

LIVER AND HEART DISEASES

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Functions of the Liver

Detoxification:

- Drugs/Alcohol
- Fatty acids
- Steroid hormones
- Ammonia → Urea
- Environmental toxins/allergens

Production of Cholesterol:

- Precursor to sex hormones, Vitamin D

Storage of Micronutrients:

- Minerals: Copper, Zinc, Magnesium, Iron
- Vitamins: Vitamin A, D, E, K, B12

Metabolism:

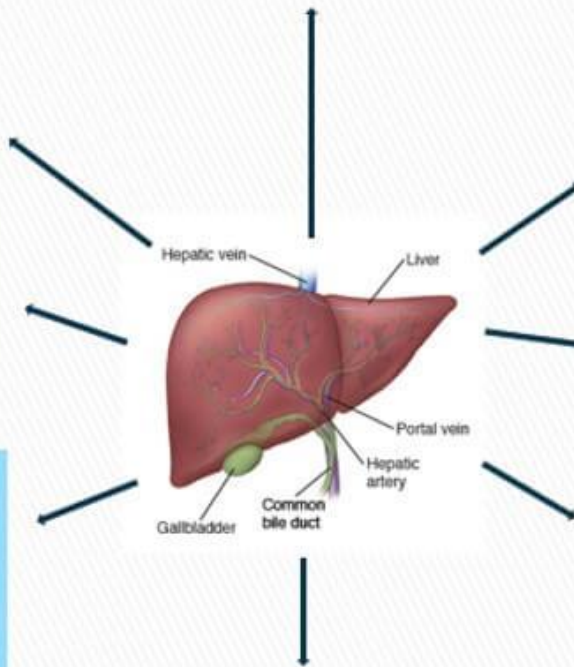
- Conversion of T4 → T3
- Detoxification of fat

Blood Sugar Balance:

- Storage of glycogen

Immune System:

- Contains viruses and pathogens
- Maintenance of the hepatic and portal vein immune system



Production of Bile:

- Needed for digestion
- GI anti-microbial

Protein Synthesis:

- Blood clotting (prothrombin)
- Cholesterol transport (lipoproteins)
- Immune Function (globulins)
- Oncotic pressure (albumin)
- Copper bioavailability (ceruloplasmin)

TESTS FOR DIAGNOSING LIVER DISEASE

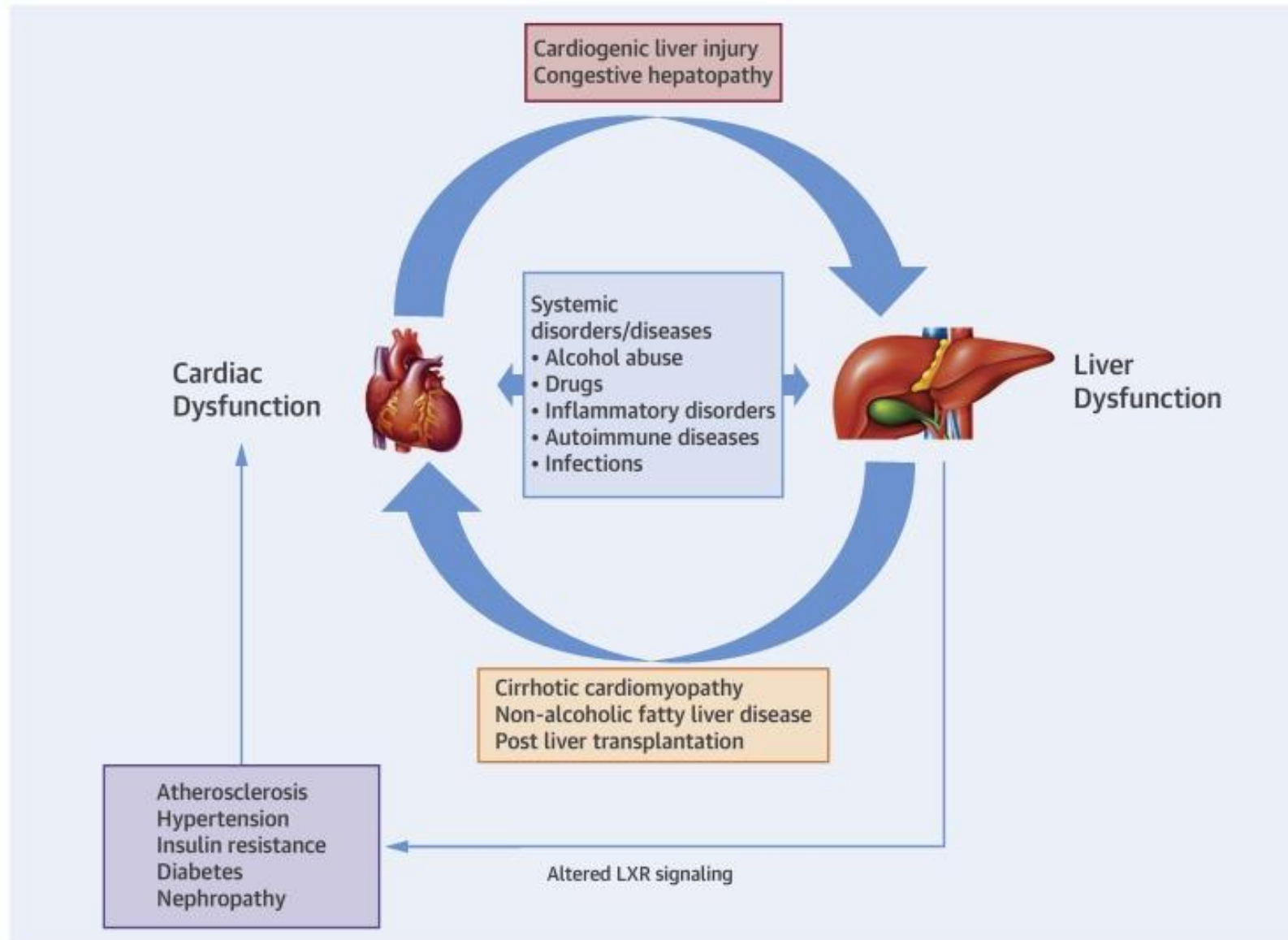
Panel 1: Typical adult reference ranges for liver function tests

| | |
|----------------------------|----------------------------|
| Albumin | 35–55 g/L |
| Total bilirubin | 3–20 μ mol/L |
| Conjugated bilirubin | 0–14 μ mol/L |
| Alanine aminotransferase | 0–45 IU/L |
| Aspartate aminotransferase | 0–50 IU/L |
| Gamma-glutamyl transferase | 0–70 IU/L ♂ 0–40 IU/L ♀ |
| Alkaline phosphatase | 90–300 IU/L |

