       - ❑ How the health of the gut leads to health of our mind and emotions
       - ❑ Foods that keep the gut healthy and lead to calmer minds.
   - Mind
   - Soul

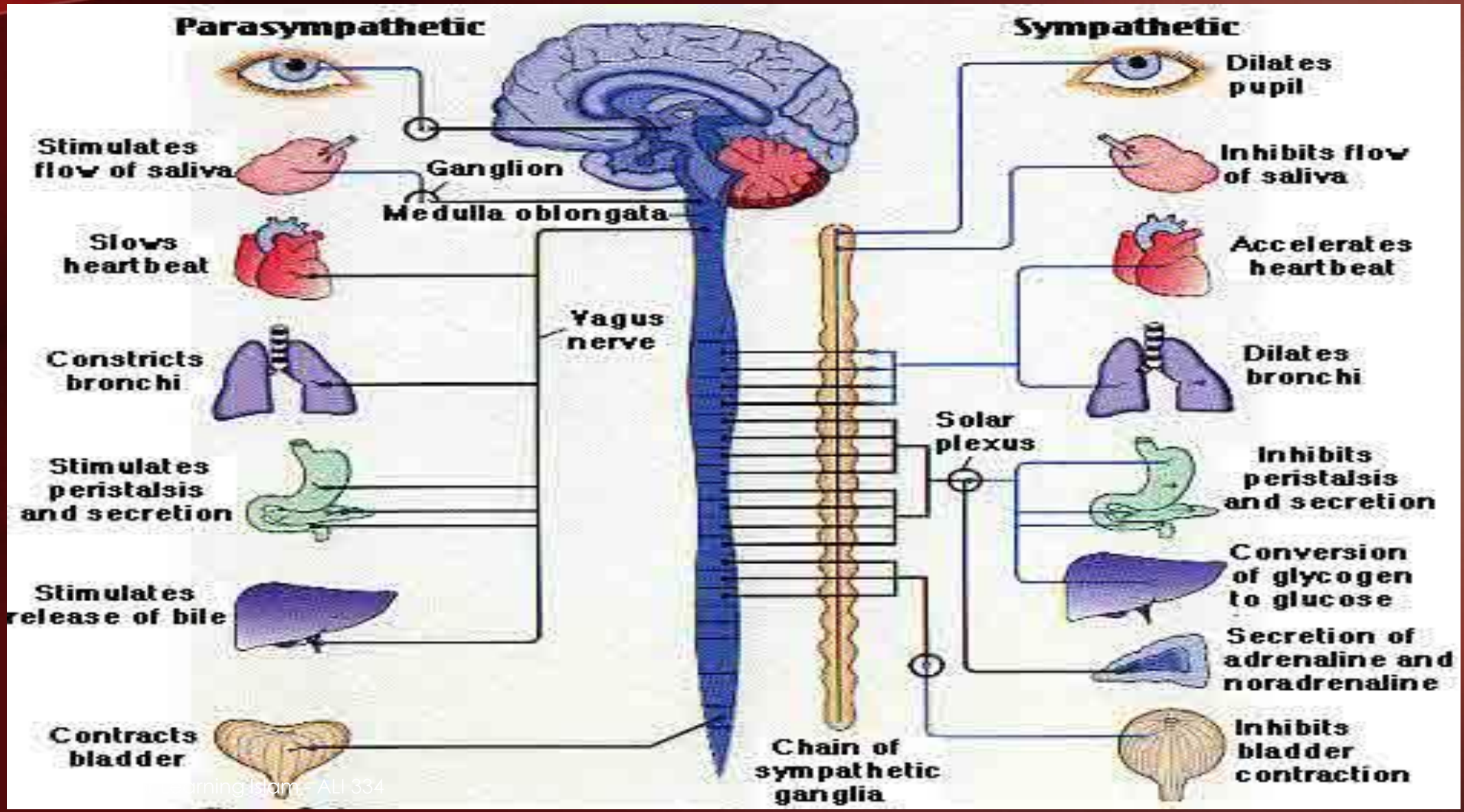
ACUTE VS CHRONIC STRESS

- Acute: imminent danger
  - Ex: bear encounter, near collision, robbery,
- Chronic: Continuos low grade presence of stressors
  - Ex: anger, anxiety, negative thinking, worrying about future, regret of past etc
- Body's response to stress:
  - A flight or fight response : no matter what the cause
  - Acute: response is short term
  - Chronic: response is long term: this continued flight fight response is the problem

PHSYIOLOGICAL RESPONSE TO STRESS

- What happens to body when it goes into the "FLIGHT OR FIGHT" response
- 2 systems that control our response to stressors; real or perceived
  - **Sympathetic nervous system**

    Vs
  - **Parasympathetic system**


Parasympathetic
Sympathetic
Stimulates flow of saliva
Ganglion
Medulla oblongata
Slows heartbeat
Vagus nerve
Constricts bronchi
Stimulates peristalsis and secretion
Stimulates release of bile
Contracts bladder
Dilates pupil
Inhibits flow of saliva
Accelerates heartbeat
Dilates bronchi
Solar plexus
Inhibits peristalsis and secretion
Conversion of glycogen to glucose
Secretion of adrenaline and noradrenaline
Inhibits bladder contraction
Chain of sympathetic ganglia

