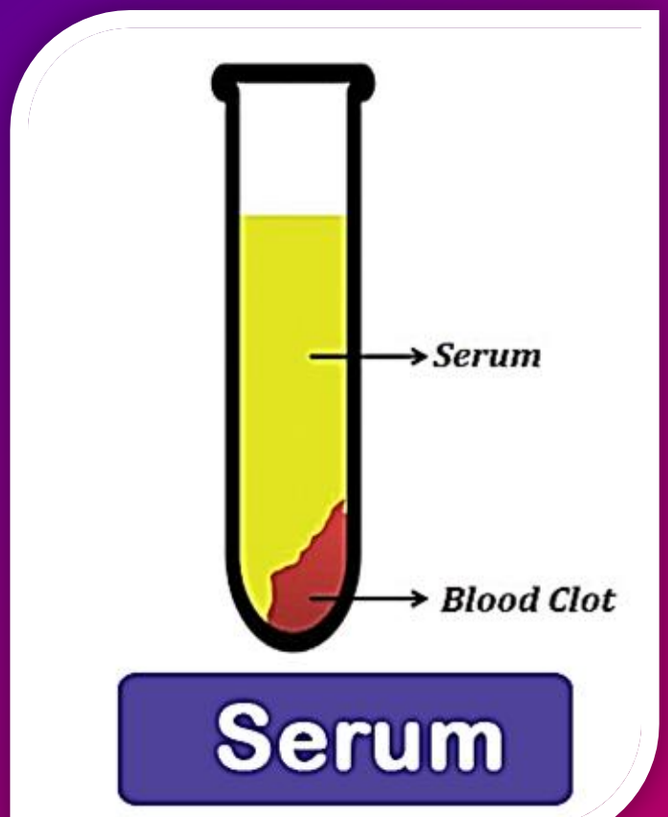
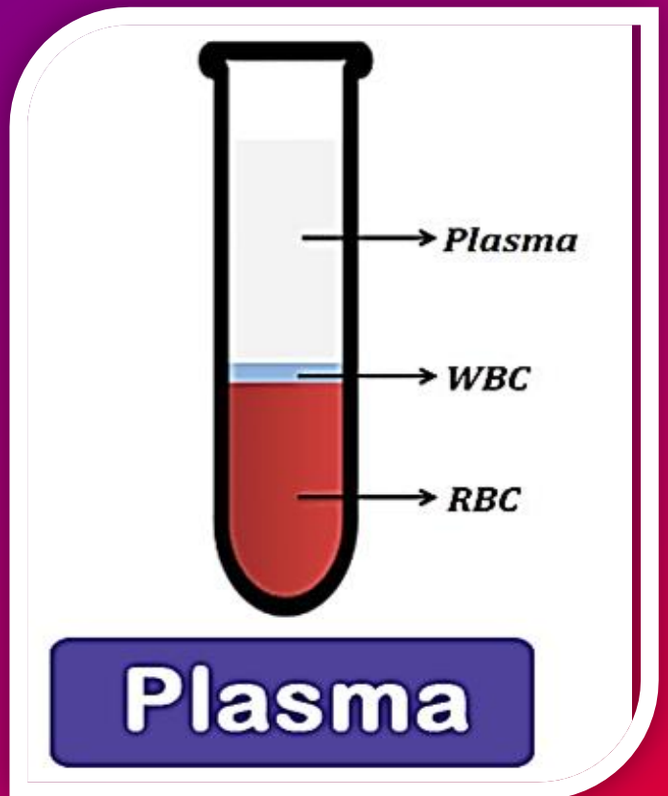
Plasma and Serum

2nd Lecture Practical clinical immunology





By

Lecturer Dr Hanaa Salih Abd Ali Alrammah

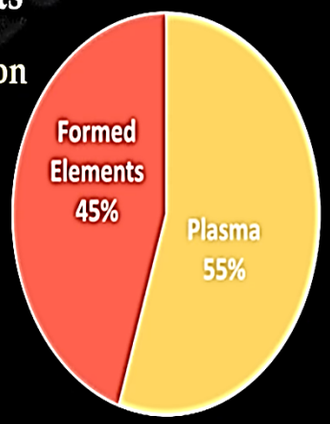
University of Baghdad/ College of Veterinary Medicine

Department of Public Health/Zoonotic Diseases Unit

Composition of Blood

Formed Elements
- Cellular portion

Blood Plasma (or Plasma)
- Fluid portion

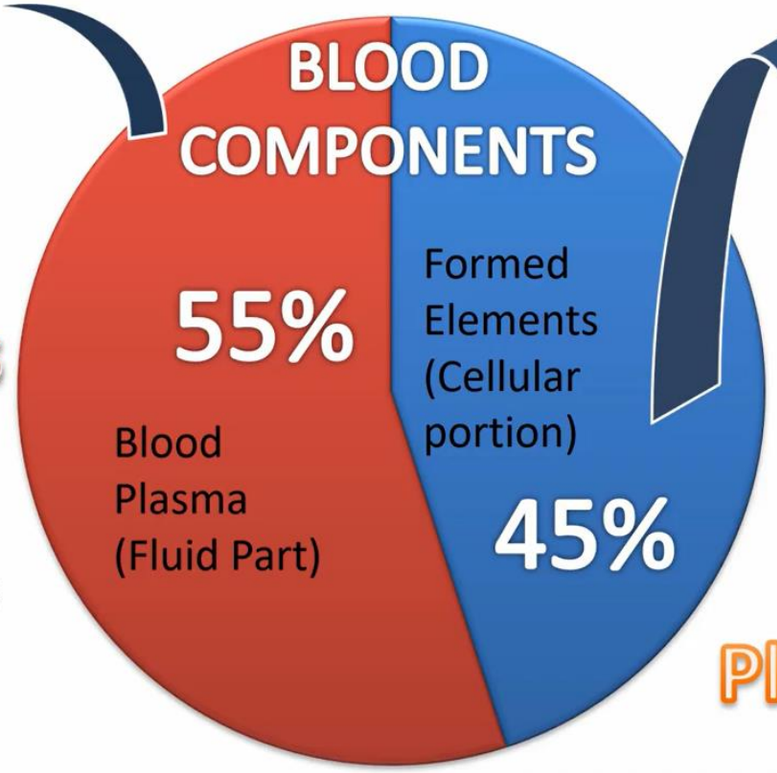


BLOOD COMPONENTS

Water

Proteins

Albumins (regulate oncotonic pressure of blood)
Fibrinogen (clotting factors)
Globulins (antibodies)

