



Bile Acids (Dogs & Cats)

Bile acids measurement is a highly sensitive assay to assess hepatobiliary function. Bile acids are derived from cholesterol in the liver, released into the intestine after eating to aid in fat absorption, then enter the portal circulation to be cleared by the liver and re-excreted into bile. Serum bile acids concentrations may be elevated in diseased states leading to decreased functional liver mass, with obstructive cholestasis, and with congenital or acquired portosystemic vascular shunts.

Biochemical changes including elevated ALT, AST, ALK, bilirubin with decreased albumin, urea, glucose, and cholesterol, and prolonged coagulation times are not reliable primary indicators of liver function compared to bile acids measurement.

A bile acids “challenge” test is recommended over a single fasting or random sample (in dogs and cats) because it has substantially higher sensitivity. Feeding stimulates gall bladder contraction and this increased load can better “challenge” the liver’s ability to clear the increased bile acids presented to it.

Indications for testing

- Bile acids “challenge” testing should be performed when there are clinical and biochemical findings that suggest liver dysfunction or portosystemic shunting.
- Testing is NOT indicated if the patient is icteric from hepatic or post-hepatic cholestasis, as the bile acids (and usually bilirubin) will inevitably be high and not provide additional information.
- When used as a screening test in puppies from breeds predisposed to congenital portosystemic shunts, it is recommended to delay testing until after 16 weeks of age, as bile acid concentrations may be falsely lower in puppies younger than 16 weeks.

Collection protocol

Sample haemolysis and lipemia can interfere with bile acids measurement and should be avoided by fasting, using a large gauge needle, jugular venepuncture, and separation of the serum after clotting.

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Species:
Canine, Feline



Specimen:
Serum
(minimum 1 ml)



Container:
Plain tube,
gel tube

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Test protocol

1. Fast the patient for 12 hours. Collect the first blood sample and label the tube with patient name and “pre” or time zero sample.
2. Feed a small amount (2-4 tablespoons) of canned maintenance-type diet. Note that a high-fat diet is NOT necessary, and can sometimes contribute to unwanted sample lipemia if given in excess.
3. Two hours after feeding, collect the second sample and label with patient name and “2 hr”. Submit both tubes to Gribbles with the completed request form.

Interpretation of bile acids challenge test

Post-prandial bile acid concentrations >31 umol/L (dogs) are suggestive of hepatobiliary disease (decreased functional mass, cholestasis or portovascular shunting). Values between 15-31 are equivocal, and such dogs may or may not have liver dysfunction. Most animals with congenital or acquired portosystemic shunting have markedly increased post-prandial bile acids concentrations.

Up to 20% of the time, the fasting bile acids may be higher than the post-feeding concentration. This can be due to a recent meal before testing, spontaneous gall bladder contraction, insufficient gall bladder contraction after feeding, or variations in gastric emptying, intestinal transit time or absorption. If both results are <31 umol/L (especially <15 umol/L), then hepatobiliary dysfunction is unlikely.

Maltese dogs – Update!

Gribbles has previously reported that bile acids measurement in the Maltese breed may have questionable utility, based on a 1995 Australian study (Tisdall et al, Aust Vet J) which found that this breed may have “artifactualy” elevated serum bile acids caused by unknown reacting substances. In this study of 200 Maltese dogs, only 11 dogs had liver biopsies performed. More recent research presented by Sharon Center (Cornell University) revealed that a high proportion of Maltese dogs have portal hypoperfusion due to histologically confirmed microvascular dysplasia or portosystemic vascular anomaly. Gribbles confidently endorses the use of bile acids “challenge” test in Maltese dogs, as for other breeds. While ammonia tolerance testing remains an alternative test to assess liver function, ammonia measurement is problematic, inconvenient and very unstable.

References

- Center SA. Breed-Specific Hepatopathies: Scottish Terriers and Maltese Dogs. ACVIM Proceedings 2012.
- Cornell University Veterinary School website. Bile Acids. <https://ahdc.vet.cornell.edu/clinpath/modules/chem/bileacid.htm>
- Tisdall PL, Hunt GB, et al. Post-prandial serum bile acid concentrations and ammonia tolerance in Maltese dogs with and without hepatic vascular anomalies. Aust Vet J. 1995;72(4):121-6.