

# Amylase

## Interpretive Summary

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**Description:** Amylase is an enzyme produced primarily in the pancreas to digest dietary carbohydrates in the intestine.

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### Decreased Amylase

#### Common Causes

- Severe hepatic dysfunction/portosystemic shunts
- Decreased amylase is seldom clinically significant

### Increased Amylase

#### Common Causes

- Pancreatic acinar cell damage
  - Inflammation
  - Necrosis
  - Neoplasia
  - Pancreatic duct obstruction
- Decreased renal clearance/renal inactivation (any condition that reduces glomerular filtration rate [GFR])
  - Pre renal disorders
    - Shock
    - Dehydration
    - Poor cardiac output
  - Renal disease
  - Post-renal disorders
    - Urinary tract obstruction or rupture

#### Uncommon Causes

- Enteritis
- Hepatobiliary disease
- Macroamylasemia
  - Amylase is complexed to immunoglobulins/other proteins too large to pass through the glomerulus
  - Extends the half life of amylase in the circulation

#### Related findings

- Pancreatic acinar cell damage
  - Increased lipase
  - Increased Spec cPL® /Spec fPL®
  - Increased ALP +/- increased bilirubin
  - Increased glucose
  - Inflammatory leukogram on CBC
- Decreased renal clearance/renal inactivation
  - Pre renal
    - Increased hematocrit and total protein
    - Increased BUN, creatinine, and possibly phosphorous
    - Increased urine specific gravity
    - Decreased blood pressure (shock, poor cardiac output)
  - Renal

- Increased BUN, creatinine, phosphorus
- Isosthenuria
- Post renal
  - Increased BUN, creatinine, and possibly phosphorus
  - Abnormalities on urinalysis (blood, inflammation, crystals, etc.)
  - Variable urine specific gravity
  - Abnormalities associated with urinary tract obstruction/rupture on abdominal ultrasound or contrast studies

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## Additional Information

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### Physiology

- Amylase is a cytoplasmic enzyme produced by the pancreas that catalyzes the hydrolysis of complex starches in the intestine.
- Although one of the main sources of amylase is the pancreas, it is produced from many other tissues in the body, making it a relatively nonspecific indication of pancreatic inflammation.
- Sources of amylase activity in blood include pancreas, intestine, macroamylases (protein complexes containing amylase bound to other proteins), and possibly liver.
- Serum amylase activity peaks at 12-48 hours and can return to the reference interval within 8-14 days after a single pancreatic insult.
- The kidneys excrete or inactivate amylase. Conditions that reduce GFR usually do not result in more than a 3 fold increase in serum amylase activity.
- In dogs, the higher the serum amylase activity (3 to 4 fold increase), the more likely the presence of pancreatic disease. Serum amylase activity can be increased 7 to 10 fold above the reference interval with pancreatic disease in this species.
- In cats, serum amylase activity is variable in patients with pancreatitis and can be decreased (experimental cases), within reference intervals, or mildly increased.
- In horses serum amylase activity is not diagnostically useful.

### Diagnostic Methodology

- Assays measure amylase activity through substrate consumption, not the quantity of circulating amylase.

### References

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