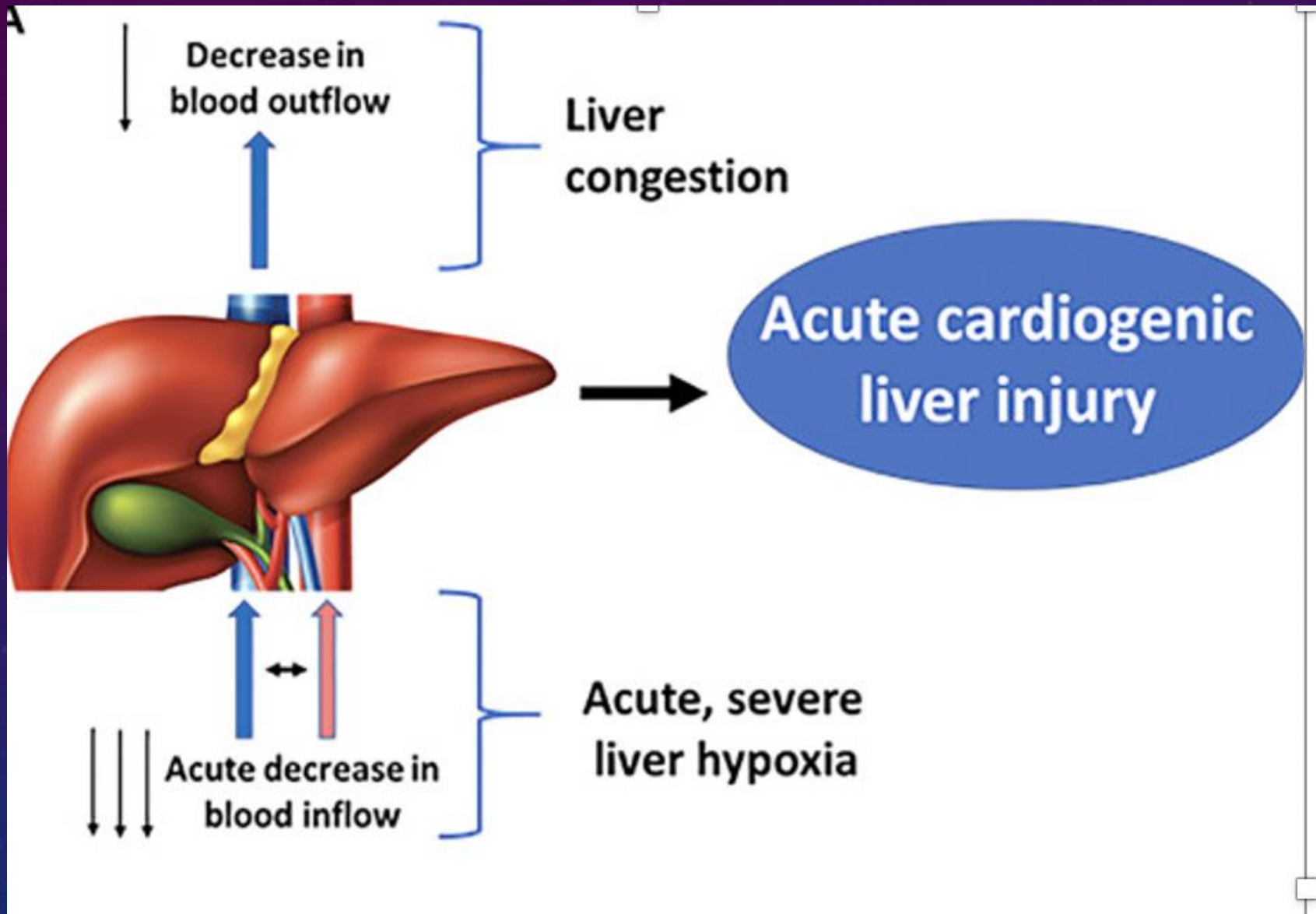
Imaging

- Ultrasound
- HIDA (CT scan)
- MRI

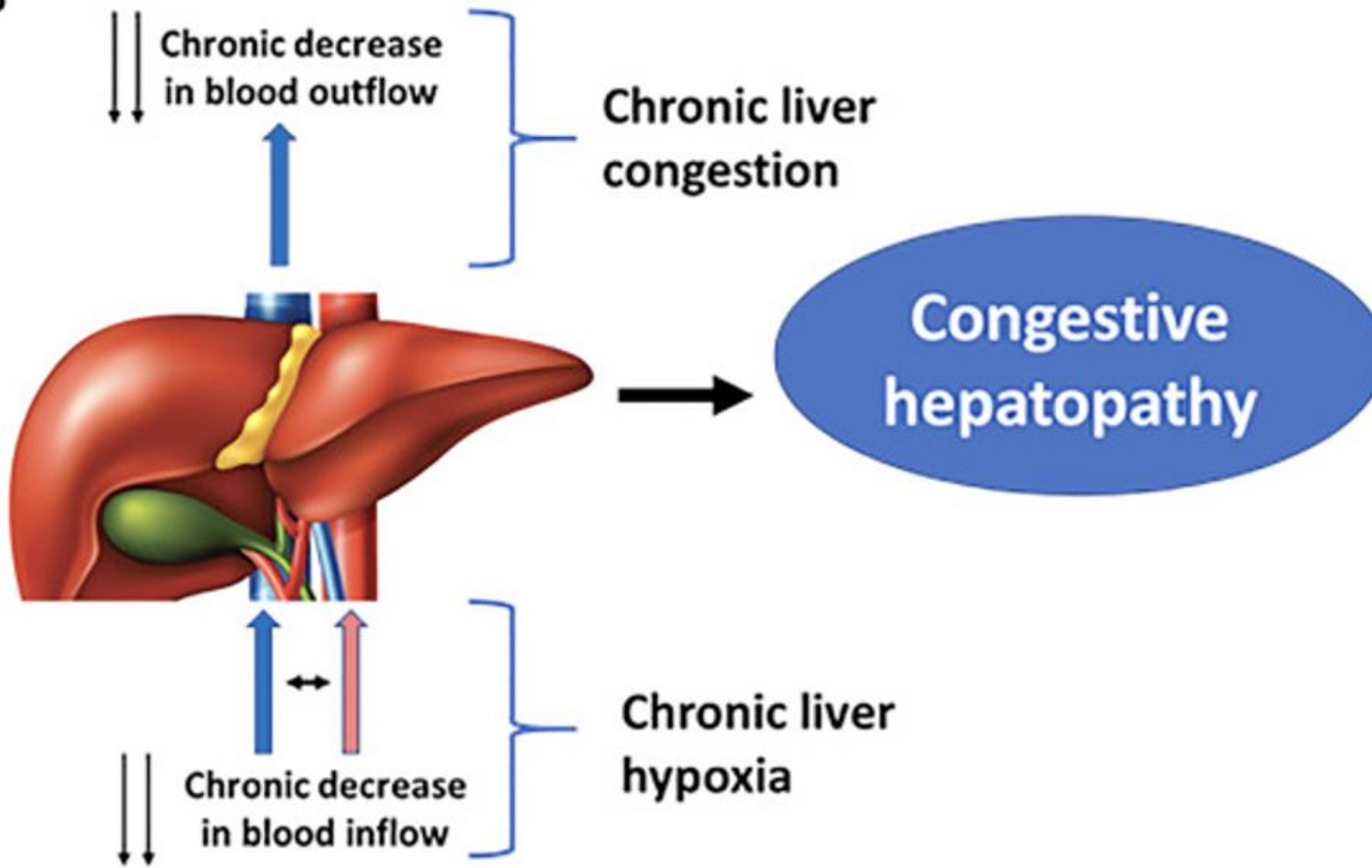
CENTRAL ILLUSTRATION: Cardiac and Liver Dysfunction Often Co-Exist



Xanthopoulos, A. et al. J Am Coll Cardiol HF. 2019;7(2):87-97.



