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Not in 1990, but today in 2024, Yes, We can!!*

Telemedicine To Live Up To 85Years! **Next Step Living Longer Books**

Essential Dietary Fatty Acids not made by our body (fish oil, flaxseeds etc.)

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Chapter 1

Omega-3 Essential Fatty Acids – We must get them From Our Food

Think about it

The Harvard School of Public Health States that:

“The human body can make most of the types of fats it needs from other fats or raw materials. That isn’t the case for omega-3 fatty acids (also called omega-3 fats and n-3 fats). These are essential fats—the body can’t make them from scratch but must get them from food. Foods high in Omega-3 include fish, vegetable oils, nuts (especially walnuts), flax seeds, flaxseed oil, and leafy vegetables.

Omega-3 fats are an integral part of cell membranes throughout the body and affect the function of the cell receptors in these membranes. They provide the starting point for making hormones that regulate blood clotting, contraction and relaxation of artery walls, and inflammation. They also bind to receptors in cells that regulate genetic function. Likely due to these effects, omega-3 fats have been shown to help prevent heart disease and stroke, may help control lupus, eczema, and rheumatoid arthritis, and may play protective roles in cancer and other conditions”.

More research is also needed.

In this book, we will be talking about unsaturated omega-3 supplements.

By that I mean fish consumption and omega-3 fatty acid supplements.



Chap1Fig1

Chapter 2

What Does the Term Essential Fatty Acids mean?

The term **essential fatty acids** happens to mean

“polyunsaturated fatty acids”

- i. That must be provided by the food we take every day
- ii. These are essential fatty acids
- iii. They cannot be synthesized in the body
- iv. But they are necessary for our health



Chap2Fig1

Essential fatty acids are very important part of phospholipids.

Phospholipids are very important in maintaining the structural integrity of cellular membranes, i.e, membranes of cells throughout our body.

Chapter 3

There are Two Major Categories of Fully Unsaturated Fatty Acids

There are two major categories of fully unsaturated fatty acids:

1. Omega-3. Also called n-3 fatty acids
2. Omega-6. Also called n-6 fatty acids



Chap3Fig1

The names Omega-3 and omega-6, are based on the location of the first double bond in the fatty acid chain.

As far as **omega-6 fatty acids** are concerned, they are abundant in the diets of most of the people.

Recently, people have been using more and more

- corn oils
 - and sunflower oils
- which are a good source of omega-6 fatty acids.

Chapter 4

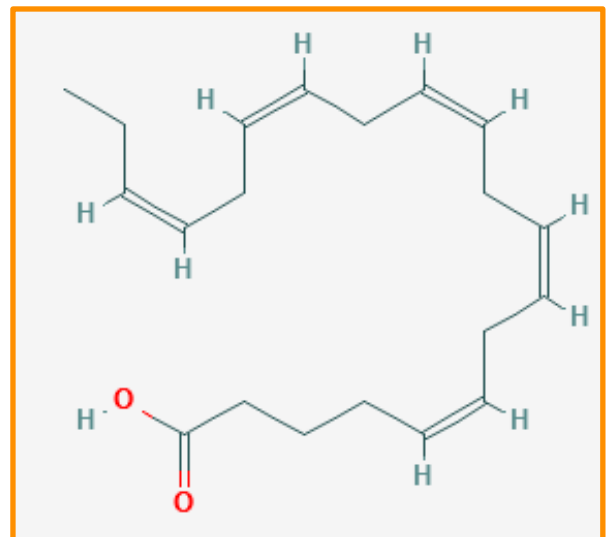
Major Dietary Omega-3 Essential Fatty Acids

There are three major dietary omega-3 essential fatty acids:



Chap4Fig1

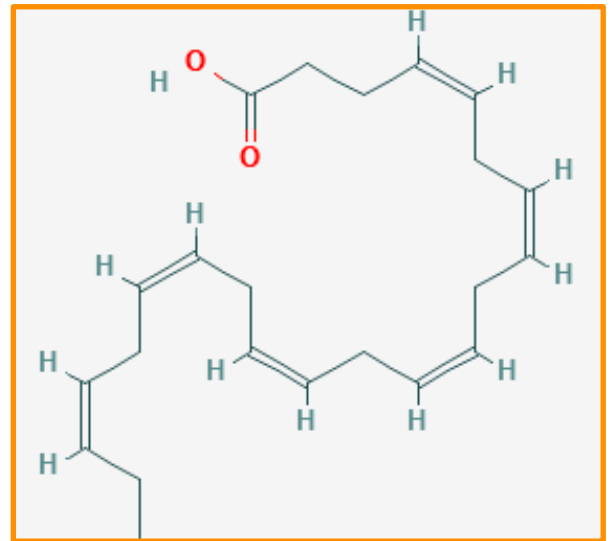
1. Eicosapentaenoic Acid (EPA)



*Molecular Structure of EPA
(C₂₀:5, omega-3)*

Chap4Fig2

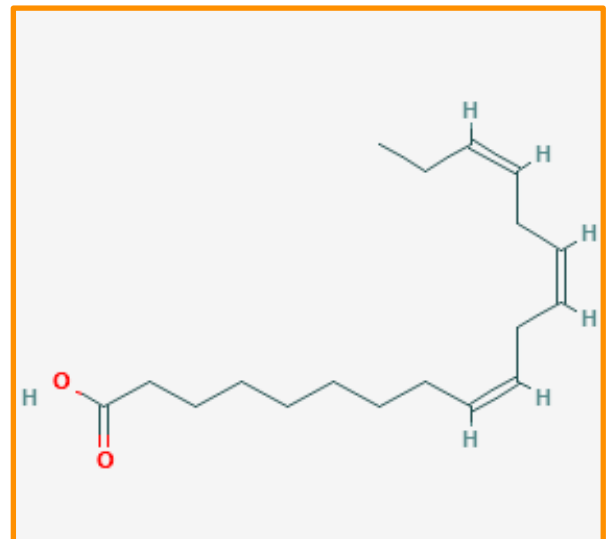
2. Docosahexaenoic Acid (DHA)



*Molecular Structure of DPA
(C22:6, omega-3)*

Chap4Fig3

3. Alpha-linolenic Acid (ALA)



*Molecular Structure of ALA
(C18:3, omega-3)*

Chap4Fig4

Alpha-linolenic Acid (ALA)

which is omega-3 fatty acids, is found in plant oils such as,

- Flaxseed oil
- Soya bean oil
- Canola oil

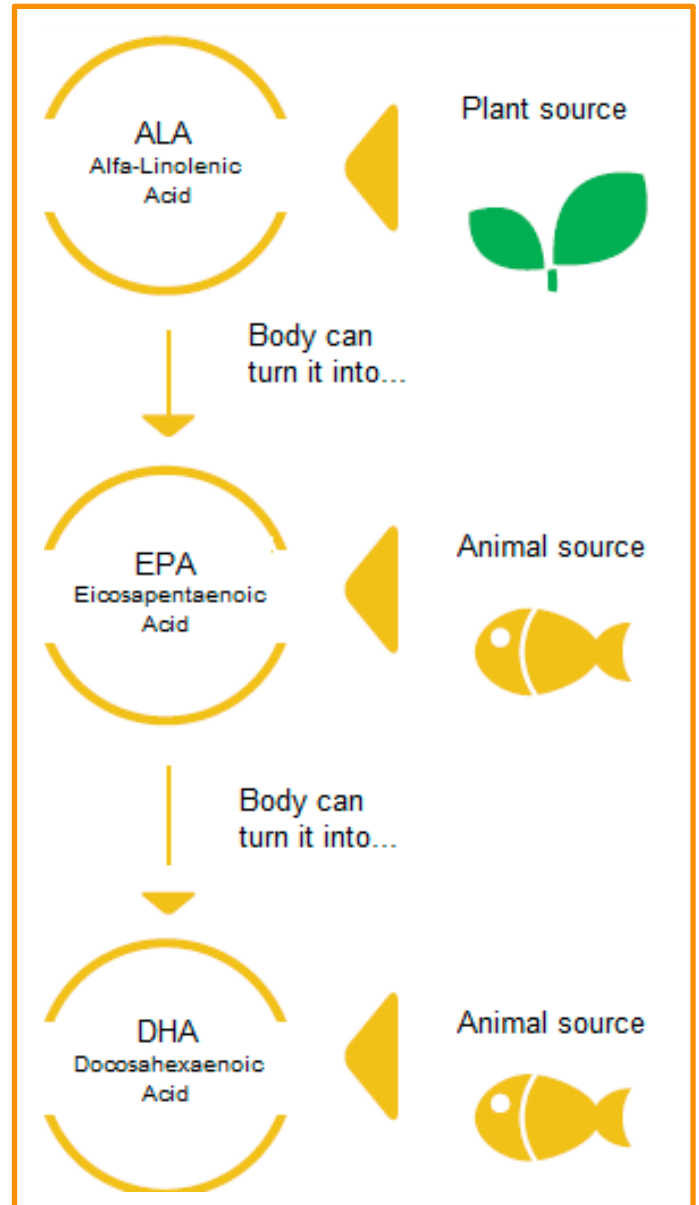
In very small quantity ALA, is also found in:

- Hemp seeds
- Walnuts

Out of the three essential omega-3 polyunsaturated fatty acids, the first two fatty acids,

- Eicosapentaenoic acid (EPA) and
- Docosahexaenoic acid (DHA)

are animal based, and they are biologically active in nature.

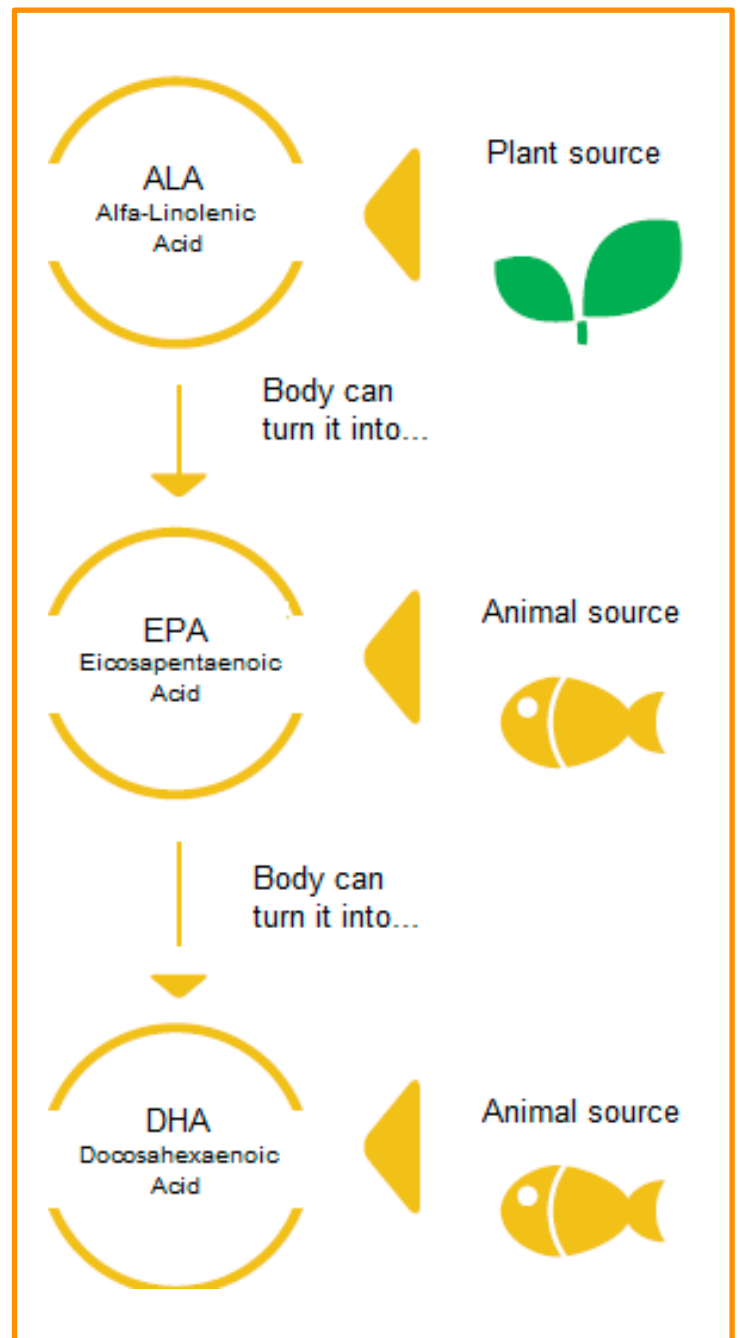


Chap4Fig5

Alpha-linolenic acid (ALA) is a plant based fatty acid,

and it is not biologically significant.