WHAT HAPPENS TO BODY WHEN UNDER STRESS

- Main features of stress response
  - Stress hormones released
    - Adrenaline --> leads to cortisol release
    - Allow energy to be released for immediate use : sugar released from liver and sent to muscles for use during flight or fight
  - New pattern of energy re distribution
    - Energy diverted from daily living such as digestion, urination etc to muscles and brain for flight or fight
  - Immune system activated and immune cells are mobilized for possible injury
  - Energy is distributed to where its needed by increase in heart rate and blood pressure

WHAT HAPPENS TO BODY WHEN UNDER STRESS

- But in chronic stress there is no imminent danger to the body and yet the body is preparing for battle
- The body doesn't distinguish between a bear or a fight with your spouse or the simmering anger or the worry about your future

YOUR BODY IS GOING TO EXHIBIT THE STRESS RESPONSE

SO WHAT'S THE PROBLEM WITH CHRONIC STRESS RESPONSE

- Chronic stress response → INFLAMMATION
- What is inflammation?
  - Immune system's response to an injury
  - 4 signs: redness, swelling, heat & pain
  - Process via which the immune system heals the body: when virus attacks, the runny nose, fever etc are all symptoms of inflammation response not the virus but how our body responds to the virus.
  - Acute stress: cortisol which is released during stress is ANTI-INFLAMMATORY: it limits the pro-inflammatory response of body once body is healed. Tells the body to stop as there is no more battle to fight

SO WHAT'S THE PROBLEM WITH CHRONIC STRESS RESPONSE

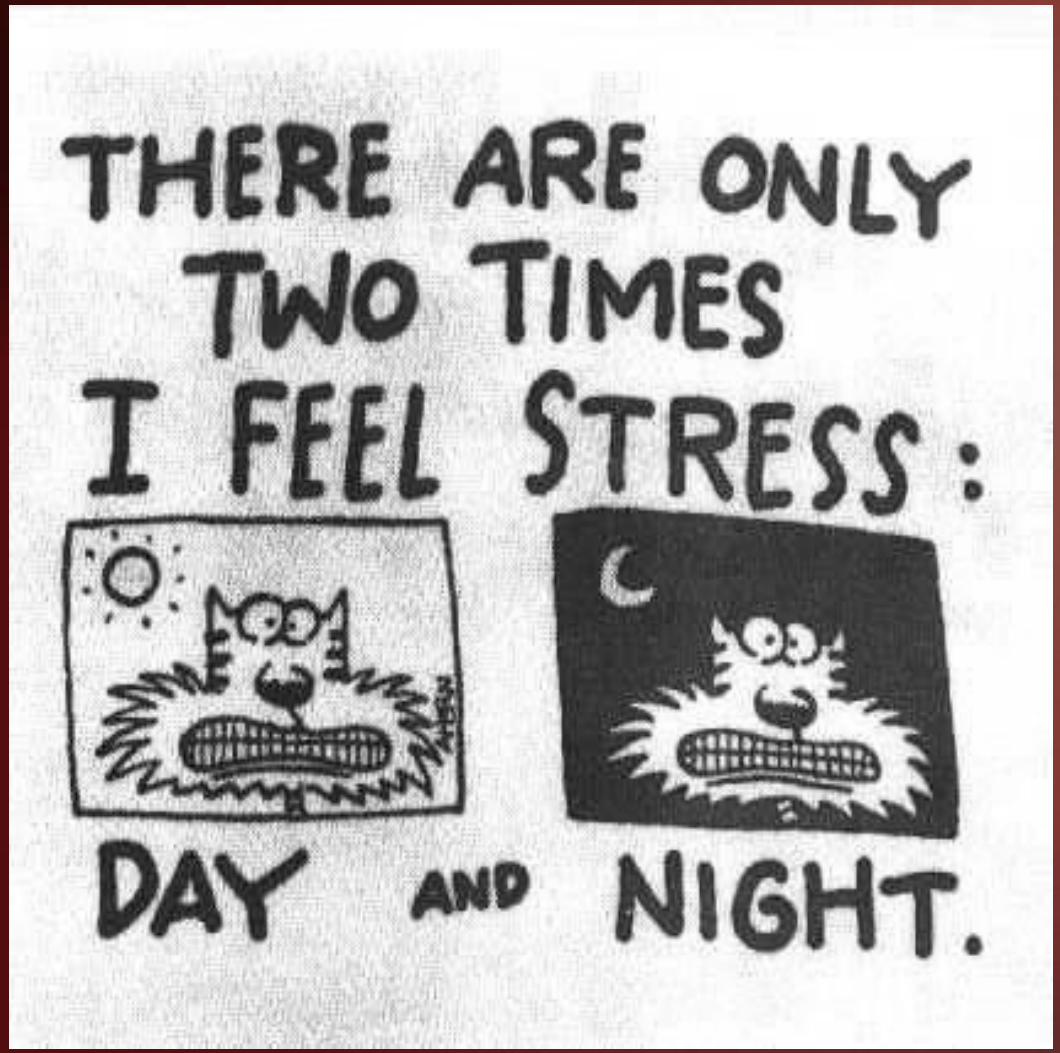
- Chronic stress:
  - immune cells become resistant to effects of cortisol (to shut off the pro inflammatory response) due to decreased tissue sensitivity to cortisol: cortisol resistence
  - Stress is still present which continues to pump pro-inflammatory immune cells that exacerbate the inflammatory response

