

# Ask a Pathologist - American Journal of Hospital Medicine

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## ASK A PATHOLOGIST

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Question: What factors should be considered when determining whether to use fresh frozen plasma (FFP) vs cryoprecipitate to treat hypofibrinogenemia?

Answer: Decreased fibrinogen levels are caused by acquired disease states of decreased production or increased consumption and, less commonly, congenital abnormalities.

Regardless of the origin, the same two blood products are commonly used for treatment: FFP and cryoprecipitate. Multiple considerations must be taken into account when deciding which product is most appropriate for an individual patient.

FFP is prepared by centrifuging whole blood to separate the red blood cells, platelets, and plasma. The plasma is then stored in a freezer at  $\leq -18^{\circ}\text{C}$  for up to one year. A single unit of FFP has a volume of 200-300 mL and contains 1 IU/mL of all coagulation factors. Additionally, FFP contains other plasma proteins such as fibrinogen (approximately 400 mg per unit), antithrombin, albumin, and proteins C and S.

Since FFP contains a significant amount of fibrinogen in addition to all other coagulation factors, it is a good choice for treating hypofibrinogenemia in a patient with multiple coagulation factor deficiencies. FFP is also preferred for fibrinogen replacement in patients in whom volume overload is not a concern or when additional volume may actually be desired such as in a bleeding patient.

Cryoprecipitate is created by thawing FFP at  $1-6^{\circ}\text{C}$  and collecting the cold-insoluble precipitate. The majority of coagulation factors and proteins are left in the liquid portion of the bag (cryo-poor plasma), while the precipitate contains five cold-insoluble proteins: fibrinogen, factor VIII, factor XIII, von Willebrand factor (vWF), and fibronectin. Each unit of cryoprecipitate has a volume of 10-15 mL and must contain a minimum of 150 mg fibrinogen and 80 IU of factor VIII. A standard adult dose of cryoprecipitate is 10 units, which is expected to raise the fibrinogen level of a 70-kg adult by 70-80 mg.

Factor concentrates are generally the treatment of choice for patients with isolated factor deficiencies of factor VIII, factor XIII, or vWF, and cryoprecipitate should only be used in these cases if factor concentrates are unavailable. Cryoprecipitate is used primarily to replace fibrinogen in volume sensitive patients in whom hypofibrinogenemia is the primary concern. Given the low volume, cryoprecipitate can be thawed and infused more rapidly than FFP and

may be useful when rapid correction of fibrinogen deficiency is required.

References:

Fung, MK. *Technical Manual*. 18th ed. Bethesda, Md.: American Association of Blood Banks; 2014.