PLASMA PRODUCTS
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Frozen Plasma (FP) and Fresh Frozen Plasma (FFP)
Description:
- Volume: 200 – 250 ml/unit
- Contents: All coagulation factors at levels close to those of normal plasma (i.e. ~100%)
- No to few viable RBCs or WBCs present. Considered acellular.

Preparation
- Prepared from whole blood, separated by centrifugation step(s) from RBCs, and platelets if platelet concentrates are desired
- “Fresh Frozen Plasma (FFP)” must be frozen within 8 hours of collection.
- Plasma frozen within 24 h of collection is called frozen plasma (FP), or 24-Hour Plasma.
- Compared to FFP, only FV and VIII are slightly reduced in FP. Therefore, FFP or FP can be used interchangeably.

Storage
- Store up to 1 year at -18C, or 7 years at -65C (this is less common)
- Can store for up to 24 hours at 1-6C after thawing at 37C
- If label as “Thawed Plasma”, can store at 1-6C for up to 5 days after thawing. Thawed Plasma products have reduced FVIII and FV levels. Provides a readily available source of plasma without needing to thaw (Thawing takes ~20-30 min)

Dose response
- A dose of 10 – 15 ml/kg should roughly increase factor levels by 20-30%.
- In an adult, a dose therefore is about 4-6 units in most patients
- Effect is transient and limited by the T1/2 of factors.
- Further therapy is guided by clinical response and PT/PTT measurements

Other Types of Plasma Products
Solvent-Detergent (SD)Plasma
- Pooled product from ~2500 ABO identical donors
- Standard volume of 200 ml
- Consistent factor levels from product to product
- Treated with solvent and detergent, then ultrafiltration to remove HMW vWF
- SD treatment eliminates lipid-coated viruses-HIV, HCV, HBV
- But not non-enveloped viruses such as parvovirus B19, HAV
- Product is deficient in some factors: FVIII, vWF, Protein S
- Reported association of use of SD-plasma with thrombotic events in liver transplant patients, possibly due to Protein S deficiency?

Cryo-poor plasma
- Supernatant recovered after cryoprecipitate is made from a unit of thawed FP or FFP; deficient in all “cryo factors”: VIII, XIII, vWF, fibrinogen, fibronectin
- Indication (Only one):
  a. Plasma exchange for relapsing TTP or TTP not responsive to exchange with FFP.
  b. In theory, cryo-poor plasma may work better than FP/FFP for TTP patients due to lack of vWF multimers. However cryopoor plasma has not been shown to be superior than FFP as initial therapy.

Donor-retested plasma
- The goal for this product is to detect window period donations of FFP/FP by a recently infected donor, thus further minimizing infectious disease risks
  - FFP/FP collected is held for 112 days, then donor is retested
  - FFP put into inventory ONLY if retesting results negative
  - Little used due to complexity, loss of unit if donor does not return, storage cost.
  - Superseded in recent years by nuclei acid testing for infectious diseases.

Thawed plasma
- Prepared from FFP or FP (plasma frozen within 24hours)
- Thaw FP/FFP as usual, then store refrigerated.
- Shelf life of 5 days after thawing (as opposed to just 24hr).
- Some loss of FVIII and FV, okay for most patients and clinical settings.
- Product in liquid form already, can use without delay due to thawing.
- Often used for trauma patients, or surgical patients with unexpected blood loss

Liquid plasma
- Prepared from WB, plasma separated and kept in liquid state, never frozen.
- Stored at 1-6C. Expires 5 days after the expiration date of the WB from which it was prepared.
- Like thawed plasma, can use without delay due to thawing.

Recovered plasma/Plasma for Manufacture
- An unlicensed product. Converted from plasma and liquid plasma
- Usually shipped to a manufacturer and fractionated into derivatives such as albumin and immune globulins.
- Has no expiration date. But records for this component must be retained indefinitely.
- Collecting facility must have a ‘short supply agreement’ with the manufacturer.

ABO Compatibility:
Plasma has ABO antibodies, so must be ABO compatible with recipient. See chart below.

\[\text{DONOR}\]

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\text{Rh compatibility:} Not an issue. Plasma products have no RBCS

\text{Summary of Indications:}

Transfusion of FFP is indicated to treat bleeding or to prepare for an invasive procedure or surgery in:
- Patients with multiple coagulation factor deficiencies—examples include liver disease, DIC, coagulopathy secondary to massive transfusion
- Patients with an isolated factor deficiency when specific therapy (recombinant or virally-inactivated) is not available—examples include factors II, V, X, and XI, c1-esterase deficiency, AT-III deficiency
- Patients requiring emergency reversal of coumadin (warfarin) therapy when medical necessity does not allow time for reversal by vitamin K
- Patients with thrombotic thrombocytopenic purpura (TTP). Treat by plasma replacement via apheresis or infusion. Achieves replacement of ADAMTS-13 and removal of larger vWF multimers.
- Patients with protein C or protein S deficiency associated with a hypercoaguable state

\text{Summary of Contraindications:}

Transfusion of FFP is not indicated for:
- Volume expansion
- Nutritional support
- Bleeding with no evidence of factor deficiency
- Mildly increased PT/PTT alone
- Heparin reversal