B



RIGHT SIDED ♥ FAILURE

(Cor Pulmonale)

- Fatigue
- ↑ Peripheral Venous Pressure
- Ascites
- Enlarged Liver & Spleen
- May be secondary to chronic pulmonary problems
- Distended Jugular Veins
- Anorexia & Complaints of GI Distress
- Weight Gain
- Dependent Edema



CAUSES OF CHRONIC LIVER DISEASE

Alcoholism

Chronic viral hepatitis

Hepatitis B

Hepatitis C

Autoimmune hepatitis

Nonalcoholic steatohepatitis

Biliary cirrhosis

Primary biliary cirrhosis

Primary sclerosing cholangitis

Autoimmune cholangiopathy

Cardiac cirrhosis

Inherited metabolic liver disease

Hemochromatosis

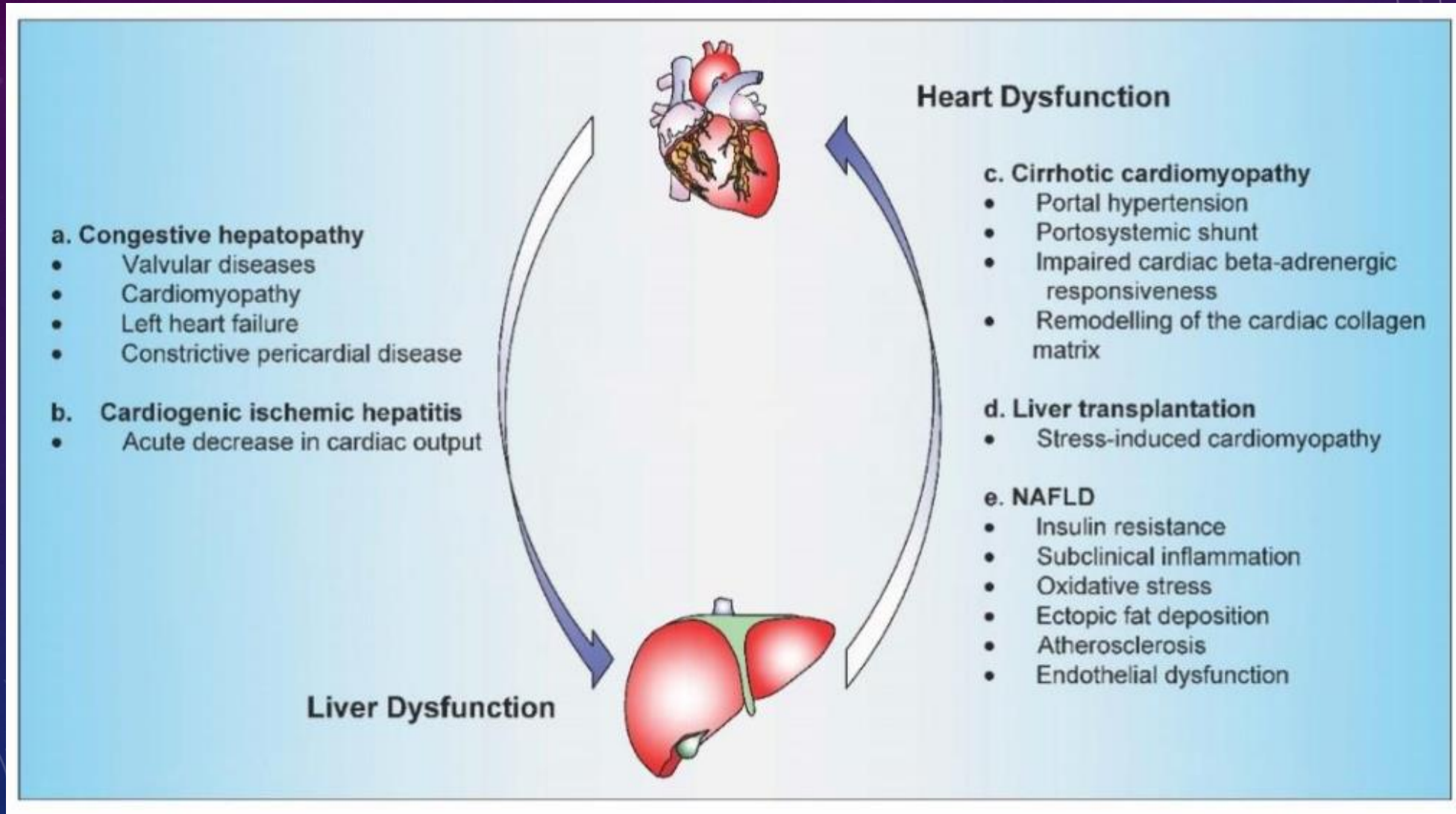
Wilson's disease

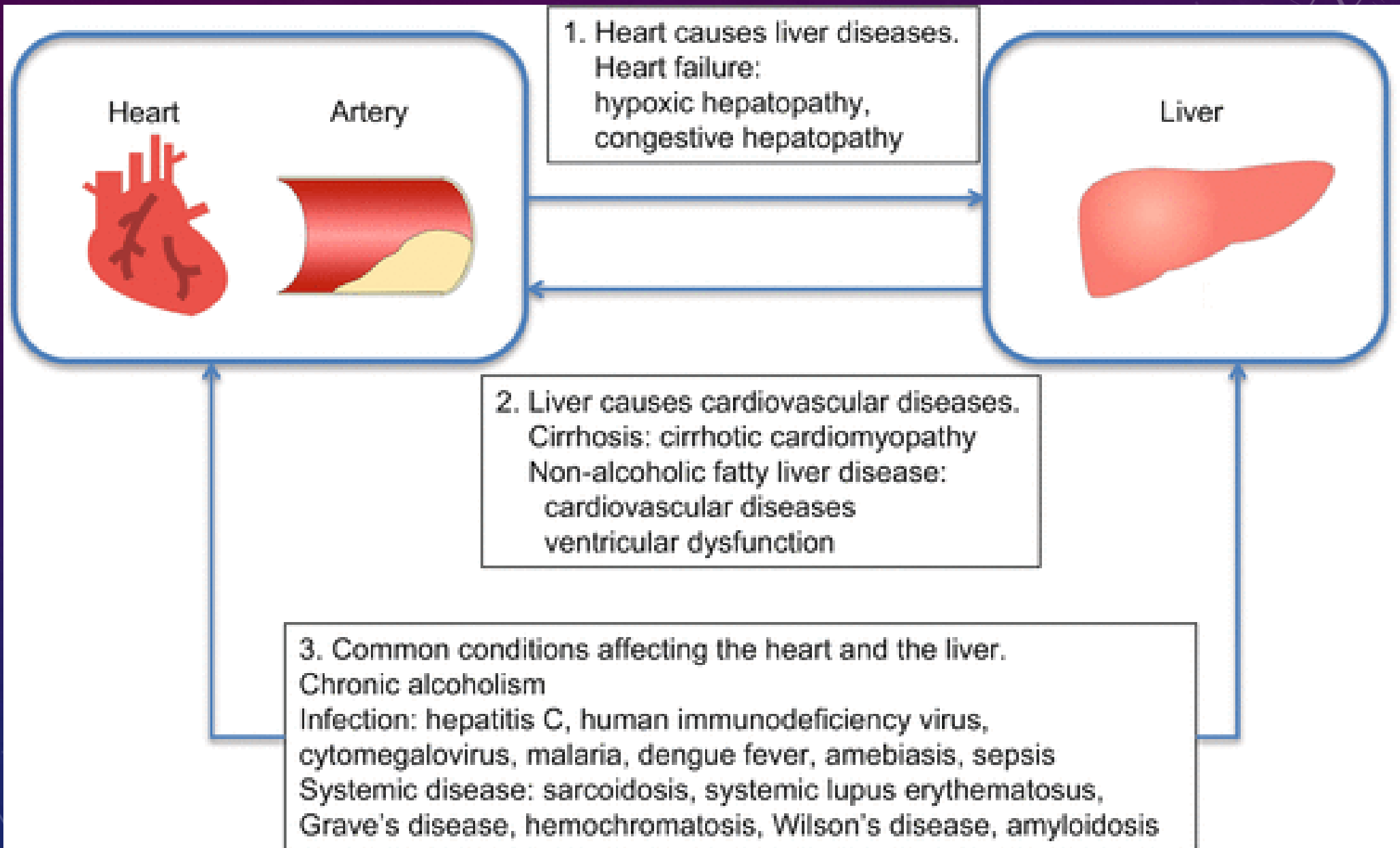
α_1 -Antitrypsin deficiency

Cystic fibrosis

