



MODULE 6 OBJECTIVES

- 1** State the Big Ideas for Fatty Acids
- 2** Name the two fatty acids that are essential to the body
- 3** List 4 roles of fats in the body
- 4** Explain the impacts of a diet low in Omega-3 and Omega-6 fatty acids to the healing process
- 5** Identify the three primary cofactors you need to consider when balancing prostaglandin formation
- 6** Describe and perform the Functional Evaluation for Fatty Acid deficiency

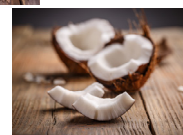
Introduction to Fatty Acids

Copyright © 2016 Nutritional Therapy Association, Inc.

3

FATS

- Fats compose about **15%** of our body weight
- Animal and vegetable sources of fat provide a concentrated source of energy in our diet
- Contrary to popular belief, a fairly high percentage of diverse, good quality fats are required for optimum health



Copyright © 2016 Nutritional Therapy Association, Inc.

4

THE BIG IDEAS



1. Healthy Fatty Acid deficiency is epidemic:
 1. Musculoskeletal issues
 2. Endocrine issues
 3. Cardiovascular issues
 4. Immune issues
 5. Allergies, Skin problems
 6. Depression, etc.
2. Inflammation can be effectively managed with nutritional therapy, therefore reducing healing time

Copyright © 2016 Nutritional Therapy Association, Inc.

5

LIPIDS AND FATTY ACIDS

- The fats and oils we consume (*technically called lipids*) are a collection of fatty acid molecules:
 - Lipids are specifically made up of triglycerides
 - Three fatty acids + one glycerol molecule
- Fatty acids are organic molecules made up of a chain of carbon atoms
 - Chains contain anywhere from one to 24 carbon atoms
 - Chains are named according to the length of the carbon chain and the degree of saturation

Copyright © 2016 Nutritional Therapy Association, Inc.

6

CLASSIFICATIONS

Degree of Saturation

Saturated	Monounsaturated	Polyunsaturated
<ul style="list-style-type: none"> Highly stable Do not go rancid easily Solid or semi-solid at room temperature Non-essential because the body can make these Found in animal fats and tropical oils 	<ul style="list-style-type: none"> Relatively stable Do not go rancid easily Liquid at room temperature Non-essential because the body can make these Found in olive oil and oils from almonds, pecans, cashews, peanuts, and avocados 	<ul style="list-style-type: none"> Relatively unstable Go rancid easily Always liquid Two are essential: <ul style="list-style-type: none"> Linoleic Acid Alpha-linolenic Acid Never heat or use in cooking Found in flax, nuts, and seeds along with fish oil <i>(The omega 3/6 oils)</i>

Note: All fats and oils are some combination of saturated, monounsaturated, and polyunsaturated fatty acids

Copyright © 2016 Nutritional Therapy Association, Inc.

7

ESSENTIAL FATTY ACIDS (EFAS)

- There are two polyunsaturated fats absolutely essential to the body:
 - Linoleic Acid (LA) – Omega 6
 - Alpha-linolenic Acid (ALA) – Omega 3
- There are four other fats that are conditionally essential:
 - Gamma-linolenic Acid (GLA)
 - Arachidonic Acid (AA)
 - Eicosapentaenoic Acid (EPA)
 - Docosahexaenoic Acid (DHA)

Copyright © 2016 Nutritional Therapy Association, Inc.

8

ROLES OF FAT IN THE BODY

Fats play numerous important roles in the body, including:

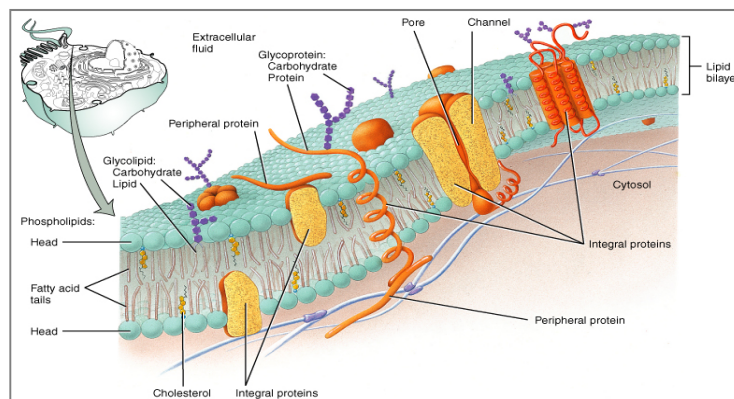
- Providing a source of energy
- Acting as building blocks for cell membranes and hormones
- Aiding the absorption of the fat-soluble vitamins: A, D, E, and K
- Allowing for the proper use of proteins
- Serving as a protective lining for the organs of the body
- Helping regulate energy absorption by slowing the absorption of food
- Increasing satiety
- Making food taste good

Copyright © 2016 Nutritional Therapy Association, Inc.

9

ROLES OF FATS *(CONTINUED)*

Are building blocks for every cell membrane in the body



Copyright © 2016 Nutritional Therapy Association, Inc.

