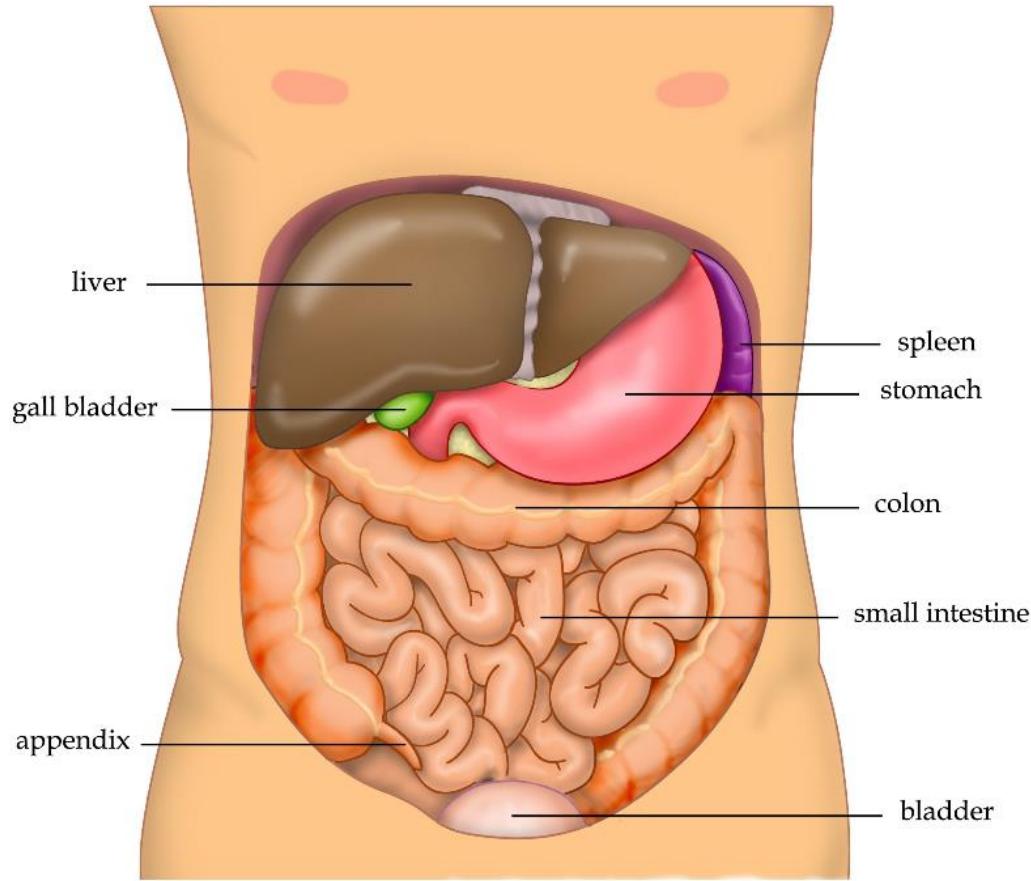


# LIVER/GALLBLADER

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# The LIVER

- Largest organ AND largest gland in body
- Filters 1.4 L of blood/min
- 500 VITAL FUNCTIONS
- Key functions:
  - Fat / carb metabolism
  - Protein synthesis
  - Glucose regulation
  - Forms/secretes bile
  - Eliminates biochemicals made by body (ex. Bilirubin, ammonia)
  - Eliminates TOXINS



# The LIVER cont.

The Liver is an important barrier between us and the OUTSIDE world!

Key, frontline immune tissue:

- detects pathogens entering the body via the gut
- captures and clears bacteria, viruses, macromolecules
- default immune status is anti-inflammatory OR immunotolerant
  - this balancing act is ESSENTIAL to its function:
    - excess inflammation in the absence of infection leads to
      - sterile liver injury, tissue damage, and remodeling
    - insufficient immunity allows for chronic infection, cancer
- albumin and globulin assembled in the liver
- globulin is the substrate upon which B cells create ANTIBODIES

TOXINS  $\leftrightarrow$  CHRONIC IMMUNE CONDITIONS

# The functions of the liver and its implications

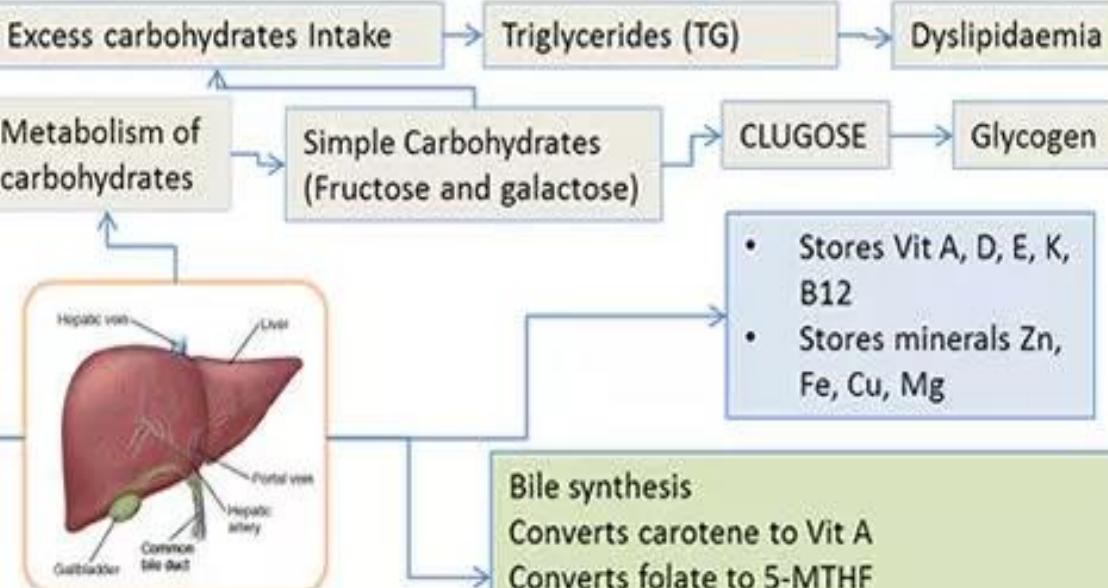
Metabolism and detoxification of:

- Alcohol
- Drugs
- Steroidal hormones
- Non steroid hormones
- Insulin
- Growth hormones

Production and regulation of:

- Triglycerides
- Phospholipids
- Lipoproteins
- Cholesterol
- Acetyl-CoA

- Non-essential amino acids
- Functional proteins(fibrinogen prothrombin) for clotting
- Transferrin for transport of iron
- Lipoprotein for transport of cholesterol
- Globulins for immune function
- Albumin for oncotic pressure



Protein metabolism

Disturbed protein metabolism

# HORMONES and the LIVER

The liver eliminates spent hormones and maintains hormone levels.

The liver regulates the balance of sex hormones, thyroid hormones, cortisone and other adrenal hormones. It transforms or removes any excess from the body. If the liver cannot do this properly, there is the risk of emotional imbalances.

