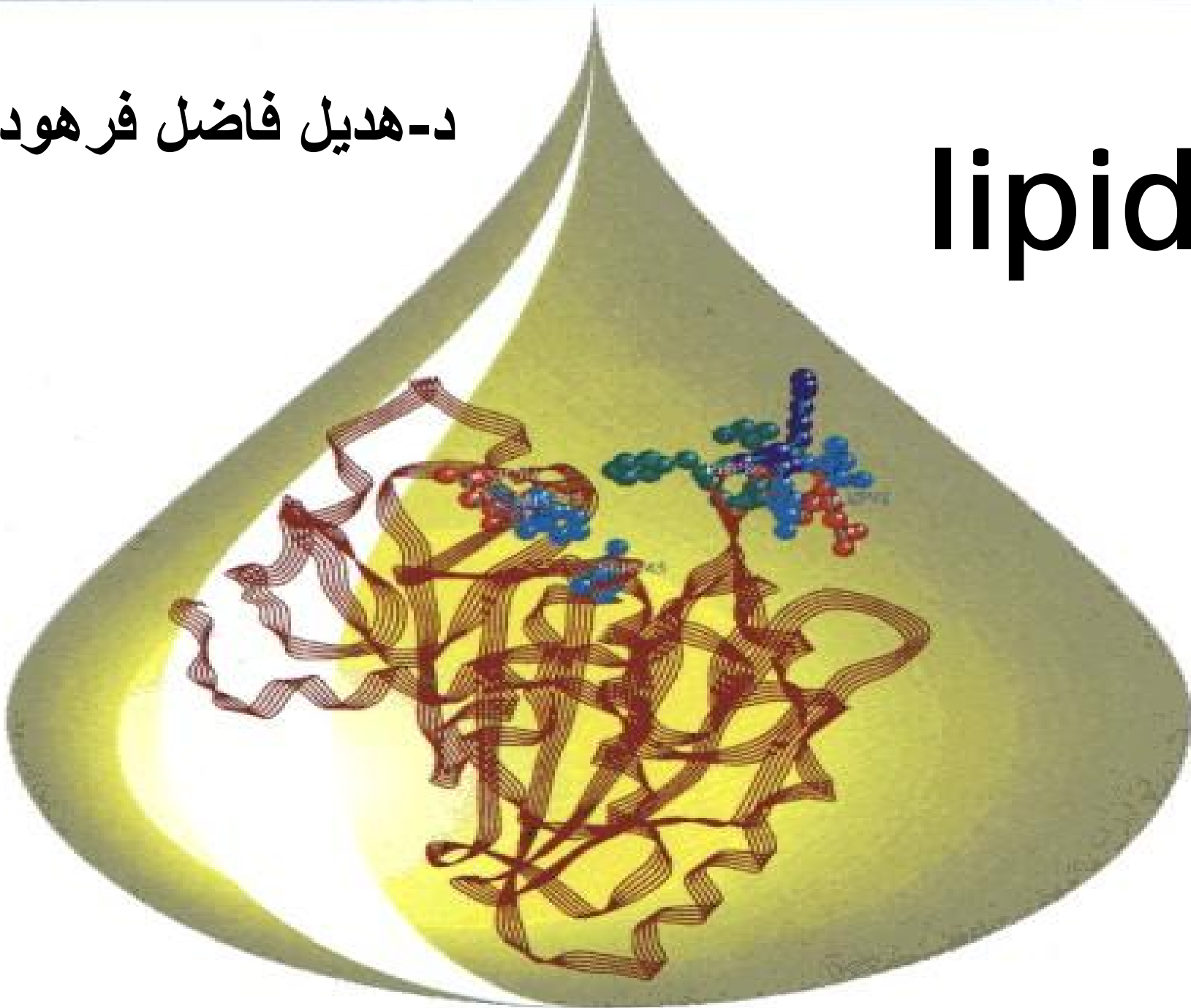
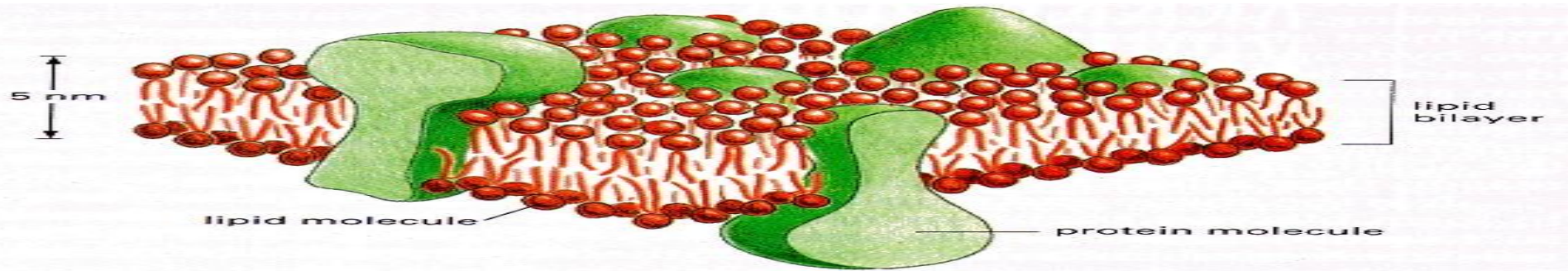