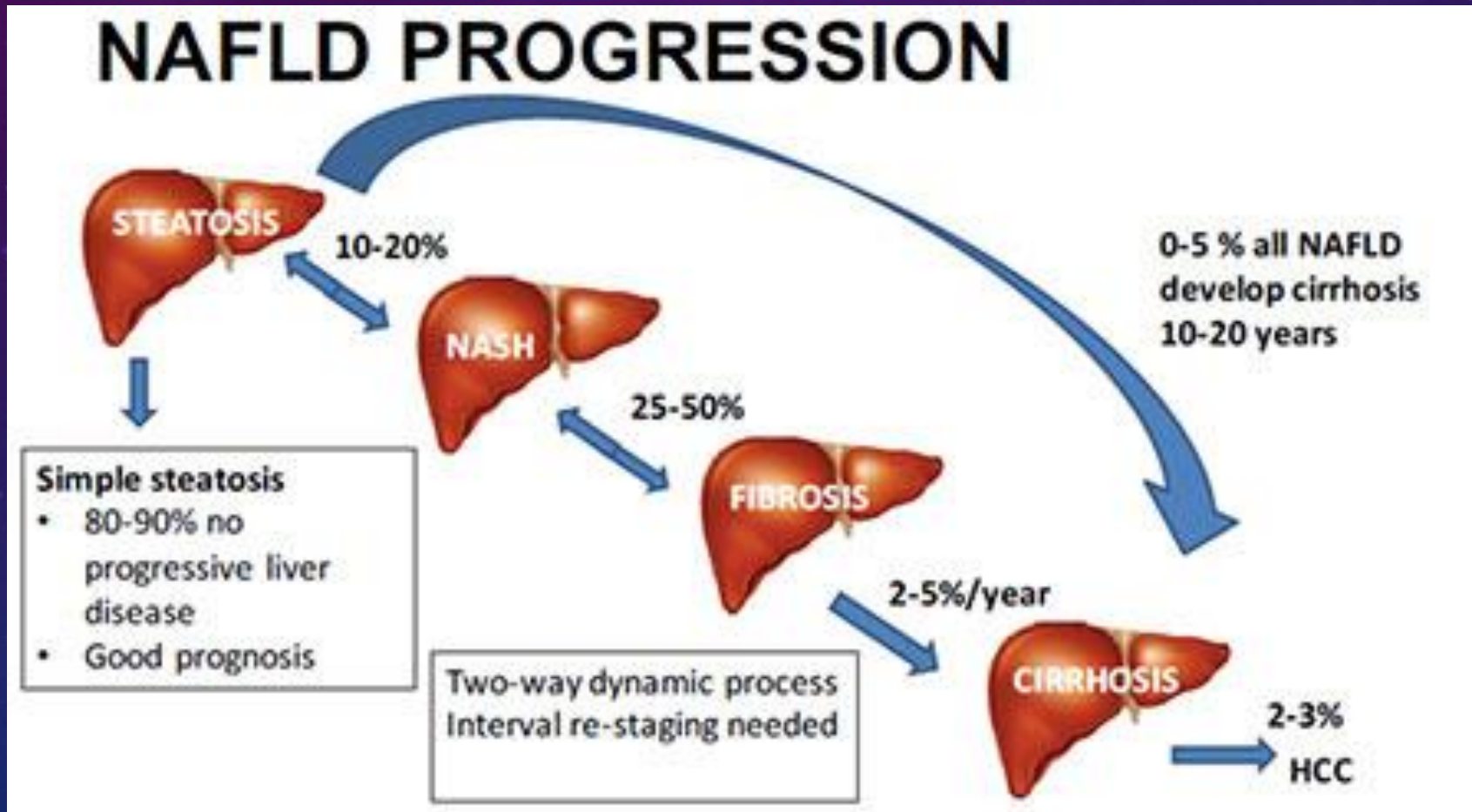
Cryptogenic cirrhosis

CARDIAC DISEASES AFFECTING THE LIVER AND VICE VERSA

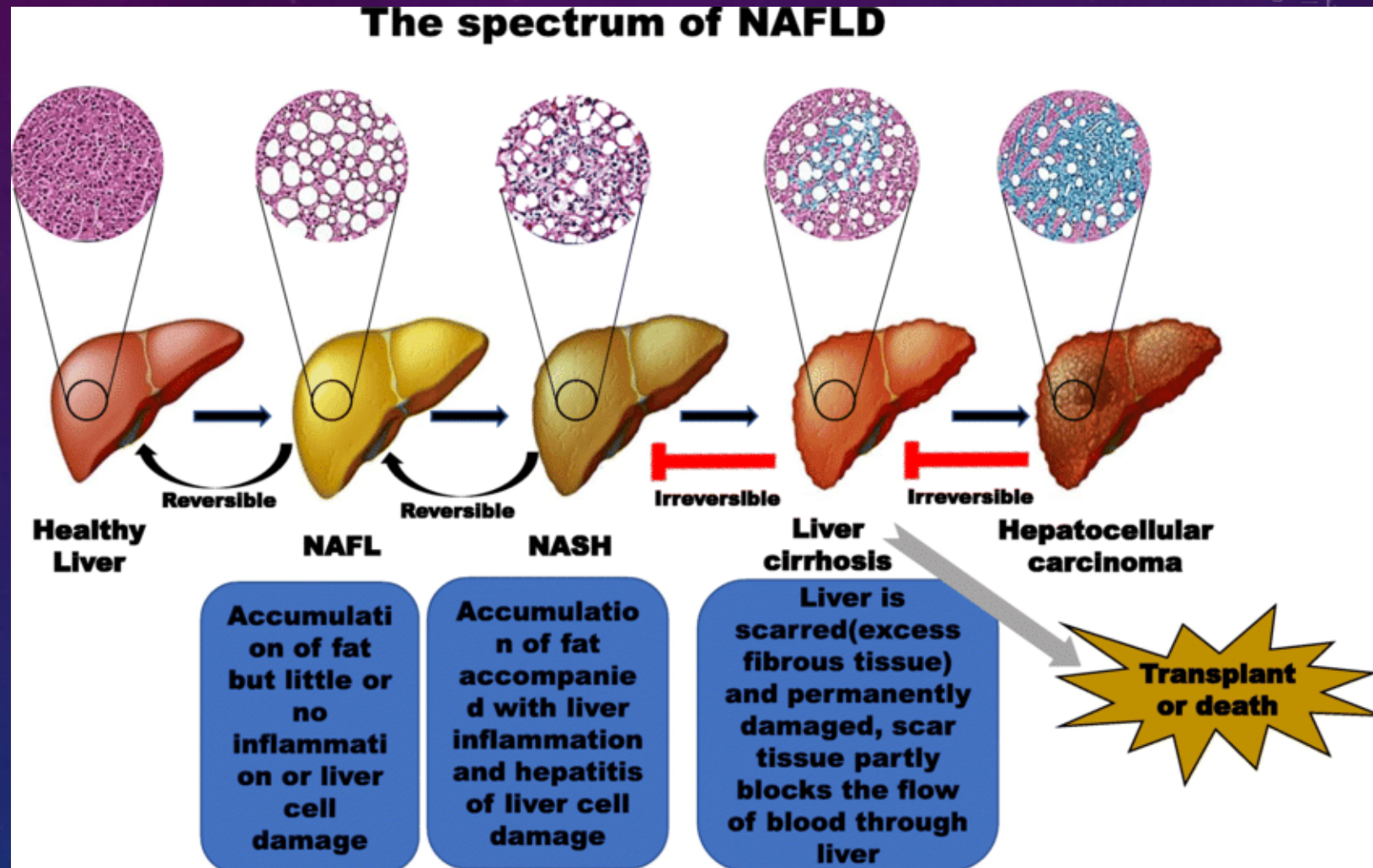


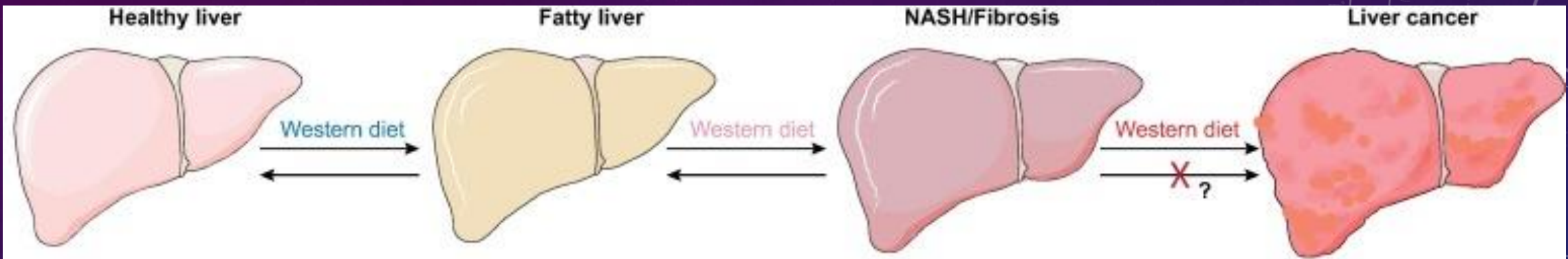


FATTY LIVER



NONALCOHOLIC FATTY LIVER DISEASE





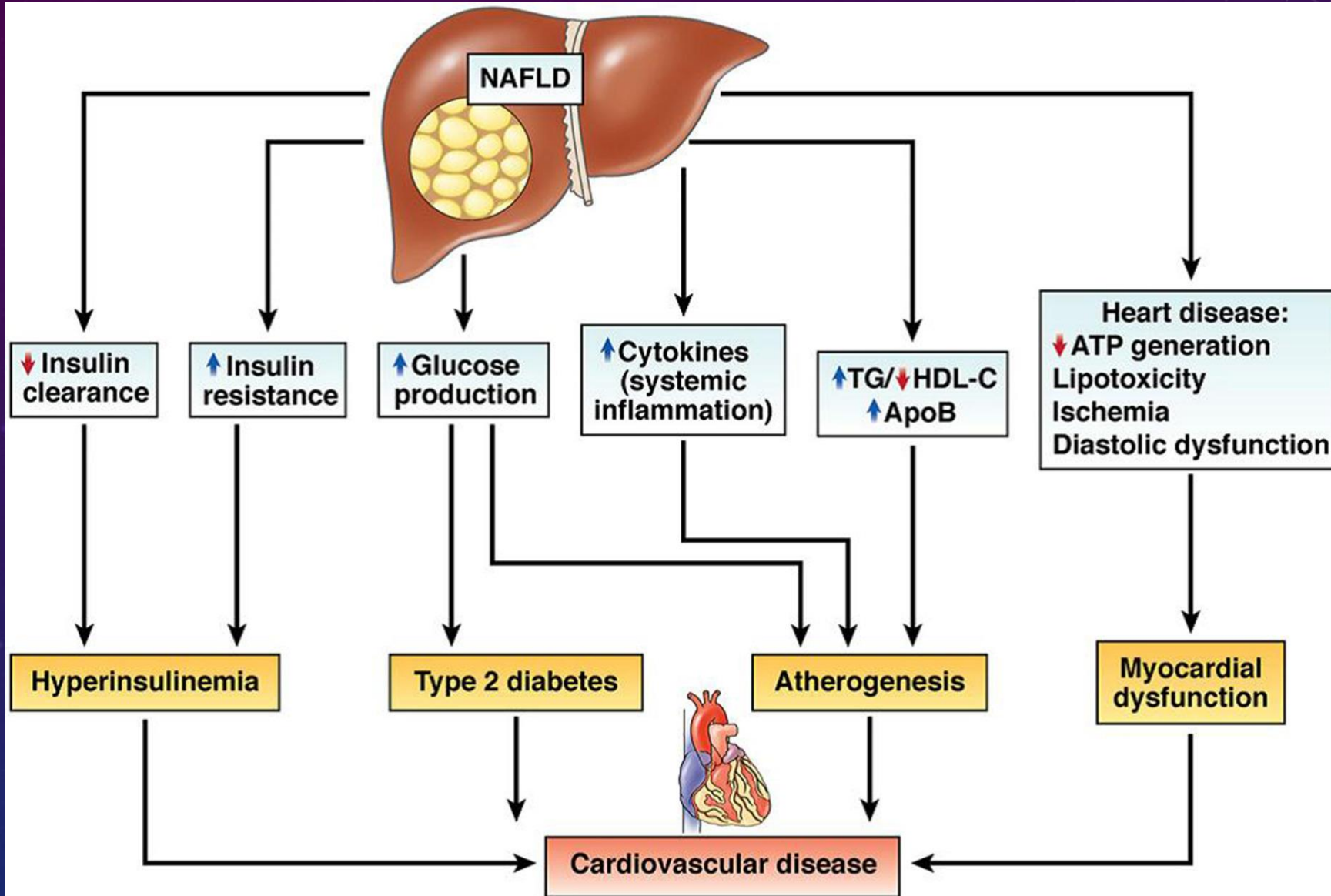
Hypocaloric or isocaloric - Mediterranean diet
Aerobic or resistance exercise
(Clinical trials)

