

# DETOXIFICATION DEMYSTIFIED

## LIVER/GALLBLADDER/LYMPH

Rajko Bisevac ND, ABAHP, FAARFM  
tel: 630-846-1400  
PURELIFEHEALTH@YAHOO.COM

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## Summary of the GI module

- Law of contrast
- Triggering mechanisms
- Parasympathetic NS
- Miracle of 2% content of saliva
- Mysterious world of small molecules
- Neuropeptides & mind-body connection
- SIBO, parasites, yeast overgrowth

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## TYPES OF DETOXIFICATION

### I GENERAL

- 1) Optimizing your organs' detoxifying channels. Liver, gallbladder, kidneys, lungs, lymph system

### II SPECIFIC

- 1) Pathogenic organisms (bacteria, fungi, parasites)
- 2) Xenohormones and xenobiotics
- 3) Heavy metals

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## I – GENERAL – NUTRICLEAR PLUS



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## I – GENERAL – NUTRICLEAR PLUS

- ▶ NutriClear® Plus is a science-based metabolic cleanse program that supports the **body's detoxification processes**. By supplying key nutrients in a delicious-tasting powder, NutriClear® Plus provides the ideal nutritional foundation for those in need of metabolic clearing, while also supporting hepatic function, energy production and intestinal balance. The formula includes easily digested, certified organic pea protein, medium chain triglycerides, added fiber and an extensive array of antioxidants. This powerful combination of micronutrients, NitroGreens®, fiber, fruit and vegetable extracts supports safe and effective detoxification.

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## OUTLINE

- ▶ Complexity
- ▶ Food for liver
- ▶ Hormones Rubik's Cube
- ▶ GI bidirectional Cross-talk
- ▶ Lab tests
- ▶ NAFLD & MAFLD
- ▶ Liver/gallbladder optimization detox

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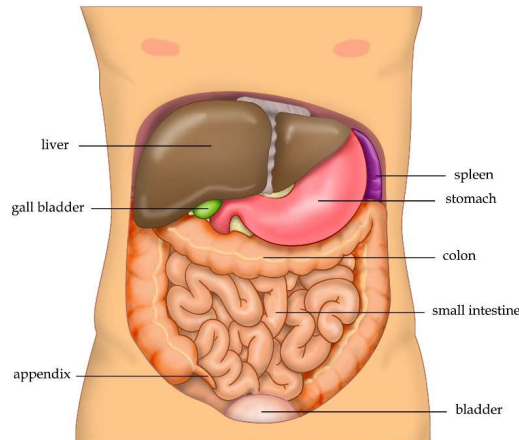
## DETOXIFICATION

- ▶ **SELF vs NON-SELF battle**
- ▶ Human leukocyte antigens (HLA) are a group of identification molecules located on the surface of all cells in a combination that is almost **unique for each person**, thereby enabling the body to distinguish self from non-self. This group of identification molecules is also called the major histocompatibility complex.
- ▶ Non-self-antigens include the antigen structures found on the surfaces of foreign **bacteria, viruses, fungi, parasites**, or other **non-native biocompounds**. The immune system relies on antibody-antigen binding and the binding of antigens with receptors on B or T Cells to recognize non-self-antigens within the body.
- ▶ **GENERAL & SPECIFIC detox** address these issues