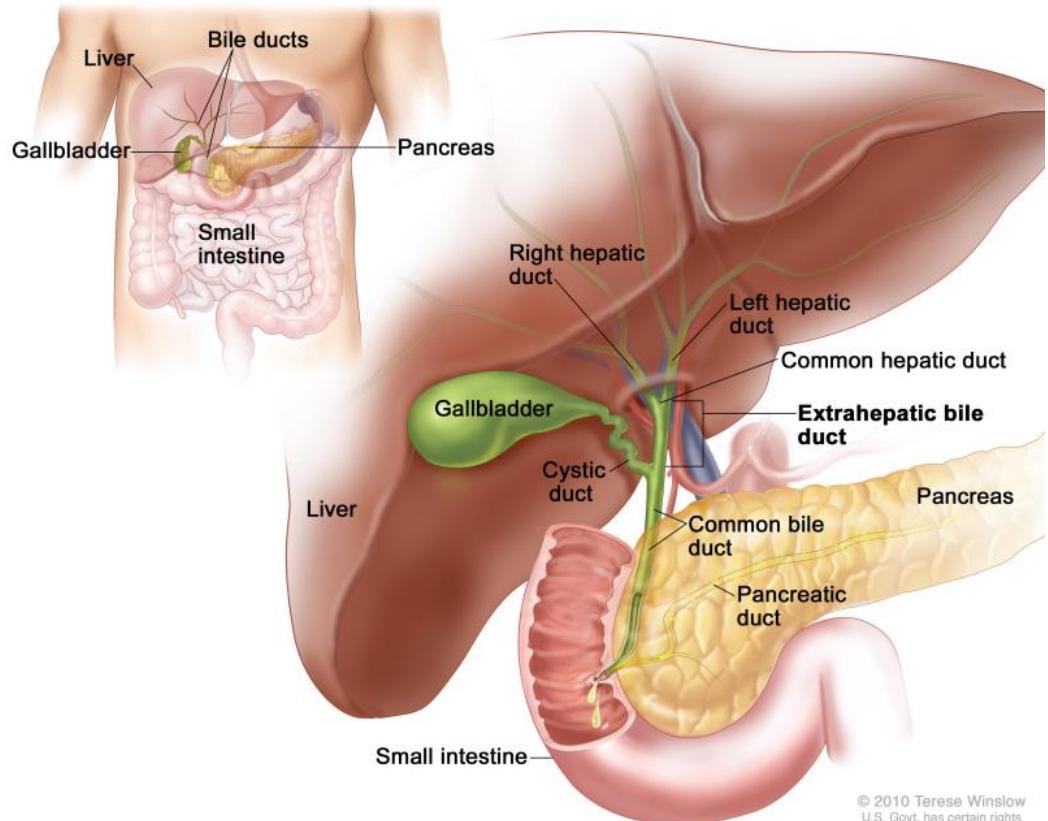
# Biliary System

Main function:

- To drain waste products from the liver into the duodenum
- To help in digestion with the controlled release of bile

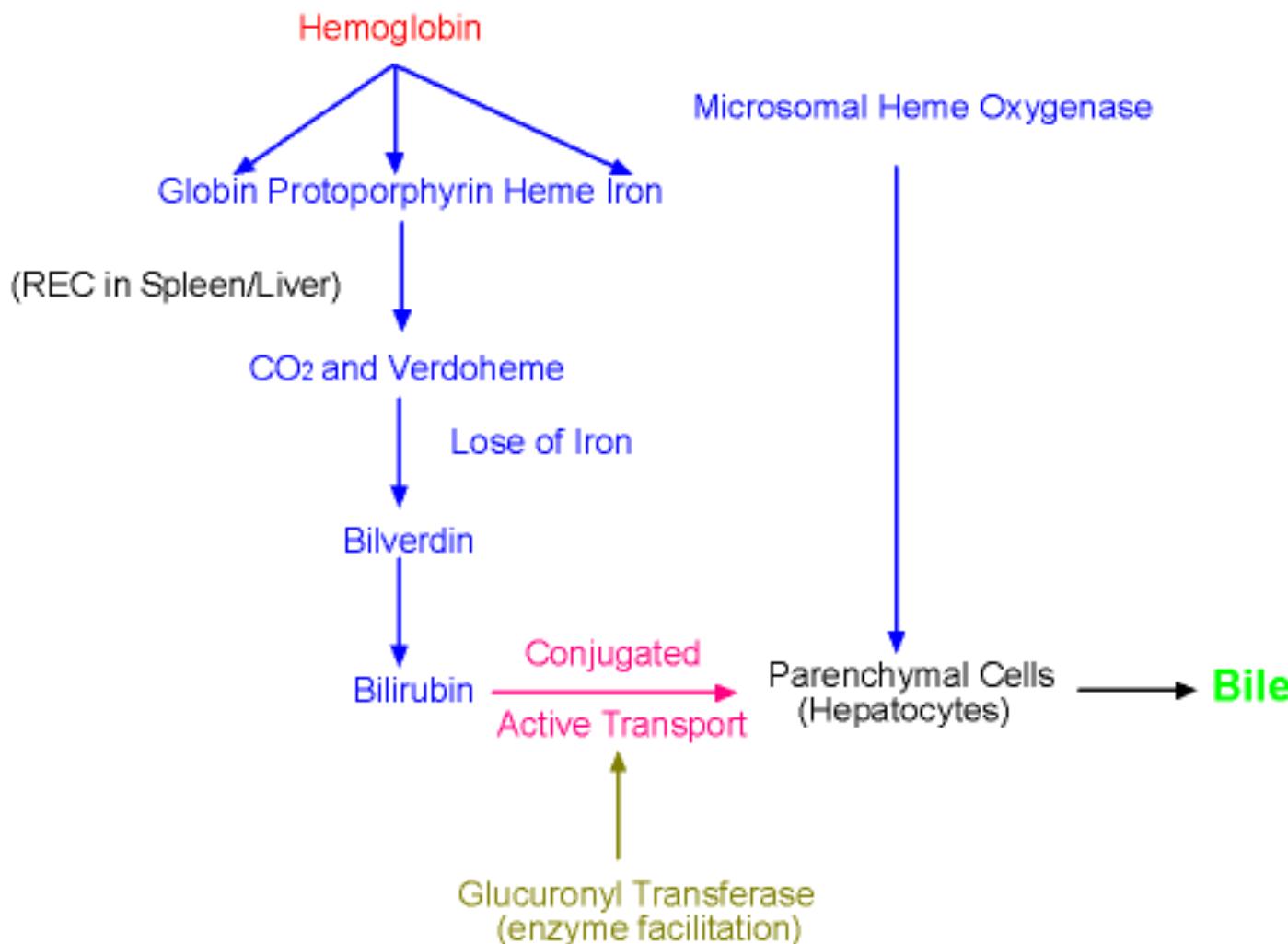
Bile is the greenish-yellow fluid (consisting of waste products, cholesterol, and bile salts) that is secreted by the liver cells to perform 2 primary functions:

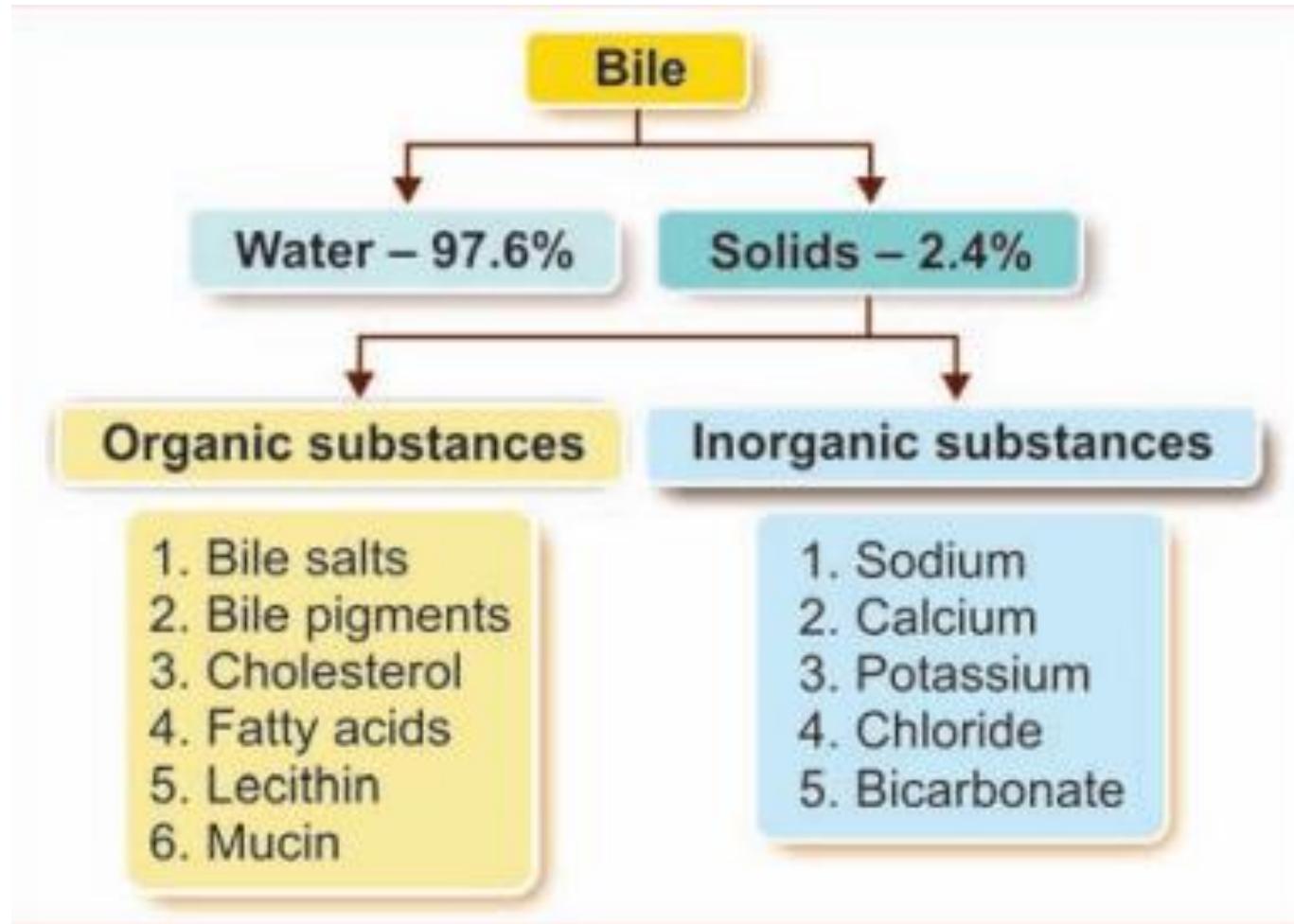
- To carry away waste
- To break down fats during digestion



Bile salt is the actual component that helps break down and absorb fats. Bile is necessary to emulsify fats making them accessible to enzymes, which ultimately allows for absorption across the GI barrier.

## Bile Production





Cholesterol conversion to bile salts improves viscosity – requires cofactors: vitamin C, taurine, betaine, choline: Beta TCP

# The transportation of bile follows this sequence:

- 1.The Liver secretes 700-1200 mL of bile daily. When the liver cells secrete bile, it is collected by a system of ducts that flow from the liver through the right and left hepatic ducts.
- 2.These ducts ultimately drain into the common hepatic duct.
- 3.The common hepatic duct then joins with the cystic duct from the gallbladder to form the common bile duct. This runs from the liver to the duodenum (the first section of the small intestine).
- 4.However, not all bile runs directly into the duodenum. About 50% of the bile produced by the liver is first stored in the gallbladder. This is a pear-shaped organ located directly below the liver. The gallbladder concentrates bile by reabsorbing water, sodium, chloride and other electrolytes. It can store 12 hours worth of bile secretions, as it continually concentrates bile.
- 5.Then, when food is eaten, the gallbladder contracts and releases stored bile into the duodenum to help break down the fats.

# Symptoms of Liver and Bile Congestion

- Low-fat diets
  - Bad fats in diet
  - Any liver or bowel condition
  - Free radical pathology
  - Sugar control issues
  - High or low cholesterol
  - Toxicity exposure
  - Heavy metals
  - History of hepatitis
  
  - Pain in the liver area (front or back / right shoulder or scapula / right lower neck)
  - Bloated, inability to digest fatty foods
  - Knee problems
- Nausea
  - Motion sickness
  - Morning sickness
  - Sea sickness
  - Air sickness
  - Problems digesting fat
  - Upper digestive problems
  - Constipation
  - Light-colored stools

# Liver Function Lab tests

- ▶ Increased ALT and AST
- ▶ Decreased ALT or AST below 10
- ▶ • Low albumin
- ▶ • Increased Bilirubin
- ▶ • Decreased BUN
- ▶ • Decreased cholesterol and triglycerides
- ▶ • Increased Ferritin and serum iron
- ▶ • Increased LDH and Alk Phos
- ▶ • Decreased Uric Acid
- ▶ • Decreased serum protein

# Liver Function

A moderate rise in SGPT/ALT and a  
Decreased albumin can alert us to a more  
Functional problem within the liver:

- ▶ – Developing liver dysfunction low albumin
- ▶ – **Liver congestion fatty liver**
- ▶ – Detoxification/Oxidative stress issues
- ▶ – Conjugation problems
- ▶ – Liver cell damage

# Liver Function Index- Fatty Liver

25 % of people may have Non Alcoholic Liver Disease (NAFLD)

20% could be children

Silent for 5-10 years

Other Liver toxicants accelerate Liver disease if NAFLD exists: alcohol, caffeine, trans fats, pain relievers like acetaminophen, pesticides, herbicides, heavy metals

# Liver Function Index- Fatty Liver

NAFLD is the accumulation of fat in hepatocytes, or liver cells, in excessive amounts. These fats are typically triglycerides, which the body naturally stores and creates from calories that it doesn't need right away. Normally these fats are burned off for energy, but if the body is overwhelmed with calories and a lack of exercise, then the triglycerides are simply never released. They instead accumulate in the liver and cause NAFLD, which can lead to inflammation, scarring, liver dysfunction and even liver cancer.”