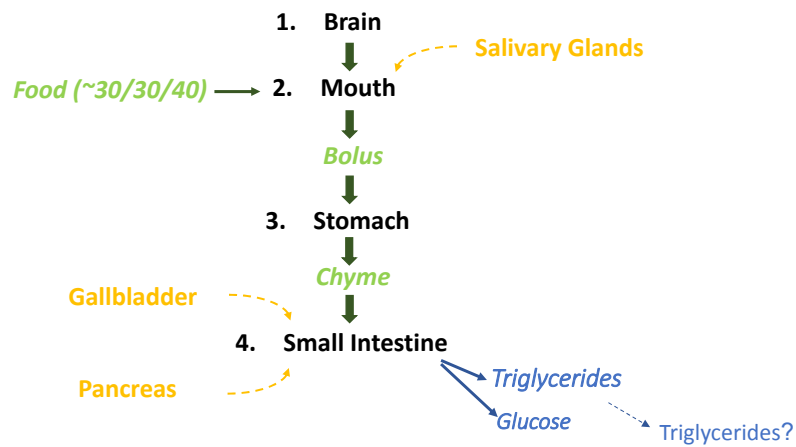
10

Fatty Acids: Normal Function

Copyright © 2016 Nutritional Therapy Association, Inc.

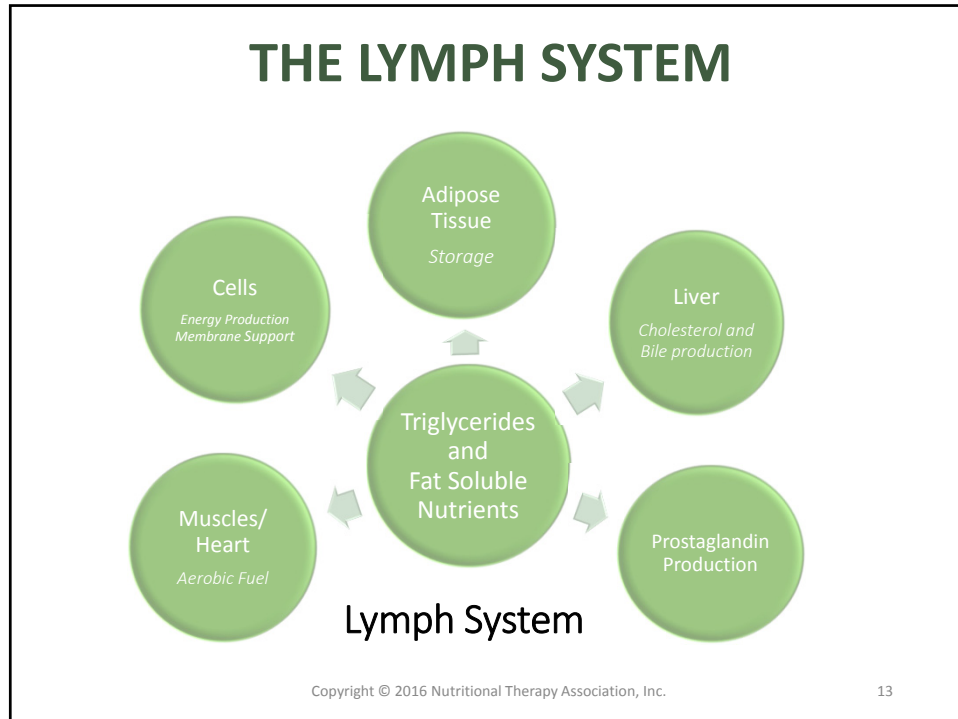
11

FOODS TO FATTY ACIDS



Copyright © 2016 Nutritional Therapy Association, Inc.

12



PROSTAGLANDINS

Prostaglandins are hormone-like substances the body cannot do without. They occur in nearly all body tissues and fluids. They are formed (*conjugated*) from elongated forms of EFAs and are thought to be synthesized in the cells' membranes.

Copyright © 2016 Nutritional Therapy Association, Inc. 14

PROSTAGLANDINS *(CONTINUED)*

Prostaglandins have a multitude of functions

Prostaglandin Functions

- Regulation the cell's communication system for doing things like opening and closing channels
- Providing the fine tuning needed for maintaining homeostasis within the body
- Increasing blood flow within the kidneys
- Dilating bronchial tubes
- Controlling inflammatory function

Copyright © 2016 Nutritional Therapy Association, Inc.