د-هدیل فاضل فرهود

lipid





Fat often referred to as lipid , –
lipid are described as substances that –
are poorly soluble or insoluble in water –
but are soluble in organic solvents. Over
90% of dietary fats are triglycerides,
other types of fat include cholesterol ,
phospholipids , sterols , and carotenoids.
Only 20-30% of total dietary energy is to
be provided by fats.

is usually divided into three major categories:

Fatty Acids: fats consist of fatty acids – that have carbon chains containing up to 22 carbon molecules in the chain.

Hydrogen is

added to fatty acids to make them more – solid

this process is known as hydrogenation –

A fatty acids with hydrogen atoms on every arm is said to be saturated.

Unsaturated fatty acids contain double carbon bonds where there is no hydrogen. If there is only one double bond the fatty acids is monounsaturated.

when more than one double bond is present the fatty acid will be polyunsaturated.



Saturated fatty acids (SFA):

SFA are obtained from animal – storage fats & their products e.g. meat fat, lard, milk, butter, cheese, & cream. Fats from plant origin tend to be unsaturated with the exception of coconut oil & palm oil.



Oils with high saturated Fat content : —

Coconut oil-----92% —

Butter-----60% —

Palm oil-----46% —

Margarine-----25% —



Monounsaturated fatty acids (MUFA):

are usually liquid. Olive oil & rapeseed – oil are the most concentrated dietary sources of MUFA.

MUFA are Present in many foods including meat fat & lard.



Polyunsaturated fatty acids (PUFA)

PUFA are derived from the essential fatty acid , linolenic acid (omega 3) & linolic acid (omega6) .

they are two useful oils that can not be produced in our body & have to be included in all diets because they are essential for health

Omega-3 fatty acids are found in oily fish like salmon and flaxseed and canola oils



Omega 3 are found in fish & fish oil – increase consumption of oily fish oil include improved cardiovascular risk factors.



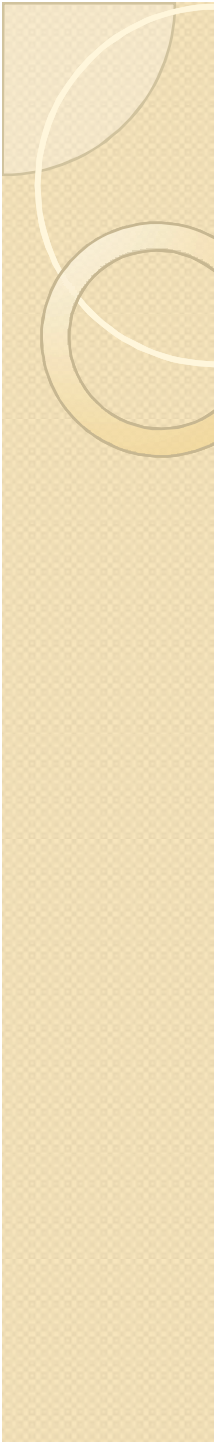
- Omega6 are found in vegetable oils . These essential fatty acids regulate complex processes , such as inflammation, platelet aggregation & oxidative damage in cells.