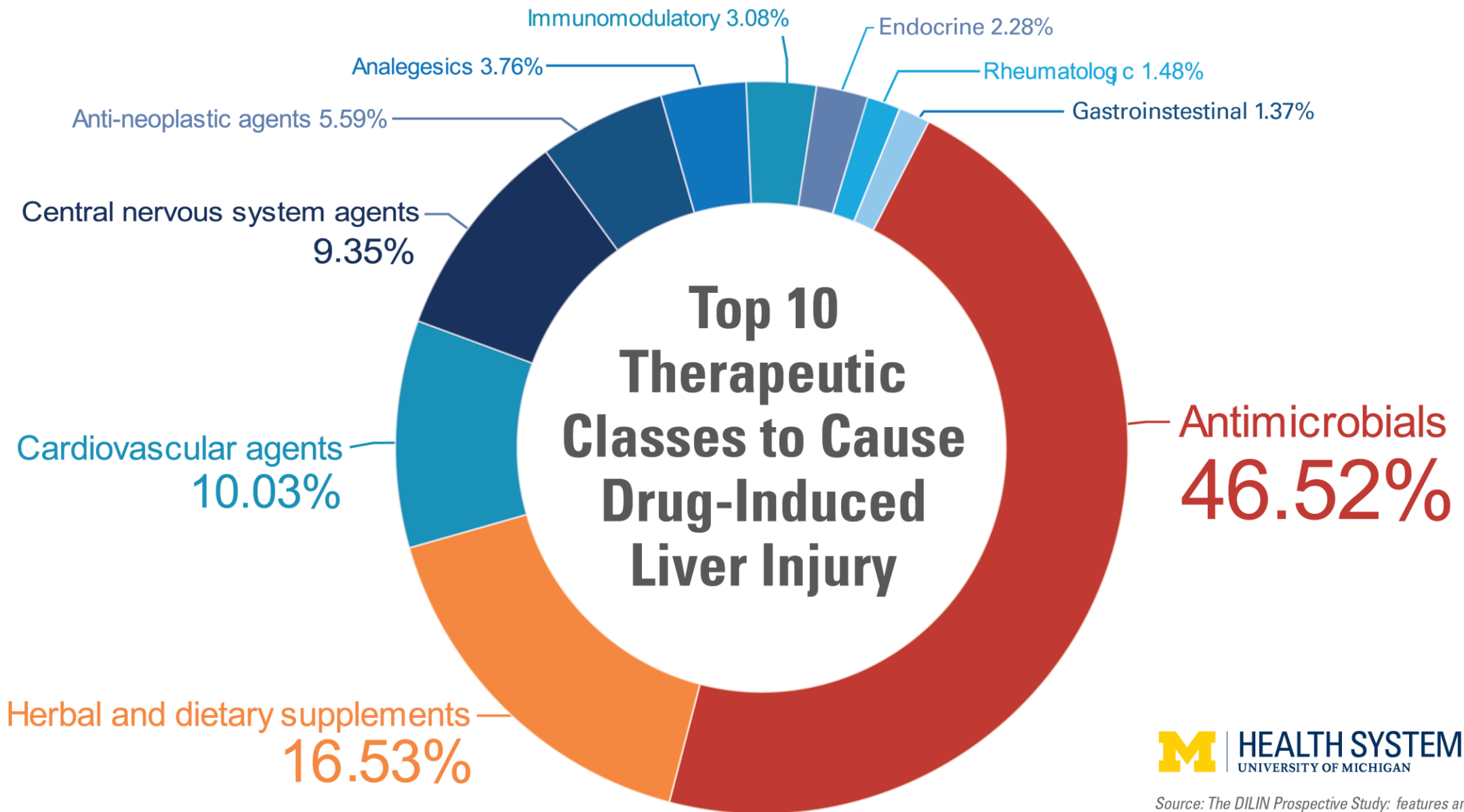
≥7-10% Weight reduction
 by energy deficit of 500-750 kcal/day through either diet:
 • low fat
 • low carb
 • Mediterranean
(Clinical trials)

Dietary composition modification
 Reduced fructose
 Mediterranean diet
(Observational studies)

Mediterranean diet
 • High fibres
 • High fish
 • High vegetables
 • Low cholesterol
 • Low sugar

Drinks
 • Coffee ≥2-3 cups/day
 • No alcohol in cirrhotics
(Observational studies)





DRUG INDUCED LIVER INJURY (DILI)

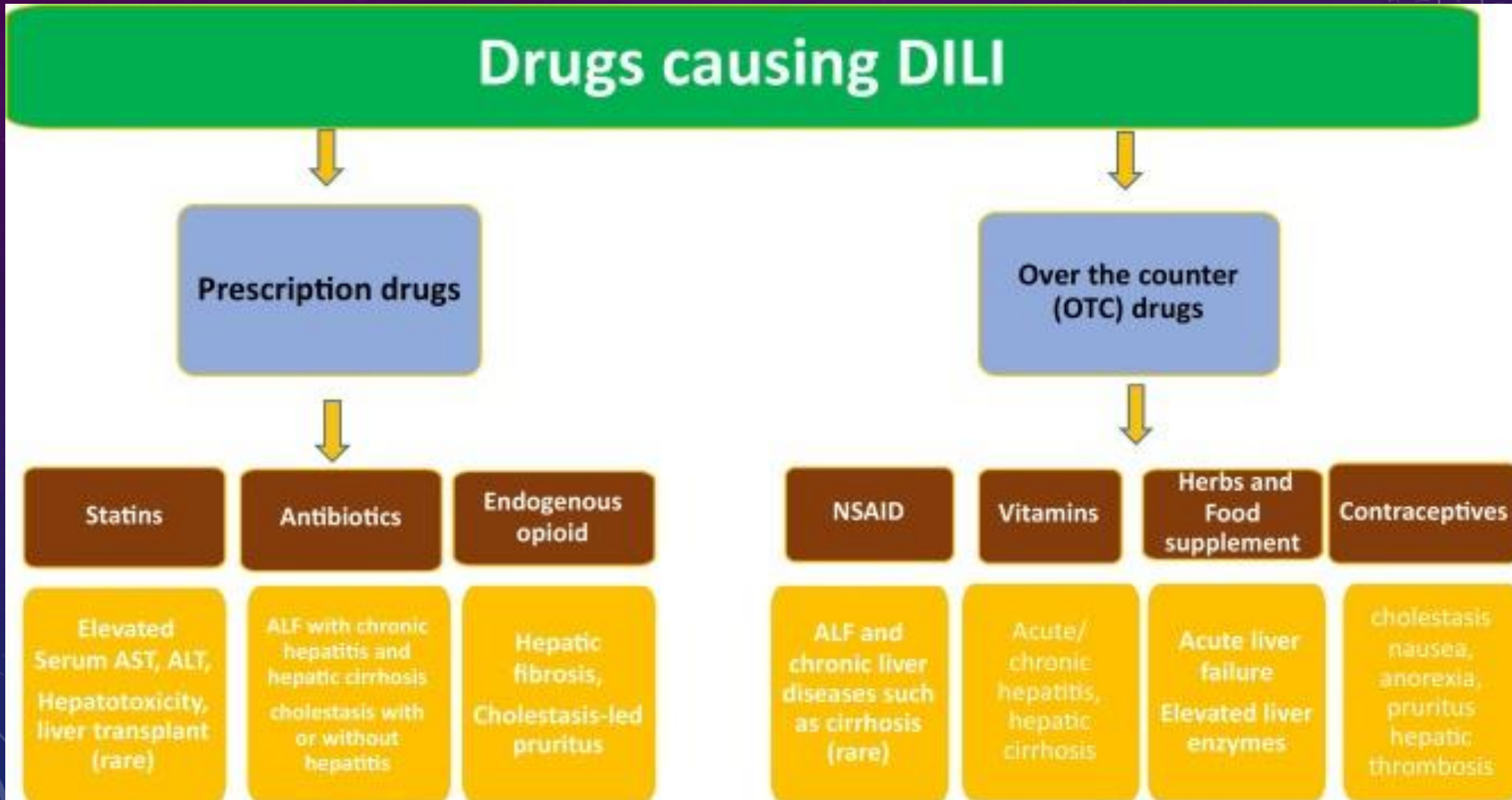
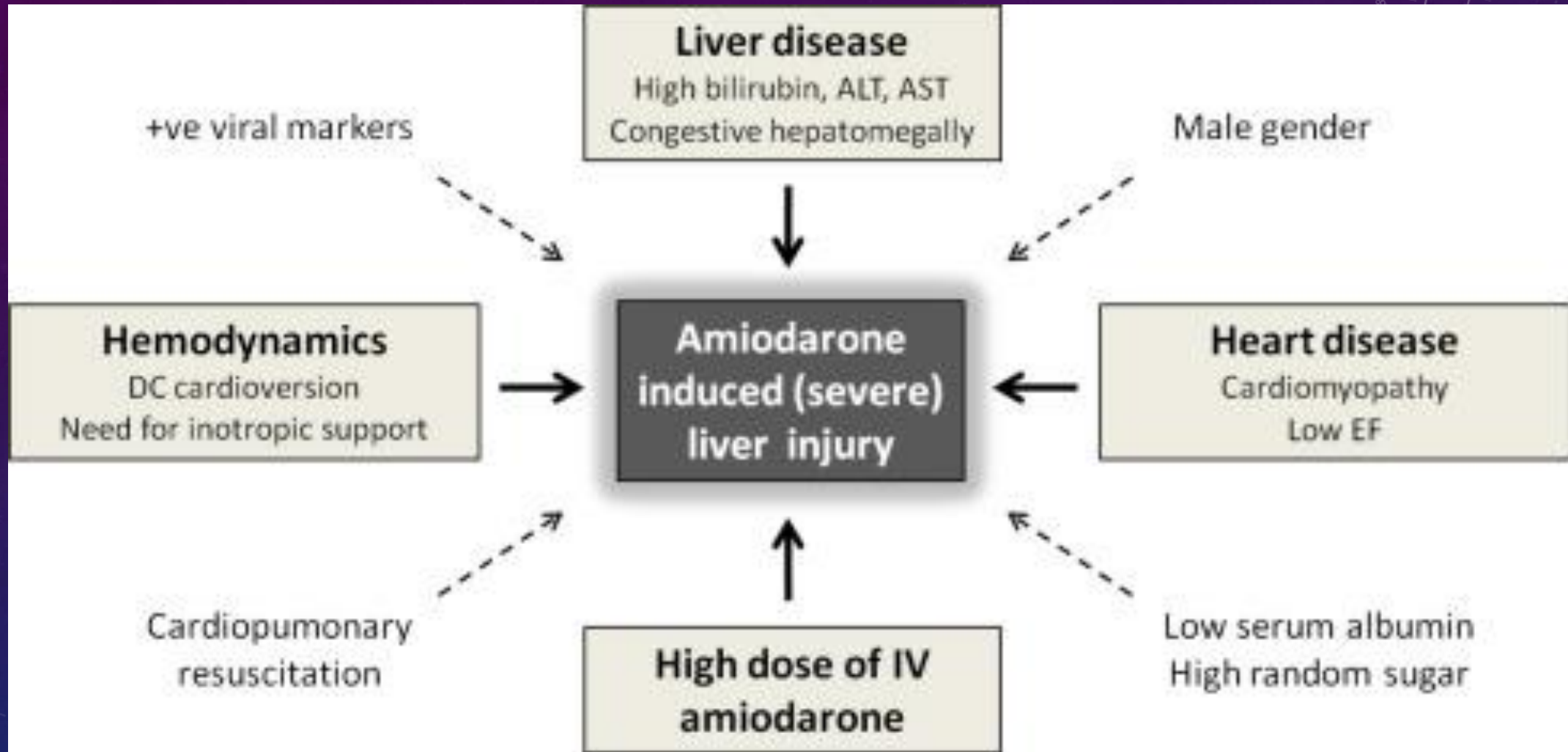


