Every drug, pesticide, hormone and artificial chemical is broken down by enzyme pathways in the liver.
Liver Detoxification

Types of Toxins Metabolized by the Liver

- Metabolic Byproducts
- Microbial Endotoxins
- Drugs and Chemicals
- Lipid-Soluble Toxins Stored in Fat

Phase 1 Detoxification

50 different enzymes which electrically charge toxins (adding or eliminating electrons) in preparation for phase 2 detoxification
Phase 1 Detoxification Produces Free Radicals

- Superoxide radicals
- Intermediate metabolites (which can be more toxic than the original compounds)

Symptoms of Sluggish Phase 1 Detox

- Caffeine, alcohol and other chemical substances have long lasting effects
- General symptoms of liver congestion

Phase 1 Inhibitors

- Foods:
  - Naringenin from grapefruit juice
  - Quercetin from onions
- Herbs:
  - Turmeric (curcumin)
  - Capsicum (capsaicin)
  - Clove (eugenol)
  - Calendula
**Nutritional Requirements for Phase 1 Detoxification**

- Beta-carotene
- Vitamin B1, C, E
- Minerals:
  - Copper
  - Iron
  - Magnesium
  - Manganese
  - Molybdenum
  - Sulfur
  - Zinc
- Choline
- Fatty Acids
- Lecithin
- Methionine

**Enhancing Phase 1 Detox**

- Environmental Detoxifying Formula
- Basic Cleansing Formula with Chinese Herbs
- Liver Protecting Formula
- B-Complex Vitamins
- Citrus Bioflavinoids
- Amino Acid Blend

**Antioxidants to Aid Detoxification**

- Antioxidant Mangosteen and Berry Drink
- Liver Protecting Formula
- Beta carotene
- Alpha Lipoic Acid
- N-Acetyl-Cysteine
Phase 2 Detoxification

- Enzymes which add chemical groups to toxins (a process called conjugation) to make them water soluble

Sluggish Phase II

- Taking supplements for Phase I detox makes you feel sick
- Get very sick when detoxifying (healing crisis)
- Toxemia during pregnancy
- Specific toxins

Nutritional Requirements for Phase 2 Detoxification

- Vitamins: Folic Acid, B1, B2, B3, B5, B6, B12, C
- Minerals:
  - Germanium
  - Magnesium
  - Manganese
  - Molybdenum
- Selenium
- Sulfur
- Zinc
- Amino Acids:
  - Cysteine, Glycine, L-glutathione, Taurine
  - N-acetyl-cysteine
Phase 2 Conjugates

- Amino acids (acylation)
- Sugars (glucuronidation)
- Glutathione (glutathione conjugation)
- Methionine (methylaion)
- Sulfur (sulfation)
- Acetyl Co-A (acetylation)

Basic Nutrients for Each Phase II System

- Acylation: Glycine
- Glucuronidation: Glucuronic acid
- Glutathione conjugation: Glutathione, vitamin B6
- Methylation: S-adenosyl-methionine
- Sulfation: Cysteine, methionine, molybdenum
- Acetylation: Acetyl-CoA

Acetylation

- Amino acid conjugation
- Helps the body to rid itself of many toxic chemicals or xenobiotics
- Disturbed acylation by toxic overload decreases bile in the gastrointestinal tract, resulting in poor assimilation of fats and fat-soluble vitamins, and disturbed cholesterol metabolism

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**Acylation Detoxifies**

- Benzoate (widely used as a food preservative)
- Aspirin
- Toluene (popular industrial solvent)

**Poor Acylation is Often Found in People with**

- Hepatitis
- Alcoholic Liver Disorders
- Carcinomas
- Chronic Arthritis
- Hypothyroidism
- Toxemia in pregnancy
- Excessive Chemical Exposure

**Acylation Supplements**

- Uses amino acids: glycine, taurine, glutamine, arginine, and ornithine
- Taurine and glycine reactions require alkaline pH
- Supplements to consider:
  - Amino Acid Blend
  - Algae Blend
Glucuronidation

- Glucuronic acid is a metabolite of glucose
- For most individuals glucuronidation is a supplementary detoxification pathway, a secondary, slower process than sulfation or glycination

Glucuronidation Detoxifies

- Chemical and bacterial toxins
- Steroidal hormones (including excess hormones produced by the body such as estrogen and T4)
- Some fungal toxins
- Polycyclic aromatic hydrocarbons
- Some nitrosamines
- Heterocyclic and aromatic amines
- Alcohols
- Phenols
- And others...