Actually, it is converted to the other two, but our body usually needs a large amount of ALA to convert to EPA and DHA.



Source for ALA, EPA and DHA

Chap4Fig6

Chapter 5

Fish and Fish Oil are the Richest source of Essential Fatty Acids

Fish, both freshwater fish and salt water fish, may contain almost 50% fatty acids.

Fish that contains omega-3 fatty acids are,

- Mackerel
- Herring
- Tuna
- Salmon

Eicosapentaenoic acid (EPA) is the richest source of fish oil.

Docosahexaenoic acid (DHA) is present in fish oil and red brown algae.

Best seller



Sponsored ⓘ

WOW Omega-3 Fish Oil Triple Strength 1000mg (550mg EPA; 350mg DHA; 100mg Other Omega 3 Fatty Acids) - 60...

★★★★☆ ~ 10,498

Limited time deal

₹698 (₹11.63/count) ₹899 Save ₹201 (22%)

Save 5% with coupon

Chap5Fig1

Chapter 6

The Basic Question which comes to our mind “What does Fish Oil contain”?

Fish oil contains two most important Omega-3 polysaturated essential fatty acids:

1. Eicosapentaenoic acid (EPA)
2. Docosahexaenoic acid (DHA)

In nature, _

these two essential fatty acids are found in:

- fish, and
- shell-fish

It is found in very low amount in some of the other animal food.



Chap6Fig1

Chapter 7

What is the Best Way to get Omega-3 Essential Fatty Acids

Think about it

It was found 50 years ago that a community in Greenland took large amount of seafood and hence the people there had a low rate of heart attack, coronary artery disease etc.

Medical community was very curious and they completed an extensive research to find out what Is there in seafood.

They found that there was something in seafood which leads to a decrease in the incidence of heart attacks.

Eventually, research got focused on long chain omega-3 polyunsaturated fatty acids in the fish oil.