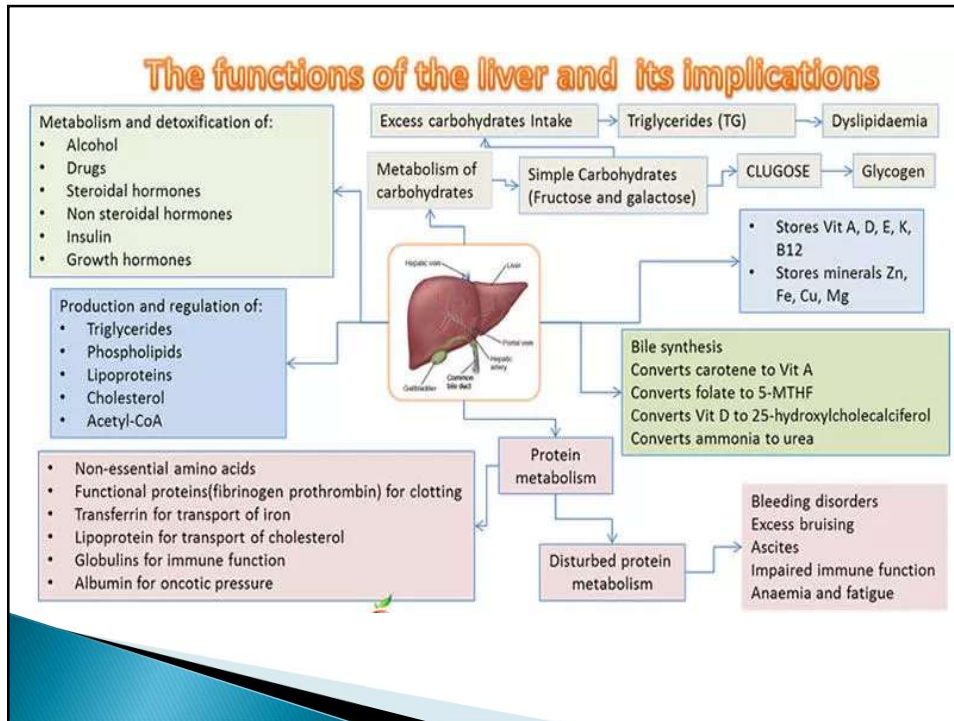
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## The LIVER

- 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



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### 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 ↔ CHRONIC IMMUNE CONDITIONS

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## 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
- Nausea
- Motion sickness
- Morning sickness
- Sea sickness
- Air sickness
- Problems digesting fat
- Upper digestive problems
- Constipation
- Light-colored stools
- Pain in the liver area (front or back/right shoulder or scapula / right lower neck)
- Bloating, inability to digest fatty foods
- Knee problems

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## FOOD FOR LIVER

- ▶ PROTEIN – non-denatured, avoid cow's dairy.
- ▶ FAT – Nuts, olive, avocado, ocean fish
- ▶ CARBOHYDRATES non-processed, avoid gluten
- ▶ FRUITS, VEGETABLES. – **Polyphenols** & micronutrients with fiber, which affect positively digestive system.
- ▶ BITTER HERBS – (refer to GI Tract module and upcoming Herbology section)

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## CARBOHYDRATES

- ▶ Bread, cereal, pizza, pasta, rice, cakes
- ▶ Glucose
- ▶ Portal vein to liver, then sent to cells – energy
- ▶ **ANAEROBIC** 20 step, fermentation = 2 units of energy – becomes PYRUVATE
- ▶ **AEROBIC** – Pyruvate to mitochondria – 8 step process = 36 units of energy
- ▶ Glycogen storage in muscles & liver
- ▶ Excess stored in fat cells
- ▶ **Glucose → 1. Cell → if excess, 2. Glycogen → when not used, 3. Fat.**

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## GLUCOSE

- 1. Cell → if excess**
- 2. Glycogen → not used,**
- 3. Fat**

Greater culprit coming...

- ▶ **FRUCTOSE**

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## PROTEIN, FATS, FIBER

- ▶ Protein – 50% of the membrane around every cell is protein
- ▶ Fat = 50% of the membrane of every cell is fat
- ▶ Brain cells are 70% fat. The brain is the fattiest organ of the body.
- ▶ Carbs are a problem if overdone and refined
- ▶ Dr. Atkins carbs out. Fiber, fat, protein in.
- ▶ GLUCONEOGENESIS
- ▶ Biosynthesis of new glucose, not derived from the consumption of carbohydrate. From lactate, pyruvate, glycerol (**fat**), and certain amino acids (protein).