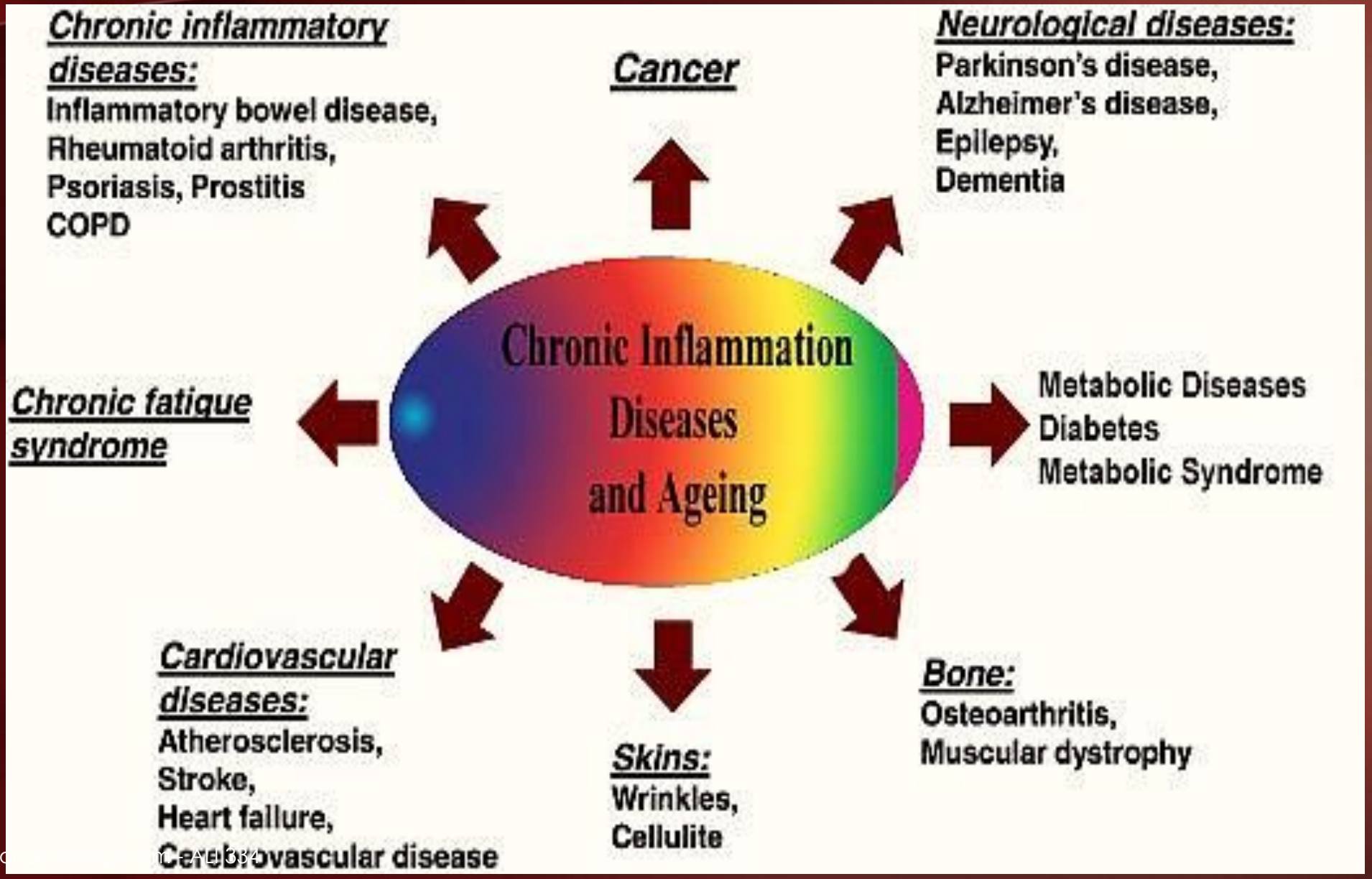
RESULT

CHRONIC INFLAMMATION: THE FIRE WITHIN

Run away inflammation in the body

IS CHRONIC INFLAMMATION A PROBLEM?


THERE ARE ONLY
TWO TIMES
I FEEL STRESS:
DAY AND NIGHT.