Scientific America Feb 15, 2105

# Liver Function Index- Fatty Liver

Glucose, can be used by virtually every cell in your body,

Fructose can *only* be metabolized by your liver, because your liver is the only organ that has the transporter for it.

Fructose ends up taxing and damaging your liver in the same way alcohol and other toxins do.

# Liver Function Index- Fatty Liver

Dr. Lustig, Professor of Pediatrics in the Division of Endocrinology at the University of California

"fructose is a "chronic, dose-dependent liver toxin." And just like alcohol, fructose is metabolized directly into *fat* – not cellular energy, like glucose"

# Liver Function Index- Fatty Liver

The following are functional signs indicate the physiology of the liver is compromised and is in the process of storing fat in the liver.

- 1) **Elevated Uric Acid** over 5.5 indicate and excess of fructose.....  $>5.5$  increased risk for diabetes, obesity, hypertension, and kidney disease
  
- 2) **Elevated Triglycerides** over 50% of the cholesterol, so if your cholesterol is 220 your triglycerides should not exceed 110.

# Liver Function Index- Fatty Liver

3) **Triglyceride / HDL Ratio** This ratio should ideally be below 2. So the farther above 2.0 the ratio is the greater the chance for fatty liver and increased risk of cardiovascular disease.

4.) **Reduced Albumin** below 4.0. The liver makes Albumin. Low levels of albumin therefore suggest an underperforming liver..

# Liver Function Index- Fatty Liver

- 5) Decreased SGPT levels. Levels below 10 suggest a need for B6 as in B6 Phosphate 50 mg tid
- 6) Increased SGPT over 20 for women or 30 for men. Many of the Medical Doctors who consider themselves functional doctors have adopted a tighter upper range. Dr. Sarah Gottfried shocked me when she said her levels to determine NAFLD are 20 for women and 30 for men.
- 7) Elevated total Cholesterol over 220.

# Liver Function Index- Fatty Liver –Diet

- 1) Cut out all high fructose corn syrup from your diet.
- 2) Reduce or eliminate starch. Get rid of white, processed flour.
- 3) Increase fruit, vegetables, nuts, and seeds.
- 4) Increase healthy oils like olive oil, macadamia nut oil, avocados, coconut butter, and fish oil.
- 5) Improve your metabolism through exercise
- 6) Eat detoxifying liver-repairing foods. Focus on the broccoli family Kale, collards, cabbage, Brussels sprouts, broccoli, arugula, daikon radish, and sulfur foods like garlic and onions.
- 7) Increase fermented foods

# Liver Function Index- Fatty Liver

**Inositol 3 gram**

**Beta TCP 3 tid or Beta Plus 2–3 tid cycle after 2 bottles**

**Phosphatidylcholine 3–6 capsules tid**

**Optimal EFA's 2 tid**

**Cyto-Zyme LV 2 tablets tid**

**Betaine Plus HP 2 in the middle of each meal**

**5-MTHF forte ½ tablet bid**

**Chlorella 2 tid to rid the body of chemicals ie glyphosate**

Non alcoholic Fatty Liver disease is the fastest growing cause of liver disease. Reduce Fructose and all other refined carbohydrates.

### **3. Liver Function Index- Cirrhosis of the Liver -extreme cases**

Nutri Clear and Whey Protein Isolate (if allergic to whey use pea protein) one serving of each mixed together bid

MCS-2 2 capsules tid

GSH Plus 2 capsules tid

Beta TCP 3 tid

Phosphatidylcholine 3-6 capsules tid

Optimal EFA's 2 tid

L-Glutamine 3 grams daily

Cyto-Zyme LV 2 tablets tid

Betaine Plus HP 2 in the middle of each meal

21<sup>st</sup> Century Homeopathics #1 Detoxification 1 capful bid

21<sup>st</sup> Century Homeopathics # 2 Lymphatic Drainage 1 bid

5-MTHF forte ½ bid

Cholecystokinin (CCK) is the hormone that controls the release of digestive enzymes from the pancreas as well as bile from the gallbladder. It also acts as a hunger suppressant.

### Cholecystectomy – Gallbladder removal

- causes ongoing digestion and fat metabolizing issues
- impairs detoxification and the release of toxins
- without a functioning gallbladder, bile may be expelled into intestines without control
- when bile is released without the presence of food, it has a corrosive effect on the intestines

### Beta Plus – supplemental bile (1–4 tablets per meal) needed FOR LIFE!

- Higher dose for heavy, fatty meals; smaller dose for less fat

When patient still has gallbladder but liver is not producing enough bile, use Beta Plus on a ROTATING BASIS, so as to not completely stop production.

## Beta Plus

Beta = Betaine from beet leaf  
concentrate with choline and synergists  
Plus = ox bile extract with pancrelipase

Use for biliary insufficiency

- light-colored, greasy, floating stools
- Constipation
- Fatty food intolerance
- All without Gallbladder

## Beta TCP

TCP = Taurine, Vitamin C, Pancrelipase

Use for biliary stasis

- fatty or fried food intolerance
- gas
- bloating
- constipation
- history of gallbladder attacks



# Gallbladder Function

## Biliary insufficiency-

- Beta TCP 3 tablets tid
  - Betaine Plus HP 1 capsule in the middle of the meal... Increase 1 per meal every 3 days until desired effect is reached
  - Phosphatidylcholine 3 capsules tid
  - Taurine 1 tid
  - Oorganik 15 three tablets tid
- 
- If Gall bladder has been removed use Beta Plus instead of Beta TCP

# Gallbladder Function

- **Biliary stasis–**
  - Beta TCP 3 tablets tid
  - **Betaine Plus HP** 1 capsule in the middle of the meal... Increase 1 per meal every 3 days until desired effect is reached
  - **Phosphatidylcholine** 3 capsules tid
- If Gall bladder has been removed use Beta Plus instead of Beta TCP

# Gallbladder Function

- **Biliary obstruction** Intra-hepatic or Extra-hepatic

**Super Phosphozyme Liquid** 25 drops tid

**B6 Phosphate** 4 tablets tid

**Mg-Zyme** 4 capsules at bedtime and increase one tablet by one capsule each evening to bowel tolerance and reduce

**Beta-TCP** 5 tablets tid

**Iodizyme -HP** 1 tablet a day

**Bio C plus 1000** 3 tablets a day

Once asymptomatic remain on ½ dose for 60 days

# Gallbladder Function

## Overt Gallstones

**Super Phosphozyme Liquid** 25 drops tid

**B6 Phosphate** 4 tablets tid

**Mg-Zyme** 6 capsules at bedtime and increase one tablet by one capsule each evening to bowel tolerance and reduce

**Beta-TCP** 5 tablets tid

**Iodizyme -HP** 1 tablet a day

**Bio C plus 1000** 3 tablets a day

**Optimal EFA's** 2 capsules tid

**Phosphatidylcholine** 3 capsules tid

Although this program for gallstones is extensive it has in many cases eliminated the requirement for surgery