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## CHOLESTEROL

- ▶ Dr. Atkins noticed he was not hungry
- ▶ Glucose burns at 4 calories per gram
- ▶ Fat burns at 9 calories per gram
  
- ▶ Liver makes cholesterol according to the demand of our body. 80% of cholesterol it makes is made from glucose and 20% is made from fat.

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## 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

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## 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, 2015

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## 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.

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## 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"

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## LIVER DETOX PHASES

### Phase 1

- ▶ Liver takes fat-soluble toxin and breaks down into metabolite (highly volatile), creates free radicals, highly toxic, sometimes 100 times more toxic than original (esp alcohol)

### Phase 2

- ▶ Liver takes metabolite and conjugated with amino acids converts the toxin to water-soluble state.

### Phase 3

- ▶ Happens in conjunction with phase 2 - water-soluble toxins get released through sweat, colon, kidneys,

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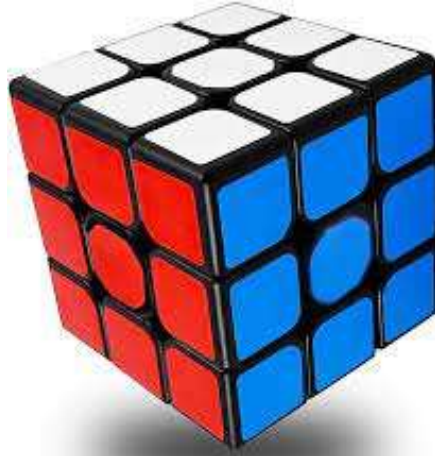
## HORMONES and the LIVER