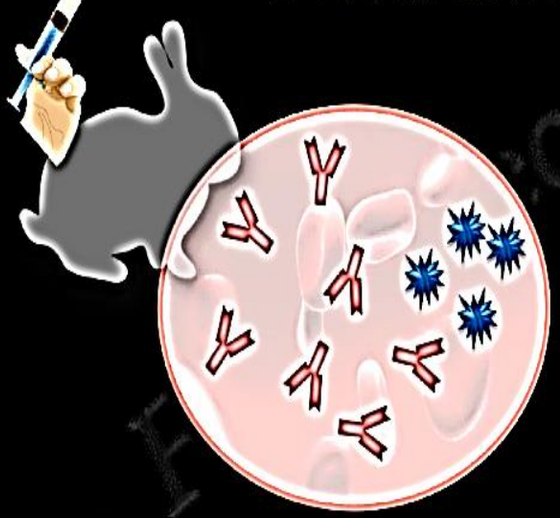


RBC

WBC

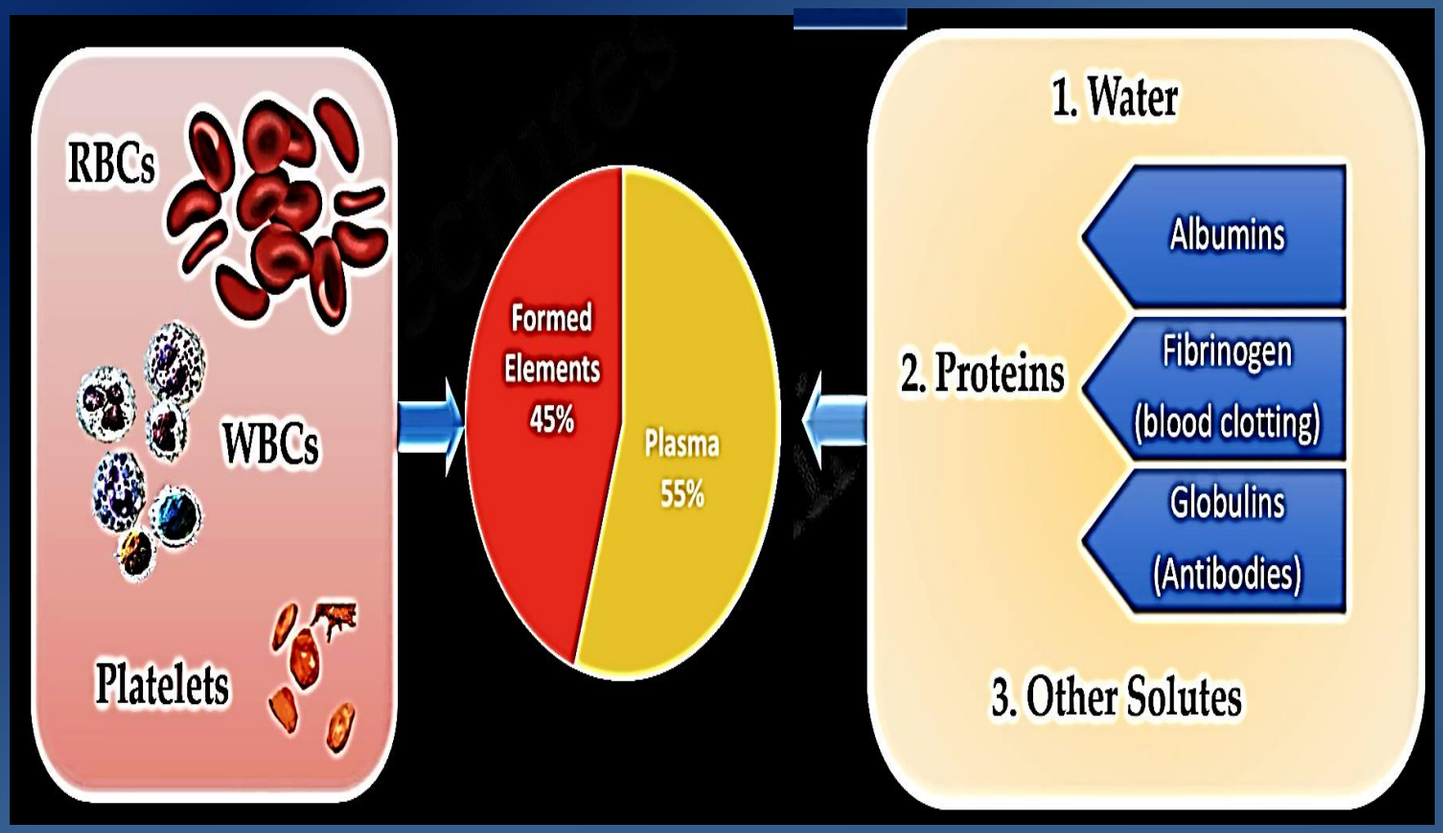
Platelets

Antiserum



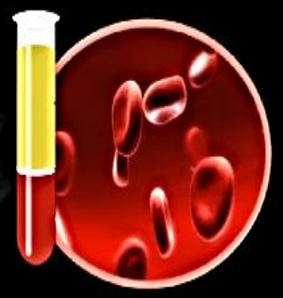
Antibodies are isolated from the rabbit's serum and concentrated in a solution known as **antiserum** (antibody-rich serum)

Antibody Antigen



Plasma

Fluid portion of the blood



Serum

(Plasma – Fibrinogen)