Chronic inflammatory diseases:
Inflammatory bowel disease,
Rheumatoid arthritis,
Psoriasis, Prostitis
COPD
Cancer
Neurological diseases:
Parkinson's disease,
Alzheimer's disease,
Epilepsy,
Dementia
Chronic Inflammation
Diseases
and Ageing
Chronic fatique syndrome
Metabolic Diseases
Diabetes
Metabolic Syndrome
Cardiovascular diseases:
Atherosclerosis,
Stroke,
Heart fallure,
Cerebrovascular disease
Skins:
Wrinkles,
Cellulite
Bone:
Osteoarthritis,
Muscular dystrophy

OTHER EFFECTS OF RAISED CORTISOL LEVELS

1. Weight gain
   - Cortisol can have the following effects on the body
     - increases blood sugar levels under stress. So energy is available for muscles for “flight or fight”. This excess energy is not used and ends up stored in fat cells eventually
     - Increases appetite and craving for high calorie foods
     - Relocates fat from liver to abdomen. Increase in abdominal fat. Abdominal fat secrete more cortisol---added insult to injury (cortisol from adrenal gland plus from abdominal fat)

OTHER EFFECTS OF RAISED CORTISOL LEVELS

2. Increased susceptibility to colds and other viruses
   - Unregulated immune system: increased inflammation when exposed to virus: symptoms of cold enhanced
3. Gastrointestinal problems
   - Cortisol high: sympathetic system on: parasympathetic system off
   - Enzymes and hormones for digestion are not produced optimally and the process is compromised
   - Indigestion; lining of stomach inflammed; ulcers & inflammatory disease of the gut

INFLAMMATION

Markers of inflammation in body

1. CRP- C-reactive protein
2. Interleukin 6 (IL6), interleukin 8 (IL8)
3. Tumor Necrosis factor (TNF)

How do we reduce inflammation

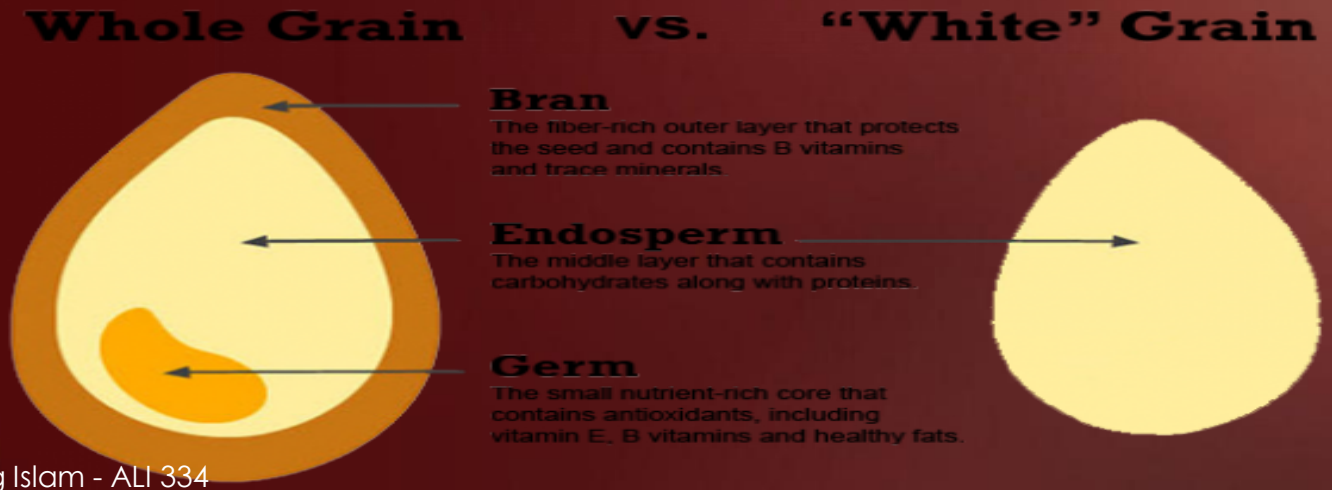
- Stress management techniques
- Anti-inflammatory diet

BASIC COMPONENTS OF AN ANTI-INFLAMMATORY DIET

1. Low glycemic load diet
2. Elimination of Trans fats and limiting saturated animal fats
3. Increase plant based foods
    1. Increase in fiber (lower glycemic load)
    2. Increase in phytonutrients – anti-inflammatory chemicals found only in plants
4. Balance ratio of omega 6 vs omega 3