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.**

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## HORMONES RUBIK'S CUBE

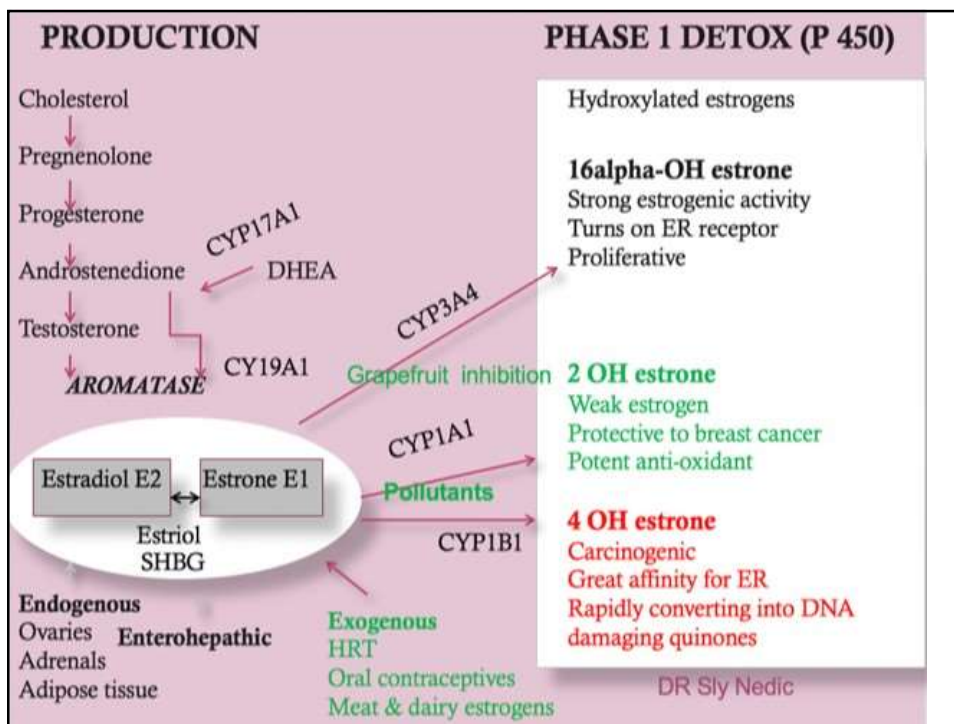


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## HORMONES & LIVER

- ▶ Estrogen is a blessing and a curse
- ▶ Detects and perceives estrogen as toxin, detoxed the same metabolic pathway as other carcinogens. Why is body not happy?
- ▶ Phase 1 – there are 3 pathways
- ▶ 1<sup>st</sup> particularly dangerous is 4 hydroxy pathway 4 OH, which creates dangerous metabolites that damage DNA
- ▶ WHY DO WE PRODUCE MORE 4 OH THAN OTHER ONES?

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## HORMONES & LIVER

- ▶ The 4-OH pathway is considered the most genotoxic as its metabolites can create reactive products that damage DNA. – Estrone is hydroxylated through Phase 1 detox to form 4-OH-E1. In Phase 2 it is methylation to form 4-MeE1.
- ▶ When 4-OH-E1 is properly methylated to 4-MeE1 it is relatively benign as the 4-MeE1 is easily eliminated and risks are low.
- ▶ – When it is not methylated 4-OH-E1 builds up. Then it converts to 3,4-Quinones which are carcinogenic similarly to the 16 pathway. Women with uterine fibroids may have increased levels of 4-OH-E1. High levels of estrogen across the board are associated with heavy cycles.

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## HORMONES & LIVER

- ▶ 4-OH-E1 is referred to as the “bad” estrogen, along with 16-OH-E1.
- ▶ – It is a minor pathway of estrogen metabolism.
- ▶ – It may also enhance cancer development.
- ▶ – It may directly damage DNA by causing breaks in the molecular strands of DNA.
- ▶ Human breast cancer tissue produces much higher levels of 4-OH-E1 than 2-OH-E1, while normal breast tissue produces approximately equal amounts of the two metabolites. Women taking hormone therapy with a polymorphism in CYP1B1 had twice the risk of developing breast cancer compared to other HRT users.

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## HORMONES & LIVER

- ▶ GENETIC PREDISPOSITION, GENE CYP1B1
- ▶ MUCH MORE THAN THAT, THIS 4 OH GETS INDUCED BY ENVIRONMENTAL TOXINS
- 1. PAH
  - ▶ CYP1B1 – this pathway gets induced by PAH –burning meat Polycyclic Aromatic Hydrocarbons (PAHs)
  - ▶ They result from burning coal, oil, gas, wood, garbage, and tobacco. PAHs can bind to or form small particles in the air. High heat when cooking meat and other foods will form PAHs. Naphthalene is a manmade PAH used in the United States to make other chemicals and mothballs. Cigarette smoke contains many PAHs.
- 2. EPOXIDES food, meat
  - ▶ Xenoestrogens, Parabens, Phtalates, Environmental toxins.
  - ▶ SOLUTION: Polyphenols, Resveratrol, DHEA

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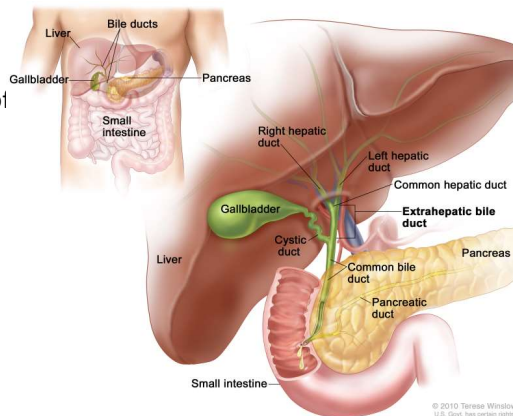
## Biliary System

Main function:

- The Liver secretes 700-1200 mL of bile daily.
- To drain waste products from the liver into the duodenum
- To help in digestion with the controlled release of bile