Trans fatty acids

are rare in naturally occurring fats.
It is found in lamb, beef, milk &
cheese





The most significant source of trans f.a — in the diet is by hydrogenation of PUFA to produce more solid form of vegetable oil for spreads , margarines & some food products.

It has adverse effects on lipoprotein — status by elevating LDL & depressing HDL.



Sterol

are relatively simple molecules; the most common sterol is the wax-like cholesterol, are only found in animal foods.

Phytosterols are found in plant foods. Cholesterol has structural role in lipoproteins and membranes and is a precursor for bile acids, steroid hormones, and vitamin D. reduction intake of saturated fat results in lower plasma cholesterol level.

Biological functions:

- fat is a carrier for The "fat-soluble" vitamins (A, D, E and K)
- Energy source
- fat provides essential fatty acids.
- increase palatability by improving taste perception & appearance of food
- cholesterol is converted to bile acids, which are important in digestion.



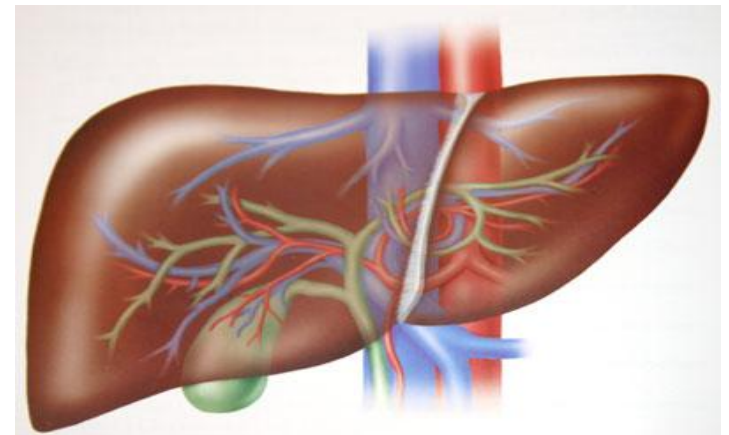
Metabolism

once we eat a fatty meal, the pancreatic enzyme (pancreatic lipase) breaks down all ingested fats to smaller molecules .

these are then absorbed in the small intestine & are repackaged together with protein to form large particles called chylomicrons, which circulate & are mainly removed in adipose tissue by lipoprotein lipase.

they bind to the membranes of – hepatocytes, adipocytes or muscle fibers, where they are either stored or oxidized for energy.

The liver acts as a major organ for – fatty acid treatment, processing chylomicron remnants and liposomes into the various lipoprotein forms .



there are five classes of lipoprotein which vary in density :

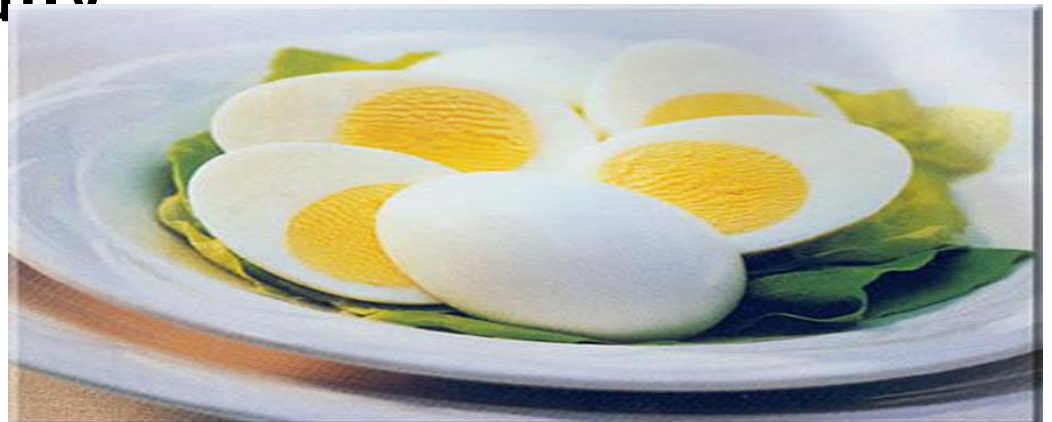
- Chylomicrons : carry diet-derived lipids to body cells
- Very low density lipoprotein (VLDL) : carry lipids synthesized by the liver to body cells
- low density lipoprotein (LDL) : transport cholesterol to peripheral tissue and liver
- High density lipoprotein (HDL) : carry cholesterol from the body back to the liver for breakdown and excretion.
- Lipoprotein (a) (LP(a)) :albumin transports free fatty acids from adipose tissue to peripheral tissue.