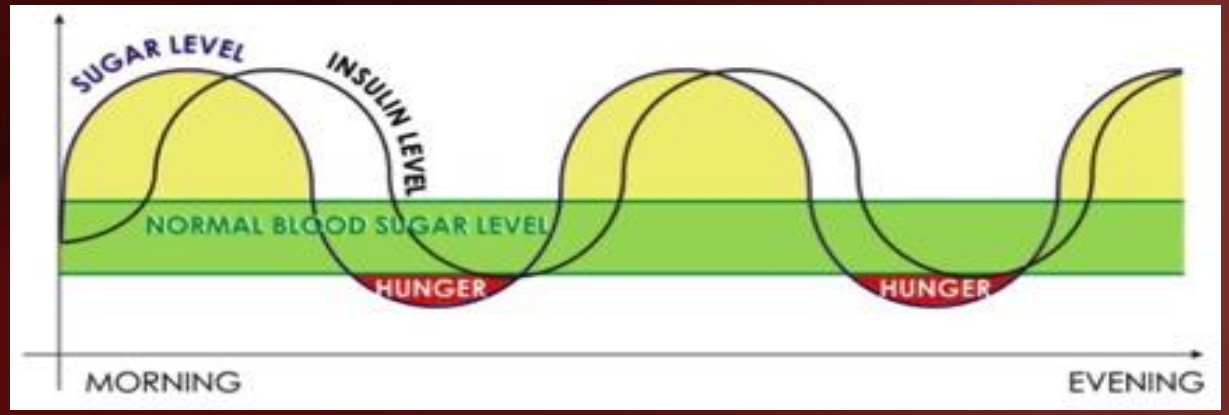
1. LOW GLYCEMIC DIET

- What is a low glycemic diet
  - Foods that don't spike your blood sugar
  - Eat foods low in sugar and high in fiber
  - Reduce refined flour products: white rice, bread, pita, cakes etc
  - Use whole grain products: foods in their original intact state



LOW GLYCEMIC DIET

- How does it reduce inflammation



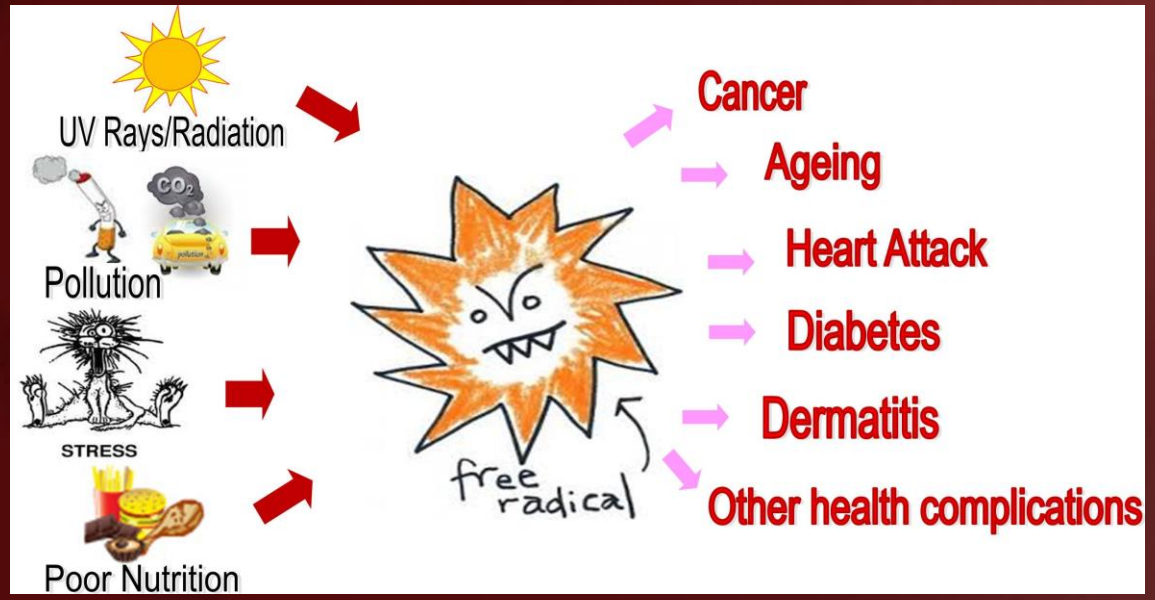
- High glycemic diet strongly correlated with high CRP levels (*Am. Journal of clinical nutrition 75:492-498, 2002*)