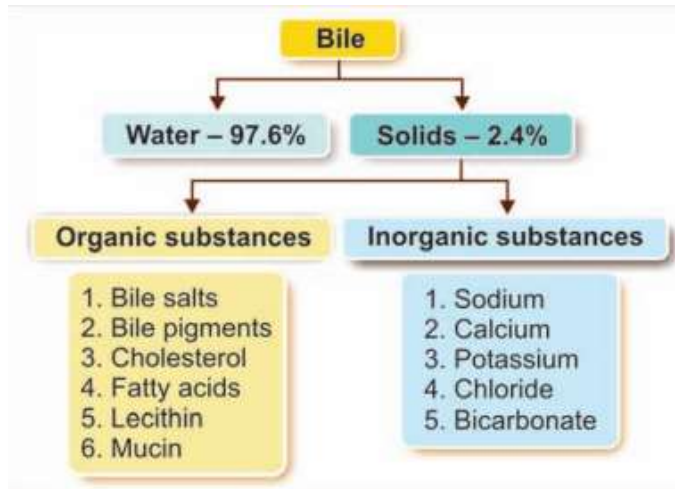
Bile is the greenish-yellow fluid (consisting of waste products, cholesterol, and bile salts) that is secreted by the liver cells to perform 2 primary functions:

- 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.

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

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## 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

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## 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

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## SIBO – NAFLD

- ▶ Journal **Nutrients** examines the relationship between small intestinal bacterial overgrowth (SIBO) and non-alcoholic fatty liver disease (NAFLD).
- ▶ Points to gut microbiota as playing a potentially **causal** role in NAFLD development and progression, including the promotion of the inflammatory response, hepatic steatosis, fibrosis, cirrhosis, and carcinogenesis.

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## The bidirectional cross-talk

- ▶ The “gut-liver axis.” In one direction, this includes the transport of gut-derived products (such as trimethylamine, secondary bile acids, short-chain fatty acids (SCFAs), and ethanol) to the liver via the portal vein.
- ▶ In the other direction, it includes hepatic synthesis of bile acids which are released in the terminal ileum, with both processes occurring routinely in healthy individuals.

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## Gut-Liver axis

- ▶ When the normal gut vascular protection is impaired, i.e., intestinal barrier permeability is increased, a variety of gut products (including pathogen-associated molecular patterns such as LPS (endotoxin), as well as other microbiome-derived metabolites) are transported to the liver and trigger a pro-inflammatory cascade.
- ▶ The liver is considered a **“first-pass organ,”** meaning it receives the highest concentration of microbial-derived compounds, which may be increased as a result of barrier damage or higher bacterial concentration (this may be why antioxidants, such as vitamin E, are considered as part of the therapeutic strategy for some patients with NAFLD, as they may provide hepatoprotection from gut-derived toxins). In a small study, individuals with NAFLD were confirmed by biopsy to have increased gut permeability, which was associated with the prevalence of SIBO.

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## NAFLD

- ▶ NAFLD can be divided into two subtypes. While one of these is more closely related to an infectious or toxin etiology, the more common of the two subtypes is closely related to metabolic syndrome (Met-S), and insulin resistance is suspected to be the primary driver.
- ▶ There is a growing consensus to shift toward reclassifying NAFLD as MAFLD, metabolic-associated fatty liver disease, in recognition of the metabolic dysfunction which accompanies (and promotes) NAFLD, as well as to de-emphasize the intake of small amounts of alcohol that may inappropriately label patients as having alcohol-induced liver disease.

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## NAFLD

- ▶ Several studies point to SIBO and dysbiosis as potentially causative of NAFLD, perhaps due to altered bile acid homeostasis, endotoxin production and leaky gut. Several animal models clearly point to a link between endotoxin production, for example, and the insulin resistance that promotes weight gain, diabetes, and obesity, conditions that are closely tied to the prevalence of NAFLD in humans. Given that hyperglycemia also drives intestinal barrier dysfunction, causality is hard to determine, but it may be a feed-forward pathological cycle.
- ▶ <https://pubmed.ncbi.nlm.nih.gov/37044299>

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## 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.