Dietary sources of cholesterol:

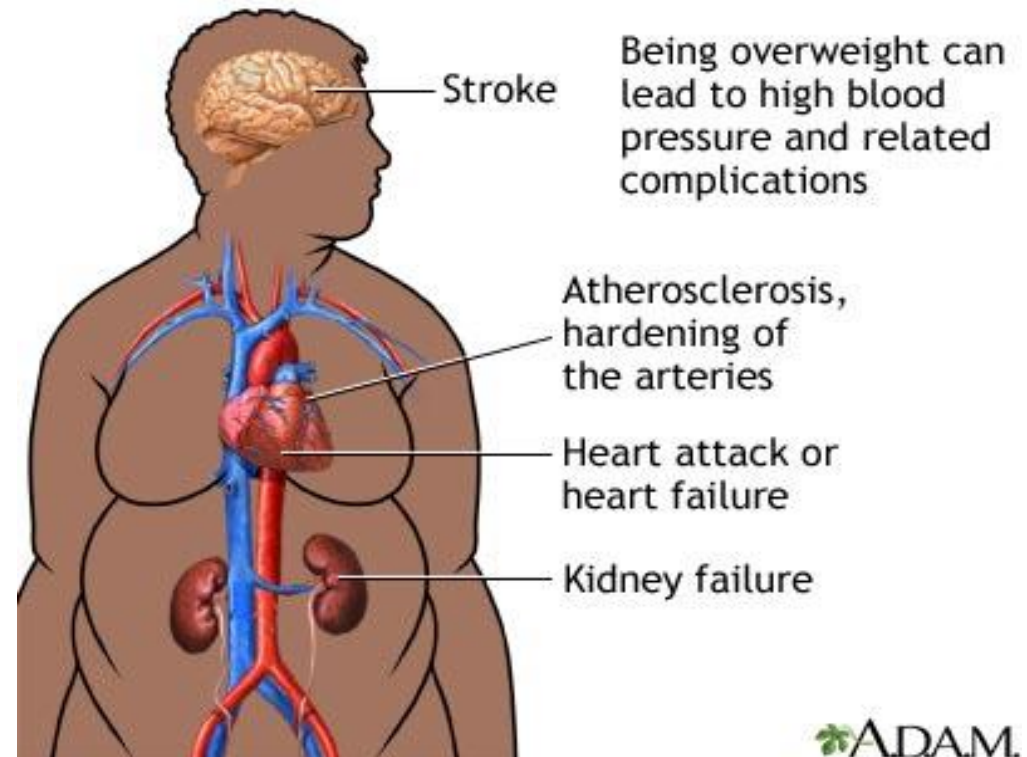
- 1- high: liver, eggs, mayonnaise, shellfish.
- 2- medium: meat fat, full fat milk, dairy products
- 3- low: skinless poultry, skimmed milk.
- 4- cholesterol free: fruits & vegetables, cereals, pasta, rice, egg white, sugar