Table 4
Clinical spectrum of drug-induced liver disease and associated drugs

| Type of Liver Injury | Drugs |
|--|--|
| Toxic necrosis | Acetaminophen, sulfonamides, ketoconazole, isoniazid, rifampin, phenytoin, valproic acid, carbamazepine, diclofenac, labetalol , disulfiram |
| Acute hepatitis | Methyldopa, nevirapine, ritonavir, minocycline |
| Cholestasis | Oral contraceptives, anabolic steroids, warfarin |
| Mixed-pattern hepatocellular/cholestasis | Macrolide antibiotics, chlorpromazine, azathioprine, amitriptyline, nitrofurantoin, phenytoin, phenobarbital, sulfonamides, verapamil |
| Chronic hepatitis | Minocycline, nitrofurantoin, fenofibrate, methyldopa, phenytoin, propylthiouracil, diclofenac |
| Hepatic vein thrombosis | Dacarbazine, oral contraceptives |
| Veno-occlusive disease | Azathioprine, mercaptopurine, cyclophosphamide, oral contraceptives, tetracycline, pyrrolizidine alkaloids |
| Steatosis | Corticosteroids, nitrofurantoin, methotrexate, tamoxifen, valproic acid, zidovudine, amiodarone, diltiazem, verapamil |
| Granulomatous hepatitis | Allopurinol, amiodarone, carbamazepine, diltiazem, isoniazid, methyldopa, phenytoin, quinidine, sulfonamides |

