



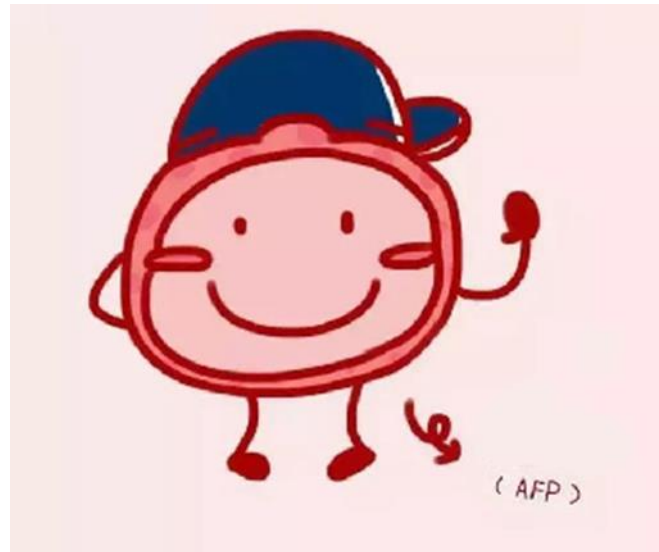
# Canine Alpha-Fetoprotein (AFP)

# Contents

Section	Page
a. Canine Alpha-Fetoprotein (AFP)	3
b. Causes, Symptoms and Diagnosis of Liver Cancer	5
c. Application of Canine Alpha-Fetoprotein (AFP)	9

# a. What is Alpha-Fetoprotein (AFP)?

Alpha-fetoprotein (AFP) is a glycoprotein that belongs to the albumin family and is mainly synthesised by liver cells and the yolk sac. Alpha-fetoprotein has a high concentration in the foetal blood circulation and decreases after birth. 2 to 3 months after birth, alpha-fetoprotein is basically replaced by albumin.

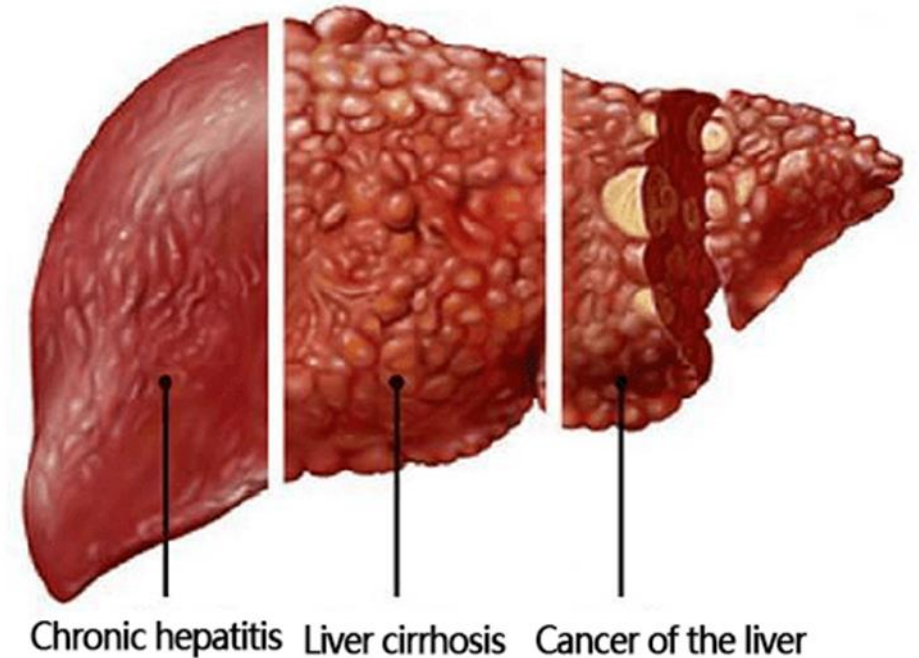


# a. What is Alpha-Fetoprotein (AFP)?

## Functions:

- Transport function
- Bidirectional regulation of growth regulatory factors
- Immunosuppression
- T lymphocyte induction of apoptosis

