

Plasma

Blood plasma

Blood plasma is a yellowish, weakly basic solution of proteins, electrolytes, and small organic molecules. Its volume corresponds to 5%^[1] of the body weight. It makes up approximately 55% of the blood volume and 25%^[1] of the extracellular fluid volume. It is not only enclosed in the extracellular compartment but it is exchanged with intracellular fluid – 70% of the blood plasma is exchanged in one minute.^[1]

Basic parameters of blood plasma^[1]

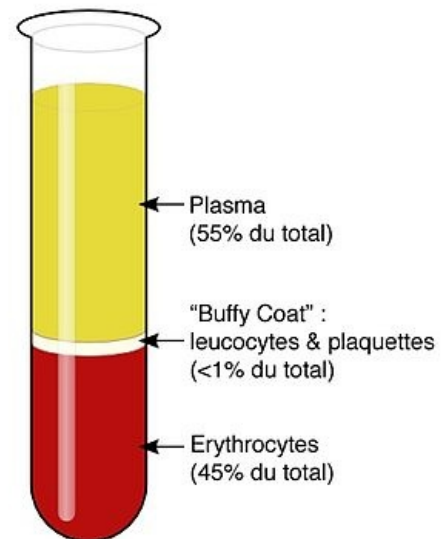
Parameter	Value
Volume	2.8-3.5 liters
pH	7.4 ± 0.04
Osmolality	280-300 mosm/l
Osmotic pressure	5150 mmHg

Composition

Blood plasma consists of water (93%) and solutes. Dissolved substances in blood plasma can be divided into organic (6%) and inorganic (1%).^[2]

Inorganic substances^[1]

	Substance	Concentration	Importance
Cations	Sodium	136-148 mmol/l	To maintain constant osmotic pressure, volume, and pH of the ECF.
	Potassium	3.7-5.0 mmol/l	For the excitability of nerves and muscles (mainly the myocardium); the main cation of ICF.
	Calcium	2.15-2.61 mmol/l	Occurs approximately one-half ionized (biologically active) and the other half non-ionized (bound to plasma proteins) For neuromuscular transmission, contractility of the heart muscle, blood clotting. It affects the permeability of cell membranes.
	Magnesium	0.66-0.94 mmol/l	It has depressant effects on nervous excitement; for enzyme activity.
	Iron men Iron women	12-27 µmol/l 10-24 µmol/l	For the formation of Hb in the bone marrow; part of enzymes is involved in biological oxidation.
	Copper	12-22 µmol/l	Part of some enzymes; significance for hematopoiesis.
Anions	Chlorides	95-110 mmol/l	With Na ⁺ osmolality maintaining, constant volume and pH ECF; For the formation of HCl gastric juice.
	Hydrogen carbonate [HCO ₃ ⁻]	22-26 mmol/l	For CO ₂ transport + part of the buffer system (buffers); To maintain the pH of the ECF; volatile, easy to fade and easy to form.
	Inorganic phosphorus	0.6-1.4 mmol/l	Part of a buffer system (buffers); maintains the pH of the ECF.
	Iodine	276-630 µmol/l	For the production of thyroid hormones.



Blood components



Plasma - components

Organic substances^[1]

Proteins

For more information see the [Plasma proteins](#) page.

Total amount: 60-80 g/l

Category	Protein	Average concentration (g/l)	Importance	
Separately	Prealbumin	0.3	Transport thyroxine and triiodothyronine, vit A	
	Albumin	42	Oncotic pressure; transport of MK, bilirubin, drugs; secondary carrier for heme, thyroxine, cortisol; reversible protein	
	Apolipoproteins (globulins)	4-9	Transport of triacylglycerols, phospholipids, cholesterol	
	Fibrinogen	4	Blood clotting	
α-globulins	Transcortin (α1-globulin)	0.04	Transport of cortisol	
	Transcobalamin	94 x 10 ⁻⁸	Vitamin B12 transport	
	α1-antitrypsin	2.5	Inhibition of proteinases (trypsin, chymotrypsin)	
	Metal-binding protein (α1-globulin)	0.055	Transport of barium, strontium, nickel	
	Antithrombin III (α2-globulin)	0.2	Thrombin inhibition	
	α2-macroglobulin	2.5	Plasmin and proteinase inhibition; carrier of certain cytokines and hormones	
	Haptoglobin (α2-globulin)	0.4-1.8	It binds Hb released during the intravascular breakdown of erythrocytes	
	Ceruloplasmin (α2-globulin)	0.35	Copper transport; ferroxidase enzyme	
β-globulins	Hemopexin (β1-globulin)	0.7	It binds heme (from Hb)	
	Transferrin (β1-globulin)	2.9	Iron transport	
γ-globulins	Immunoglobulins	15-16	Antibodies	

Other

Substance	Concentration
Glucose	3.3-6.1 mmol/l
Amino acids	2.3-3.9 mmol/l
Urea	3.0-7.6 mmol/l
Lipids (total lipemia)	4-9 g/l
Triacylglycerols	0.5-1.8 mmol/l
Phospholipids	1.8-2.5 g/l
Creatinine	55-110 μmol/l
Cholesterol (total)	3.5-5.2 mmol/l
Bilirubin	3.3-18.0 μmol/l
Lactate	0.55-2.22 mmol/l

Functions

- Plasma volume maintenance;
- transport functions;
- isolation maintenance;
- nutritional significance;
- proteolytic systems;
- plasma protease inhibitors;
- defense of the organism against infection.

References

Related Articles

- Blood
- Blood elements
- Plebotomy (blood drawing)
- Blood count
- Hemocoagulation
- Coagulation test
- Bleeding time
- Erythrocyte sedimentation
- Laboratory blood examination of ABB
- Erythrocytes

External links

- Blood plasma (anglická wikipedie)
- Krevní plazma (česká wikipedie)

References

1. TROJAN, Stanislav – ET AL.,. *Lékařská fyziologie*. 4. edition. Grada, 2003. 112-113 pp. pp. 772. ISBN 80-247-0512-5.
2. KITTNAR, Otomar. *Lékařská fyziologie*. 1. edition. Praha : Grada, 2011. 121 pp. pp. 790. ISBN 978-80-247-3068-4.

Sources

- TROJAN, Stanislav – ET AL.,. *Lékařská fyziologie*. 4. edition. Grada, 2003. ISBN 80-247-0512-5.
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