# Synergistic Considerations

PRODUCT	DOSAGE	DESCRIPTION
Bio-GGG-B	1–3 per meals	B vitamins which aid in fat metabolism, intestinal healing
Phosphatidylcholine	1 per meal	Activated form of choline for bile production
Livotrit Plus	1–2 per meal	Vega, Ayurvedic, liver cleansing formula with milk thistle
MCS-2	2–4 bid or tid	Metabolic clearing support – promotes Phase II detox, reduces biliary mineralization and stones
Cytozyme-LV	1–3 per meal	Neonatal bovine liver
Oorganik-15	2–4 bid or more	Methyl donors/acceptors for liver support, bile production, detoxification, and heart/lung oxygen utilization

# DETOXIFICATION

The collection and elimination of toxins and metabolic wastes

Water-soluble eliminated through urine, sweat, breath	VS	Fat-soluble more difficult to eliminate Liver – Phase I and II pathways
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## Fat-soluble elimination

Phase I involves cytochrome P450 enzymes, which use oxygen to combust and alter the chemical structure of the toxin. After Phase I some toxins are eliminated directly while others move on to Phase II. Sometimes products from Phase I can end up being more toxic than before Phase I processing.

Phase I chemical reactions generate excessive amounts of free radicals – radical oxygen species that may degrade anything they come into contact with. Antioxidants are needed to supply the oxidant-quenching electrons in a chemical form.

# Phase I Support

PRODUCT	DOSAGE	DESCRIPTION
BioProtect	2 bid	Broad-spectrum formula for prevention of free radical damage
ProMulti-Plus	2 tid	High-potency phytonutrient multivitamin
Dismuzyme Plus	1 tsp tid	SOD and catalase directly quench superoxide free radicals
ADHS	2 in AM, 2 at lunch	Herbal adaptogenic formula for adrenal insufficiency and Phase I detox support

Phase II is compromised of several conjugation pathways each adding a different amino acid (ex. Glutathione, glycine) or metabolite to change the nature of the toxin. Additional processing includes methylation, sulfation, acetylation, and glucuronidation. Then, the toxin goes through the biliary route.

The toxin is dumped to the gallbladder and, in some cases, may still be reactive and toxic. The gallbladder collects and concentrates the waste along with bile components. When all is well, everything is emptied into the duodenum, travels down the digestive tract and gets eliminated through the fecal route.

In cases of leaky gut, constipation, etc, toxins get reabsorbed and go back to the liver for another round of liver processing. When problems occur, gallbladder contents stagnate, and it becomes inflamed, congested and forms stones.

# Phase II Support:

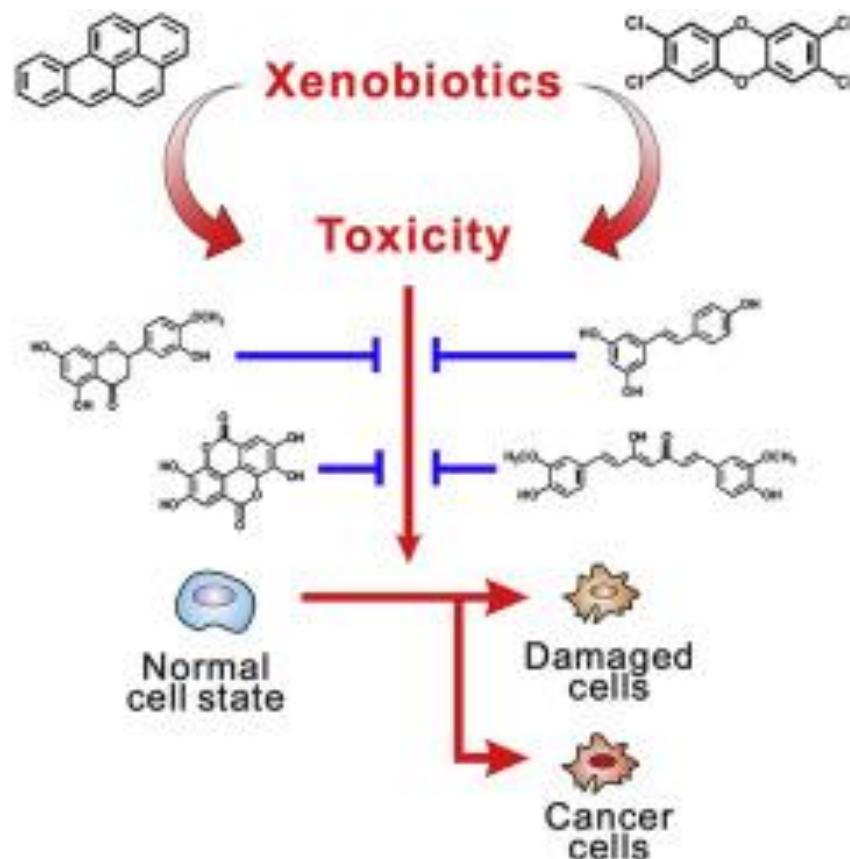
- MCS-2, 1-3 with meals, metabolic clearing support
- Beta-TCP, 6-12 qd, betaine for promotion of bile production
- Oorganik-15, 2-4 tid, methyl donors to counter free radical and promote phase II detox
- MSM, 3-6 qd, sulfur promotes Phase II conjugation
- Mo-Zyme Forte, 1-2 qd, where fragrance and environmental sensitivities noted, transports sulfur
- Ca D-Glucarate, 1-3 qd, promotes Phase II
- Amino Sport, 1-3 qd, amino acids to support phase II
- Methylfolate Plus, 1-3 qd, active folic acid in methylation rxns
- NitroGreens, 1 scoop bid, cruciferous veg promote detox
- NAC, 1 bid, promotes glutathione production
- GSH Plus, 1 tid, active glutathione
- Livotrit Plus, 3-9 qd, primary liver support
- Phosphatidylcholine, 1-3 qd, vital in bile formation, production and thinning; also helps to contain released toxins
- Colon Plus, 2-6 qd, fiber and herbs for bowel health and binding toxins for removal