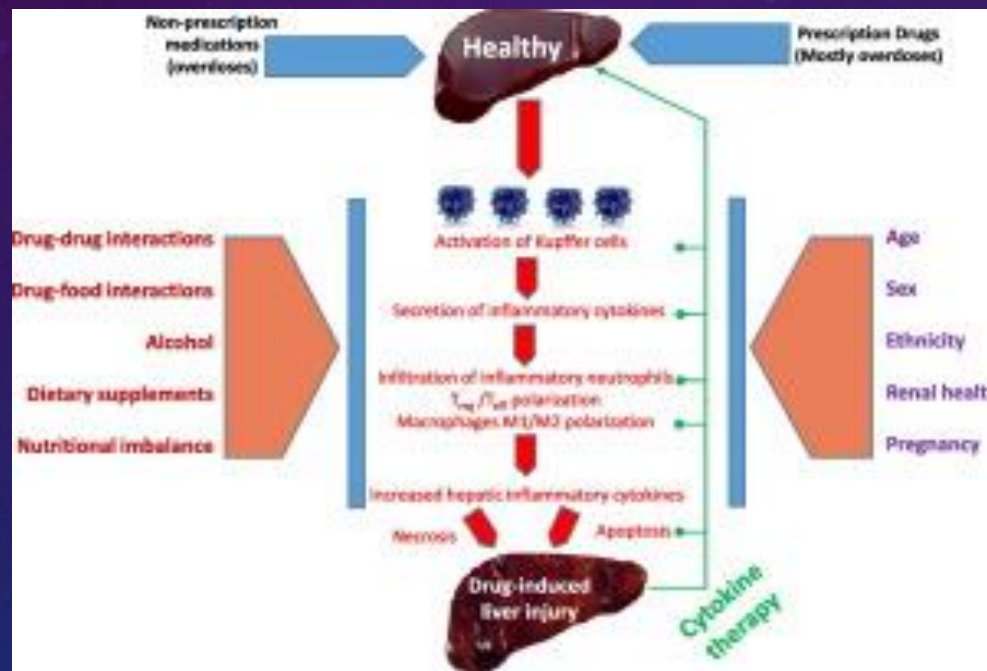
AMIODARONE

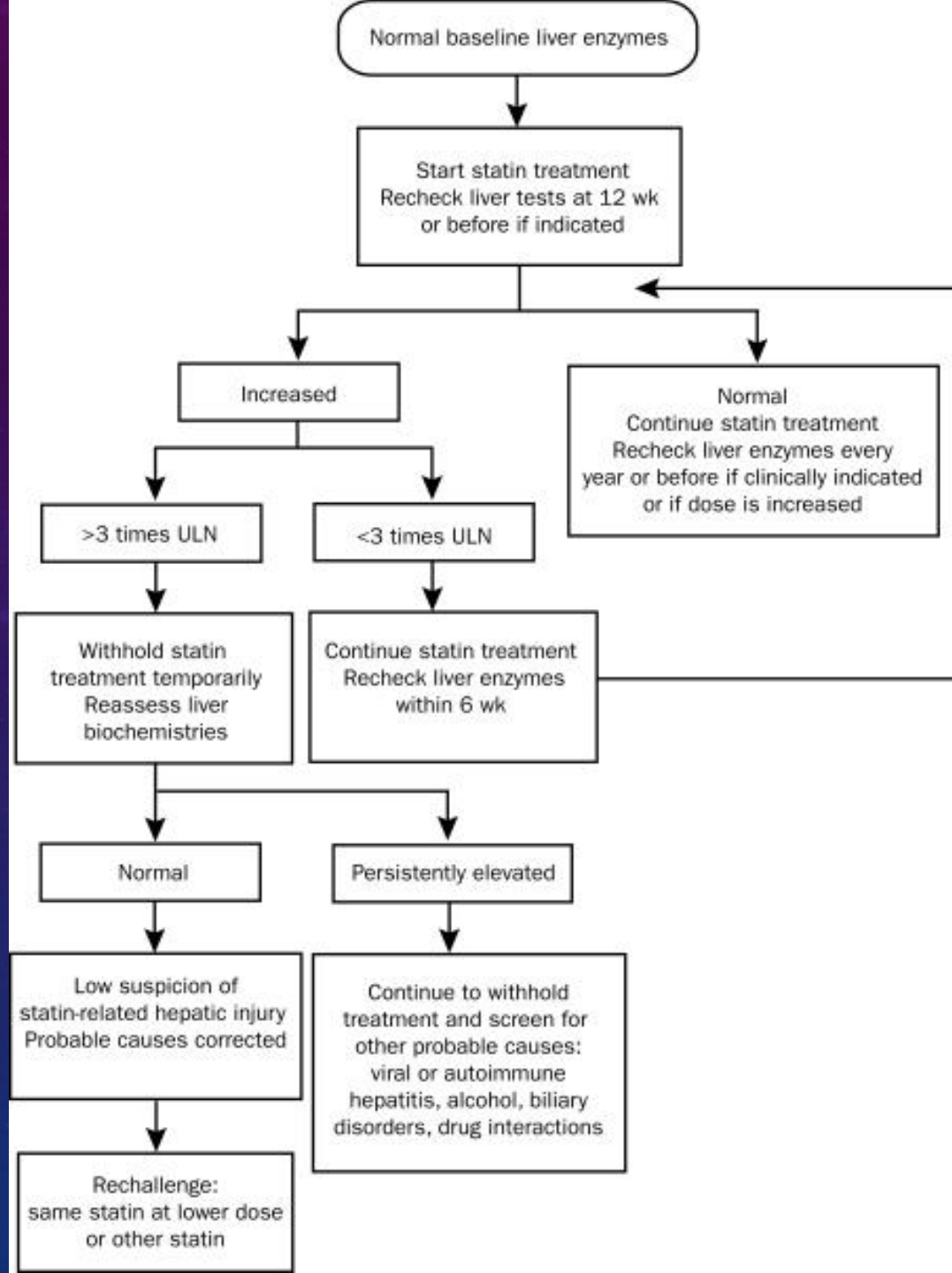
The background features a dark blue gradient with a field of small, light blue stars. Overlaid on this are several technical diagrams in a lighter blue color. On the right side, there is a large circular gauge with concentric rings and numerical markings from 80 to 210. Below it is a smaller circular diagram with dashed lines and arrows. In the bottom left corner, there is another circular diagram with dashed lines and arrows. The overall aesthetic is clean, modern, and technical.



STATINS

The background features a dark blue gradient with a fine, light blue dot pattern. On the right side, there is a large, semi-circular technical graphic. It consists of several concentric circles and arcs. The outermost arc is a scale with numerical markings from 80 to 210 in increments of 10. A dashed line with an arrowhead points inward from the 180-degree mark. Another dashed line with an arrowhead points outward from the 100-degree mark. In the center of these circles, there are two solid white arcs forming a partial circle. In the bottom right corner, there is another smaller circular graphic with a dashed outer arc and an arrowhead pointing clockwise, and a solid inner arc.





Niacin

Conjugation
Low Affinity, High
Capacity

Amidation
High Affinity, Low
Capacity

Nicotinuric

Nicotinamide

Liver Toxicity



Table. Examples of Common Herbal Medications Associated with Hepatotoxicity

| Herb Scientific Name | Reported Products | Common Possible Uses | Type of Hepatotoxicity Reported |
|---|--|---|---|
| <i>Actaea racemosa</i> | Black cohosh | Menopause symptoms | Acute, autoimmune, and fulminant hepatitis ^{20,21} |
| <i>Camellia sinensis</i> | Green tea extract, Hydroxycut | Weight loss, mental alertness, lowering cholesterol | Cholestatic hepatitis, fulminant liver failure ^{22,24} |
| <i>Symphytum officinale</i> | Comfrey, pyrrolizidine alkaloids ^a | Back pain, osteoarthritis, sprains | Veno-occlusive disease resulting in acute liver failure, fibrosis, and cirrhosis ²⁵ |
| <i>Teucrium chamaedrys</i> | Germander | Fever, stomachache, diarrhea, gall bladder conditions, digestive aid, adjunct for weight loss | Acute, chronic, and fulminant hepatitis ^{26,27} |
| <i>Chelidonium majus</i> | Greater celandine | Dyspepsia, detoxification, irritable bowel syndrome, antispasmodic | Cholestatic hepatitis ^{28,29} |
| <i>Piper methysticum</i> | Kava | Anxiety, depression | Hepatic necrosis, cholestatic hepatitis fulminant liver failure ^{30,32} |
| <i>Larrea divaricata</i> Cav <i>Larrea tridentata</i> (DC) <i>Coville</i> | Chaparral ^a , creosote bush, greasewood | Common cold, pain | Cholestatic hepatitis, fulminant liver failure ^{33,34} |
| <i>Hedeoma pulegioides</i> <i>Mentha pulegium</i> | Pennyroyal | weight loss | Fulminant hepatic necrosis ^{35,36} |
| <i>Cassia augustifolia</i> | Senna | Pesticide/insect repellent | Acute hepatitis, subacute cholestatic hepatitis, acute liver failure, portal vein thrombosis ^{37,40} |
| <i>Ephedra sinica</i> | Ma Huang ^a | Constipation | Acute hepatitis and liver failure ^{41,42} |
| <i>Morinda citrifolia</i> | Noni juice | Weight loss | Severe acute hepatitis (hepatocellular) ^{45,46} |
| <i>Usnea</i> | LipoKinetix ^a | Immune stimulating, antioxidant | Acute liver failure ^{44,45,47} |

^aDue to multiple cases of acute liver failure, the product was removed from the market in the United States.



THANK YOU