Requirement: metabolic requirement —
of fat is 10-20 gm daily



Lipid and health

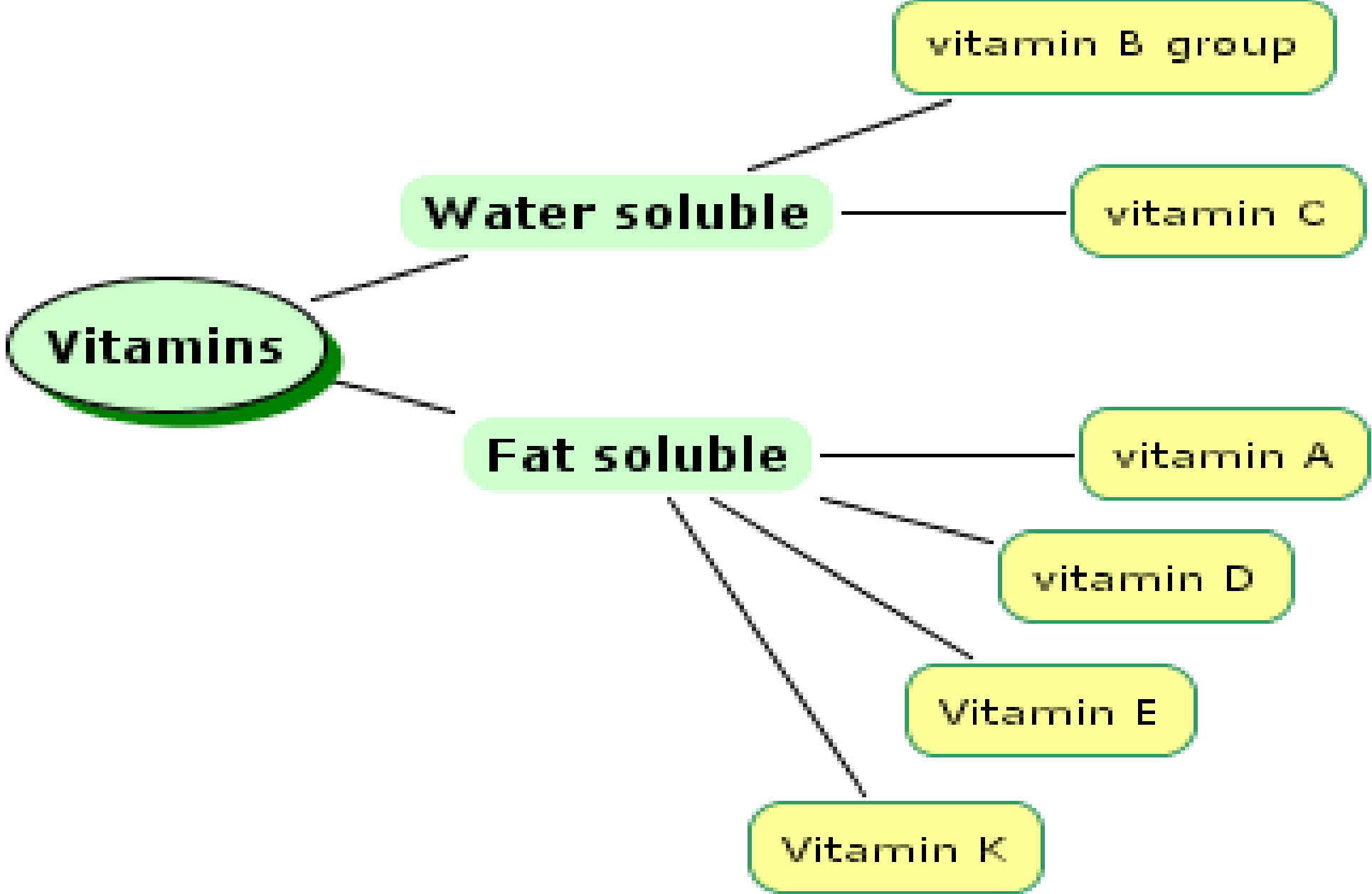
High fat intake contributes to increased – risk of obesity, atherosclerosis, IHD, diabetes, cancer (colorectal), gall bladder disease and arthritis, alzhiemer , CVA



Water and fat soluble vitamins

Vitamins are a number of – chemically unrelated families of organic substances that cannot be synthesized by humans but need to be ingested in the diet in small quantities to prevent disorders of metabolism.