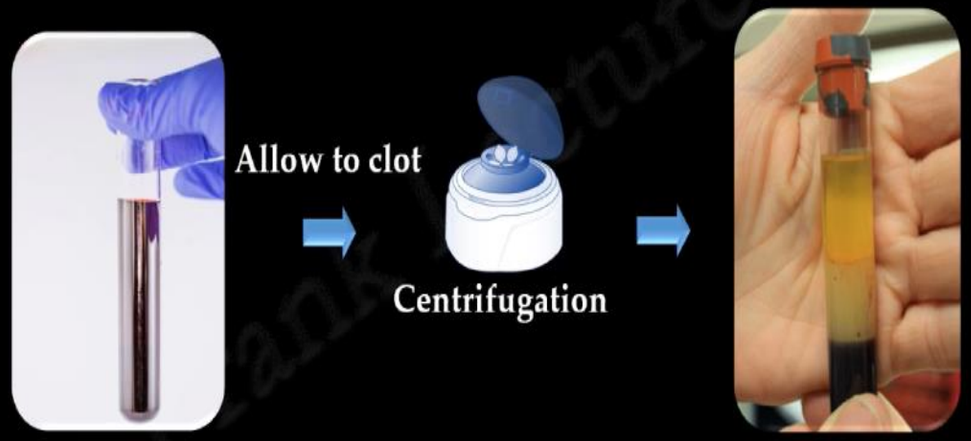
Fluid phase of clotted blood

Antiserum

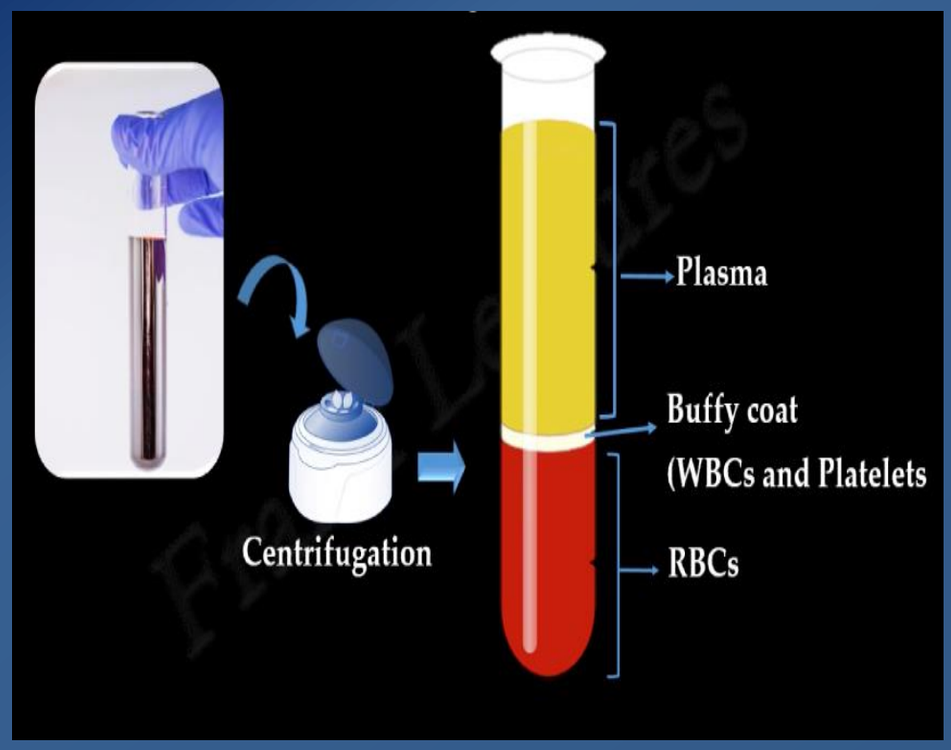
Antibody-rich Serum

Serum obtained from an immunized animal/individual

Serum = Plasma - Fibrinogen



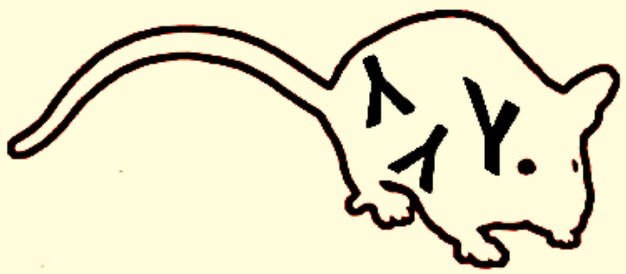
Both Plasma and Serum contain antibodies