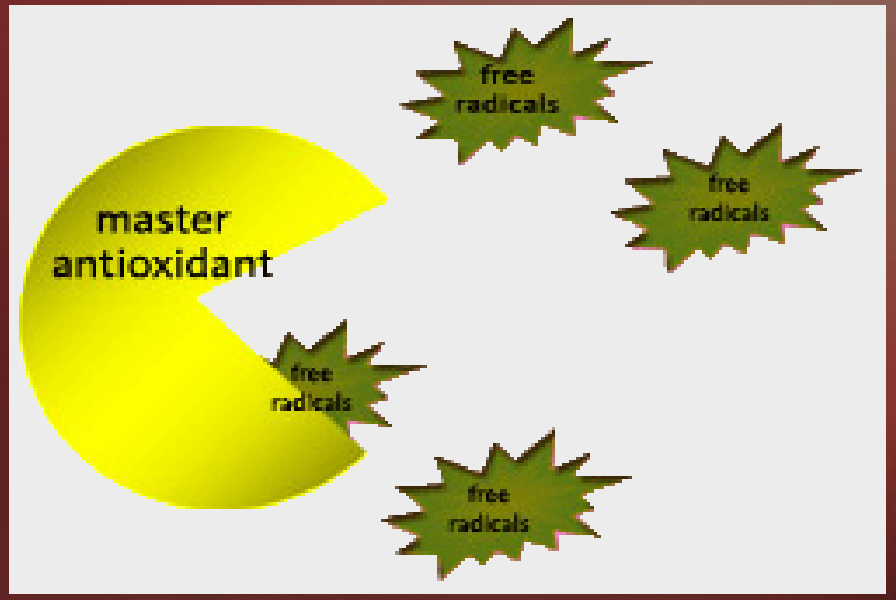
2. ELIMINATION OF TRANS-FATS

- What are trans fats
  - Look for "hydrogenated fats" or "partially hydrogenated fats" fats
  - Formed through an industrial process where hydrogen is added to the fat to make it SHELF STABLE
  - Found in most packaged foods with long shelf lives
    - Cookies, crackers, chips, popcorns, frozen dough
    - Fried products: Many restaurants and fast-food outlets use *trans* fats to deep-fry foods because oils with *trans* fats can be used many times in commercial fryers.
    - Read labels

3. INCREASE PLANT BASED FOODS IN DIET

- Contain anti-oxidant nutrients that neutralize damage to tissues by free radicals
  - Free radical damage leads to inflammation
  - What causes free radicals





3. INCREASE PLANT BASED FOODS IN DIET

- Plant based diet contains abundance of phytonutrients
- What are phytonutrients
  - Chemicals that form part of the plant immune system: promote health in humans
  - Give plants their colour, taste and aroma
  - Ex are carotenoids in orange coloured fruits and vegetables, polyphenols in green tea, lutein in leafy greens, lycopene in tomatoes.
  - Fruits, vegetables, grains, legumes, nuts and teas are rich sources of phytonutrients
  - Mechanism of action not fully understood but likely involved in anti-oxidant activity, anti-inflammatory, cell repair, enhanced detoxification and more

4. BALANCE RATIO OF OMEGA 6 VS OMEGA 3

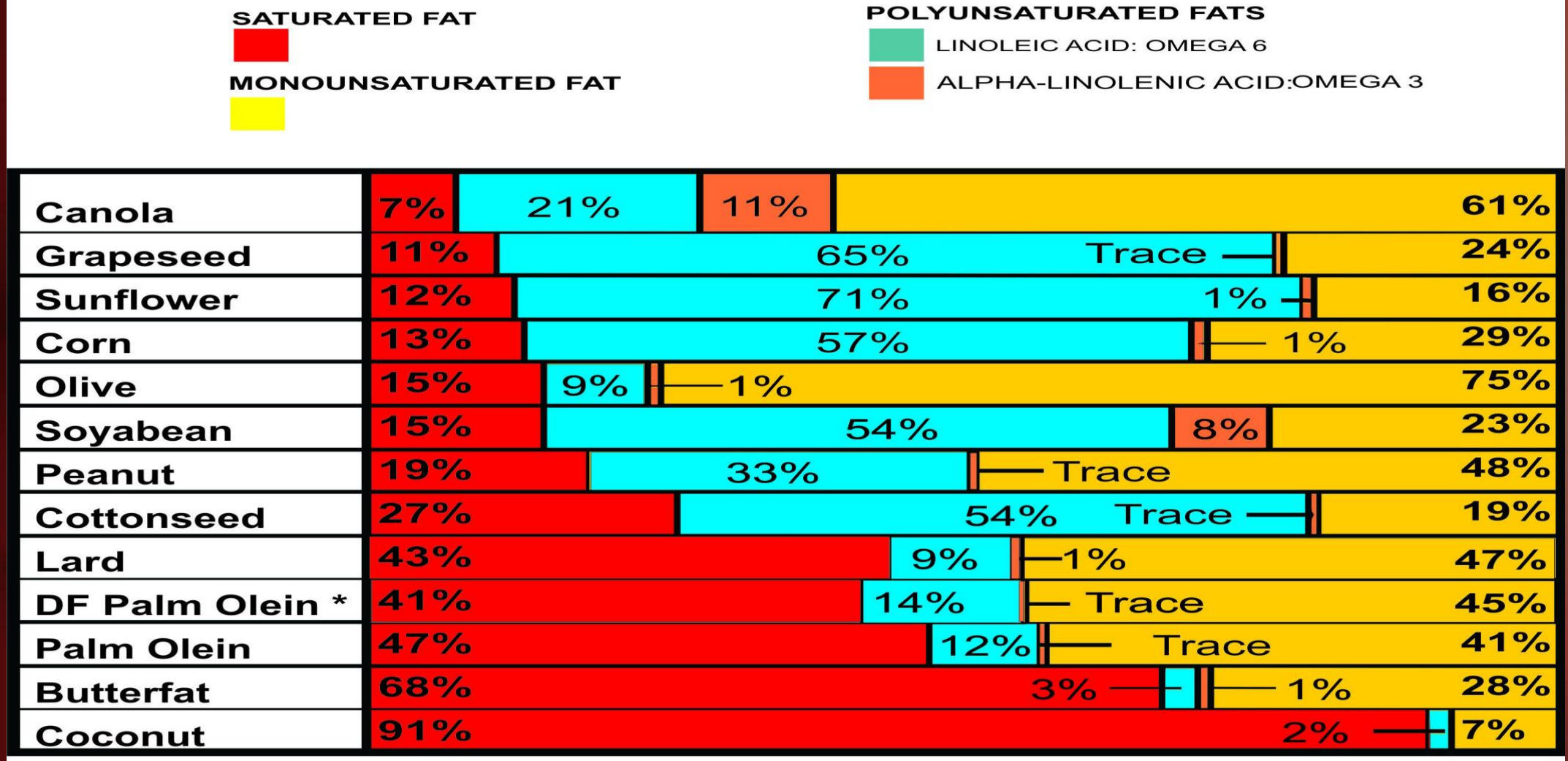
- What are omega 3's and omega 6's
  - Essential fatty acids—our body can't make them and needs to get them from the diet

