

FELINE FRESH FROZEN PLASMA



Description

Fresh Frozen Plasma (FFP) is separated and frozen within 8 hours of collection of whole blood. Fresh frozen plasma preserves the concentration and activity of all coagulation factors of a whole fresh blood unit while maintaining the same therapeutic power.

Contents

FFP contains plasma proteins including all coagulation factors both labile and non-labile. Source of all clotting factors, immunoglobulins, albumin, lipids and electrolytes, fibrinogen, fibronectin, and anti-inflammatory mediators; may also contain a small amount of erythrocyte.

Platelets, IF present, are not viable.

Indications

All coagulopathies: Liver disease, anticoagulant rodenticide toxicity and hereditary coagulopathies

- Control of bleeding in patients who require replacement of labile coagulation Factors (V and VIII and vWf) when simultaneous blood volume expansion is required.
- Patients that are actively hemorrhaging benefit from immediate supplementation of clotting factors in FFP.
- Immunoglobulin (Ig) transfer (i.e. passive immunity) in situations where neonates never had colostrum
- Pretreatment of haemophilia A patients before invasive procedures
- Can be considered for volume resuscitation in acute trauma with TS <4 g / dl.
- Non responsive hypotension*
 - o FFP will but not significantly increase the patient's colloid osmotic pressure
- Hypovolemia
 - o Not recommended by guidelines, but suggested to be effective
- Antioxidant properties
 - o Through iron sequestration, which limits the production of free hydroxyl radicals.
 - No current guidelines exist for FFP administration with regard to its antioxidant effects.
- Sepsis
- Pancreatitis*
 - o FFP contains anti-proteases which allegedly counteract the proteases that are released as a result of pancreatic inflammation. Pancreatitis patients may have concurrent low albumin levelSeveral veterinary studies show no decrease in morbidity or mortality and even some increase in morbidity with the use of plasma therapy for pancreatitis patients.

In severe cases (e.g., necrotizing pancreatitis) that are coagulopathic or have clinical signs of SIRS, sepsis, or multi organ dysfunction syndrome the use of FFP is warranted. As well as cases of AKI and azotemia where colloids are not recommended

- DIC
- SIRS (peritonitis...)
- Hypoalbuminemia*

It is considered that the risks of transfusing such large volumes, (risk of reaction as well as cost) negate plasma as an effective sole treatment for hypoalbuminaemia

- o To raise the albumin level in the body by 0.5-1g/dL, ~20-40ml/kg of plasma must be administered which is not cost effective and large volumes can be detrimental. Transfused albumin will also only remain in circulation for 24-48h. These undermine FFP as an effective sole treatment for hypoalbuminemia.
- Parvovirus/Panleukopenia*
 - o Fresh frozen plasma transfusion, **if at all**, is required, to maintain blood volume, hydration status, and colloid oncotic pressure necessary for tissue oxygen delivery to body tissues. Significant losses of plasma proteins into the intestinal lumen can lead to hypoproteinaemia, hypoalbuminaemia, and, occasionally, coagulation abnormalities. The use of fresh frozen plasma in these patients is controversial, but it also has sound rationale.
- Neonatal hypoglobulinaemia due to colostrum deficiency
- Prophylaxis before invasive surgery in an animal with a known significant clotting factor deficiency
 - o 98% of cats with liver diseases (neoplasia, inflammation, hepatic lipidosis or other degenerative liver diseases), had one or more coagulation abnormality

Contraindications

- Do not use FFP when coagulopathy can be corrected more effectively with specific therapies, such as Cryoprecipitate, vitamin K or others
- Do not use FFP when blood volume can be safely and adequately replaced with other volume expanders such as 0.9% Sodium Chloride or Lactated Ringer's or HES
- Do not use FFP for volume replacement alone
- It is not advised to use FFP as the sole therapy for hypoalbuminaemia in the absence of coagulopathy