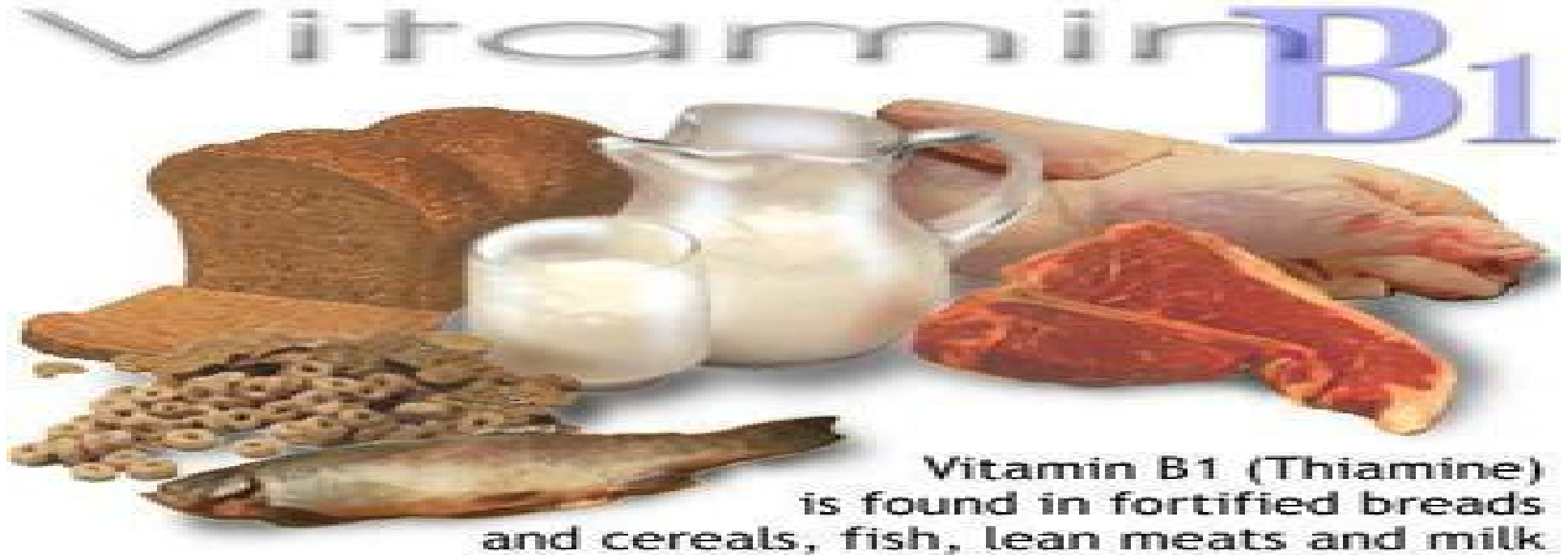




Water – soluble vitamins:

VITAMIN B1 (THIAMINE) –

Thiamine, known as vitamin B1, –
thiamine is soluble in water and
partly soluble in alcohol.



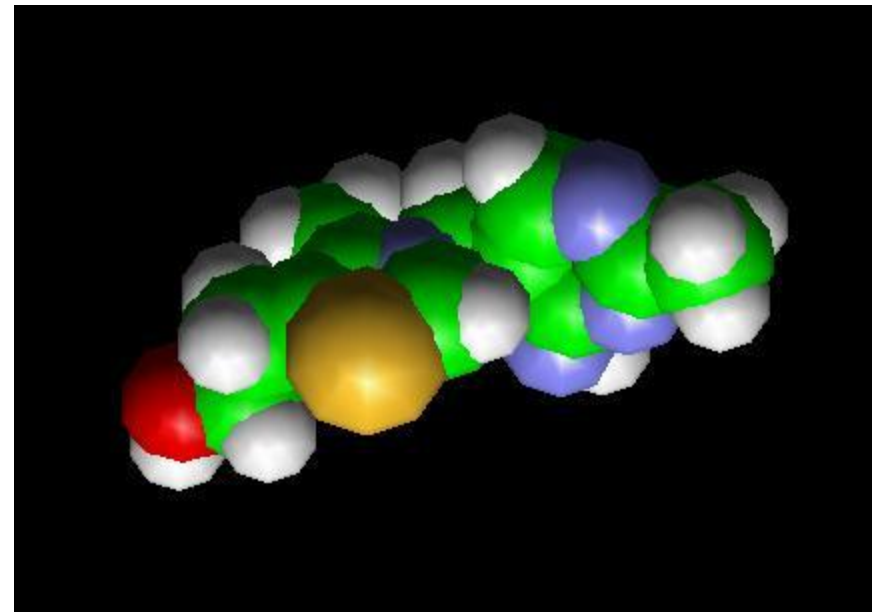
**Vitamin B1 (Thiamine)
is found in fortified breads
and cereals, fish, lean meats and milk**

Metabolism — Thiamine is absorbed —
in the small intestine .The maximal
absorption of thiamine is in the
jejunum and ileum .Thiamine
passes through the mucosal cells to
enter the blood stream, Bound to
albumin, it is carried by
the portal circulation —
to the liver. . —



The highest concentrations are found in – the skeletal muscles, the liver, the heart, the kidneys, and the brain.