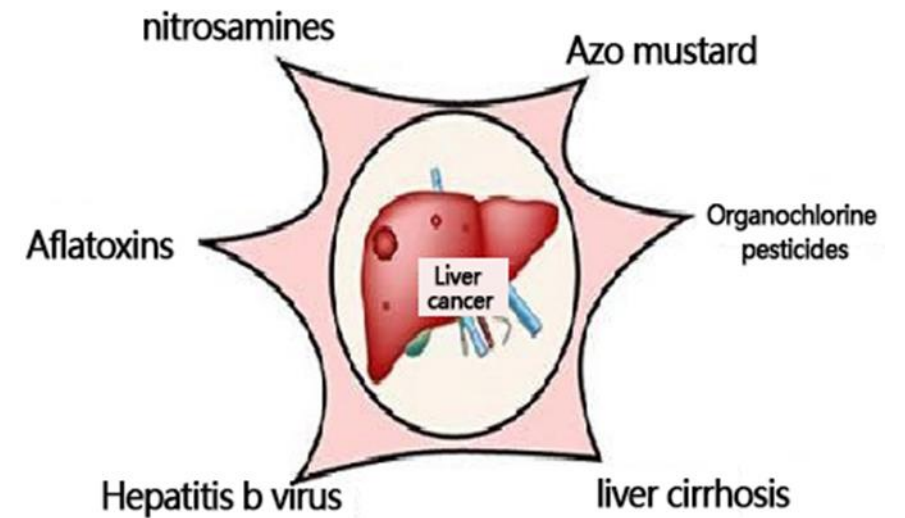
Alpha-fetoprotein is closely related to the occurrence and development of liver cancer and various tumours. It can show high concentrations in various tumours and can be used as a positive detection indicator for various tumours. Currently, it is mainly used clinically as a serum marker of primary liver cancer for the diagnosis and efficacy monitoring of primary liver cancer.



## b. Causes of Liver Cancer

### Causes of Liver Cancer:

- ❑ Viral hepatitis – Viral hepatitis is the most important factor among the many causative factors of primary liver cancer, among which chronic hepatitis B and C are the most common
- ❑ Cirrhosis of the liver – Liver cirrhosis due to different causes is a common feature of most hepatocellular carcinomas. About 70% of primary liver cancers occur on the basis of cirrhosis and most of them are nodules developed from chronic hepatitis B and chronic hepatitis C
- ❑ Aflatoxin contamination – 13 subtypes of aflatoxin, of which aflatoxin B1 (AFB1) is the most toxic
- ❑ Family history and genetic factors



## b. Clinical Symptoms of Liver Cancer

### Clinical Symptoms of Liver Cancer:

- Pain in the liver area – Usually the first symptom of liver cancer and manifests as persistent dull pain or distending pain
- Gastrointestinal symptoms – Loss of appetite, bloating, nausea, vomiting, diarrhoea and other digestive tract symptoms
- Systemic manifestations of malignant tumours – Progressive fatigue, weight loss, fever, malnutrition and cachexia etc.
- Paraneoplastic syndrome – Spontaneous hypoglycaemia and polycythaemia are common, which may coexist with clinical manifestations or precede liver cancer symptoms.

### Physical Signs

- Hepatomegaly – It is the main sign of mid-to-late stage liver cancer and is the most common
- Splenomegaly – Often caused by liver cirrhosis.
- Ascites – Ascites is straw yellow or bloody, mostly caused by liver cirrhosis combined with portal vein or hepatic vein tumour thrombus
- Jaundice – Mostly a late-stage sign, with diffuse liver cancer or cholangiocarcinoma being the most common.