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## 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..

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## 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.

7) **Elevated total Cholesterol** over 220.

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## 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**

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## 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.

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### 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

5-MTHF forte ½ bid

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#### 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



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## 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

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## 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

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### 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

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### 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.

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## 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

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Phase II is comprised 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.

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## 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

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## 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

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## TYPES OF DETOXIFICATION

### I GENERAL

- 1) Optimizing your organs' detoxifying channels. Liver, gallbladder, kidneys, lungs, lymph system

### II SPECIFIC

- 1) Pathogenic organisms (bacteria, fungi, parasites)
- 2) Xenohormones and xenobiotics
- 3) Heavy metals

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## II SPECIFIC – 3 STEP DETOX

### Pathogenic organisms

#### STEP 1 **Reduce Inflammation** 15 days

1. Intenzyme Forte 10 tid empty stomach
2. Kapparest 4 tid empty stomach

#### STEP 2 **Cleanse & Detoxify** 10 days

1. ADP 4 tid with food
2. Dysbiocide 3 bid before meals
3. FC Cidal 3 bid before meals
4. Caprin 4 tid before meals
5. Berberine HCL 1 tid before meals

#### STEP 3 **Rebuild & Repair** 1 month

1. Bio Doph 7 Plus 1 bid empty stomach
2. Bio D Mulsion Forte 5-10 drops with meals
3. Butyric Cal-Mag 4 bid empty stomach
4. Biomega 1000 1 with food
5. IAG 1 tsp in water empty stomach
6. Bio Fiber 1 scoop x 2 any time

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## II SPECIFIC

### Xenohormones and xenobiotics

- ▶ Ca D Glucarate 1 tid F
- ▶ NitroGreens 1 scoop
- ▶ Bio Doph 7 1 bid E
- ▶ Chlorocaps 2 bid E
- ▶ NAC 2 bid E (bonds with glutamine and glycine to form [glutathione](#))
- ▶ Mg Zyme 2 bid F (phase 2 liver detox)
- ▶ Carbamide Plus 3 bid E
- ▶ MCS 2 capsules twice daily. (Phase 1 / 2)

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## Ca D-GLUCARATE – Xenobiotics

- ▶ Calcium D-Glucarate - the glucuronidation pathway of detoxification. The glucuronidation pathway is one of the most important phase II **CONJUGATION** pathways in the liver.
- ▶ Phase 2 metabolism involves conjugation - that is, the attachment of an ionized group to the xenobiotic. These groups can include glutathione, methyl or acetyl groups.
- ▶ The attachment of an ionized group makes the metabolite more water soluble. This facilitates excretion as well as decreasing the toxic activity.
- ▶ Glucuronidation - liver's normal process of attaching a glucuronic acid molecule to potentially harmful substances to detoxify and eliminate them from the body.
- ▶ During phase II liver detoxification, certain hormones and various fat-soluble toxins will undergo glucuronidation and be excreted through the bile or urine (attached to a hydrophobic molecule to make it more water soluble, and then the kidneys can better facilitate its removal from the body.)

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## PROBIOTICS – Xenobiotics

- ▶ Xenobiotics exert a negative effect on human health such as inflammation, oxidative stress, and intestinal disorders linked with perturbation of the composition and metabolic profile of the gut microflora.
- ▶ Promising approach to reduce the risk related to the presence of xenobiotics in foodstuffs is a biological detoxification done by probiotic strains and their enzymes.
- ▶ Many studies confirmed that probiotics are an effective, feasible, and inexpensive tool for preventing xenobiotic-induced dysbiosis and alleviating their toxicity.
- ▶ <https://www.sciencedirect.com/science/article/pii/S0278691521003392>

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## NitroGreens – Xenobiotics

- ▶ Cruciferous vegetables are unique among all plant foods in their capacity to balance phase 1 detoxification via changes in genetic expression, and to support phase 2 detoxification, by virtue of their ability to activate enzymes that lead to increases in the stage 2 workhorses—molecules that stick to the toxins, rendering them water soluble, leading to successful neutralization and elimination from the body.