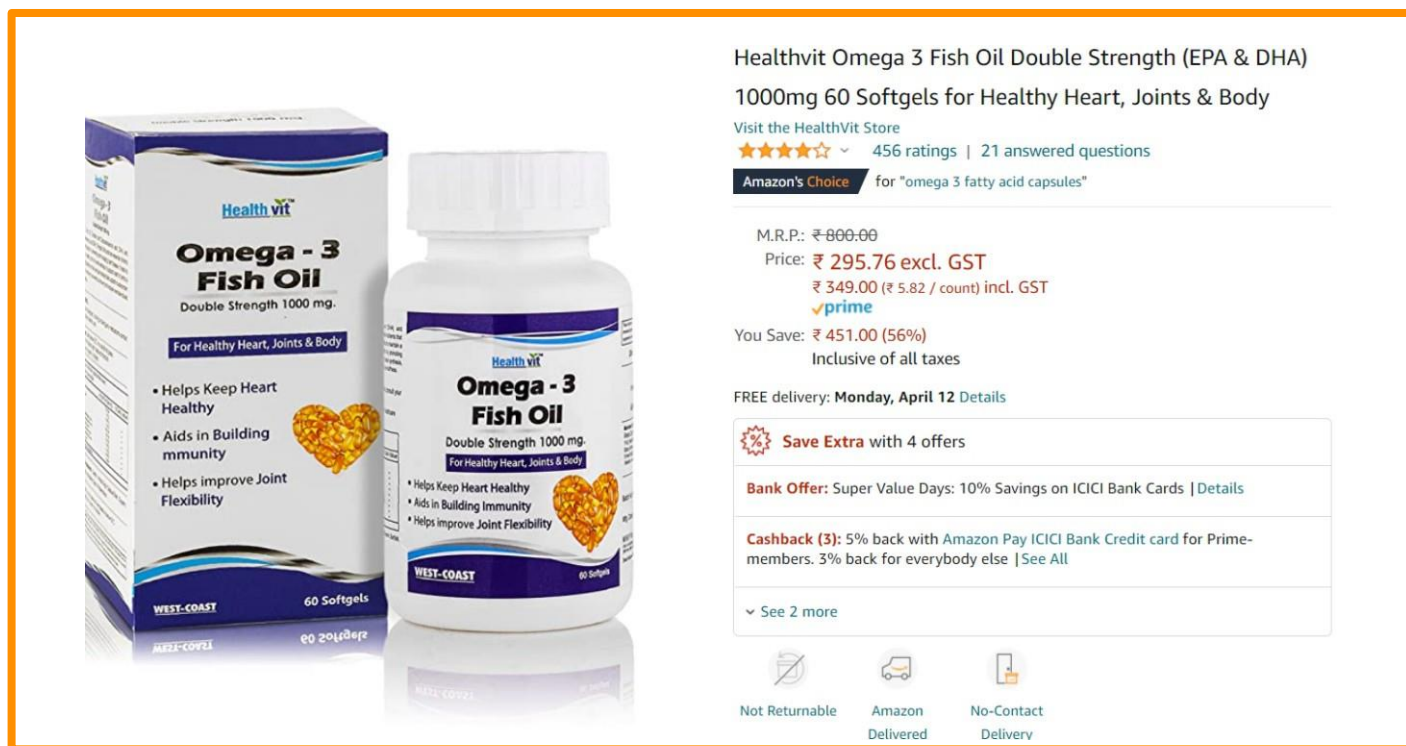
To be honest, the best way to get omega-3 essential fatty acids is by consuming fish oil capsules/supplements



Chap7Fig1

Chapter 8

Major Components of Fish Oil Supplements



Chap8Fig1

These two polyunsaturated fatty acids are the major components of the fish oil supplements:

1. Eicosapentaenoic acid (EPA)
2. Docosahexaenoic acid (DHA)

We can traditionally call these two polyunsaturated fatty acids, EPA and DHA,

But we can also call them:

- Long chain omega-3 fatty acids,
or
- Seafood omega-3 fatty acids,
or
- Marine omega-3 fatty acids

Chapter 9

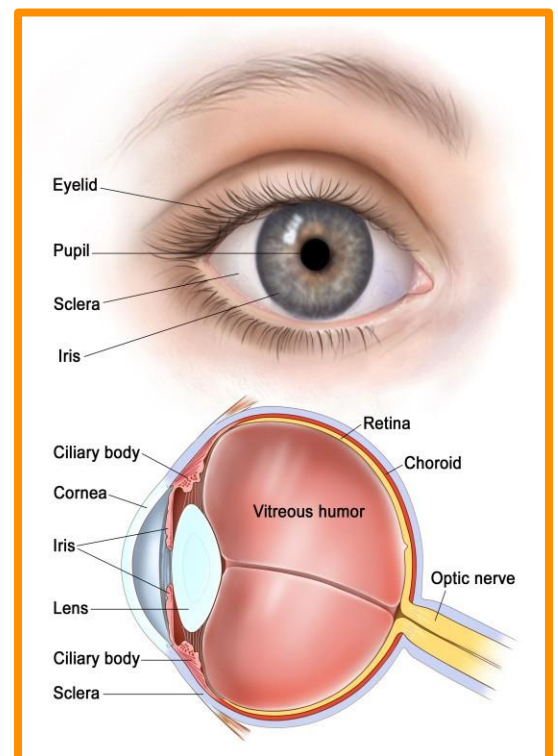
Polyunsaturated Essential Fatty Acids (in Fish Oil)

The polyunsaturated essential fatty acids, found in fish oil, are very significant because they form important components of phospholipids.

