Bile Acid Functional Tests and Protocols

Symptoms of bile acid sluggishness or stasis

Sluggishness (Biliary Sludge)

Functional decline of bile acid secretion is more common in women than men, as is traditionally represented by the four F's – Female, Fat, Forty and Fertile.

Change in weight distribution, decline in energy, change in skin condition, difficulty with fatty foods, nausea, mood swings, changes in hormone related problems, decline in libido, travel sickness, light coloured stools, greasy or shiny stools, bitter taste in mouth after meals, nausea after wine, easily intoxicated, hangovers, haemorrhoids, sensitive to tobacco smoke, sensitivity to diesel fumes or perfumes, mid thoracic or right shoulder pain, reaction to aspartame, increased inflammation and blood sugar problems can all be linked to sluggish or reduced bile output.

Diagnosis

A good case history including food choices and body composition as well as a functional Murphy's test can give good indication of reduced bile quality and quantity. Urine test strips can also be used to see if any bilirubin is present, an absence of bilirubin does not exclude sludge.

Stasis (Cholestasis)

Jaundice, dark urine, light-coloured stools, and generalised itchiness are characteristic symptoms of cholestasis. Jaundice results from excess bilirubin deposited in the skin, and dark urine results from excess bilirubin excreted by the kidneys.

Retention of bile products in the skin may cause itching, with subsequent scratching and skin damage. Stools may become light-coloured because the passage of bilirubin into the intestine is blocked. Stools may contain too much fat (a condition called steatorrhea) because bile cannot enter the intestine to help digest fat in foods.

Fatty stools may be foul-smelling. The lack of bile in the intestine also means that calcium and vitamin D are poorly absorbed. If cholestasis persists, a deficiency of these nutrients can cause loss of bone tissue. Vitamin K, which is needed for blood clotting, is also poorly absorbed from the intestine, causing a tendency to bleed easily.

Diagnosis

Physical findings: Can include certain kinds of abdominal pain (such as intermittent pain in the upper right side of the abdomen and sometimes also in the right shoulder) and an enlarged gallbladder (felt during the physical examination called Murphy's Test or detected by imaging studies).

Blood tests: Two enzymes, alkaline phosphatase and gamma-glutamyl transpeptidase, are very high in people with cholestasis. A blood test that measures the level of bilirubin indicates the severity of the cholestasis but not its cause.

Imaging studies: An imaging study, usually ultrasonography, is almost always done if blood test results are abnormal. Computed tomography (CT) or sometimes magnetic resonance imaging (MRI) may be done in addition to or instead of ultrasonography.

Urine tests: These look for the presence of bilirubin, which if conjugated correctly would not be found in urine. The urine test strip has limited value because it may be falsely negative with prolonged storage of the urine specimen, vitamin C ingestion, or nitrates in the urine (eg, from UTIs). It does however make for a cheap functional assessment of effectiveness of intervention.

Physical exam

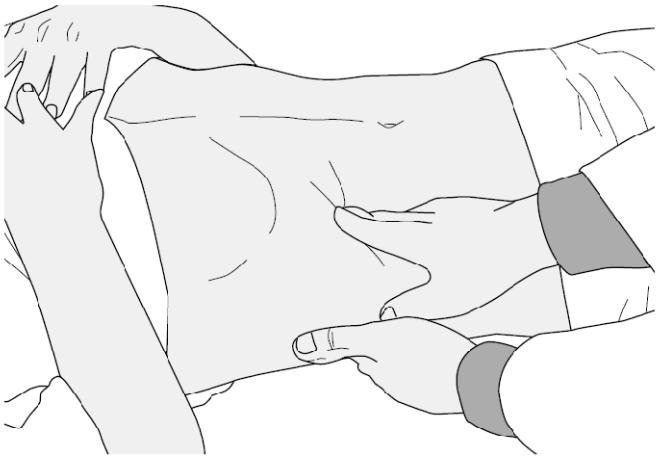
1. **Functional Murphy's test.** (view PDF)

Ask your patient to lie on their back with their knees bent, to relax the abdomen.

Ask the patient to take in and hold a deep breath while palpating the right subcostal area. If pain occurs when the inflamed gallbladder comes into contact with the examiner's hand, Murphy's sign is positive.

For the functional test, if there is no acute discomfort as described above, then ask the patient to exhale. As they do, push gently but firmly under the edge of the ribs up towards the right axilla. This will compress the GB against the diaphragm. There should be nothing more than mild pressure and in a healthy moderately toned abdomen the fingers will be able to travel up to the middle knuckle without discomfort if all is healthy.