## b. Diagnosis of Liver Cancer

### Common Diagnostic Methods:

- Blood biochemical tests – Alkaline phosphatase, aspartate aminotransferase, lactate dehydrogenase, bilirubin, albumin etc.
- Imaging – Ultrasound examination, CT examination, MRI examination, contrast examination
- Liver biopsy – Liver biopsy for needle aspiration cytology
- Liver cancer serum marker detection – Serum alpha-fetoprotein (AFP) determination



## b. Canine Alpha-Fetoprotein (AFP)

With the development of medical technology, liver cancer in dogs and cats has attracted much attention. In recent years, liver cancer is a common and frequently-occurring disease in dogs and cats, and the incidence rate has shown a significant upward trend. Existing experimental data indicates that liver cancer disease in animals is common in elderly cats and dogs in clinical cases. Dogs are one of the animals with a higher incidence of tumours among pets. The incidence rate continues to increase from juveniles to young adults, reaching a peak incidence rate between 5 and 10 years old, and then decreases with age.





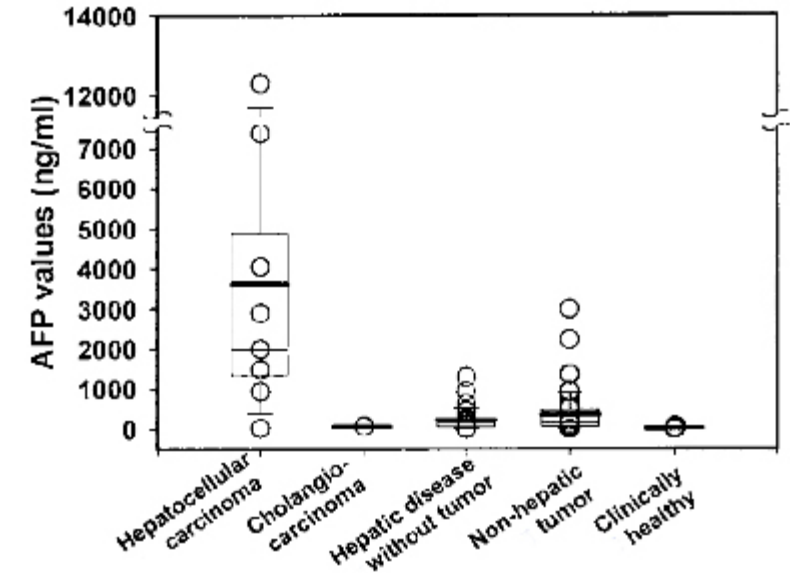
## c. Canine Alpha-Fetoprotein (AFP)

Table 1. Serum AFP values in dogs with various hepatic diseases

Group	No.	Means $\pm$ SD (ng/ml)	Range
Hepatic diseases			
With tumor			
Hepatocellular carcinoma	9	2860 $\pm$ 3910	20–12300
Cholangiocarcinoma	2	75 $\pm$ 12	66–84
Without tumor			
Hepatitis, Colangitis	21	310 $\pm$ 426	18–1700
Non-hepatic tumor <sup>a)</sup>	54	366 $\pm$ 555	13–2990

a) Lymphosarcoma, Mammary tumor, Melanoma, Squamous-cell carcinoma, Mastocytoma, Stomach cancer.

*J. Vet. Med. Sci. 61(6): 657–659, 1999*



*J. Vet. Med. Sci. 61(6): 657–659, 1999*

Serum AFP value – The serum alpha-fetoprotein value of clinically healthy dogs is less than 70 ng/mL. Except for 1 dog with hepatocellular carcinoma (20 ng/mL), the serum AFP value was very high, and 7 out of 9 dogs were higher than 1400 ng/mL (Table 1) (Figure 1), while 2 dogs with bile duct cancer had very high serum AFP values. The serum AFP value was within the normal range. The serum AFP value of dogs without tumors and liver disease is 18 ~ 1700 ng/mL and 90% of dogs with liver disease have serum AFP values below 500 ng/mL.

