

Cholesterol

Interpretive Summary

Description: Cholesterol is one of the main lipids in the body. It has an important role as a component of cell membranes.

Decreased Cholesterol

Common Causes

- Decreased production
 - Severe liver disease/failure
 - Cirrhosis
 - Portosystemic shunt (PSS)
- Decreased absorption
 - Low fat diet
 - Small intestinal disease (severe)
- Increased loss
 - Lymphangiectasia (lacteal rupture into the small intestine)
- Addison's disease

Uncommon Causes

- Decreased absorption
 - Maldigestion
 - Exocrine pancreatic insufficiency (EPI)
 - Brush border enzyme deficiency
 - Severe malnutrition

Related Findings

- Liver disease/failure
 - Increased or normal liver enzymes (ALT, AST, ALP, GGT), increased bilirubin
 - Decreased albumin, BUN, glucose
 - Increased bile acids, increased fasting ammonia
 - Microcytic red blood cells (PSS)
 - Ultrasound shows abnormal liver parenchyma or an aberrant vessel
 - Abnormal liver histopathology on biopsy
- Severe small intestinal disease/lymphangiectasia
 - Decreased albumin, globulin, total protein
 - Increased or decreased folate, decreased cobalamin (B12)
- Addison's disease
 - Lack of a stress leukogram
 - May have decreased sodium and chloride, increased potassium
 - May have decreased albumin
 - Abnormal stimulation on ACTH stimulation test, decreased resting cortisol

Increased Cholesterol

Common Causes

- Increased cholesterol absorption
 - Post-prandial (minimized with 12-hour fast)

- Decreased lipolysis or processing
 - Hypothyroidism
- Multiple or unknown mechanisms
 - Diabetes mellitus
 - Pancreatitis
 - Obstructive cholestasis
 - Nephrotic syndrome, protein-losing nephropathy (PLN)
 - Cushing's disease/steroid administration

Uncommon Causes

- Decreased lipolysis or processing
 - Lipoprotein lipase deficiency (dogs)
- Multiple or unknown mechanisms
 - Starvation/hyperlipidemia (horses)
 - Steatitis (cats)
 - Familial hypercholesterolemia (dogs – Briards and other breeds)
 - Idiopathic hyperlipidemia (dogs – usually Miniature Schnauzers)

Related Findings

- Hypothyroidism
 - Decreased T4 and free T4, increased cTSH
 - Increased thyroglobulin autoantibodies
 - Mild non-regenerative anemia
- Diabetes mellitus
 - Increased blood glucose, fructosamine
 - Glucose in urine +/- ketones
- Pancreatitis
 - Increased Spec cPL_®/fPL_®
 - Increased amylase and lipase
 - Increased ALP/GGT +/- increased bilirubin
 - Inflammatory leukogram (increased mature neutrophils +/- band neutrophils)
 - Abnormal pancreas on ultrasound
 - Pancreatic inflammation of cytology/histopathology
- Obstructive cholestasis
 - Increased ALP, GGT, and bilirubin
 - Secondary increases in ALT/AST
 - Enlarged gall bladder and common bile duct on ultrasound
- Nephrotic syndrome/PLN
 - Decreased albumin
 - Increased urine protein:creatinine ratio
 - Decreased urine specific gravity
 - Increased BUN, creatinine, phosphorus
- Cushing's disease/exogenous steroids
 - Increased ALP
 - Decreased urine specific gravity
 - Adrenal tests consistent with Cushing's
 - Normal to increased adrenal size/adrenal mass on ultrasound

Additional Information

Physiology

- Cholesterol is absorbed from the diet and also produced in the liver from fatty acids.
- The total amount of serum cholesterol is under close homeostatic control. It is influenced by dietary intake, production in the liver from fatty acids, and tissue utilization. It is also taken up by the liver and metabolized. The liver excretes cholesterol unchanged or as bile acids into the gastrointestinal tract.
- A twelve hour fast is suggested to minimize post-prandial increases in cholesterol.
- Lipoproteins transport most cholesterol and triglycerides in serum.
- In addition to its role as a component of cell membranes, cholesterol is a substrate for hormones and second messengers.

References

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