15

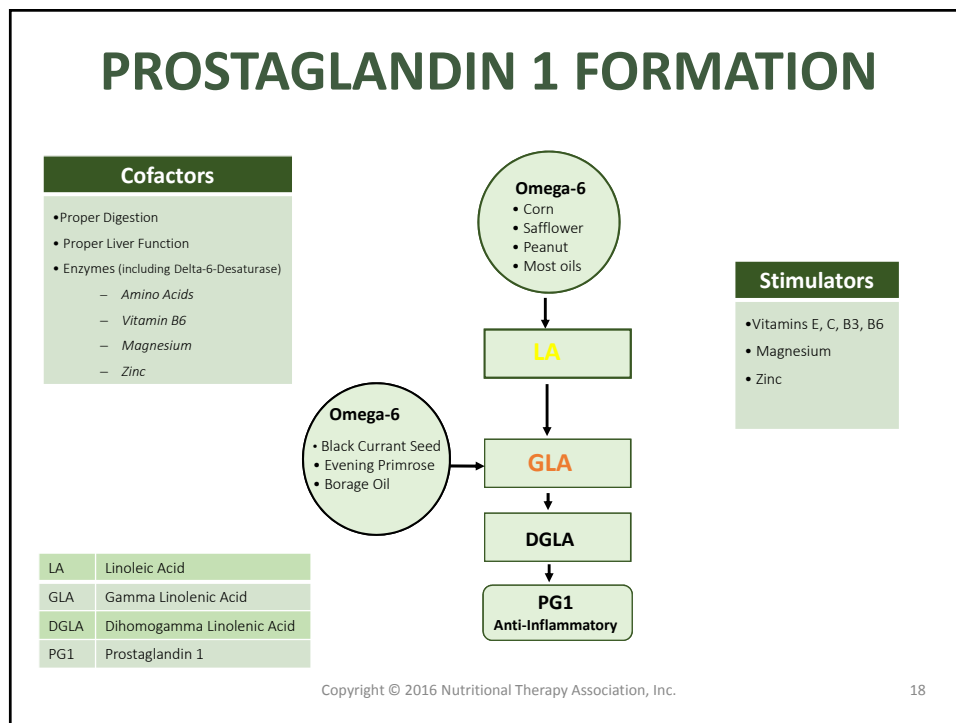
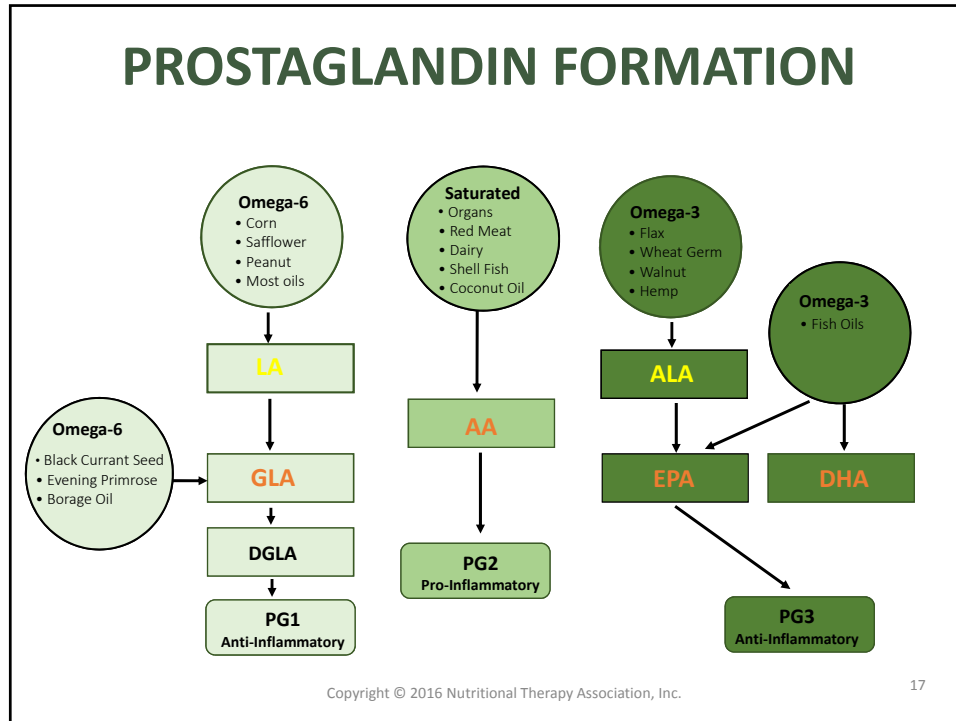
PROSTAGLANDINS *(CONTINUED)*

