

Hematology

Stage three

Anticoagulants (lab -2-)

Department of Medical Laboratory Technologies



Anticoagulants:- is a substances which prevent blood clotting /coagulation , and allow separation of the blood into cells and liquid (plasma) components

❖ **EDTA** and **sodium citrate** remove **calcium** which is essential for **coagulation**.

Type anticoagulants commonly used in hematology laboratory are:-

- 1- EDTA (Ethylene Diamine Tetra Acetic acid)
- 2- Sodium citrate
- 3- Sodium fluoride
- 4- Heparin



Purple tube

❖ Additive

EDTA (Ethylene Diamine Tetra Acetic acid)

❖ Function of Additive

The potassium salts of EDTA are powerful anticoagulants act by chelation effect calcium ion in blood and they are especially suitable for routine **hematological** work.

❖ Laboratory use :-

- Differential leukocyte count and platelet count .
- CBC (complete blood count)
- Blood group
- Hb & PCV
- Total leukocyte count

Excessive EDTA produces shrinking RBCs and increase in the mean cell hemoglobin concentration (**MCHC**), decrease in mean cell volume (**MCV**) and Platelets are also affected , they will swell and then disintegrate causing falsely high platelets



Light blue tube

❖ **Additive**

3.2% Sodium citrate

❑ **Function of Additive**

Prevents blood from clotting by remove calcium

❑ **Laboratory use**

- **PT** (Prothrombin time)
- **PTT**(Partial Thromboplastin Time)
- **D- dimer**
- Unsuitable for blood count because it has dilution effect on cell and causes platelet clumping



Black tube

❖ **Additive:-**

3.8% sodium citrate

❖ **Function of Additive**

Prevents blood from clotting by remove calcium

❖ **Laboratory use:-**

- **ESR** (Westergren sedimentation rate)



Gray tube

❑ **Additive:-**

Sodium Fluoride and potassium oxalate

❑ **Function of Additive**

Fluoride inhibits glycolysis , oxalate prevents clotting by remove calcium

❑ **Laboratory use:-**

For glucose determine



Green tube

□ Additive

Heparin (sodium or lithium)

□ Function of Additive

Inactivates thrombin so that it is not available for formation of fibrin from fibrinogen.

□ Laboratory use:-

- Blood gas
- Chemistry studies
- Ammonium

❖ Not recommended for CBC because

1. Make WBC clumping
2. bluish background of blood



Red tube (plain tube)

❖ Additive

- No additive without gel but contain silica

❖ Laboratory use:-

- biochemistry ,serology ,hormones, immunology, blood bank (cross match)



Yellow tube :- Serum Separating Tube (SST)

❖ Additive

No additive, have gel in bottom

❖ Laboratory use:-

- biochemistry, serology ,hormones



Red capillary tube

- ❑ **Additive**
Contain sodium- Heparin
- ❑ **Function of Additive**
(anticoagulant)
- ❑ **Laboratory use:-**
 - Use for Hb
 - PCV
 - TSB



Blue capillary

- ❖ **Additive**
No have any additive
- ❖ **Laboratory use**
 - For clotting time



Properties of good anticoagulant

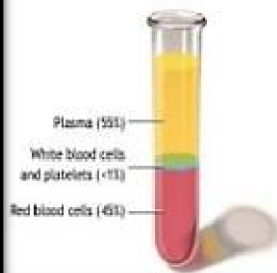
1. a good anticoagulant must **not hemolysis the RBCs** .
2. a good anticoagulant must **not change the composition of blood**
3. a good anticoagulant must **not change the morphology , size , shape or appearance of the cells**

Different between serum and plasma

2. Plasma vs. serum

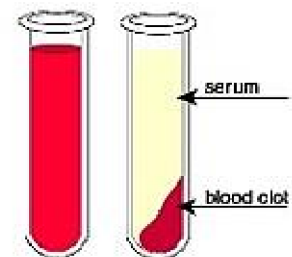
• **Plasma** is the liquid, cell-free part of blood, that has been **treated with anti-coagulants**.

Anticoagulated

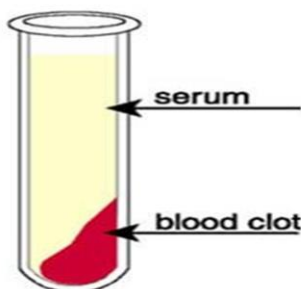


Serum is the liquid part of blood **AFTER coagulation**, therefore devoid of clotting factors as fibrinogen.

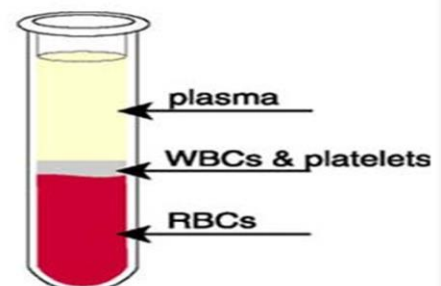
Clotted



• serum = plasma - fibrinogen



Serum
vs
Plasma



Serum = Plasma – Clotting Factors