A. The phospholipids help form various aspects of our cell membranes.

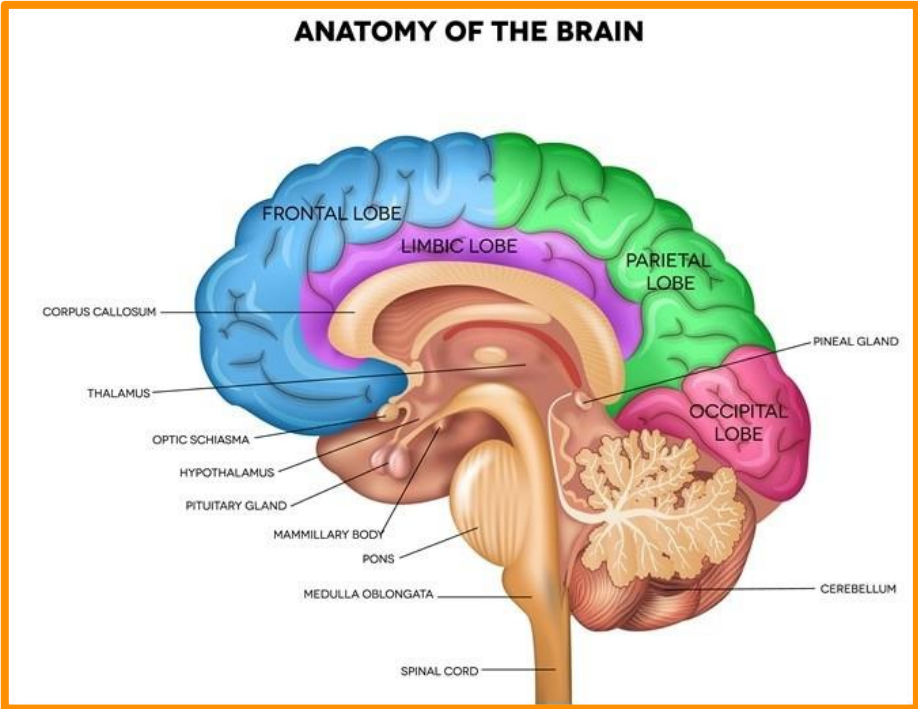
Especially,

1. Retina



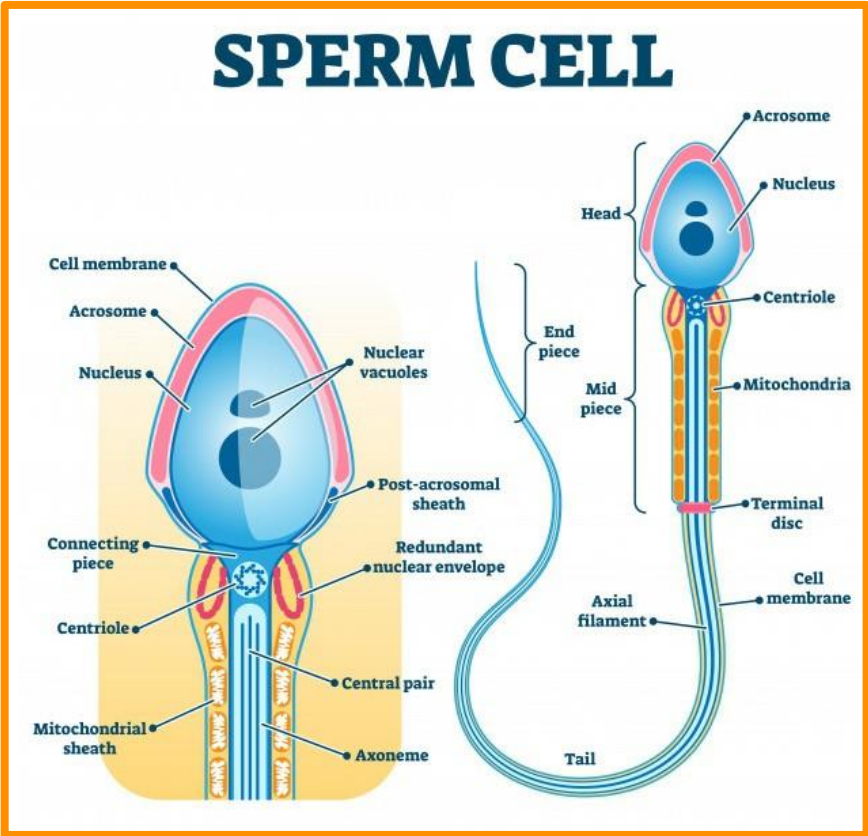
Chap9Fig1

2. Brain



Chap9Fig2

3. Sperm cell



Chap9Fig3

- B. These omega-3 fatty acids also help to reduce the inflammation or inflammatory activity**
- C. Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA) are really two most important biologically active polyunsaturated fatty acids.**
- D. The third one, Alpha-linolenic acid (ALA), is not biologically active.**

Chapter 10

Effects Of Fish Oil On Our Body

I. Effects on Fats (Lipids)

Fish oil consumption



Chap10Fig1

does decrease the lipids/serum triglyceride concentration by almost close to 30%.

Lowers Triglycerides by 30%

If you take it less, effect will be minimal.

If you take more and more of it, lowering of lipids or serum triglycerides will be more and more.

This happens by effect of polyunsaturated fatty oils/omega-3 effect on the liver.

Also, this effect is directly proportional to the amount of fish oil supplements we consume.



II. Effect on Blood Pressure

Think about it

In our medical profession reduction of heart rate using healthier means is considered healthy.

The best example is athletes who really do extensive practice for professional sports every day.

Their heart rate is really low and in those situations this is a sign of a good health, but in other people who just lead a regular routine/sedentary life, low heart rate is not a good sign.

Fish oil consumption:

- does help to **reduce blood pressure**

Reduces Blood Pressure



Chap10Fig2