Omega 3	Omega 6
Anti-inflammatory	Pro-inflammatory
Cold water fish, nuts, ground flax seeds,leafy green vegetables	Vegetable fats such as corn, soy, safflower

  - Ratio between omega 6/omega 3 should be 2:1 or 4:1
    - North American diet has 15:1 to 20:1

Comparison of Dietary Fats

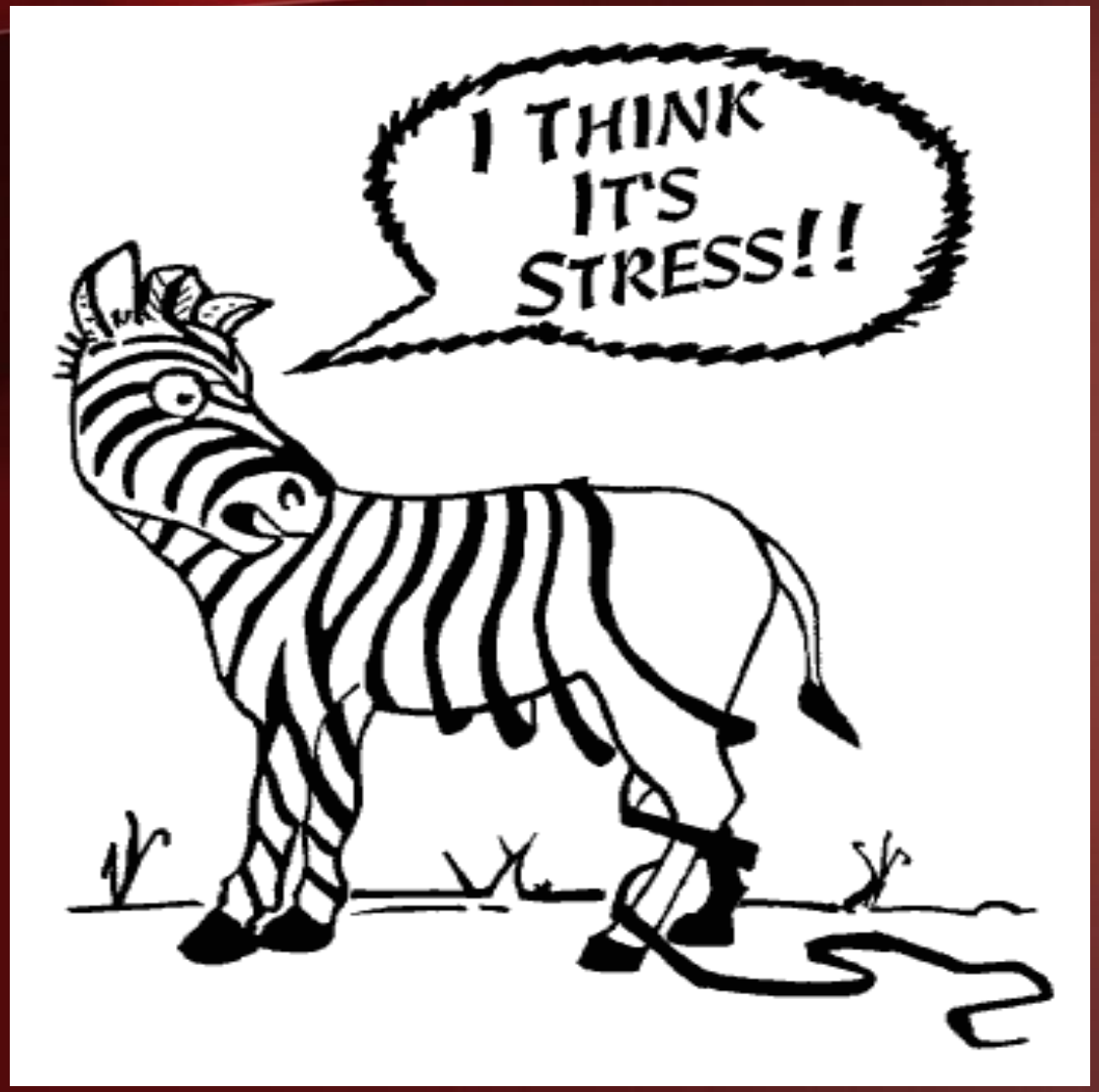
Average Fatty Acid Value



*Double Fractionated

HOW TO RESTORE THE 1:1 RATIO

- Increase consumption of fish and produce, especially leafy, green vegetables
- Decrease intake of processed food items.
- Avoid all partially hydrogenated fat, even (especially) if package describes product as “trans-fat free.”
- Increase nutritious fats such as nuts, peanuts, avocados, seeds, fish, and even dark green leafy vegetables.
- To the extent possible, choose animal protein (fish, eggs, poultry) from sources that themselves eat a balanced omega 6:3 ratio, and avoid grain-fed sources.