Side Effects and Hazards

- Anaphylactic, anaphylactoid:
 - o Characterized by urticaria, pruritis, erythema, edema, emesis, dyspnea, hypertension, bronchoconstriction, and severe shock. Can be mild or life threatening. Onset is rapid, occurring 1-45 minutes from the start of the transfusion.
- Circulatory overload (overdose):
Transfusion related circulatory overload (TACO) and transfusion-related acute lung injury (TRALI)
 - o Characterized by cough, tachypnea, pulmonary edema, congestive heart failure, vomiting, and urticaria. Can be mild or life threatening. Patients with underlying cardiac disease are most at risk. **TRALI HAS NOT BEEN REPORTED IN CATS**
 - o If massive volumes of plasma are used, citrate toxicity, hypothermia and other metabolic problems may occur
- Others include:
 - o Fever, hemolytic and allergic reactions
 - o **nonhemolytic reactions are by far the most likely reason for acute fever during transfusion.**
 - o Febrile Non Hemolytic Transfusion Reactions can also occur during FFP administration from patient antibodies against donor plasma proteins

- Fortunately, in both dogs and cats FNHTR are typically mild and of limited clinical significance.
- Transmission of infectious diseases
- Plasma produced from whole blood collection cannot be guaranteed free of red cells.
- Plasma may react with the recipient's red cells, causing a positive direct antiglobulin test, possibly hemolysis and, rarely, non-cardiogenic pulmonary edema.
- In one retrospective study, no reactions were reported in 19 FFP transfusions in 13 cats. Adverse reactions are reported to be around 15% in another.

Precautions

- If FFP is thawed but the temperature is below 11°C it can be re-frozen and used as Frozen plasma. This can be kept for an additional 4 years from date of production. If above 11°C use within 24h or discard.
- Always use a filter
- Discard any unused portion (Can be kept max 24h after being opened)
- Never mix IV medications, colloids, Ringer's lactate with the plasma, even in different lines or limbs. These products are not compatible with blood products and will cause clotting.
- Flush the IV line with saline before and after product administration
- Use NaCl 0.9% ONLY.
- Keep bags in an upright position to facilitate examination and potential unwanted thawing
- Handle frozen bags carefully as they rupture easily.
- Defrost frozen plasma within a protective pouch (ziplock bag) in a water bath at 30-35°C for 20-30 minutes and stir occasionally. MAX 37°C. NEVER use a microwave

Administration

- A minor crossmatch is strongly recommended before plasma is administered.
- Infusion pumps can be used.
- Plasma should ALWAYS be typed
- Plasma administration is intravenous, however in very young or circulatory impaired animals it may be given intraperitoneally.

Dosage

- Dosage should be guided by close patient monitoring.
 - Monitor blood pressure to avoid volume overload.
- FFP can improve coagulation times in cats. If no improvement in coagulation times is seen after one unit of FFP, transfusion of additional units should be considered.
- FFP appears efficacious in individual cats at doses of 2.15–10.85 ml/kg for treatment of prolonged PT and/or PTT
 - Monitor post transfusion coagulation times to be sure that the dose was effective

Quick guide:

- 6-10 ml/kg at 4-6 ml/minute over MAX 4h. Infuse as quickly as the patient can tolerate.
- Standard dose (hypo-coagulation, hypoalbuminemia or increased passive immunity):
- 5-20 mL/kg (median dose is 6ml/kg) every 12 hours to effect.
 - ➔ Severe coagulopathies require the higher end of the dose range
- If the volume transfused exceeds 20 ml/kg/day, serum calcium should be measured. Induced tetany and a hypo coagulable state can be triggered due to excess citrate.

Infusion rate

- 1 ml/kg/h for the first 15 mins
 - o Then 5 ml/kg/h for the next 15 mins, followed by a rate adequate to deliver the transfusion within 4 h.
 - Do not use the above rate if the recipient is in hypovolemic shock due to acute hemorrhage.
 - ➔ Plasma can be given in a bolus or over the course of 1 to 2 hours.
 - Normovolemic patients: 5-10 ml/kg/h for 2-4 h (median 6ml/kg)
 - Haemorrhaging hypovolemic patients: up to 22 ml/kg/h.
 - High risk overload patients (heart failure, renal failure or hypertension): 1-3 ml/kg/h
- Start with the lowest rate and gradually increase.