- **The effect of lowering blood pressure** is more in the people who have elevated blood pressure, not taking any other medication.

- does **reduce heart rate**

Reduce Heart Rate



Chap10Fig3

- has **some effect on increasing the blood flow in our body**, but effect is not very significant.

Increases Blood Flow in the Body

III. Effect on Inflammation

Fish oil consumption

helps in reducing inflammation in our body.

Helps Reduce Inflammation



Chap10Fig4

and when we take supplements of fish oils,
they do lower,

- C-reactive protein

Lowers C-Reactive Protein



Chap10Fig5

The low risk measurement for C-reactive protein is less than 1mg.

The average risk is 1-3mg.

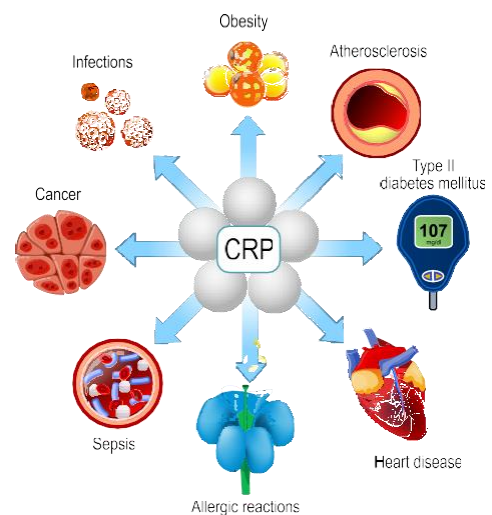
And high risk is more than 3 mg.

All these are markers of inflammation in the body.

If these numbers are high,
there is an inflammation,
somewhere in the body

**Low risk measurement of C
Reactive Protein = <1mg and
high risk =>3mg**

C- Reactive Protein may be increased in these conditions



Chap10Fig6

**Lowers Tumor Necrosis
Factor, alpha**

- Tumor necrosis factor, alpha

Chapter 11

Taboo Around Consumption Of Fish Oil Capsules By Vegetarians

Think about it

A colleague of mine told me that her dietician had asked to take fish oil supplements. Considering that my colleague was a vegetarian and that she wouldn't get enough omega 3 supplements in her diet, the dietician asked her to consume fish oil supplements, flax seeds etc.

It is generally seen that vegetarians consider taking fish oil supplements as against their religion, food choices etc.



Chap11Fig1

However, this taboo needs to be done away with.

The benefits of consuming fish oil supplements is huge.