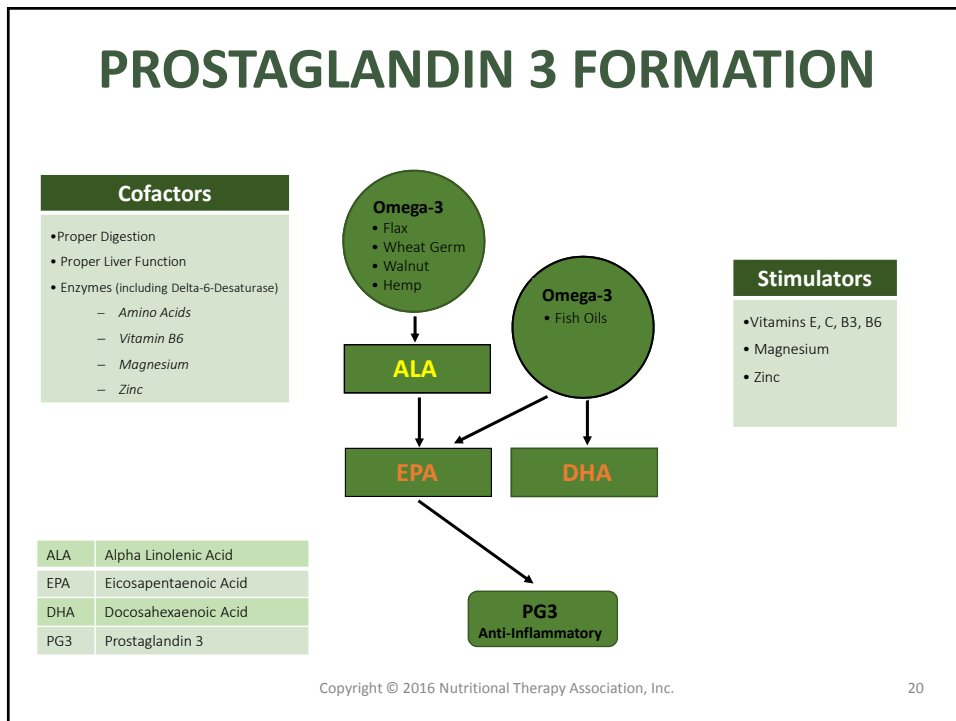
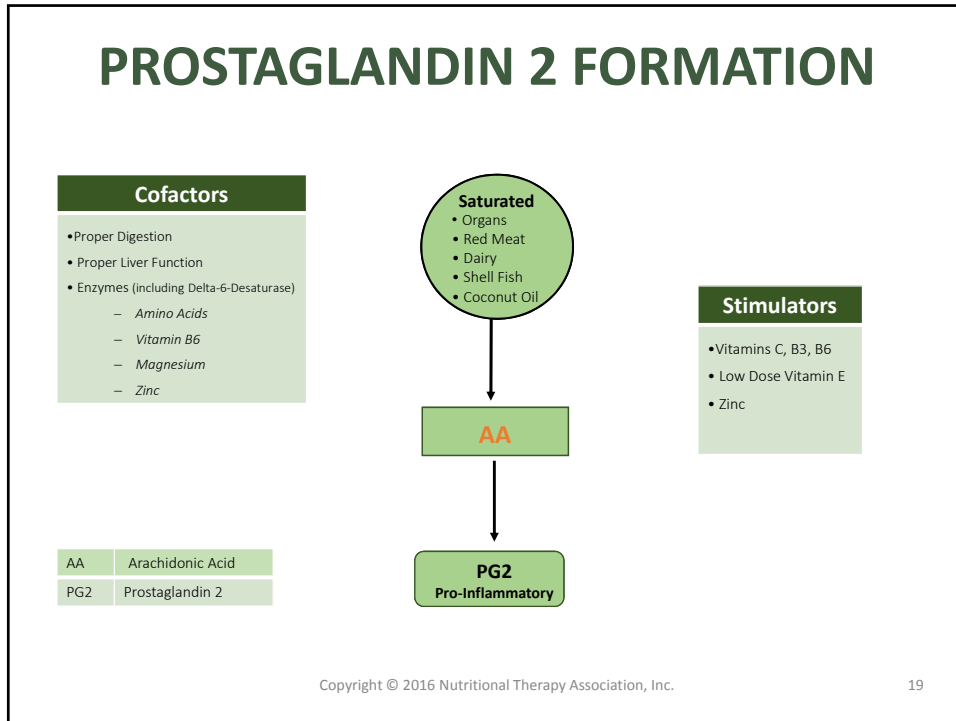
- To control inflammatory function, the body needs the ability to both inflame and anti-inflame
 - The body inflames to heal before it anti-inflames
- There are three groups of prostaglandins that control this process:

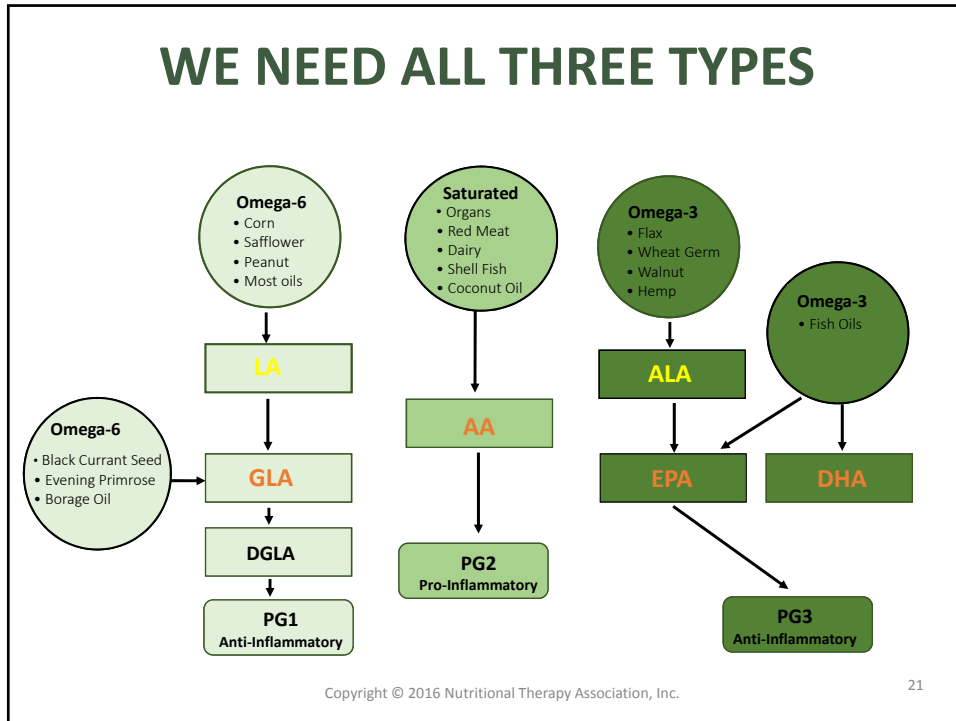
Anti-inflammatory	Pro-inflammatory
PG1	PG2
PG3	

Copyright © 2016 Nutritional Therapy Association, Inc.

16







GOOD FATS VS. BAD FATS

The difference between a Good fat and a Bad fat is in the way they are processed *not* in the inherent nature of their source

Exception: Canola (rapeseed or mustard seed), Soy and Cottonseed Oils

Copyright © 2016 Nutritional Therapy Association, Inc. 22

THE GOOD FATS/OILS

Omega-3s	Omega-6s	Saturated	Omega-9s
<ul style="list-style-type: none"> • Fish oil • Flax seed oil • Wheat Germ • Walnut • Hemp • Pumpkin 	<ul style="list-style-type: none"> • Sunflower oil • Sesame oil • Safflower oil • Peanut oil • Black currant seed • Evening Primrose 	<ul style="list-style-type: none"> • Palm oil • Coconut oil • Eggs • Butter • Raw dairy • Animal flesh fats from pastured animals 	<ul style="list-style-type: none"> • Extra virgin olive oil • Hazelnut oil • Almond oil • Avocado oil

Note: The ratio of Omega-6s to Omega-3s in the diet should be approximately 1:1

Copyright © 2016 Nutritional Therapy Association, Inc.