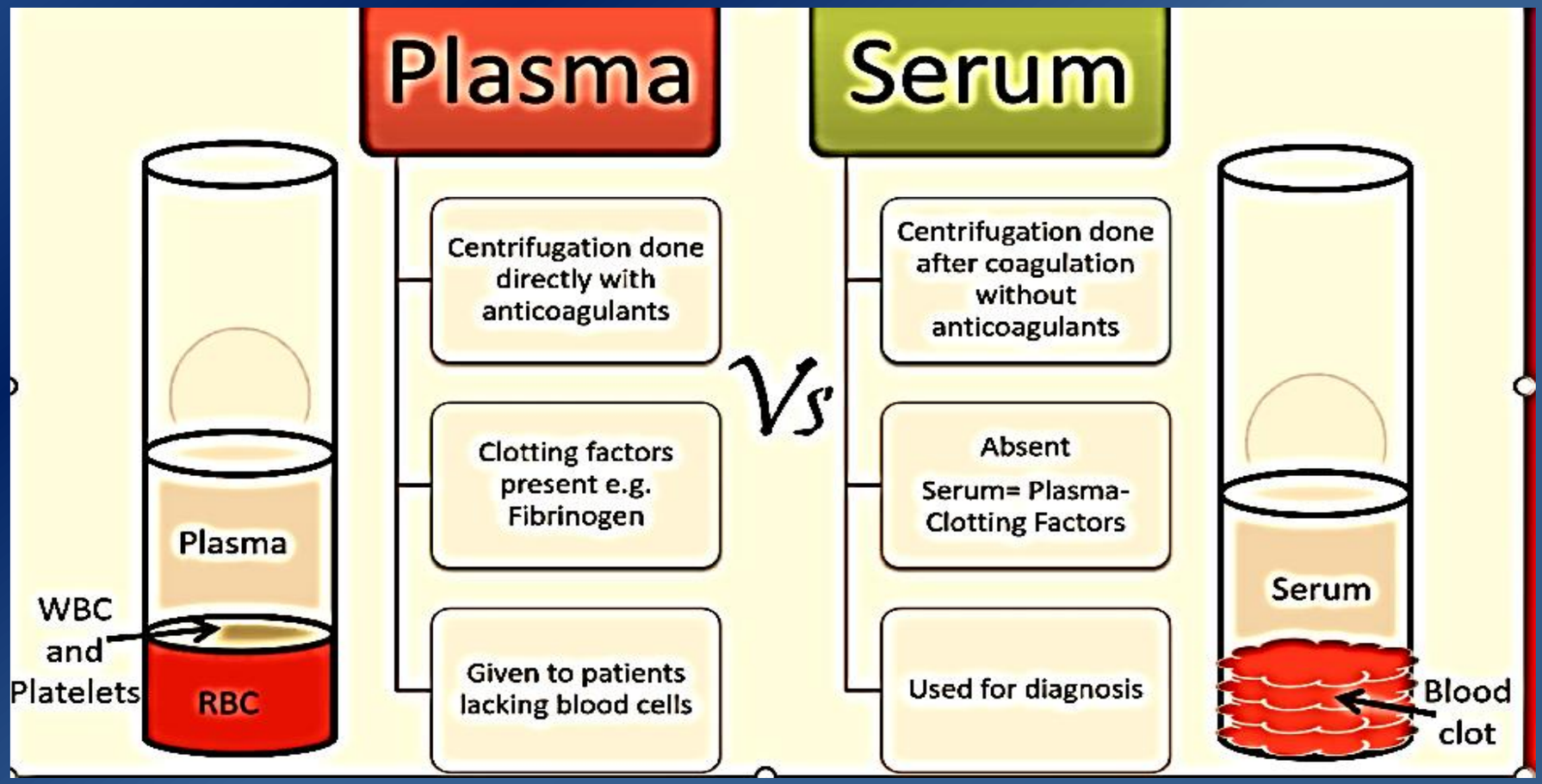
Antiserum

Antigen injected

Specific Antibodies produced

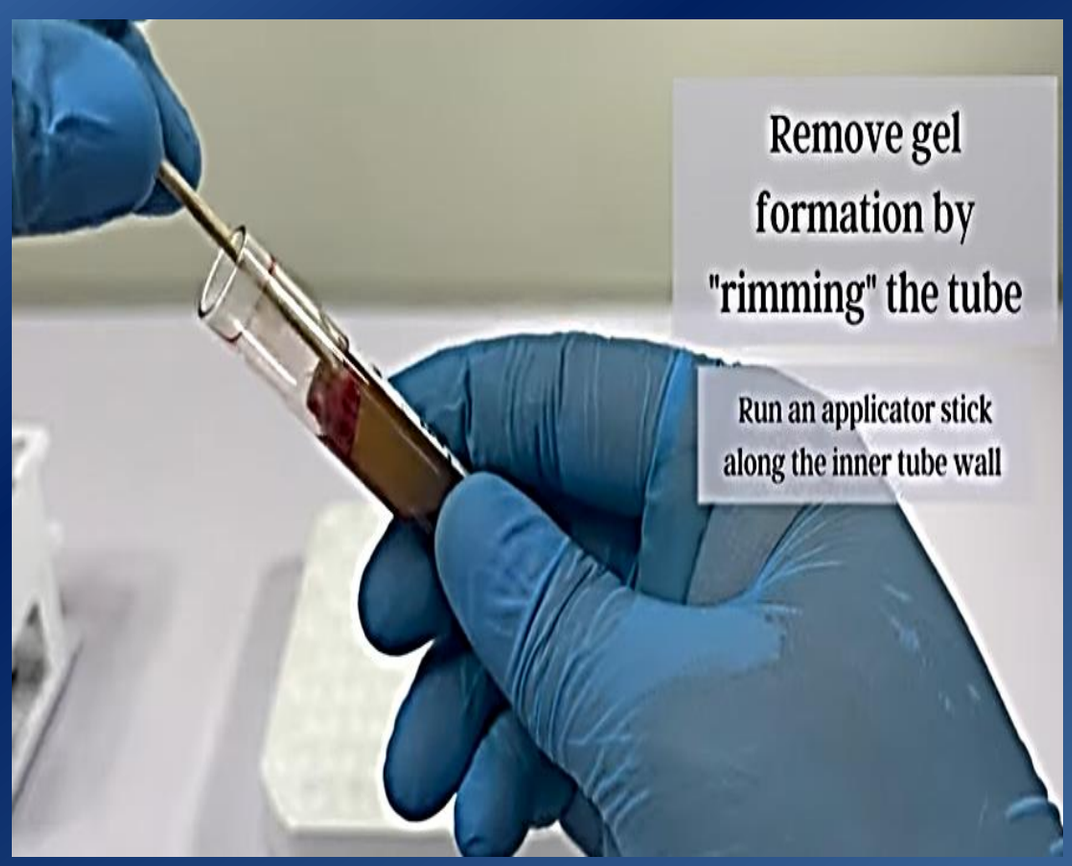


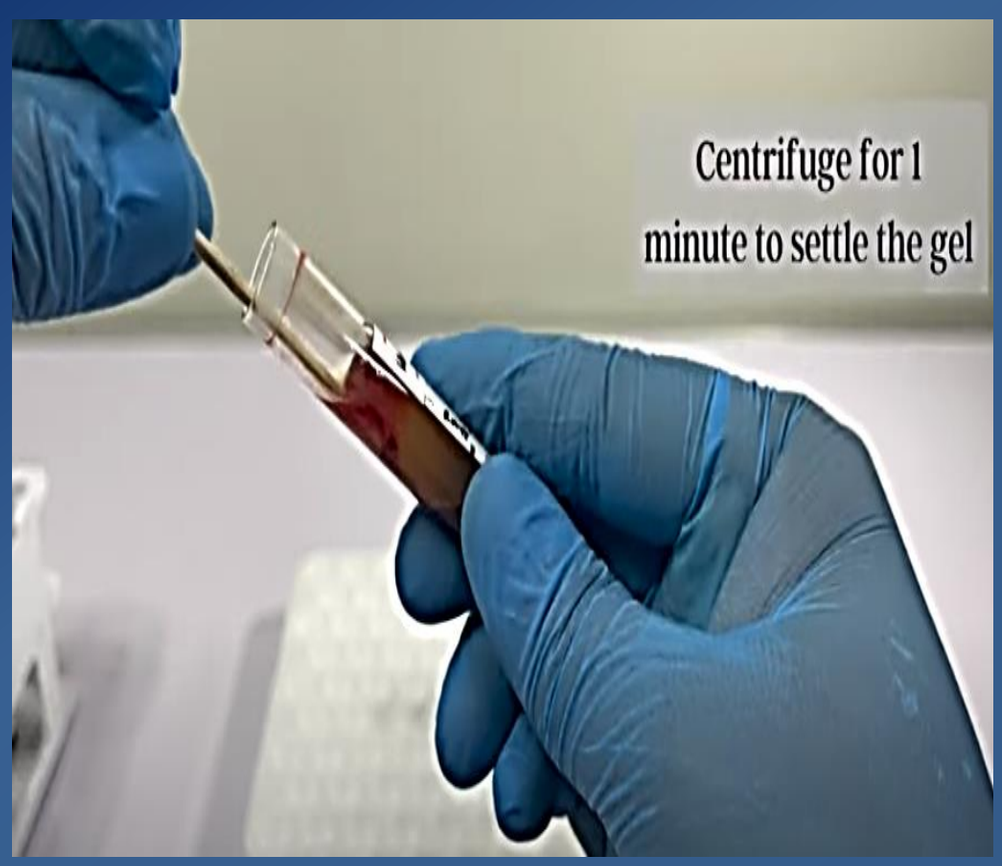
Human/ non human blood serum enriched with specific antibodies




Properly
centrifuged serum

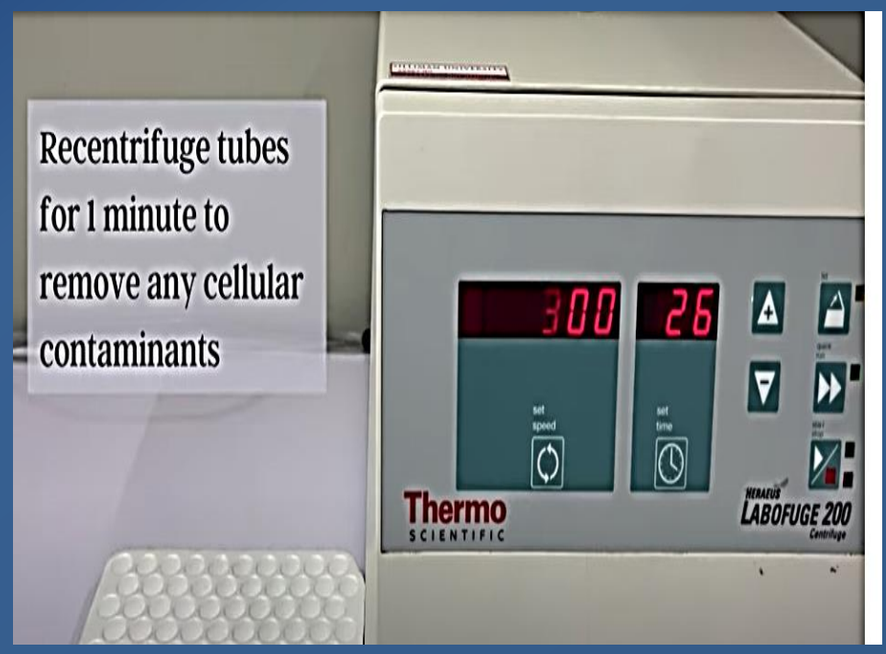

Gel Formation


Remove gel
formation by
"rimming" the tube
Run an applicator stick
along the inner tube wall


Centrifuge for 1
minute to settle the gel


Lipemic Serum
• turbid


Hemolyzed
• reddish/pinkish


Recentrifuge tubes for 1 minute to remove any cellular contaminants
300
26
Thermo
SCIENTIFIC
LABOFUGE 200


Blood Cell Pellet


Remove the serum to another sterile test tube
to avoid the blood cell pellet


Cover with parafilm
to avoid spillage and
contamination

PURPLE

Full Blood Count - *(FBC)*

- *Haemoglobin (Hb)*