Nutrients to Assist Glucuronidation

- L-glutamine
- Aspartic acid
- Magnesium
- B-Vitamins (B3 & B6)
Glutathione Conjugation

- Helps to detoxify and eliminate poisons in the liver, lungs, intestines, and kidneys
- Glutathione is one of the most important antioxidants in the body
- Heavy metals inhibit the replenishment of glutathione

Glutathione Detoxifies

- Aromatic disulphides
- Naphthalene
- Anthracene
- Phenanthacin compounds
- Aliphatic disulphines

Nutrients for Glutathione Conjugation

- Synthesis requires adequate amounts of the amino acids cysteine, glutamic acid, and glycine
- Nutrients that help to raise glutathione levels include vitamin C, alpha-lipoic acid, raw whey protein, and the amino acids glutamine and methionine
- Cruciferous vegetables (cauliflower, broccoli, brussel sprouts, etc.)
- N-Acetyl-Cysteine
**N-Acetyl-Cysteine**

- Glutathione is a substance used by cells (especially liver cells) to aid detoxification and protect against free radicals
- N-Acetyl-Cysteine is a precursor to glutathione

**Indole-3-Carbynol**

- Enhances both Phase 1 and Phase 2 Detoxification
- Helps break down estrogens (including xenoestrogens)
- Cancer preventative (breast, prostate, cervical)
- Glutathione conjugation support

**Methylation**

- Methylation occurs in every cell of the body
- Helps break down excess hormones (estrogen, etc.)
- Poor methylation may be a contributing factor in heart disease, cancer, arthritis and PMS
Methylation Detoxifies

- Steroid hormones, including estrogen
- Adrenaline and noradrenaline
- Dopamine
- Melatonin
- Histamine
- Serotonin
- Homecysteine
- Amines
- Phenols
- Thiols
- Pyridine, sulphites and hypochlorites into compounds excreted through the lungs

Nutrients for Methylation

- Amino acid: methionine
- B-Vitamins: B6, B12, Folic acid
- Choline
- Sam-e
- Bentaine (from beets)
- The activity of the methyltransferase enzyme is dependent on magnesium

Sam-e

- Aids liver detoxification
- Helps produce many methyl-based substances, including:
  - Carnitine
  - Acetyl-L-carnitine (a neuronutrient)
  - Creatine phosphate (used in ATP energy production)
  - Epinephrine (adrenaline)
  - Phosphatidyl choline (neuronutrient)
  - DNA bases methyladenine and methylcytosine
Sam-e May Help

- Liver Diseases: cirrhosis of the liver, chronic liver disease, alcoholic liver damage, toxic chemical exposure, NSAID-liver damage, estrogen induced liver problems, bile disorders, and environmental chemical hypersensitivity
- Inflammatory disorders: osteoarthritis, rheumatoid arthritis, fibromyalgia, joint injuries and osteoporosis

Sam-e May Also Help

- Depression
- Intestinal inflammation and irritation
- Elevated blood levels of homocysteine
- Brain Function: People wishing to protect their brain or who are in early stages of dementia

Sulfation

- Principle pathway for eliminating excess neurotransmitters
- Reduced sulfation may be involved in Parkinson’s disease, Alzheimer’s disease and other nervous system disorders
- Environmental illness may also involve reduced sulfation
Sulphate

- Sulfation requires sulphate and is limited by the amount present in the body
- Sulphate may be ingested from food, but is also produced by the action of the enzyme cysteine dioxygenase on cysteine

Sulfoxidation

- Transforms toxic sulfites into sulfate using molybdenum
- Final phase of methylation process
- Sulfites are used to preserve food (wines, dried fruits, seasonings, salad dressings, salad bars, some asthma medications)
- Sulfites can interfere with breathing in sensitive individuals

Sulfation Detoxifies

- Many normal body chemicals including neurotransmitters, steroidal and thyroid hormones
- Several drugs (acetaminophen, etc.)
- Some food additives
- Toxins from intestinal bacteria
- Various environmental toxins
- Many phenolic compounds
- Aliphatic alcohols
- Aryl amines
- Alicyclic hydroxy-steroids
**Nutrients for Sulfation**

- Amino Acids: methionine and cysteine, taurine, glutathione
- MSM
- Garlic and onions
- Cruciferous vegetables (broccoli, etc.)
- Vitamin B1, B2
- Magnesium
- Molybdenum
- Excess molybdenum or vitamin B6 (over 100 mg./day) inhibit sulfation

**Nutrients to Aid Sulfation**

- Amino acids: methionine & L-cysteine
- N-Acetylcysteine
- Chinese Red Yeast Rice Supplement
- Minerals: zinc, copper, selenium, & magnesium
- Vitamins: B2, B6, B12 & Folic Acid
- Impaired by excess B6 or molybdenum

**Acetylation**

- Attaches acetyl co-A to toxins
- Many people are slow acetylators, especially those who are chemically sensitive
- N-acetyltransferase activity in these people is thought to be reduced, which prolongs the life span of drugs and other toxic chemicals in the body, thus enhancing their toxicity
Acetylation Detoxifies

- Histamine
- Serotonin
- PABA
- P-amino salicylic acid
- Sulfa drugs
- Aniline and procaine amide
- Sulphur amides
- Aliphatic amines
- Complex hydrazines.