23

GENERAL GUIDELINE

You need a mixture of healthy fatty acids in your diet to maintain optimal health

~30% Saturated Fats
 ~10% Polyunsaturated Fats (e.g. Omega 3s/6s)
 ~60% Monounsaturated Fats (e.g. Olive Oil)

Note: These guidelines are controversial and vary greatly within individuals because of heredity, blood type, etc.

Copyright © 2016 Nutritional Therapy Association, Inc.

24

Fatty Acids: Dysfunction

Copyright © 2016 Nutritional Therapy Association, Inc.

25

THE BIG IDEA #1



Healthy Fatty
Acid deficiency
is epidemic

Copyright © 2016 Nutritional Therapy Association, Inc.

26

HISTORICALLY SPEAKING

- Historically, EFA deficiency was not an issue, because the range of foods was much broader
 - Before agriculture, we ate 300 – 1,000 different foods
 - Today, we eat 17 – 20
- Wild things in their natural form are high in Omega-3s
 - Insects, cold-water fish, flax seeds, grass-fed beef, etc.



Copyright © 2016 Nutritional Therapy Association, Inc.

27

OTHER FACTORS

- Cooking is a factor that contributes to EFA deficiency
 - For example, cooking fish destroys most of the Omega-3 oils
- Industrialization is another contributing factor
 - Grain-fed beef is completely void of Omega-3s, whereas grass-fed beef is not



Copyright © 2016 Nutritional Therapy Association, Inc.

28

ADULTERATED FATS



These fats are toxic and interfere with the essential roles fatty acids play within a healthy body

Copyright © 2016 Nutritional Therapy Association, Inc.

29

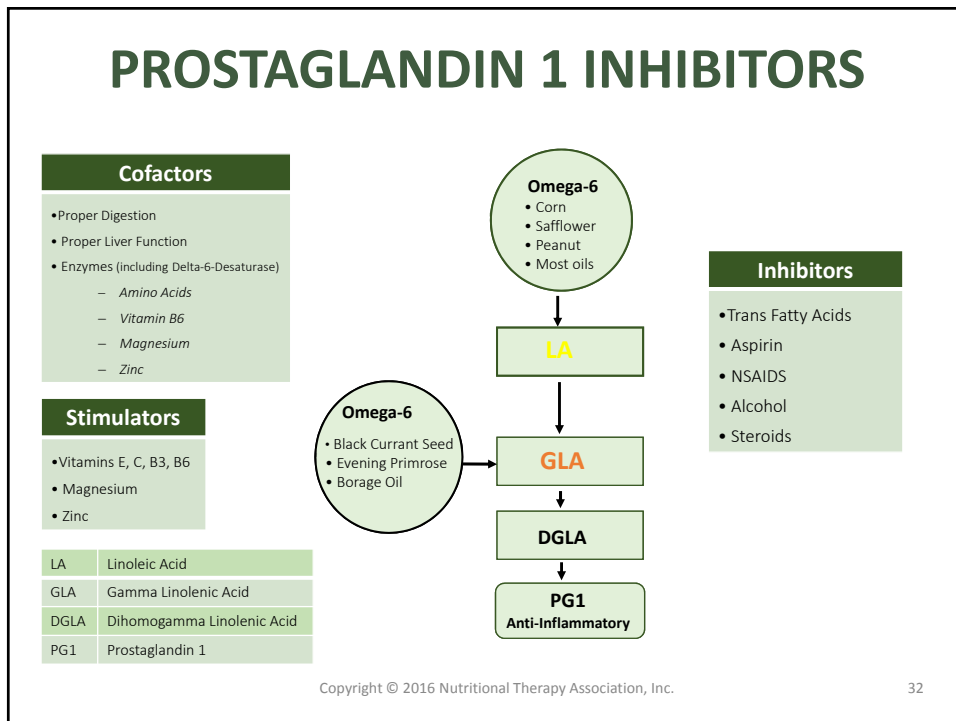
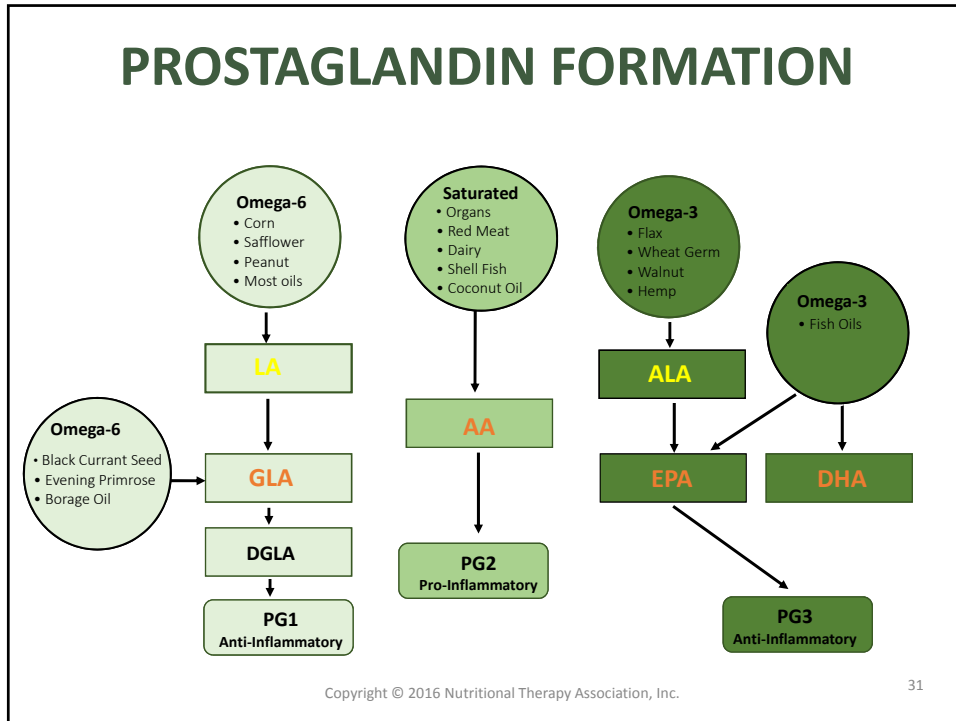
SUPERMARKET OILS