Tenderness, muscular contraction and expulsion of your fingers or a bruised and tender sensation after withdrawal suggests biliary congestion, as does the occasional production of wind and belching following the test.



2. **Finger web pressure discomfort on palpation between the thumb and forefinger of the right hand can also support indication of reduced bile acid flow.**

Protocols

Foods and food concentrates

Dietary recommendations are always based on a thorough case history including medical interventions such as gall bladder surgery. In general the following food guidelines will help hasten a recovery of optimal bile acid function.

Basic recommendations

1. Reduced fat, cholesterol and animal proteins.
2. Reduce or exclude refined carbohydrates
3. Increase overall fibre, esp. fruit fibres such as grated apples due to the skins terpenoid content. Olives, including skins are also excellent as is fresh or standardised dried garlic.
4. Increase vegetables esp. cruciferous vegetables to aid TGR5 activation.
5. Radish and beets raw, grated or steamed each day, or in soups also act to promote bile flow. Beetroot and beetroot tops are the richest source of betaine, a natural liver detoxifier and bile thinner. Use chopped or shredded raw beets combined with a little raw flax oil and lemon juice daily. It's easy to include whole beetroots in the diet. They can be baked, roasted, steamed, grated raw in salad, or juiced with other vegetables.
6. Asparaus, celery, leeks and carrots should all be consumed steamed or lightly boiled.

Avoid if possible

1. Dairy products except butter
2. Wheat and rye where indicative of gastrointestinal reactions.
3. Fried foods and hydrogenated fats
4. Very cold drinks – they can induce transitory colic.
5. There may also be individual merit in excluding eggs, pork, onion, coffee for a short while.

Supplements for optimising bile acid flow and signalling components

Supplement	Dose	Areas of Effect	Ingredients/Mechanism
Beta TCP (BRC)	**1-4 per meal**	Reduction of sludge, increased bile flow. TGR5, FXR-α, BAT	Taurine is essential in the production of bile salts; Pancrealipase are fat digesting enzymes, supporting fat metabolism. Beet concentrate effectively thins the bile to decongest the liver.
Beta Plus (BRC)	**1-4 per meal**	TGR5, FXR-α, BAT, VLDL, anti-inflammatory, bacteriostatic, GIP inhibitor	Beet Juice and bile salts - primarily Cholic acid and deoxycholic acid.
Bio-GGG-B (BRC)	**1-3 per meal**	Fat metabolism and bile activator	The enzymatic (phosphorelated) forms of thiamin, riboflavin, pyridoxine, are included, along with choline, inositol, PABA, Trimethylglycine, and others.
Phosphatydylcholine (BRC)	**1-2 per meal**	Bile emulsifier and increased flow, resolution of sludge	Commonly known as lecithin, is an effective fat emulsifier that is an important component of bile. In the past decade it became apparent that phospholipids, and not bile salts, are the main cholesterol emulsifiers in bile.[1,2]
Mg Zyme (BRC)	**1-6 at night**	Increased bowel activity	Thins bile and keeps bowels moving. Magnesium has numerous functions in the body, and acts as an electrolyte and calcium buffer. It maintains bowel mobility and balances minerals.
Sugar Balance Formula (ARG)	**1-3 per day**	TGR5 stimulation	Guggul extract and other Triterpenoids plus nutrients for TGR5 activation.
Lactobacillus; Rhamnosus, Plantarum, Salivarius (ARG)	**3 per day with food**	Hepatic reuptake, bile acid metabolism, bile acid pool management in terminal ilium.	Bacterial deconjugation is essential for reuptake and neutralisation of noxious bile components.
Bio Bifido BacT – *Bifido Bifidus* (BRC)	**1 tspn daily**	Ileal deconjugation and hepatic re uptake modifier.	Bacterial deconjugation is essential for reuptake and neutralisation of noxious bile components

For further information contact Nutri-Link Technical Team on: 0 8704 054 002.

[1] Jungst D, Lang T, Huber P, et al. Effect of phospholipids and bile acids on cholesterol nucleation time and vesicular/micellar cholesterol in gallbladder bile of patients with cholesterol stones. J Lipid Res 1993;34:1457-1464
[2] Halpern Z, Moshkowitz M, Laufer H, et al. Effect of phospholipids and their molecular species on cholesterol solubility and nucleation in human and model biles. Gut 1993;34:110-115