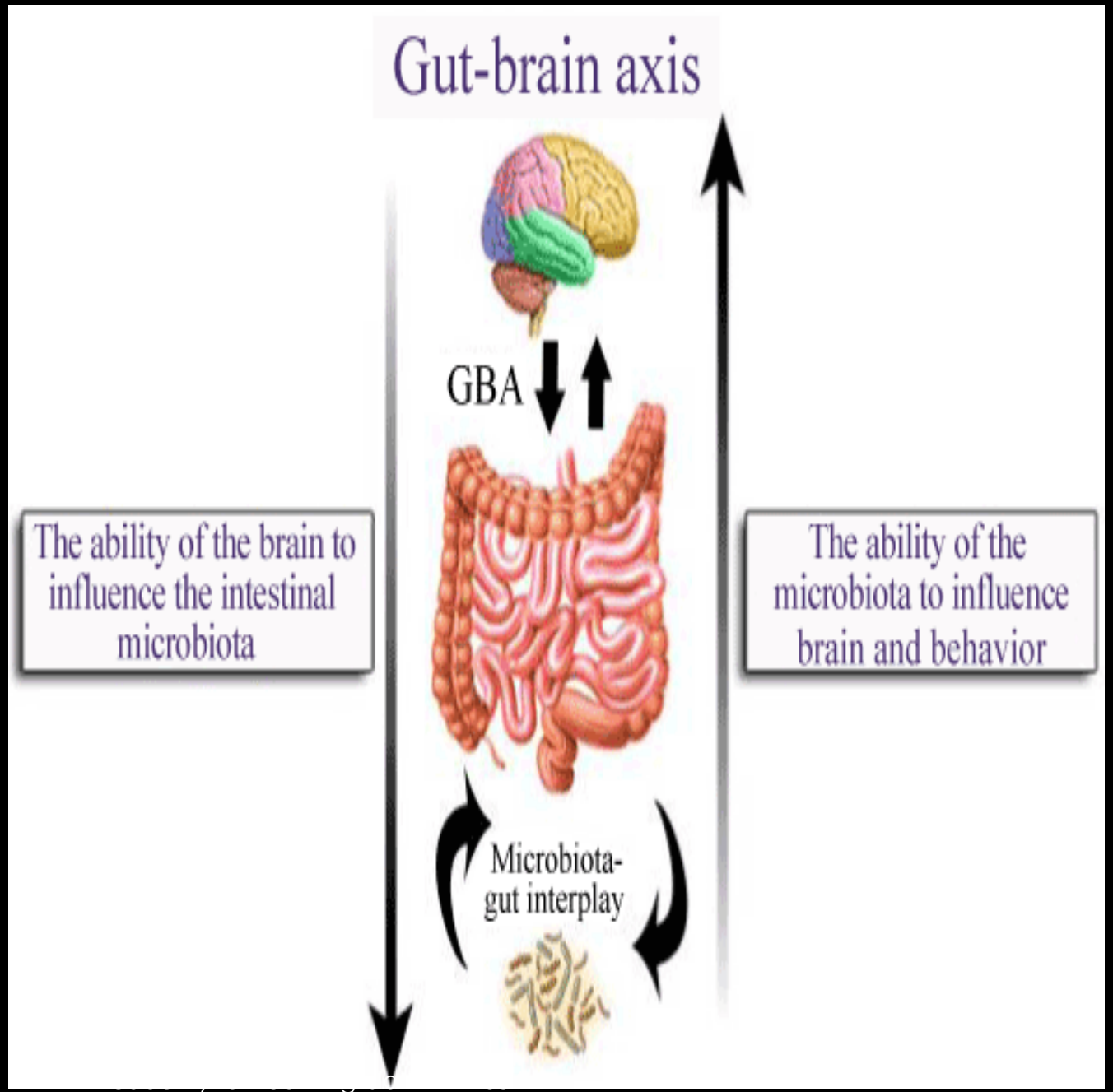

I THINK
IT'S
STRESS!!

FOOD FOR THOUGHT?

- We know that our thoughts can cause chronic stress which can have a negative affect on our body via inflammation

BUT

Can inflammation in your body affect your mood, emotional state and clarity of thought?



GUT-BRAIN CONNECTION

- What happens in your GUT can influence your brain: your thinking, your emotions and your mood---ANS & CNS
- 70% of serotonin: the feel good hormone found in brain is produced by the stomach
- What happens in your gut based on your diet can influence your emotions such as anxiety and depression

Keep Calm

Cuz it is the end of my

Presentation