Thiamine's biologic half-life is – approximately 10 to 20 days; due to limited tissue storage, continuous supplementation is required .Thiamine and all of its metabolites are excreted in the urine.



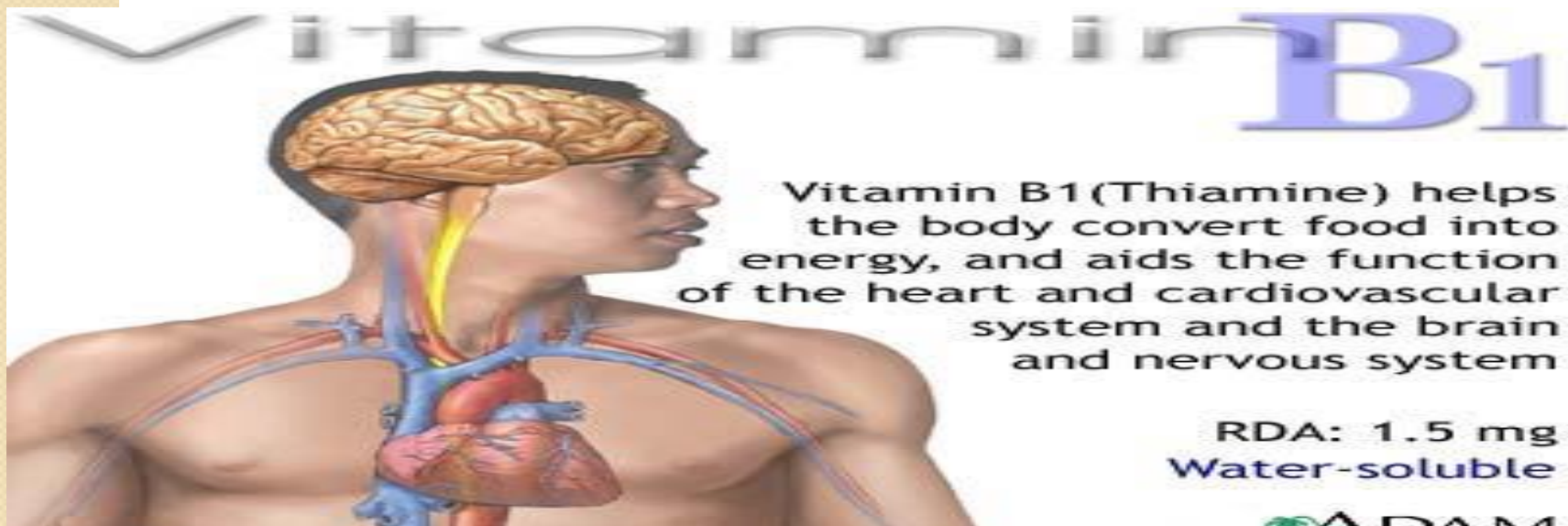
Function :

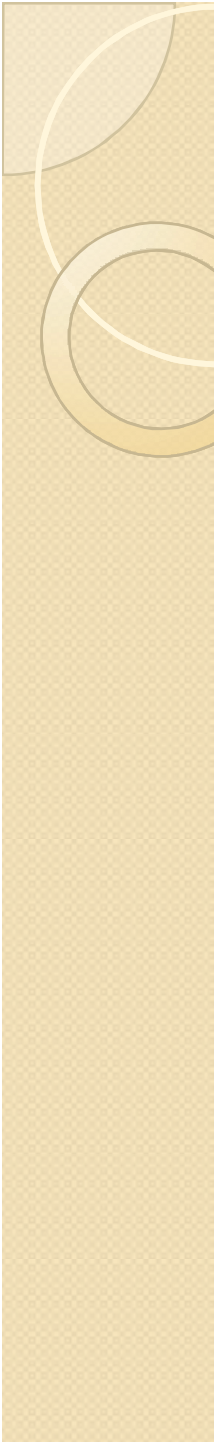
It form part of the coenzyme – thiamine pyrophosphate (TPP) which is involved in major decarboxilation steps .

initiation of nerve impulse – propagation that is independent of its coenzyme functions . also it needed for the metabolism of fat , CHO, and alcohol .