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## NitroGreens – Xenobiotics

OREGON STATE UNIVERSITY

- ▶ Crucifers helps phase 1 of liver detoxification, which helps the estrogen get ready for elimination, and calcium d-glucarate helps phase 2 of liver detoxification and eliminates the excess estrogen from the body.
- ▶ Cruciferous vegetables are unique in that they are rich sources of sulfur-containing compounds known as **glucosinolates**.
- ▶ Chopping or chewing raw cruciferous vegetables results in the formation of bioactive glucosinolate hydrolysis products, such as **isothiocyanates** and **indole-3-carbinol**.
- ▶ The biological activities of glucosinolate-derived **isothiocyanates** and **indole-3-carbinol** likely contribute to the potential health-promoting effects of cruciferous vegetables.
- ▶ Variations in the sequence of genes coding for Phase II detoxification enzymes, glutathione S-transferases (GSTs), may influence the potential health benefits of consuming cruciferous vegetables.
- ▶ High intakes of cruciferous vegetables have been associated with **lower risk** of bladder, breast, colorectal, endometrial, gastric, lung, ovarian, pancreatic, prostate, and renal cancer. However, evidence of associations remains largely limited to case-control studies.

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## NitroGreens – Xenobiotics

OREGON STATE UNIVERSITY

- ▶ A recent intervention study demonstrated that cruciferous vegetables could increase the detoxification of carcinogens and other xenobiotics in humans. In this **12-week randomized controlled trial in 391** healthy Chinese adults exposed to high levels of air pollution, daily consumption of a broccoli sprout-rich beverage (providing 600 µmol/day of glucoraphanin and 40 µmol/day of sulforaphane) significantly increased the urinary excretion of a known carcinogen, benzene, and a toxicant, acrolein, compared to placebo (20). The biological activities of glucosinolate derivatives, isothiocyanates and indole-3-carbinol, which include modulation of xenobiotic metabolism, but also antioxidant and anti-inflammatory properties, induction of cell cycle arrest and apoptosis, and inhibition of angiogenesis, likely contribute to the potential benefits of cruciferous vegetables in the prevention of cancer (see the MIC articles on Isothiocyanates and Indole-3-Carbinol) (23).
- ▶ 59 studies!!!
- ▶ Traka MH. Chapter 9 - Health benefits of glucosinolates. **Advances in Botanical Research**. 2016;80:247-279.
- ▶ <https://lpi.oregonstate.edu/mic/food-beverages/cruciferous-vegetables#:~:text=needs%20further%20investigation.-,Cancer,and%20other%20xenobiotics%20in%20humans.>

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## CARBAMIDE PLUS

- ▶ PROMOTES FLUID BALANCE IN THE BODY: Carbamide Plus is a combination of Carbamide along with herbal diuretics and enzymatically processed organic beet, tillandsia (Silver Spanish Moss), rice bran along with vitamins, minerals, amino acids, molasses, SOD and catalase that help promote healthy **fluid balance** in the body.
- ▶ SUPPORTS HEALTHY URINARY SYSTEM FUNCTION: Carbamide Plus provides special dietary support for healthy **renal and biliary** function by providing nutrients that enhance the osmotic transfer of tissue fluids, it aids the physiological elimination of waste products.
- ▶ PROMOTES HEALTHY FORMATION AND EXCRETION OF URINE: Carbamide reduces the electrical conductivity of water and will denature proteins. This causes the release of free calcium phosphate into the blood which reacts with sodium bicarbonate to provide **calcium bicarbonate an important blood buffer**. Carbamide Plus naturally supports **healthy fluid transfer** among tissues.

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## II SPECIFIC – HEAVY METALS

- ▶ 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

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