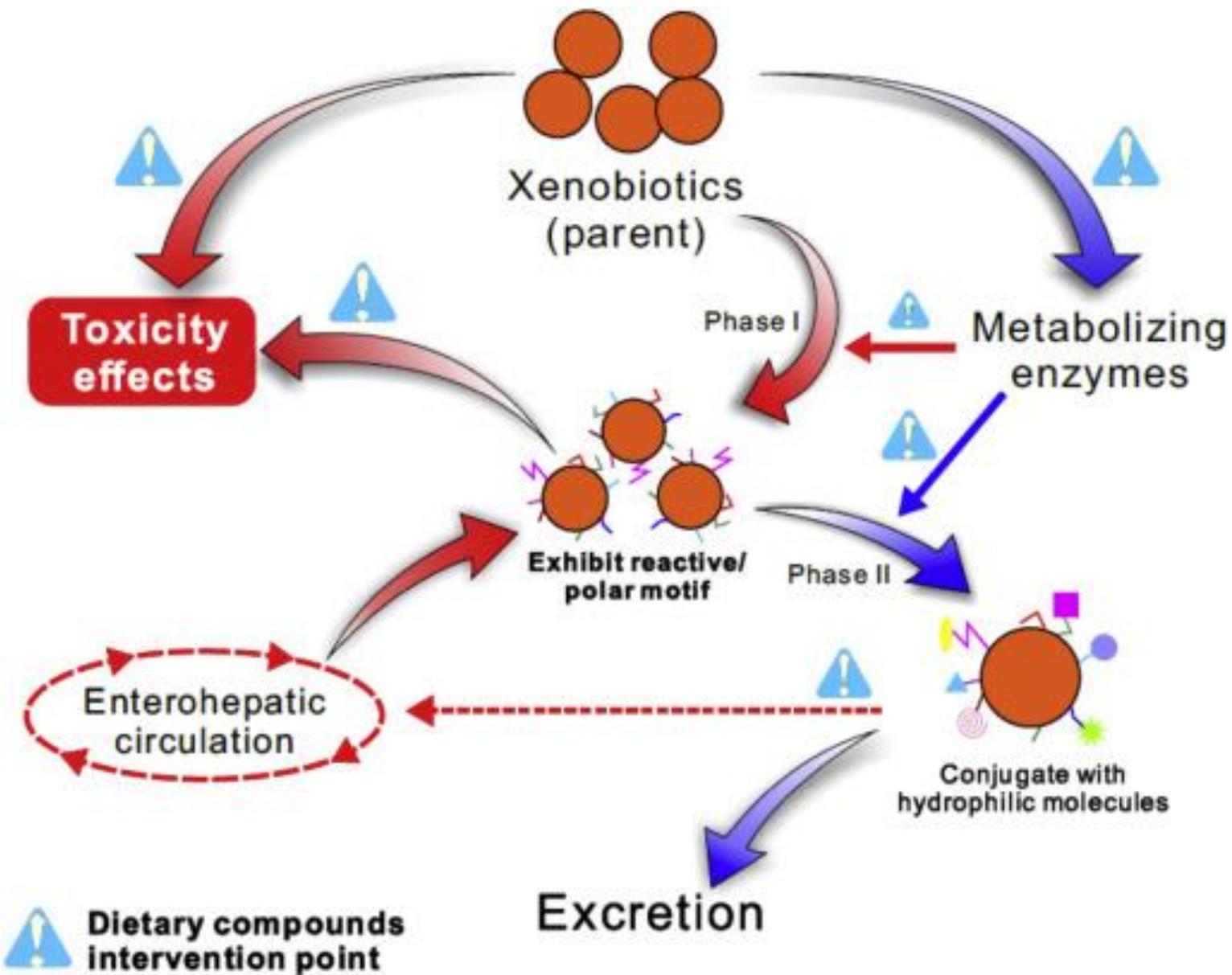
# Xenobiotics

Toxins, usually man-made, that interfere with natural processes due to their similarity and can mimic a life form.

Xeno = foreign + bio = life

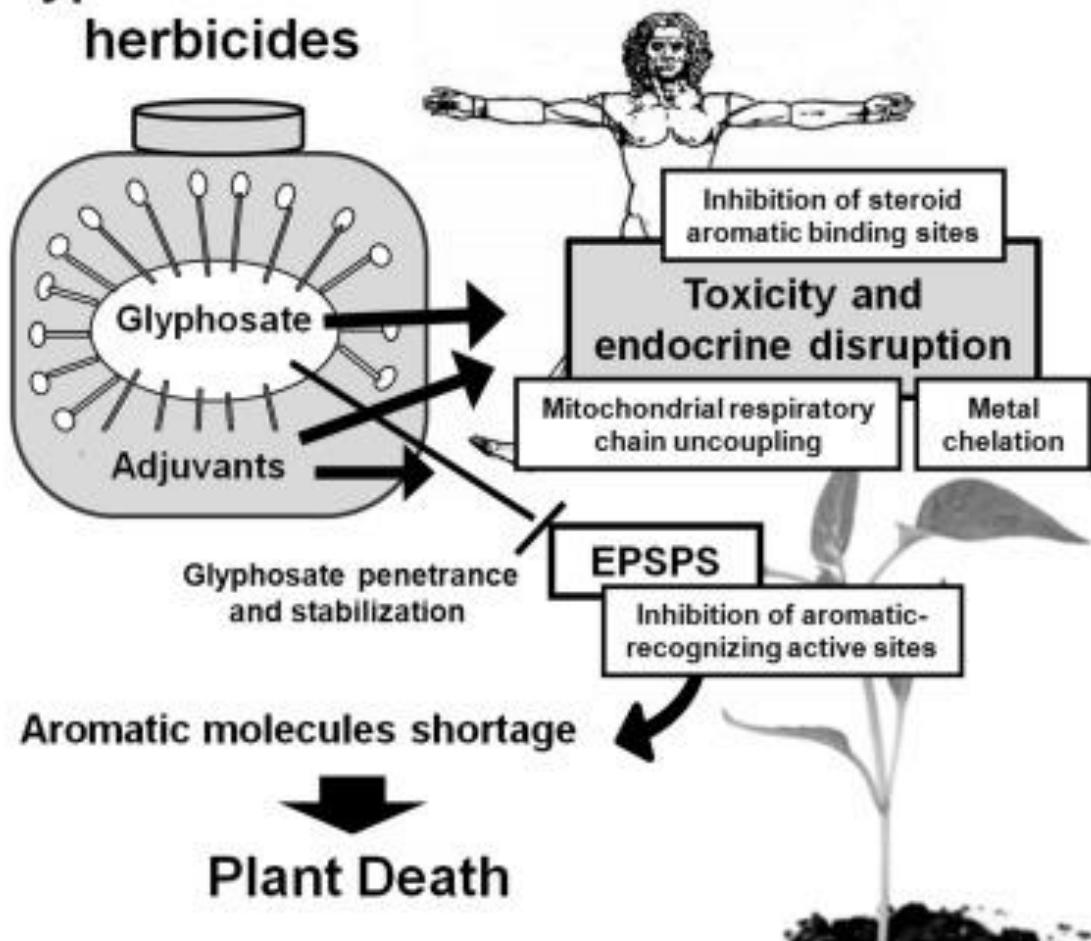
- Pesticides
- Dioxins
- PCBs
- Many pharmaceuticals
- pollutants





Glyphosate preferentially targets beneficial bacteria and causes disruption of P450 enzymes which can lead to the disruption of the biosynthesis of aromatic amino acids by gut bacteria, as well as impairment in serum sulfate transport.