Deficiency —

Thiamine deficiency has been — associated with three disorders:
Beriberi (infantile and adult)
Wernicke-Korsakoff syndrome &
Leigh's syndrome



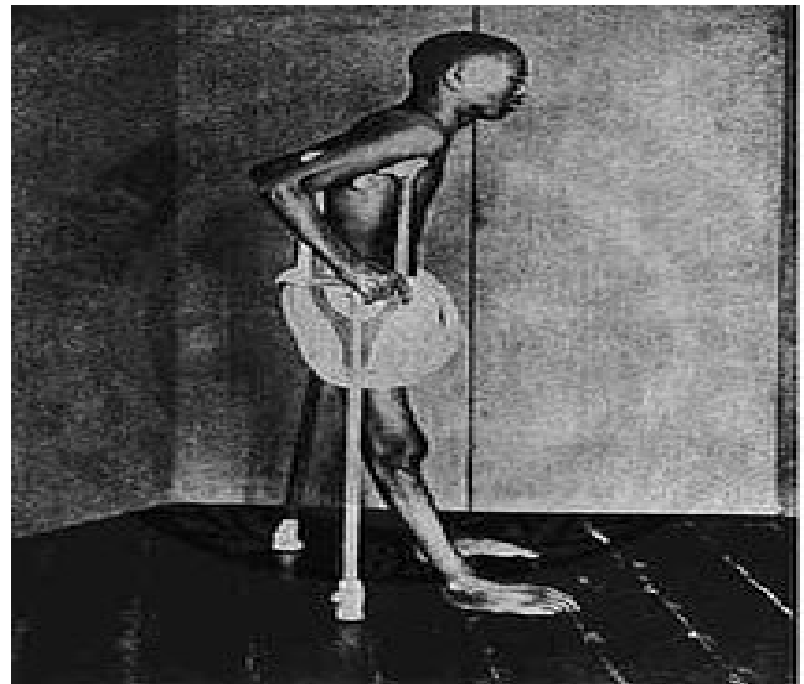


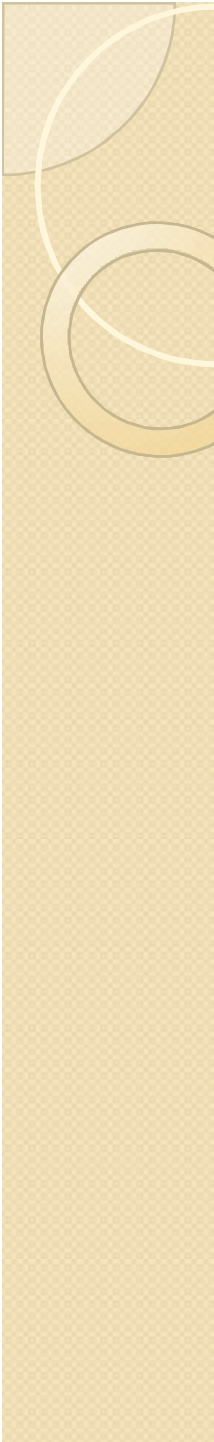
Infantile beriberi — becomes — clinically apparent between the ages of two and three months.

The clinical features are variable and — may include a fulminant cardiac syndrome with cardiomegaly, tachycardia, cyanosis, dyspnea.



Adult beriberi — Adult beriberi is —
described as dry or wet. Dry
beriberi is the development of a
symmetrical peripheral neuropathy
and vomiting





**Wet beriberi includes a neuropathy, —
as well as signs of cardiac
involvement with cardiomegaly,
cardiomyopathy, congestive heart
failure, peripheral edema, and
tachycardia**

Wernicke-Korsakoff syndrome — —
Wernicke's disease is a triad of
nystagmus, ophthalmoplegia, and ataxia,
along with confusion.

Korsakoff's psychosis is —
impaired short-term memory. —
This combination is almost exclusively
described in chronic alcoholics
with thiamine deficiency —

