Bile acids

Yvonne McGrotty from Idexx Laboratories Ltd presents notes on bile acids.

Bile acids (such as chenodeoxycholic acid and cholic acid) are compounds which are synthesized in the hepatocytes from cholesterol and then excreted into bile; they are then subsequently stored in the gall bladder. Bile acids are released into the duodenum following feeding and aid in the digestion and absorption of fats in the diet.

Following release, bile acids are absorbed in the intestine and then extracted by hepatocytes and re-excreted into bile; this is known as enterohepatic circulation. This process is generally very efficient resulting in only small amounts of bile acids in circulation in healthy animals.

Bile acid stimulation test protocol

1. Starve the patient for 12 hours
2. Collect a baseline serum sample
3. Feed a regular meal (high fat meal not necessary)
4. Collect a second serum sample 2 hours after the patient has eaten
5. Ensure samples are correctly labelled as 'pre' or 'post' prandial
6. Analyse bile acids on both samples

Increased bile acids

Bile acid values of >30 µmol/l are considered to be clinically significant (although laboratory reference range may be lower than this value) and suggestive of hepatobiliary disease.

Most animals have a postprandial bile acid result higher than the preprandial value, but this may be reversed in up to 20% of dogs due to spontaneous gall bladder contraction during fasting or due to delayed gastric emptying.

Causes of increased bile acids include:

- Decreased bile acid clearance from portal blood due to a decrease in functional hepatic mass
- Abnormal portal blood flow (portosystemic shunts) (Figure 1)
- Cholestasis
- Biliary rupture
- Drug effects – ursodeoxycholic acid.

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Key points

- Bile acids should not be evaluated in icteric patients
- Serum bile acids are typically assessed in both a 12-hour fasted sample and in a sample collected 2 hours after feeding
- A bile acid stimulation test (samples collected before and 2 hours after feeding) is a more sensitive indicator of hepatic function than a single value
- Only a small amount of food is generally required to stimulate gall bladder contraction (10–30 ml of food)

FIGURE 1: (A) A Yorkshire Terrier with elevated postprandial bile acids. (B) CT scan of dog in (A) showing a portosystemic shunt.

- A regular meal can be offered (high fat foods not necessary, but avoid low fat foods)
- Bile acids are good markers of hepatobiliary function
- Increased bile acids are not, however, specific for the type of liver disease present (increased with both primary hepatic disease and extrahepatic diseases, e.g. intestinal disease, pancreatitis, hyperadrenocorticism)
- Increased results do not determine the severity or prognosis of the disease
- Ursodeoxycholic acid treatment should be withdrawn for 24–48 hours before assessing bile acids

Bile acid analysis should NOT be performed in patients with icterus/hyperbilirubinaemia. Bile acids provide no useful information regarding liver function in icteric patients.