### Glyphosate-based herbicides



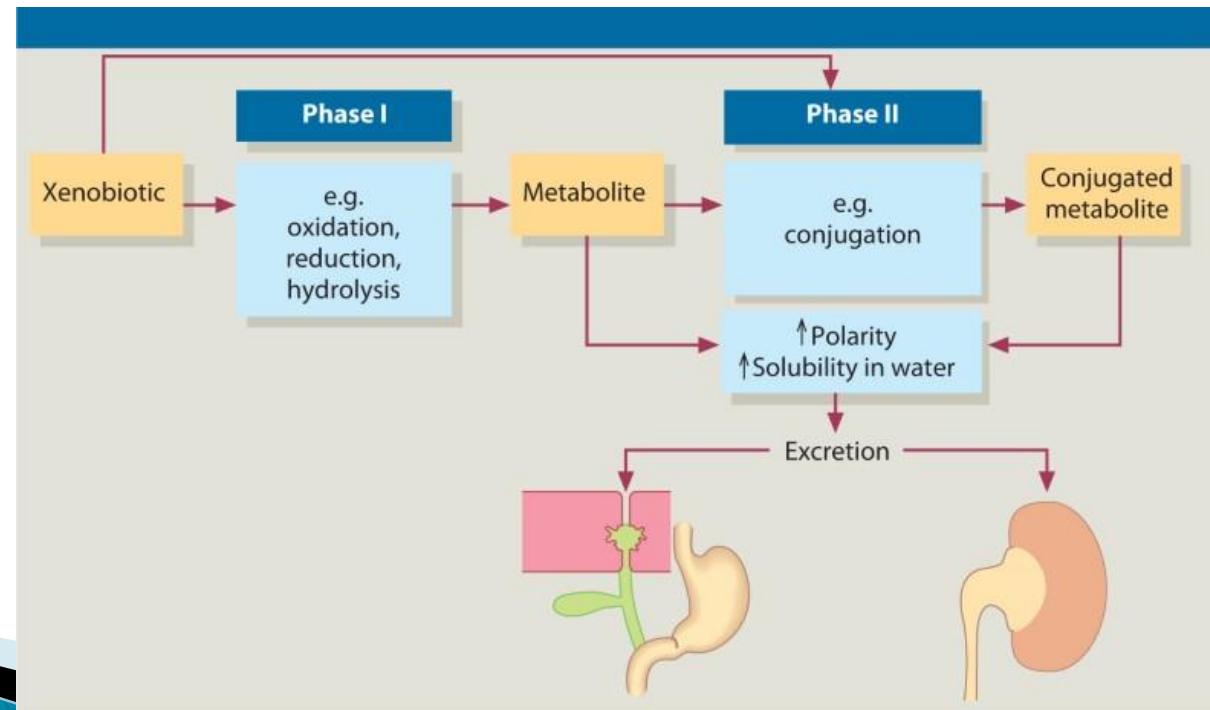
Exogenous compounds (xenobiotics) must be metabolized before they can be excreted. The biochemical transformation of xenobiotics, such as alcohol, nicotine and drugs is a prime activity of the LIVER. In addition to the liver, biotransformation processes occur in plasma, in the lungs, in the gastrointestinal tract and in the skin.

Because of their poor solubility in water, lipophilic substances are reabsorbed in the renal tubules and are excreted only slowly by the kidneys. The elimination velocity of lipophilic compounds depends on their transformation to water soluble substances.

Hepatic biotransformation increases the polarity of xenobiotics, thereby increasing their solubility in water and enhancing their biliary and renal excretion.

Process in 2 phases:  
Phase I and

Phase II reactions



But...

When the liver is overloaded, it cannot detoxify. Poor nutrition, increased stress, and liver-loaders such as alcohol and caffeine compromise liver function.

Conversely, poor nutrition choices and increased stress create nutrient deficiencies. Without the proper nutrients, the liver cannot detoxify toxins from the body.

Most of the time, Phase I is efficient but Phase II is sluggish creating half-detoxified molecules. These molecules are often hormones, which contributes to hormonal imbalances.

# Toxin Deposits

Toxins, which are not eliminated, accumulate within the body. Fat-soluble toxins find their way into fat cells for long-term storage, which can make weight loss difficult.

During weight loss, these stored toxins may be released as fat cells shrink, which can create unpleasant symptoms. HOWEVER, some of these toxins that cannot be broken down, simply get redistributed into other tissues in the body and in extracellular space. The toxins that settle outside the cell can interfere with cellular communication leading to a loss of tissue function.

Most people see an increase in their toxic burden by 3–5% per year, because many persistent organic pollutants (POPs) do not break down easily. These POPs are found in our food and environment. As toxins accumulate, a tipping point arises when the body cannot compensate any further resulting in illness.

The body begins to degrade and lose function. Local inflammation occurs, the immune system weakens, and body parts begin to lose function. We feel stiff, sore, and tired. Opportunistic microbes are drawn to these areas of toxic deposit creating microbial overgrowth.

# Exotoxins and Endotoxins

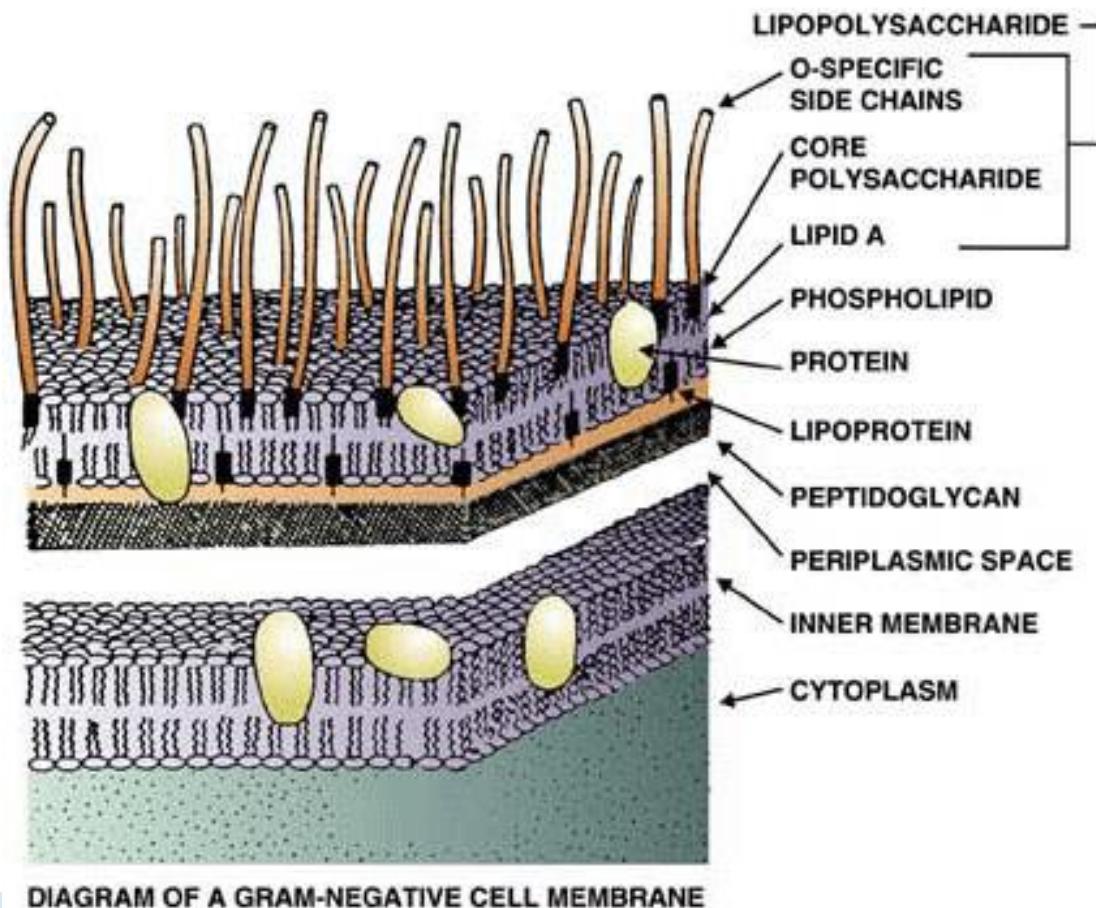
The bacteria, fungi, and parasites that live within us produce toxins as part of their metabolic processes. Their metabolic waste becomes our toxins, and we must deal with it.

