

ALPHA FETOPROTEIN (AFP)

INTRODUCTION

Alpha fetoprotein is normally produced by fetal liver, yolk sac and gastrointestinal tract. Infants normally have high levels of AFP which decreases to adult value by 10 months of age. Serum AFP is elevated in tumors like Hepatocellular carcinoma and Nonseminomatous germ cell testicular tumors. To a lesser extent it is also elevated in cancers of pancreas, stomach, lung and colon. Testicular & Ovarian tumors of germ cell origin with high AFP levels are Embryonal carcinoma, Yolk sac tumor & Mixed germ cell tumors.

NORMAL RANGE

<10 ng/mL

CLINICAL USE

- Useful for determining prognosis and monitoring therapy for Hepatocellular carcinoma. Level of AFP is a prognostic indicator of survival. Elevated AFP and serum bilirubin levels in these patients is associated with shorter survival time.
- An aid in the management of Germ cell (Non-Seminomatous) tumors. Measurement of AFP levels in combination with HCG levels are useful in classifying and staging Germ cell tumors
- To predict tumor recurrence / presence of residual tumor

INTERPRETATION

Increased Levels

Neoplastic conditions
<ul style="list-style-type: none">• Hepatocellular carcinoma (72%)• Ovarian tumors• Non seminomatous germ cell tumors (85%)• Pancreatic carcinoma (23%)• Gastric carcinoma (18%)• Lung carcinoma (7%)• Colon carcinoma (7%)• Metastatic liver disease
Non neoplastic conditions
<ul style="list-style-type: none">• Primary biliary cirrhosis• Post necrotic cirrhosis• Viral hepatitis• Subacute hepatic necrosis• Alcoholic liver disease• Extrahepatic biliary disease
Pediatric conditions

- Hepatoblastoma
- Hereditary tyrosinemia Type 1
- Ataxia telangiectasia
- Hereditary persistence of AFP

HIGH RISK FACTORS FOR HEPATOCELLULAR CARCINOMA (HCC)

- Hepatitis B Virus carriers
- Hepatitis C Virus Cirrhosis
- Family history of HCC

HIGH RISK FACTORS FOR TESTICULAR CANCER

- Cryptorchidism
- Testicular feminization syndromes
- Klinefelter’s syndrome

LABORATORY DIAGNOSIS

- Serum tumor markers like AFP, HCG & LDH
- Biopsy / U/S guided Fine needle aspiration cytology
- Ultrasound / CT Scan

Risk Classification of Non Seminomatous germ cell tumors

Risk	Levels
Good	<ul style="list-style-type: none"> • AFP < 1000 ng/mL • BetaHCG <5000 mIU/mL • LDH <1.5
Intermediate	<ul style="list-style-type: none"> • AFP 1000 – 10,000 ng/mL • BetaHCG 5000 -50,000 mIU/mL • LDH 1.5 - 10
Poor	<ul style="list-style-type: none"> • AFP > 10,000 ng/mL • BetaHCG >50,000 mIU/mL • LDH > 10

AFP in prenatal screening

To identify women for increased risk of Open Neural Tube defects & Fetal abnormalities between 16-18 weeks of gestation when used in conjunction with AFP, Free estriol (Triple marker) & Inhibin A (Quadruple marker).

AFP levels	Possible Abnormality
Increased with MoM from 2 - >2.5	Anencephaly (95% detection) Levels affected by <ul style="list-style-type: none"> • Gestational age • Maternal weight

	<ul style="list-style-type: none"> • Maternal diabetes • Multiple gestation • Race
Reduced with MoM <0.25	<ul style="list-style-type: none"> • Trisomy 21 • Trisomy 18 • Other causes <ul style="list-style-type: none"> ✓ Spontaneous abortion ✓ Preterm birth ✓ Still birth ✓ Infant death ✓ Increased macrosomia

LIMITATIONS

- This test is not recommended to screen cancers in the general population.
- False negative / positive results are observed in patients receiving mouse monoclonal antibodies for diagnosis or therapy
- Use of AFP as a tumor marker is not recommended in pregnant females
- AFP values regardless of levels should not be interpreted as absolute evidence for the presence or absence of disease. All values should be correlated with clinical findings and results of other investigations