

# Regulation of Healthy Bile Acids

Developed and reviewed by the clinical, chiropractic, and naturopathic members of the Standard Process team

## The Importance of Bile Acids

Bile acids are essential digestive compounds and fundamental components of bile, synthesized from cholesterol in the liver and stored in the gallbladder. As amphipathic molecules, bile acids function as natural detergents, emulsifying dietary fats and facilitating the absorption of fat-soluble nutrients such as omega-3 fatty acids, coenzyme Q10, and vitamins A, D, E, and K. They are also central to cholesterol homeostasis and act as signaling molecules that influence metabolism and inflammation.

The liver produces two primary bile acids, cholic acid and chenodeoxycholic acid, which are conjugated with glycine or taurine before secretion. Conjugation enhances solubility, reduces cytotoxicity, and improves their effectiveness in emulsifying dietary fats. These conjugated bile acids represent the most physiologically efficient and least harmful form within the intestinal lumen.

Once bile acids enter the intestine, gut microbes can deconjugate and further metabolize them, generating secondary bile acids such as deoxycholic acid and lithocholic acid. While these compounds still aid in fat digestion, they are more hydrophobic and may be irritating to the gut lining. Excessive levels or impaired clearance of secondary bile acids have been associated with intestinal inflammation, dysbiosis, impaired liver detoxification, insulin resistance, and neurocognitive impairments.

Dietary and lifestyle interventions are crucial for maintaining a balance of primary and secondary bile acids. Supporting optimal liver function, promoting gastrointestinal microbial health and diversity, and enhancing bile acid solubility all help regulate bile acid composition and protect long-term health.

## Supportive Lifestyle Practices

- Encourage aerobic training such as swimming, cycling, dancing, and running. Aerobic fitness has been associated with the beneficial secondary bile acid ursodeoxycholic acid (UDCA), which has been shown to reduce bile acid toxicity, enhance cell membrane stability, prevent liver cell fat infiltration, and ameliorate liver fibrosis.<sup>1</sup>
- Consider intermittent fasting as a targeted therapy to modulate gut microbiome composition. Time-restricted feeding has been shown to favor bacteria expressing bile salt hydroxylase, including *Lactobacillus* and *Bifidobacterium*, which deconjugate bile acids, alter bile acid pools, and influence metabolic pathways.<sup>2</sup>

## Whole Foods Nutritional Recommendations

- Support a healthy microbiome by consuming soluble and insoluble dietary fiber, such as oats, apples, carrots, and whole grains. Dietary fiber binds to bile acids in the gut, inhibiting the absorption of toxic secondary bile acids while reducing bile acid reabsorption, increasing excretion, and lowering bile acid burden.<sup>3</sup>
- Encourage consumption of whole food sources of dietary choline, such as egg yolks, beef, chicken, edamame, and salmon. Choline, a precursor to phosphatidylcholine, is crucial for solubilizing cholesterol in bile and protecting hepatobiliary epithelia from bile acid-induced cytotoxicity.<sup>4</sup>
- Incorporate glucosinolate-rich foods, such as broccoli, Brussels sprouts, collard greens, turnip greens, and Spanish black radish, to support liver and gallbladder function. Glucuronidation and sulfation—Phase II conjugation reactions—are major contributors to bile acid detoxification and reduction of bile-acid-mediated toxicity.<sup>5</sup>

# Dietary Supplement Regimen



## Choline

Suggested Use: **1 tablet per meal**

A choline supplement made with choline bitartrate containing 180 mg of choline per serving, supports healthy fat metabolism.\*

- Supports healthy cell membrane structure and function\*
- Provides support for methylation reactions\*
- Supports healthy liver function\*
- Supports a healthy nervous system\*
- Excellent source of choline\*



## Whole Food Fiber

Suggested Use: **1 level tablespoon**

Whole Food Fiber is a good source of dietary fiber from nutrient-rich whole foods.

- Contains both soluble and insoluble fiber
- Supports healthy bowel function\*
- Promotes regular intestinal motility and elimination\*
- Supports healthy epithelial cells in the bowel\*
- Provides food for beneficial microorganisms in the lower gastrointestinal (GI) tract\*



## Spanish Black Radish

Suggested Use: **1-3 tablets per day**

- Supports healthy liver and gallbladder function\*
- Encourages healthy digestion\*
- Contains organically grown Spanish black radish from the Standard Process certified organic farm



## Turmeric Forte

Suggested Use: **1 tablet 1-2 times daily**

Turmeric Forte contains a bioavailable form of Turmeric rhizome and Fenugreek seed. These herbs and their constituents:

- Support a healthy inflammatory response\*
- Support healthy liver function and healthy digestion\*
- Provide antioxidant activity\*

## Assessment of Bile Acids

## In Office/Physical Exam

- Lab studies: Liver function tests, bilirubin, serum bile acids, lipid panel, 25-OH vitamin D, fecal fat, elastase
- Signs/Symptoms: fat malabsorption, steatorrhea, diarrhea, bloating, gas, GERD-like symptoms, upper right quadrant discomfort

- Medical History: Gallbladder removal, fatty liver disease, Crohn's or ulcerative colitis, small intestine bacterial overgrowth (SIBO)

## REFERENCES

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2. Zhang, Z., et al (2025). Cell & bioscience, 15(1), 64.
3. Guo, K., et al (2022). Front. Nutr, 9, 1003571.
4. Falguières, T., et al (2014). Clinics and research in hepatology and gastroenterology, 38(5), 557-563.
5. Kastrinou Lampou, V., et al (2023). Toxicology in vitro : an international journal published in association with BIBRA, 87, 105533.