Metabolites released by bacteria, fungi and parasites are called **Exotoxins**. Microbes sometimes produce these exotoxins to have an effect on us with the intent to interfere or misdirect our immune system, thereby helping the microbe elude detection.

Gram-negative bacteria such as salmonella, E.coli, helicobacter and others consist of an outer cell membrane complex composed of lipopolysaccharides also known as **Endotoxins**. When their cell wall is broken, the endotoxin is released and induces an immune response in us.

The biological activity of endotoxin is associated with the lipopolysaccharide (LPS). **Toxicity** is associated with the lipid component (**Lipid A**) and **immunogenicity** is associated with the **polysaccharide** components. The cell wall antigens (**O antigens**) of Gram-negative bacteria are components of LPS.

LPS elicits a variety of inflammatory responses in the body. Gram-negative bacteria probably release minute amounts of endotoxin while growing, which may be important in the stimulation of natural immunity



# Support the LIVER

1. Cruciferous vegetables – phytochemicals and DIM to break down excess estrogen
2. Avoid plastics which contain xenoestrogens
3. Avoid chemicals on skin, which enter lymphatic system, bloodstream, then travel to liver
4. Skip alcohol and coffee – go for Green tea instead – EGCG helps with liver detox and is anti-inflammatory
5. Nutrients: B-vitamins, Se, vitamins A,C,E, Cu, Zn, Mn, CoQ10, Bioflavanoids

## Porphyra-Zyme

PorphyraZyme is a concentrated porphyrin extract from green plant life.

Porphyrins have the unique character of being able to complex divalent metals, with the heavier metals being complexed first. These heavy divalent metals are toxic, e.g. mercury, lead, cadmium, arsenic, etc. After available heavy metals are chelated, calcium will be removed. The theoretical order of removal of these metals is based on weight/charge and is Mercury, Lead, Chromium, Nickel, Cadmium and Arsenic. We can see from this that PorphyraZyme will chelate Chromium, and that this will occur before it removes nickel or cadmium.

PorphyraZyme is effective in removing the calcium in vascular plaques. This product should be taken on an empty stomach, 60 minutes before meals to facilitate its chelating ability. If the patient has clinical or subjective indicators of hypochlorhydria, 2 tablets of Hydrozyme should be taken with their dosage of PorphyraZyme. The acid medium of the empty stomach removes the magnesium center of the porphyrin ring and allows for the “exchange” of the heavy metal component.

## SOME COMMON SOURCES OF HEAVY METALS

ALUMINUM : Aluminum Cans, Deodorants, Cooking Utensils, Antacids

ARSENIC: Air Pollution, Some Seafood, Tap Water, Tobacco

CADMIUM: Dental Amalgams, Cigarette Paper, Margarine, Refined foods

COPPER: Tap Water, Soy Beans, Soft Drink Dispensers, Processed Meats

LEAD: Air Pollution, News Print, Lead Pipes, Processed Meats

MERCURY: Fish, Air Pollution, Dental Amalgams, Pharmaceuticals

NICKEL: Air Pollution, Costume Jewelry, Cigarette Smoke, Hydrogenated Oils

TIN: Air Pollution, Tap Water, Processed Fish, Pasta

## Heavy Metals Protocol

PorphyraZyme 4 tablets 3 times a day on an empty stomach

BioProtect 2 capsules 3 times a day

MCS 2 capsules twice daily.

Consider the use of PorphyraZyme for patients with mercury fillings: 3 tablets a day of PorphyraZyme on an empty stomach along with 1 capsule of MCS

Better yet, REMOVE THE MERCURY FILLINGS!

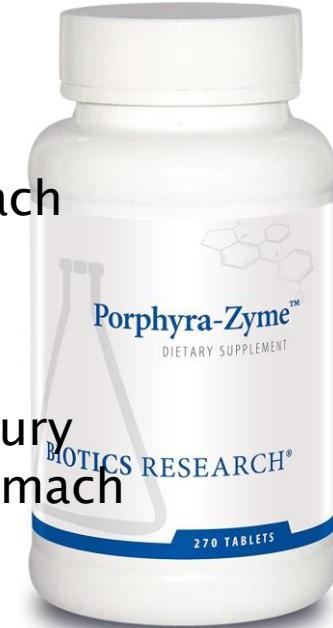
## ATHEROSCLEROSIS PROTOCOL

Beta TCP 2–3 tablets with meals (this will ensure the bile route is open).

PorphyraZyme 3–4 tablets one hour before meals and at bedtime (dose dependent on severity).

Intenzyme Forte 3 tablets one hour before meals and at bedtime.

Super Phosphozyme 1 tablet one hour before meals.



## Radiation Exposure

B12, 1–3 qd, B12/B6/folate formula

Methylfolate Plus, 1–2 bid, methylated folate for DNA repair

ResveraSirt–HP, 1–2 bid, DNA repair and longevity

Chlorella Caps, 6–15 qd, attracts and sequesters toxins and metals

Colon Plus Caps, 2–4 with meals, promotes bowel clearing

Beta TCP, 2–3 tid, bile support for liver detox

Nuclezyme–Forte, 2–4 with meals, nutritional RNA from yeast and DNA from fish to protect and rebuild chromosomes

Bio D Mulsion Forte, 8–10 drops qd, supports healing and repair as well as resistance to radiation damage

KappArest, 2–4 bid, protects against chromosome damage and premature aging by downregulating the inflammatory process

# Lymphatic Support

PRODUCT	DOSAGE	DESCRIPTION
Bio-Ae-Mulsion Forte	1–4 drops, bid or more	Needed for WBC, lymph tissue support, epithelial tissue repair and regeneration
Iodizyme HP	½ – 1 qd	Iodine lowers the viscosity of bodily secretions including lymph, antiseptic, promotes metabolism
Carbamide Plus	2 tid	Urea for fluid buildup, water retention, and swelling
Cytozyme-SP	1–2 tid	Neonatal spleen for glandular support, WBC and immunoglobulin production
Cytozyme-THY	1–2 tid	Neonatal thymus glandular supports T lymphocytes
Bio-FCTS	2–4 bid	Bioflavanoid (quercetin) formula with thymus and spleen to promote vascular health and immune support