

Plasma protein	Properties	Function	Synthesis	Clinical notes
Albumin	<ul style="list-style-type: none"> -69 kDa -20 days half life -Major and most concentrated protein - negative at pH=7.4. -negative acute phase protein. 	<ul style="list-style-type: none"> -Main contributor to the osmotic pressure. -contributes in blood viscosity along with fibrinogen. -high binding capacity: <ul style="list-style-type: none"> 1.free fatty acids (transported to liver for energy production) 2.steroid hormones 3.Bilirubin (degraded heme groups of hemoglobin) 3.tryptophan 4.metals 5.Drugs 	<ul style="list-style-type: none"> -By the liver. - 12g/day -As preproprotein Then subdivided by protease into (Signal peptide,hexapeptide,Albumin) 	<ul style="list-style-type: none"> -used for liver function test. Decrease Due to: Malnutrition/ nephrotic syndrome cirrhosis/ GI loss of proteins Causes: _Hypoalbuminemia (Albumin <2g/dl) Due to: Hypertension 🖱 kidney albumin loss Causes: Congestive heart failure. Increase Due to: Dehydration Causes: Hyperalbuminemia No Albumin Due to: Genetic mutation .. splicing. Causes: Analbuminemia
Prealbumin (Transthyretin)	<ul style="list-style-type: none"> -62 kDa -small glycoprotein -rich in tryptophan. -2 days half life. -negative acute phase protein. 	<ul style="list-style-type: none"> -T4& T3 transporter . 		<ul style="list-style-type: none"> -sensitive indicator of disease or poor protein nutrition
@1 – AT	<ul style="list-style-type: none"> -52 kDa -Acute phase protein -90% of @1 glob. Band -many polyphormic forms (M/S/Z/F). 	<ul style="list-style-type: none"> -neutralizes trypsin & trypsin like enzymes in lungs preventing emphysema. 		<ul style="list-style-type: none"> -Defeciency causes emphysema (mostly related to ZZ,SZ) -smoking can inactivate @1-AT by oxidation of Met358 into met sulfoxide (ZZ). -liver disease due to polymerization of ZZ AT which aggregates in the liver causing cirrhosis
@1 Fetoprotein	<ul style="list-style-type: none"> -very low levels in adult -high levels in fetus and pregnant women. 	<ul style="list-style-type: none"> -protect the fetus from immunological attacks. -modulates fetus growth. -Transport compounds e.g Steroids. 	<ul style="list-style-type: none"> -primarily by the fetus yolk sac then by liver. 	<ul style="list-style-type: none"> Low levels increase the risk of down syndrome. High levels in Hepatoma & acute hepatitis.

@1 acid glycoprotein	-con. = 0.6-1.4 g/dl -rich in carb (41%). -acute phase protein.	-progesterone (a steroid) transporter. -transport carb to injury site.		-marker of acute inflammation. -increases in inflammatory diseases/ cirrhosis/ malignant. -Decreases in liver disease/ malnutrition/ nephrotic syndrome.
@2 HP	-90 kDa -Acute phase protein. -glycoprotein. -tetramer with 3 phenotypes. -HP t1/2= 5 days. -HP_HB complex = 90 min t1/2	-Binds free hemoglobin after RBC hemolysis to prevent losing it into urine.		-Decreased in Hemolytic anemia.
Ceruloplasmin	-160 kDa -Copper containing glycoprotein (6 cu atoms). -acute phase protein.	-metallothioneins (regulate cu level in tissue) -regulates cu levels in blood -cu storage. -enzyme activities like tyrosinase.		-Decreased levels in liver disease Ex. Wilson (liver genetic disease related to cu metabolism)
macroglobulin	-8_10% of plasma proteins (130-300 mg/dl). -acute phase protein.	-inactivates all proteases (anticoagulation). -transporter of many growth factors.	-by hepatocytes and macrophages.	-increased in nephrotic syndrome (not lost in the urine like other proteins)
Haemopexin	-0.5_1 g/L in adults. -low level at birth.	- binds heme after breakdown of hb or other hemeoproteins. (preventing losing it in urine + protection from its oxidative action)	-In the liver.	-decreased in hemolytic disorders at birth / some drugs. -increased in pregnancy / diabetes/ malignancies / muscular dystrophy.
CRP	-main acute phase protein.	-helps defend against bacteria and foreign substances (able to bind to polysaccharide in the cell wall of bacteria)		-undetectable in healthy individuals. -detectable in many inflammatory diseases (gout, rheumatic fever, bacterial infection). -level peaks after 48 hrs of incident (monitoring marker)
Complement c1 q	-beta globulin -0.15 g/l normally -thermolabile	-first complement factor to bind antibody and trigger the classical complement pathway.		-increased in chronic infections
Gamma globulin	-five types	-antibody activity		
fibrinogen	-Clotting factor 1. -4_6% of total proteins. -highly elongated (20:1) -negatively charged due to rich glu N terminus. _6 Chains linked with s_s	-imparts maximum viscosity of blood. -soluble due to the negative amino end rich in glu. -negative charge prevents aggregation.	-by liver	

-Ghada Barakat