- *Platelets (PLT)*
- *White Cell Count (WCC)*

PURPLE

HbA1C

- *Diabetic blood sugar control*

YELLOW (GOLD)

Urea & Electrolytes - *(U&E)*

- *Sodium (Na)*
- *Potassium (K)*
- *Urea*
- *Creatinine*

YELLOW (GOLD)

Other tests:

- *Liver function tests (LFT)*
- *C-reactive protein (CRP)*
- *Bone profile (Ca/Phos/Albumin/ALP)*
- *Magnesium*
- *Lipids*
- *Thyroid function tests (TFT)*
- *Cardiac enzymes (e.g. Troponin T)*

BLUE

Coagulation screen:

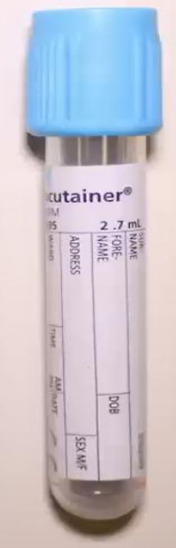
- *Prothrombin time (PT)*
- *Activated partial thromboplastin time (APTT)*
- *Fibrinogen*

INR:

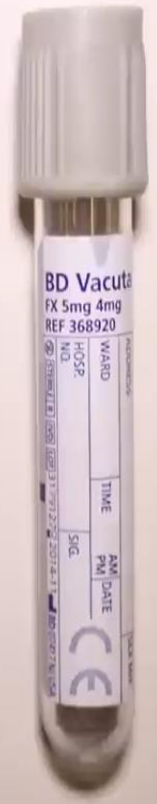
- *Warfarin monitoring*

D-Dimer:

- *Raised in DVT & PE*



GREY



Blood glucose:

- *Fasting glucose*
- *Random glucose*

Lactate:

- *↑ in tissue hypoperfusion*
- *e.g. sepsis / acute ischaemia*

PINK

Group & Save:

- *Analysis of patient blood group*

Crossmatch:

- *Requesting blood from the lab*

Label by hand at the bedside

BLOOD CULTURE

Isolation of causative organism

Targeted antimicrobial therapy

Follow local trust guidance

Differences between Serum and Plasma

S.N.	Characteristics	Serum	Plasma
1.	Definition	The clear yellow fluid separated when blood is allowed to clot freely.	Yellowish and slight alkaline fluid, in which blood cells float.
2.	Clotting factors	It is the watery fluid from blood without the clotting factors.	It is the blood fluid that contains blood-clotting agents.
3.	Composition	The serum contains proteins, electrolytes, antibodies, antigens, and hormones.	It contains all suspended blood cells with proteins, salts, lipids, glucose.
4.	Water content	The serum contains 90% water.	Plasma contains 92-95% of water.
5.	Components	The serum contains proteins like albumin and globulins.	Plasma contains clotting factors and water.

6.	Fibrinogen	Fibrinogen absent.	Fibrinogen present.
7.	Cell arrangement	Cells are usually attached together by clot formation.	Cells are not attached together and suspended in plasma.
8.	Method of Separation	Acquired from the process of spinning after clotting.	Acquired from the process of spinning before clotting.
9.	Use of Anti-coagulant	Anticoagulant is not needed to separate the serum.	Anticoagulant is required to obtain plasma.
10.	Feasibility of Separation	Separation of serum requires higher levels of expertise, expenses and is time-consuming.	Separation of plasma is relatively easy and inexpensive
11.	Volume in blood	Less volume in comparison to plasma.	Consists of 55% of the total volume of blood.

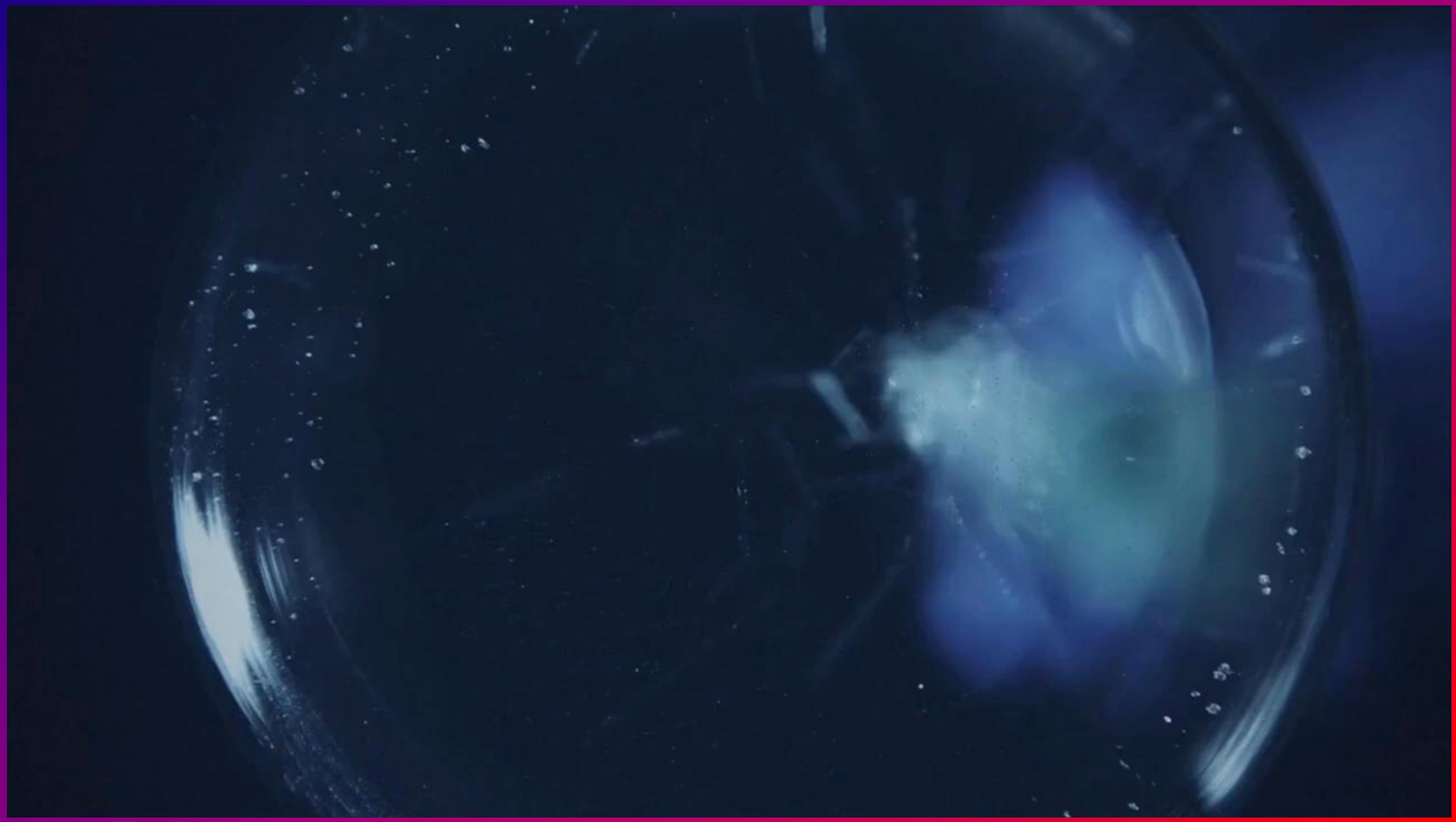
12.	Density	The density of serum is 1.024 g/ml.	The density of plasma is 1.025 g/ml.
13.	Storage	The serum can be stored at 2-6 degrees centigrade for several days.	Frozen plasma can be stored for up to a year.
14.	Discoloration	The serum does not discolor on standing.	Plasma tends to discolor on standing.
15.	Importance	The serum is the primary source of electrolytes.	The function of the plasma is the transport of excretory metabolites and materials in the blood. It also helps in the maintenance of blood pressure and in the regulation of body temperature.