Nutrients for Acetylation

- Pantothenic acid
- Vitamin C
- Thiamine

Conjugated Toxins are Excreted Via the Kidneys or Liver

- Smaller molecules are excreted via the kidneys
- Large molecules are excreted via the bile (and colon)
Liver and Colon

Liver filters toxins out of the blood coming from the digestive tract.
Liver eliminates toxins into the digestive tract via the bile.

Hepatic Irritation

- Reddish, ruddy complexion, flushing of the face
- Irritation and redness around the eyes
- Flushing of the face
- Tendency to anger and irritability
- Tendency to high blood pressure
- Tongue red (especially on the sides)
- Yellowish cast to the skin in severe cases
- Chronic or severe flu-like symptoms
- Medical diagnosis of hepatitis
Direct Aids for Hepatic Irritation

- Single Herbs
  - Blessed Thistle
  - Milk Thistle
  - Yarrow
  - Yellow Dock
  - Helichrysum EO

- Supplements
  - Sam-e
  - Vitamin C

- Formulas
  - Liver Protecting Formula
  - John Christopher’s Herbal Iron Formula

Hepatic Depression

- Dark, sunken eyes
- General malaise and fatigue
- Lack of appetite
- Frequent headaches
- Difficulty expressing anger, discouragement, depression, despair
- PMS with anxiety
- Chronic skin conditions
- Swollen liver and lymph glands

Direct Aids for Hepatic Depression

- Single Herbs
  - Fenugreek
  - Horse chestnut
  - Rosemary
  - Thyme
  - Turmeric
  - Wormwood

- Formulas
  - Chinese Wood Increasing Formula
  - Chinese Formula for Sagging Chi
  - Paavo Airola’s Liver Formula
Hepatic Stagnation

- Bloated, stuffy feeling under right rib cage
- Difficulty digesting fats
- Greasy or clay colored stools
- Nervous energy in the evening
- Insomnia with difficulty getting to sleep
- Morning grogginess
- Frequent dull headaches, malaise
- Migraines, especially behind the eyes

Hepatic Stagnation

- Biliousness
- Tendency to constipation
- Boils, rashes, pimples and other skin conditions
- Gallstones
- Urine dark in morning, increasingly clear and copious during the day

Direct Aids for Hepatic Stagnation

- Single Herbs
  - Artichoke
  - Barberry
  - Blessed Thistle
  - Dandelion Root
  - Milk Thistle
  - Oregon Grape Root
  - Yellow Dock
Direct Aids for Hepatic Stagnation

- Formulas
  - Special Cellular Cleansing Formula
  - John Christopher’s Blood Purifying Formula
  - Environmental Detoxifying Formula
  - Chinese Wood Reducing Formula
  - Jeannie Burgess’ Liver Formula

Hepatic Atrophy

- Lack of appetite for fats and proteins, but cravings for sugar after or between meals
- Dark, sunken eyes
- Cirrhosis of the liver
- Hardening of liver tissue
- Dry tongue, withered on the sides
- Fatigue and weakness
- Chronic liver damage
- Dry skin, person thin and pale with poor digestion

Direct Aids for Hepatic Atrophy

- Single Herbs
  - Beets
  - Burdock
  - Chickweed
  - Ganoderma
  - Licorice
  - Milk thistle
  - Schizandra berry
  - Wood betony

- Supplements
  - Chinese Wood Increasing Formula
  - Liver Protecting Formula
**Hepatic Constriction**

- Mental tension, tension headaches
- Outbursts of anger
- High blood pressure
- Acute gallbladder attack
- Gall bladder obstruction
- Clay colored stools
- Spasm in the chest area that feels like heart pain
- Sharp spastic or stabbing pains under right rib cage

**Direct Aids for Hepatic Constriction**

- Single Herbs
  - Agrimony
  - Blessed thistle
  - Blue Vervain
  - Lobelia
  - Wild Yam
- Nutrients
  - Magnesium
- Formulas
  - John Christopher’s Gallbladder Formula

**Gall Bladder Flush**

- Fast on raw apple juice for 24-72 hours
- Take magnesium (or Epsom salts) and Gall Bladder Formula
- Prior to bed drink 1/2 cup olive oil mixed with 1/2 cup grapefruit or lemon juice
- Lay on right side before going to sleep
- If bowels don’t move in the morning, take an enema
Hepatic Relaxation

- Mental depression
- Puffy, sallow face with grey, yellow complexion
- Hemorrhoids
- Varicose veins
- Heavy menstrual bleeding and menstrual pain
- Weeping eczema
- Difficulty breathing with sensation of weight and fullness under right rib cage
- Prostate problems in men, uterine fibroids in women

Direct Aids for Digestive Relaxation

- Single Herbs
  - Bayberry
  - Butcher’s Broom
  - Horsechestnut
  - Sage
  - White Oak Bark
- Supplements
  - Bioflavinoids
- Formulas
  - Chinese Wood Increasing Formula
  - Varicose Vein Formula