- Living fats/oils are very sensitive to light, heat, and oxygen and become rancid easily
 - The more unsaturated the fat, the more unstable it is
- Unstable oils are the ones most important to our health in terms of EFAs
 - Cannot be heated
 - Cannot be exposed to light
- Therefore, supermarket oils in clear, plastic bottles shelved under bright light and not refrigerated are **not** supporting life



Copyright © 2016 Nutritional Therapy Association, Inc.

30



PROSTAGLANDIN 2 INHIBITORS

Cofactors

- Proper Digestion
- Proper Liver Function
- Enzymes (including Delta-6-Desaturase)
 - Amino Acids
 - Vitamin B6
 - Magnesium
 - Zinc

Stimulators

- Vitamins C, B3, B6
- Low Dose Vitamin E
- Zinc

AA	Arachidonic Acid
PG2	Prostaglandin 2
LT	Leukotriene

```

graph TD
    Saturated((Saturated  
• Organs  
• Red Meat  
• Dairy  
• Shell Fish  
• Coconut Oil)) --> AA[AA]
    AA --> PG2[PG2  
Pro-Inflammatory]
            
```

Inhibitors

- Aspirin
- NSAIDS
- EPA
- High Doses of Vitamin E
- Bioflavonoids

Copyright © 2016 Nutritional Therapy Association, Inc. 33

PROSTAGLANDIN 3 INHIBITORS

Cofactors

- Proper Digestion
- Proper Liver Function
- Enzymes (including Delta-6-Desaturase)
 - Amino Acids
 - Vitamin B6
 - Magnesium
 - Zinc

Stimulators

- Vitamins E, C, B3, B6
- Magnesium
- Zinc

ALA	Alpha Linolenic Acid
EPA	Eicosapentaenoic Acid
DHA	Docosahexaenoic Acid
PG3	Prostaglandin 3