16.	Associated terms	The branch of study that deals with studying serum and analyzing it for diagnostic purposes are called serology.	Plasmapheresis refers to the process of isolation of plasma from the blood using centrifugation.
17.	Uses	Human serum is usually used for the purpose of diagnostic testing. Other animal sera are used as anti-venom, antitoxins, and vaccinations. They are also used in humans for therapeutic purposes.	Plasma is delivered to the patients who lack blood cells. It is also Transferred to patients who suffer from hemophilia, shocks, burns, and other clotting problems.

Plasma and serum

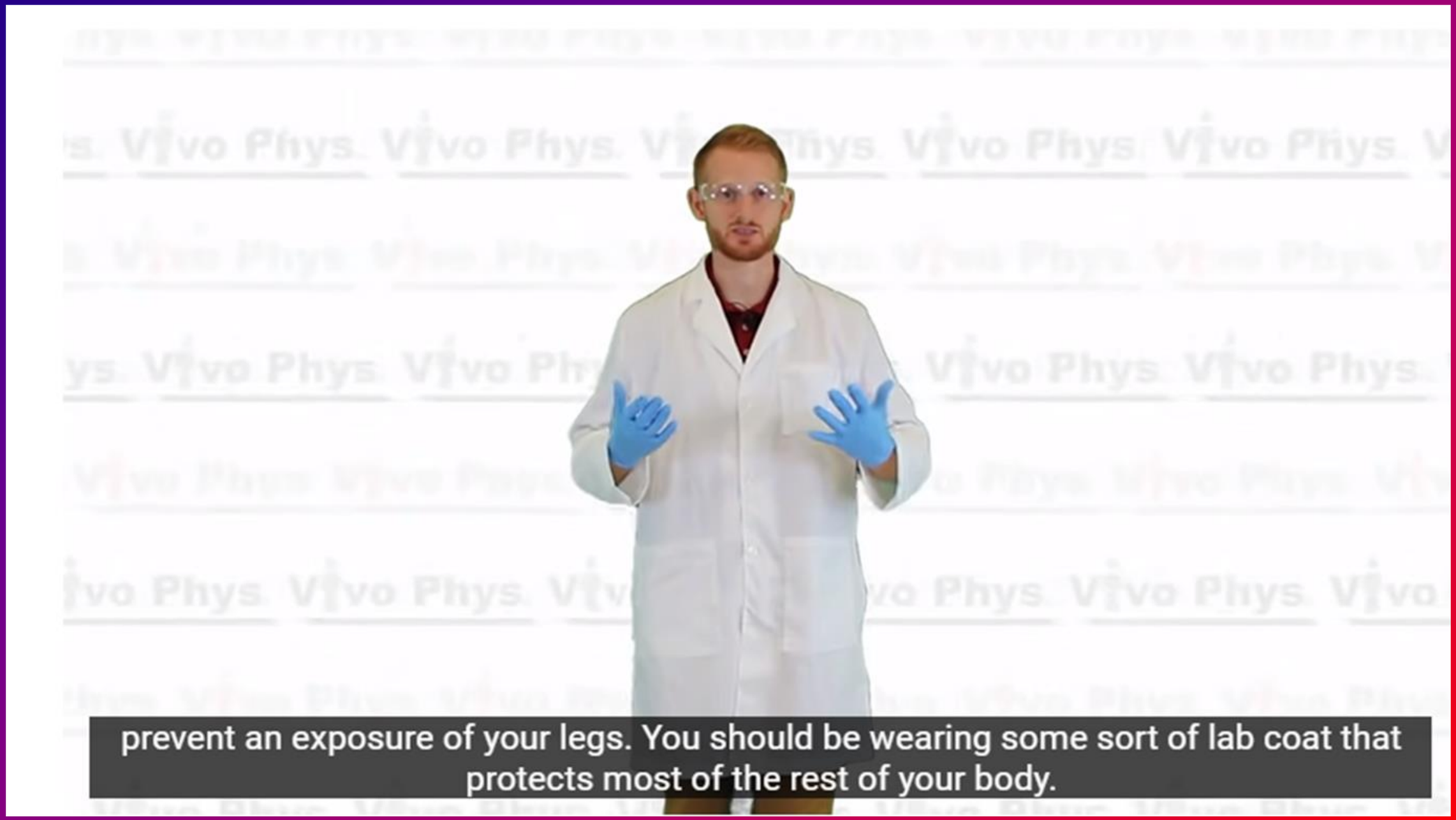
https://www.youtube.com/watch?v=VHpAs1sLfgs