The supplements are rich in omega-3 essential fatty acids. Hence, eating such medicines/capsules is beneficial, especially for vegetarians.

One thing we have to understand that out of the three essential omega-3 polyunsaturated fatty acids,

the first two fatty acids,

Eicosapentaenoic acid (EPA) and
Docosahexaenoic acid (DHA),
are animal based,
and they are biologically active in nature.

Alpha-linolenic acid (ALA) is a plant based fatty acid and it is not biologically significant.

Actually, it is converted to the other two, but our body usually needs a large amount of ALA to convert to EPA and DHA.

We request vegetarian people to understand that:

the biologically active polyunsaturated omega-3 essential fatty acids EPA and DHA are derived from animal products.

Yes, we do understand that as a vegetarian you will like to take flax seeds and walnuts,



Chap11Fig2

which do contain ALA (essential polyunsaturated fatty acids),

but you have to understand that **ALA is not biologically active** in humans, and

unfortunately, it takes a huge amount of ALA to convert to EPA and DHA.

To be very honest, this process of conversion is very poor in human beings.

So,
in other words taking flaxseeds and walnuts is
really not very useful.



Chap11Fig3

We are not going to get the benefit of the so called essential omega-3 polyunsaturated fatty acids.

Everybody needs to understand that.

Fish oil supplements also come as a prescription medicine (which contains enough polyunsaturated essential fatty acids)

and we need to do full research,

and make sure that there are enough polyunsaturated essential fatty acids in the fish oil supplements we buy.

Chapter 12

Vegetarian Source of Omega-3 Essential Fatty Acids - Flax Seeds and Flax Seeds Oil

We do need essential fatty acids in our body.

We can augment the diet to reduce the deficiency of essential fatty acids.

Vegetarian sources of essential fatty acids include:

- Flaxseeds
- Canola
- Walnut
- Sun-flower oil



Chap12Fig1

As stated, flax seeds/oil are also an important source of Omega-3 essential fatty acids.

Dieticians and nutritionists all over the world have emphasized on the importance of consumption of flax seeds/oils in everyday meals.



Chap12Fig2

Flaxseeds also contain alpha-linolenic acid (ALA), which is one of the omega-3 fatty acids and then this is converted into other two active forms with omega-3 fatty acids which are Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA).

But the fact is very large amount of ALA are converted into small amounts of EPA and DHA and those are the really two omega-3 essential fatty acids which are biologically active and are most important.

Flaxseed oil is obtained from ripened flaxseeds and to be honest, people may or may not know about one of the less common name of the flaxseed oil, which is, linseed oil.

Flaxseed oil is available both in capsules and the liquid forms.



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Sorich Organics Flax Seeds -
Fibre and Omega-3 Rich
Superfood - 400 Gm

★★★★☆ ~ 215

Deal of the Day

₹154 (₹38.50/100 g) ₹160 Save ₹6 (4%)

Chap12Fig3

Chapter 13

**If You Want to Consume Omega-3 Essential Fatty Acids,
We Won't Say – NO!
More Research is Needed!**

Think about it

We physicians/doctors and the top medical bodies feel that there is a benefit of taking omega-3 polyunsaturated fatty acids and they do decrease risk of coronary artery disease/heart attack.

The top medical bodies across the globe agree that if we take fish oil supplements they do help in reducing/decreasing our blood pressure.

And also risk of heart attack and yes there is a scientific evidence of that.



Chap13Fig1

But top medical body still state that:

“okay”,

take this medicine with omega 3 unsaturated fatty acids,
and your “risk of heart attack” will go down.

But, if you ask us physicians,

we are going to say that **yes, it helps,**

yes, we do agree as a doctor/physician:

a) there is scientific evidence that it does decrease blood pressure.

Reduces Blood Pressure

b) **it does decrease the risk of coronary artery disease**

**Reduces the risk of
Coronary Artery Disease**

c) **most important effects obviously are in relation to the heart**

Promotes Heart Health

d) it also **decreases the level of triglycerides in our body**

Decreases Triglycerides

**But, we in the medical community won't actively encourage everybody to take it!
NOT YET!!**

As per top medical bodies around the world, More Research Is Needed!!