

Basics of Clinical Chemistry

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Basics of Clinical Chemistry

Clinical chemistry also known as chemical pathology, clinical biochemistry or medical biochemistry, it is laboratory unit of clinical pathology that is generally concerned with analysis of body fluids like blood, cerebrospinal fluid (CSF), urine, transudate and exudate, but mostly deal with analysis of serum or plasma.

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Biochemical constituents measured in blood include:

- **Total proteins and its fractions.**
- **Lipid profile and glucose.**
- **Serum enzymes activities.**
- **Serum electrolytes levels.**
- **Serum minerals levels.**
- **Serum bilirubin, Blood urea nitrogen and creatinine.**
- **Hormones.**

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Total proteins and its fractions

- **Usually measured serum proteins include total proteins, albumin and globulins. The latter can be separated by electrophoresis in α -globulin, β -globulin and γ -globulins.**
- **Total proteins level measured in plasma is higher than that measured in serum, this because another protein present in plasma, which is fibrinogen.**
- **Commercially supplied kits are able to measure total proteins and albumin only, the globulin level is calculated mathematically by subtracting the albumin levels from total proteins levels.**

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Lipid profile and glucose

- Serum lipid profile include measurements of total lipids, phospholipids, triglycerides, total cholesterol, high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C) and Very low density lipoprotein cholesterol (VLDL-C). HDL-C transports cholesterol from cells to liver (anti-risky). LDL-C transport cholesterol to cells. VLDL-C transports triglycerides from the liver to cells.
- Glucose in blood is the first source of energy in the body, especially for the brain.
- Serum lipids and glucose variables are measured using spectrophotometer

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Serum enzymes levels

Enzymes that are mostly measured in blood for diagnosis of different diseases including:

- Creatine phosphokinase (CK)
- Lactate dehydrogenase (LDH)
- Alanine aminotransferase (ALT)
- Aspartate aminotransferase (AST)
- Gamma glutamyl transferase (GGT)
- Alkaline phosphatase (ALP).

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Serum electrolytes levels

- **Sodium, potassium and chloride are the three electrolytes most commonly considered in veterinary medicine, while bicarbonate is measured much less frequently. These ions are all freely diffusible throughout the entire ECF (plasma, interstitial fluid, lymph).**
- **Serum sodium and potassium levels can be determined using flame photometer or spectrophotometer. The latter also used for measuring serum chloride level.**

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Serum minerals levels

- **Common measured minerals in serum include calcium, phosphorus, magnesium, iron, copper and zinc.**
- **Serum minerals are measured using spectrophotometer.**

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Serum bilirubin, blood urea nitrogen and creatinine.

- **Bilirubin is a by-product of haem breakdown. On laboratory request forms 'total bilirubin' means just that. 'Direct bilirubin' is conjugated bilirubin, and the unconjugated (or indirect) bilirubin is calculated by subtraction from the total.**
- **Urea is a nitrogenous waste product which is formed in the liver as the end product of amino acid breakdown. After the urea has been formed in the liver it is transported in the plasma to the kidneys where it is excreted in the urine.**

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- **Creatinine, like urea, is a nitrogenous waste product en route to the kidneys, but it is a product not of amino acid breakdown but of breakdown of creatine. Creatine is a substance present in the muscle which is involved in high energy metabolism.**
- **Serum bilirubin, blood urea nitrogen and creatinine are measured using spectrophotometer.**

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