Different between serum, plasma and antiserum



https://www.youtube.com/watch?v=RQLbSxvVej4

Centrifugation and Aliquoting of Blood Serum and Plasma

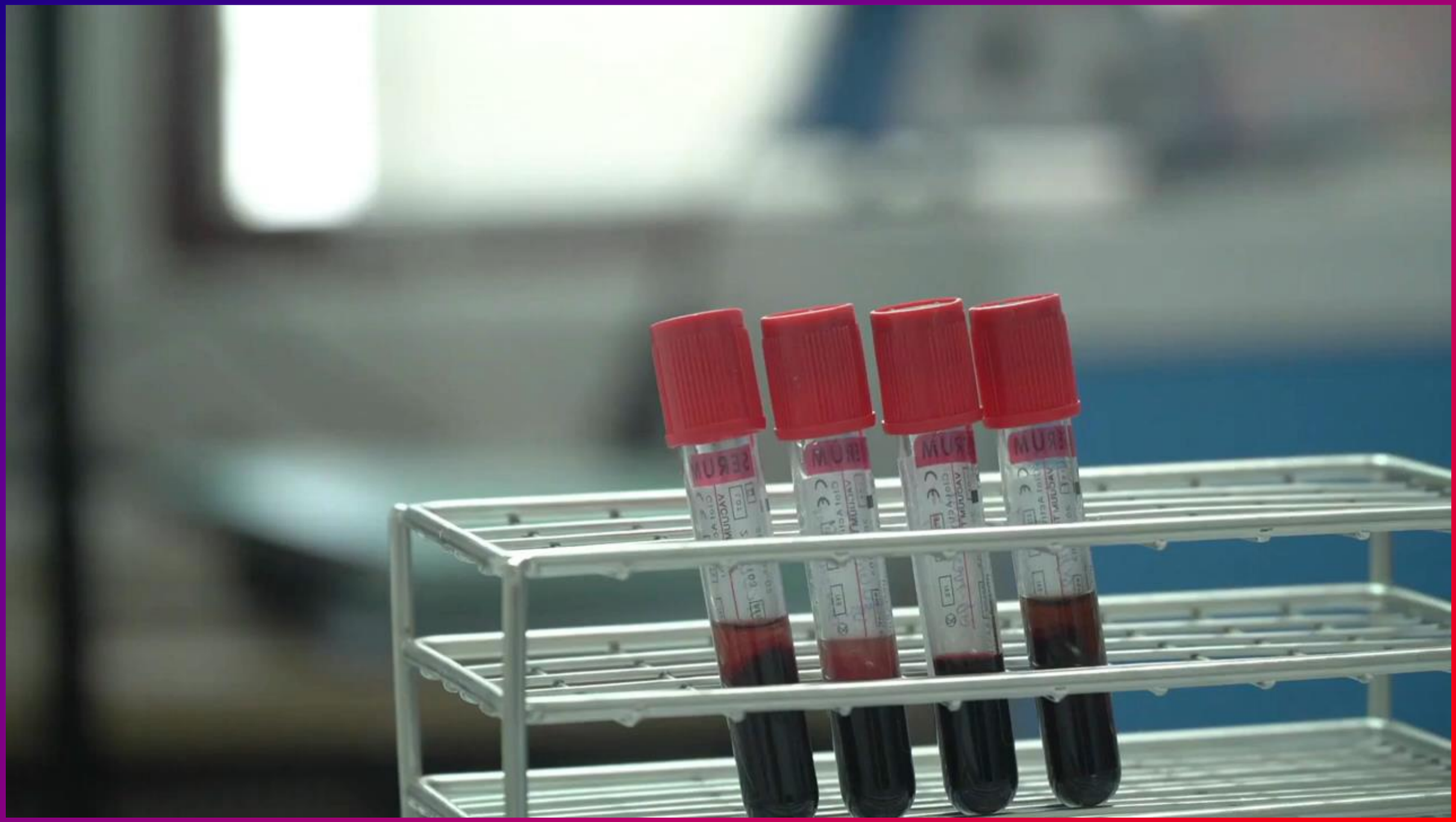


https://www.youtube.com/watch?v=XAhBzUosvsU

Prepare the serum and plasma for small animal

https://www.youtube.com/watch?v=AomdQO0tskU&t=48s

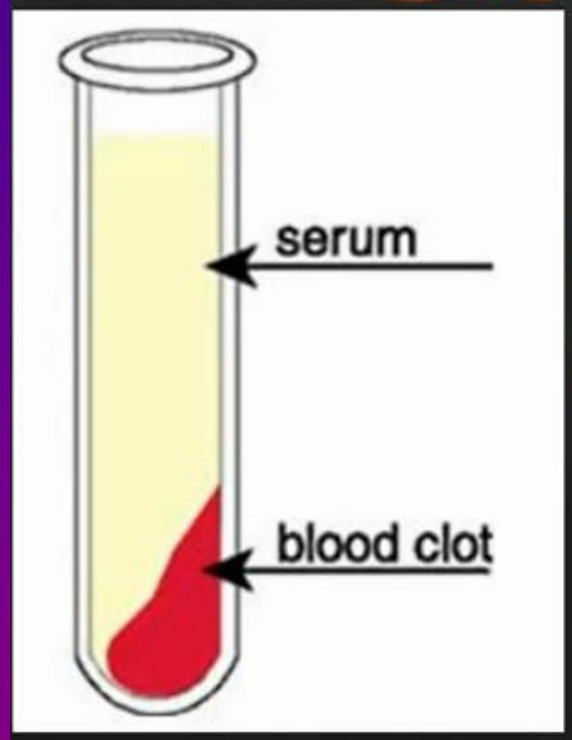
Serum Extraction from Whole Blood



https://www.youtube.com/watch?v=7vLEtK5cB8Y

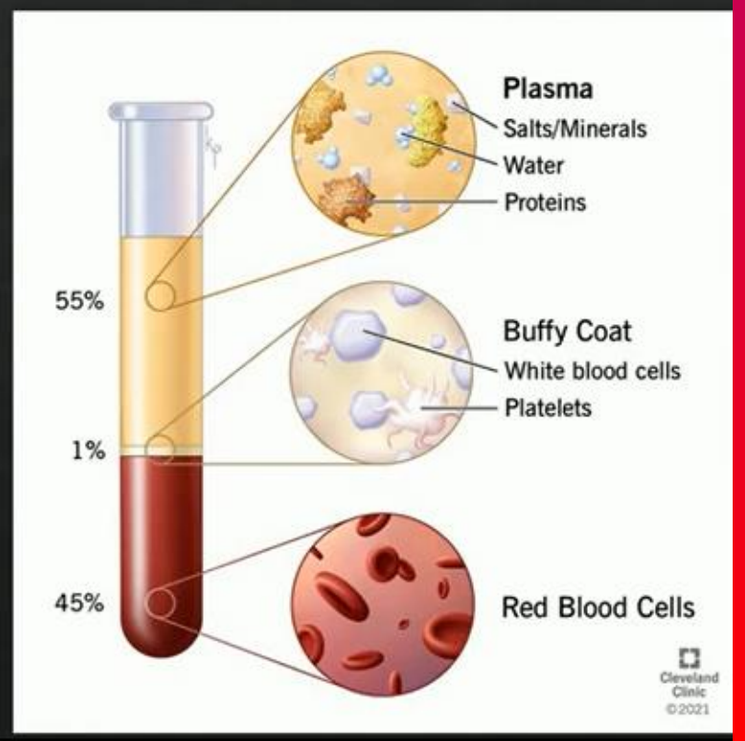
Plasma and serum

Difference
Serum vs Plasma



Plasma = Whole Blood-Blood cells

Serum = Plasma-clotting factors



https://www.youtube.com/watch?v=aQtlMbBLXl4

Blood bottles guide

https://www.youtube.com/watch?v=YuZQG6zMw_w

Thank you for listening