Changes in serum AFP values of dogs without liver tumours – 92% of dogs have AFP values below 1000 ng/mL.

# c. Common Misunderstandings

## Elevated Alpha-Fetoprotein ≠ Liver Cancer

Elevated alpha-fetoprotein does not mean the patient has liver cancer. The elevation of alpha-fetoprotein is divided into physiological elevation and pathological elevation. Even if it is pathologically elevated, it may not be liver cancer and needs to be identified.

<p><b>Physiologically Elevated Alpha-Fetoprotein</b></p>	<p><b>In the foetus</b> – AFP is mainly secreted by immature liver cells in the foetal liver and the concentration in fetal blood is relatively high</p> <p><b>In the body of pregnant women</b> – AFP can pass through the placental barrier and enter the maternal blood from both sides of the placenta or fetal membranes by active diffusion, in circulation. Therefore, AFP can be detected in maternal serum at the end of first trimester.</p>
<p><b>Pathologically Elevated Alpha-Fetoprotein</b></p>	<p><b>Hepatocellular carcinoma</b> – About 70% of liver cancer patients have elevated serum alpha-fetoprotein, which has strong specificity and high sensitivity.</p> <p><b>Acute or chronic active liver disease</b> – During an attack of viral hepatitis, after the liver cells are attacked and damaged by the virus, the body repairs the damage and the new liver cells secrete alpha-fetoprotein.</p> <p><b>Digestive system tumours</b> – Alpha-fetoprotein may also increase to varying degrees in patients with gastric cancer, pancreatic cancer, bile duct cancer etc., but is usually accompanied by the positivity of other tumour markers. Among them, the AFP positive rate among gastric cancer patients can reach 5%-15%.</p> <p><b>Germ cell tumours</b> – The common sites are mainly located in the sacrococcygeal region, testis, ovary, pelvis, retroperitoneum, mediastinum and other parts.</p> <p><b>Children:</b> Endodermal sinus tumour (yolk sac tumour)</p> <p><b>Male:</b> Testicular cancer (seminoblastoma)</p> <p><b>Female:</b> Ovarian cancer, teratoma etc.</p>

## c. Common Misunderstandings

### Normal Alpha-Fetoprotein ≠ No Liver Cancer

20%-30% of patients with early-stage small liver cancer can maintain normal levels of AFP. Some patients continue to have negative AFP from the onset to the end stage of the disease. Therefore, negative alpha-fetoprotein cannot be used as a criterion to exclude liver cancer.

For people at high risk of liver cancer (mainly patients with chronic liver disease), in order to detect liver cancer early, even if alpha-fetoprotein is normal, regular liver colour ultrasound examinations should be performed to avoid missed diagnosis.

## c. Summary of Clinical Applications of AFP

- ❑ Primary liver cancer markers to assist liver cancer screening
- ❑ Early screening indicators for various tumours and cancers
- ❑ Used for primary liver cancer screening and monitoring of surgical treatment efficacy
- ❑ Hepatitis, cholangitis and other related liver diseases mostly cause a transient increase in AFP, which usually lasts for 2-3 weeks. However, neoplastic diseases and cancers continue to increase and are at a high level
- ❑ It is only an auxiliary means for the initial screening of related cancer tumours to improve the clinical detection rate and provide a basis for further examination; it cannot replace imaging and histopathological examination



## Canine Alpha-Fetoprotein (AFP) Rapid Quantitative Test

Woodley have developed a rapid, accurate, reliable and highly sensitive detection method for AFP in canines.

The InSight V-IA Canine Alpha-Fetoprotein (AFP) Rapid Quantitative Test is a fluorescence immunoassay used with the InSight V-IA Veterinary Immunoassay Analyser quantitative determination of cAFP concentration in canine serum or plasma.

The test is used as an indicator for diagnosis of liver cancer in dogs.

It can be stored at room temperature.





# Thank You