



Department of Anesthesia
Techniques



Fragility test (RBC fragility test)

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2nd course

Lec.4

- * **The Osmotic Fragility Test** : is used to measure erythrocyte resistance to hemolysis while being exposed to varying levels of dilution of a saline solution.
- * When erythrocytes are exposed to a hypotonic environment, water enters the cell and causes swelling and eventual lysis.
- * **Hemolysis:-** breaking down (bursting) of red cells resulting in release of Hb into the surrounding fluid.

➤ The sooner hemolysis occurs, the greater the osmotic fragility of the cells.

* **Isotonic Solution:** A solution that has the same salt concentration as cells and blood.

* **Hypertonic Solution :** a solution that has a high solute concentration and low water concentration compared to body fluids.

* **A Hypotonic Tonic Solution** is a solution that has a low solute concentration and high water concentration compared to body fluids.

* **PRINCIPLE**

- Patient sample and normal red cells are placed in a series of graded strength NaCl solution and resulting hemolysis is compared to a 100% standard.
- The normal red cells can remain suspended in normal saline (0.9% NaCl solution) for hours without rupturing or any change in their size or shape.

Material & Instruments

1. Test tubes
2. NaCl with different concentrations
3. Heparinized venous blood
4. Distill water

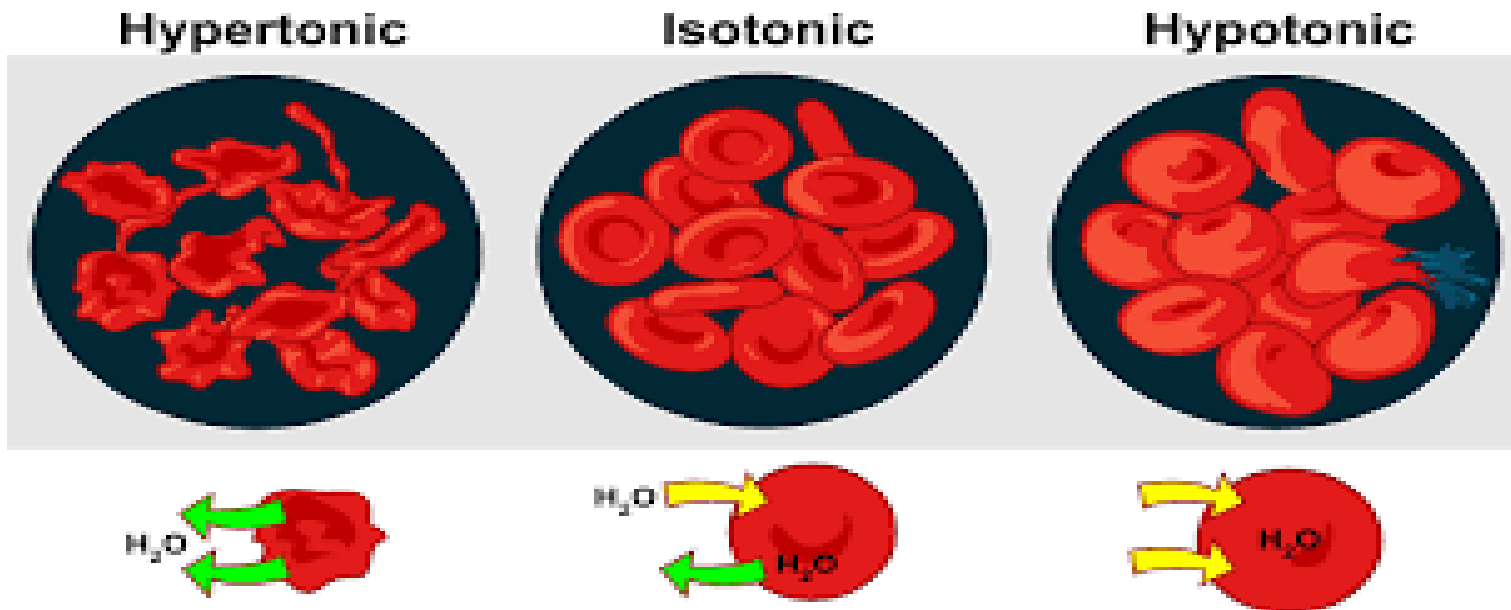
Procedure

- 1- Prepare different concentrations of NaCl start with 0 concentration i.e. put only D.W. then put in the rest of the test tubes the following concentrations of NaCl 0.3, 0.35 0.4, 0.45, 0.5, 0.9 %
- 2- Put a few drops of heparinized blood in each test tube and read the results visually.
- 3-Incubate at room temperature for 30 min. Mix again and centrifuge 1000g for 5 min.
- 4-Remove the supernatants carefully without including cells and estimate the amount of lysis in a photometer at 540 nm. or colorimeter provided with a yellow-green filter.



❖ **Red cells in hypertonic saline.** In hypertonic solutions, the RBCs , shrink due to movement of water out of the cells.

❖ **Red cells in hypotonic saline.** In hypotonic saline, water moves into the red cells (endosmosis). They swell up and lose their biconcave shape, becoming smaller and thicker.



➤ Normal Range of Fragility

- ❖ Normally, hemolysis begins in about (0.45%) saline.
- ❖ Hemolysis will be complete at 0.3 % NaCl.
- ❖ No cells hemolyze in solutions of 0.5% saline and above.

➤ **Increased Red Cell Fragility** (increased tendency to hemolysis) caused by:

1. Hereditary spherocytosis.
2. Autoimmune hemolytic anemia.
3. Toxic chemicals, poisons, infections, and some drugs (aspirin).
4. Deficiency of glucose 6-phosphate dehydrogenase (G6D).

➤ Decreased red cell fragility (increased resistance to hemolysis) in:

1. **Thalassemia.**
2. **Iron deficiency anemia.**
3. **Sickle cell anemia**