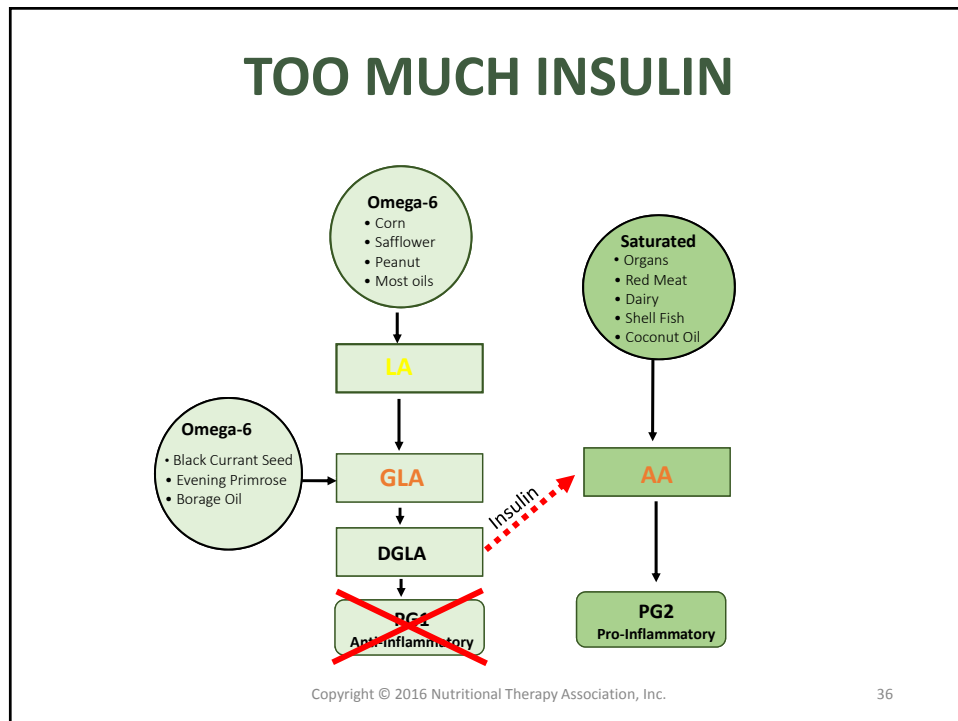
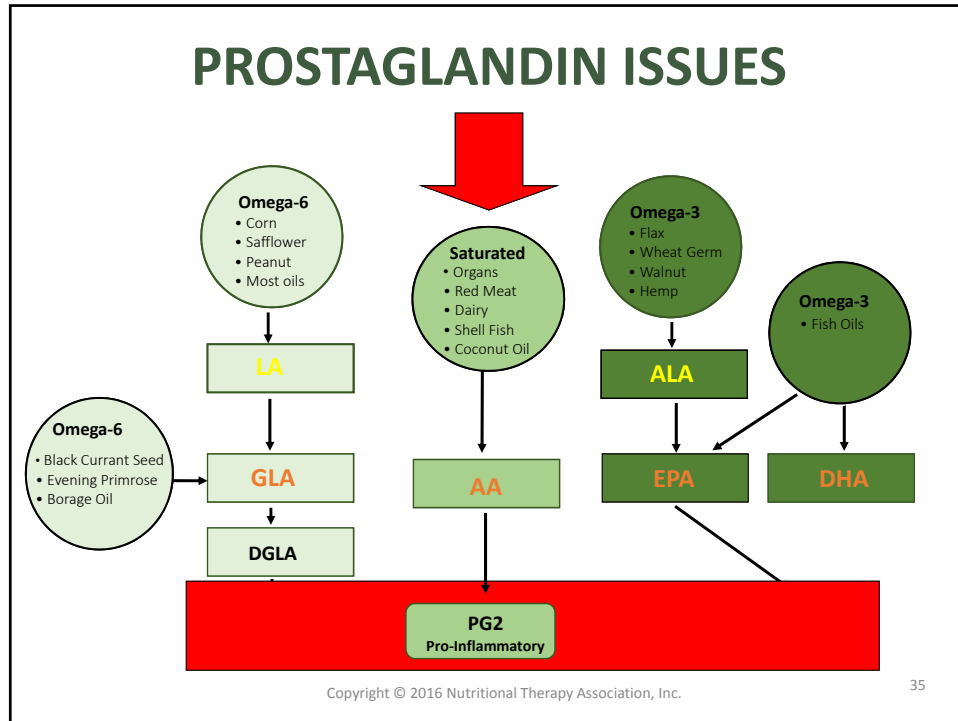
```

graph TD
    Omega3((Omega-3  
• Flax  
• Wheat Germ  
• Walnut  
• Hemp)) --> ALA[ALA]
    Omega3_2((Omega-3  
• Fish Oils)) --> EPA[EPA]
    Omega3_2 --> DHA[DHA]
    ALA --> EPA
    EPA --> PG3[PG3  
Anti-Inflammatory]
    DHA --> PG3
            
```

Inhibitors

- Trans Fatty Acids
- Aspirin
- NSAIDS
- Alcohol
- Steroids

Copyright © 2016 Nutritional Therapy Association, Inc. 34



Fatty Acids: Functional Evaluation

Copyright © 2016 Nutritional Therapy Association, Inc.

37

ORAL PH

A general test for Essential Fatty Acids (EFAs) need is to examine the oral pH

A client whose oral pH is **below 7.2** is a good candidate for EFA supplementation and further testing for EFA deficiency

Oral pH should be checked at least 30 minutes away from any food or beverages

There are other factors that can effect oral pH, such as gum disease or poor mineral reserves

However, particularly when taken several times during the day and averaged, this is a good fatty acid measurement

Copyright © 2016 Nutritional Therapy Association, Inc.

38

ORAL PH *(CONTINUED)*

Purpose:

- Determine a potential deficiency in EFAs.

Procedure:

- Instruct the client not to eat or drink anything within 30 minutes of the appointment.
- Tear off a 2 inch piece of pH test paper (Make sure you don't put the end of the paper you touch in the client's mouth)
- Have the client moisten the paper with saliva and allow you to pull it out of the mouth with their lips apart
- Compare the test strip to the chart as quickly as possible

Scoring:

- A pH of 7.2 to 7.4 is sufficient

Copyright © 2016 Nutritional Therapy Association, Inc.

