

Plasma Expanders: intravenous fluid solutions

- agents with high molecular weight that increase the plasma volume by increasing osmotic pressure.
- used to treat patients suffering from haemorrhage & shock (to replace lost fluids)
- they do not carry oxygen
- PVEs increase or retain the volume of fluid in the circulatory system

Types: crystalloid
colloid

Crystalloid: aqueous solutions of mineral salts or other water soluble molecules

Ex: • Normal saline • Dextrose • Ringers solution

- given to ↑ intravascular volume & as nutrition to patients who are unable to intake food orally.
- also used for delivery of i.v. medicines, increase filtration & avoid renal toxicity
- isotonic to plasma & do not produce any osmotic pressure $\therefore$ they increase plasma volume without significant changes in the intracellular, intravascular & interstitial fluids.

Colloids: large insoluble molecules

Ex: • Dextran • Human Albumin • Gelatin • Blood • Degraded gelatin Polymer (poly geline)
• Hydroxyethyl starch (HES) • Polyvinyl pyrrolidone (PVP)

- retained more easily in intravascular space & increase osmotic pressure so that fluid moves to the intravascular space from the intracellular & interstitial spaces.

Advantages of Colloids over Crystalloids:

- the larger colloid molecules are retained more easily in the intravascular compartment & increase the osmotic pressure $\therefore$ more effective resuscitation of plasma volume occurs by colloids
- duration of action of colloids is relatively longer than crystalloids

Ideal properties of Plasma Volume Expanders:

- iso-oncotic with plasma
- distribution is limited to intravascular compartment only
- pharmacodynamically inert
- non-pyrogenic, non-allergic & non-antigenic
- no interference with blood grouping or cross-matching
- stable, easily sterilizable & cheap

MoA: principle of osmosis

PVE administration
↓
↑ in plasma oncotic pressure
↓
water is drawn into plasma
from the interstitial fluid

- ∴ the lost blood is replaced with a suitable fluid, the now diluted blood flows more easily even in small vessels
- ∴ more oxygen reaches the tissues

Conditions where PVEs are Used:

- Shock
- Hypovolemia
- Sepsis
- Dehydration
- Fluid loss due to burns & injuries
- Fluid loss due to diarrhoea & vomiting
- Hypernatremia
- Hypoglycemia

Adverse Effects of PVEs:

- fluid overload
- pulmonary edema
- hyperchloremia
- metabolic acidosis (caused due to loss of bicarbonates in urine)
- Hyperglycemia
- Hypotension
- Nausea, Vomiting, Fever, Chills
- Bronchospasm
- Urinary
- Periorbital edema
- Acute renal failure
- Anaphylactic reactions