39

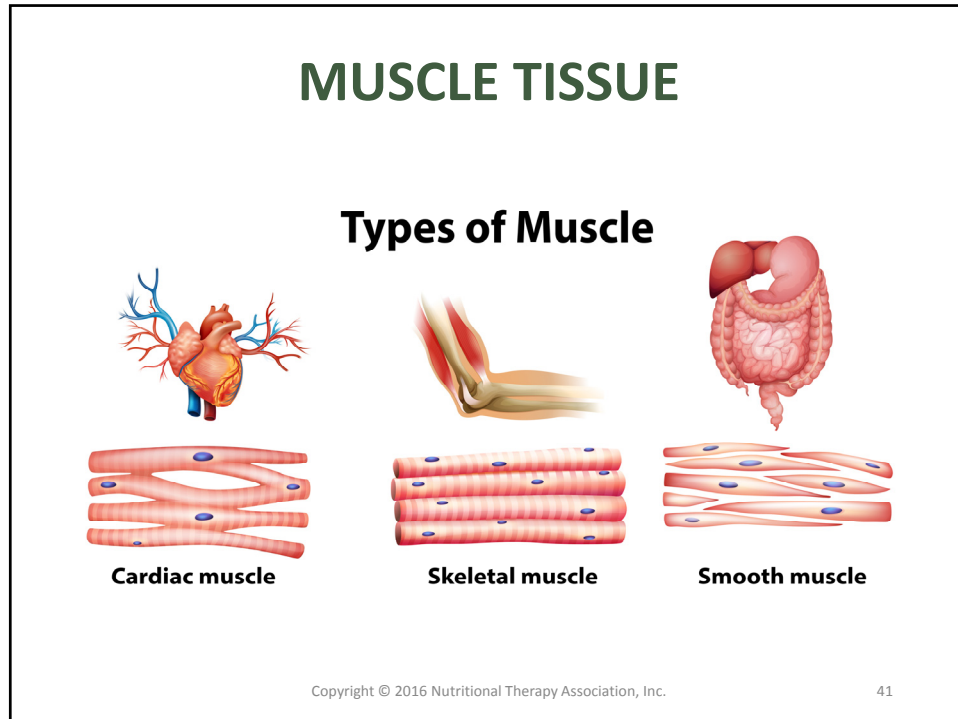
PH SCALE

Lingual pH scale Color Guide



Copyright © 2016 Nutritional Therapy Association, Inc.

40



SKELETAL MUSCLE TISSUE

Each skeletal muscle tissue is made up of elongated muscle cells called muscle fibers:

1. **Slow Oxidative (*Endurance*)**
 - Burn fat
 - Generate energy by aerobic cellular respiration
 - Capable of prolonged, sustained contractions
2. **Fast Oxidative-Glycolytic (*Sprinting*)**
 - Burn fat and glucose
 - Generate energy by aerobic cellular respiration and glycolysis
3. **Fast Glycolytic (*Weight Lifting*)**
 - Generate energy by glycolysis
 - Used for intense movements of short duration

Copyright © 2016 Nutritional Therapy Association, Inc. 42

POSTURAL & NON-POSTURAL

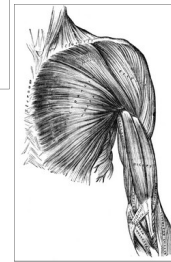
1. Postural muscles are constantly active

- Contain a high number of the fat-burning, slow oxidative fibers
- Examples are the neck, back, and legs



2. Non-postural muscles are not constantly active

- Contain a higher concentration of the fast oxidative-glycolytic fibers that burn both fat and glucose
- Examples are the shoulder and arm muscles



Copyright © 2016 Nutritional Therapy Association, Inc.

43

FATTY ACID TEST (REPEATED MUSCLE CHALLENGE)

Fat is the primary energy source of the muscle in an aerobic state, while blood sugar is needed for the muscle's anaerobic function.

In the Fatty Acid test, we simulate an aerobic condition in the muscles using a "*repeated muscle challenge*". This challenge involves a simple, normal muscle test repeated 20 times at a rate of once per second.

Copyright © 2016 Nutritional Therapy Association, Inc.

44

FATTY ACID TEST (CONTINUED)

- 1 The joint is positioned in such a way that the muscle to be tested is shortened
- 2 The practitioner applies pressure to the joint to lengthen the muscle until a “locking” is noted
- 3 A positive result (*meaning there’s an EFA deficiency*) occurs when a “locking” of the muscle and joint does not occur
- 4 Initial screening should include a postural and non-postural muscle
- 5 If the client fails the repeated challenge, lingually stimulate the client with different forms of fats and fat cofactors until s/he passes the test
- 6 If client fails non-postural but passes postural **try folic acid**
If client fails postural but passes non-postural **try iron**

Copyright © 2016 Nutritional Therapy Association, Inc.

45

SCORING THE RESULTS

No Deficiency

- 20 or more reps

Mild Deficiency

- 15 – 19 reps

Moderate Deficiency

- 9 – 14 reps

Severe Deficiency

- 0 – 8 reps

Copyright © 2016 Nutritional Therapy Association, Inc.

46

Fatty Acids: Solutions

Copyright © 2016 Nutritional Therapy Association, Inc.

47

KEEP IN MIND

Balancing prostaglandin production is a game of cofactors:

Digestion

has to be working, so fats are appropriately emulsified

Liver

has to be working to be capable of making the enzymatic conversions

Enzymes

the appropriate vitamins and minerals need to be present for the production of enzymes

You have to consider all of these when testing for and correcting Fatty Acid deficiencies

Copyright © 2016 Nutritional Therapy Association, Inc.

48

FATTY ACIDS AND COFACTORS

Fatty Acids

- Flax Seed Oil
- Mixed Fatty Acids
- EPA/DHA from Fish Oil
- Blackcurrant Seed Oil
- Evening Primrose Oil
- Conjugated Linoleic Acid

Cofactors

- Beet Juice
- Taurine
- Vitamin C
- Pancrelipase
- Bile Salts
- Phosphatidylcholine
- Inositol
- Pancreatic Enzymes
- Herbs for Liver Cleansing
- Nutrients for Phase II Detoxification
- Liver Tissue

WORKSHOP 6A

Using the Workshop 6a pages work with a partner to complete the Functional Evaluation and LNT for Fatty Acid Deficiency.

MODULE 6 SUMMARY

- 1 State the Big Ideas for Fatty Acids
- 2 Name the two fatty acids that are essential to the body
- 3 List 4 roles of fats in the body
- 4 Explain the impacts of a diet low in Omega-3 and Omega-6 fatty acids to the healing process
- 5 Identify the three primary cofactors you need to consider when balancing prostaglandin formation
- 6 Describe and perform the Functional Evaluation for Fatty Acid deficiency

Copyright © 2016 Nutritional Therapy Association, Inc.

51