FACTOR 9- Human

Class: Antihemophilic Agent

Indications:

Prevention and control of bleeding in patients with hemophilia B (congenital factor IX deficiency or Christmas disease)

Available dosage form in the hospital:

-FACTOR 9 500 I.U VIAL

-FACTOR 9 250 I.U VIAL

Dosage:

NOTE: Contains **nondetectable levels of factors II, VII, and X**. Therefore, **NOT INDICATED** for replacement therapy of any other clotting factor besides factor IX or for reversal of anticoagulation due to either vitamin K antagonists or other anticoagulants (eg, dabigatran), for hemophilia A patients with factor VIII inhibitors, or for patients in a hemorrhagic state caused by reduced production of liver-dependent coagulation factors (eg, hepatitis, cirrhosis).

-Control or prevention of bleeding in patients with factor IX deficiency (hemophilia B or Christmas disease): I.V.: *AlphaNine® SD, Mononine®:* Dosage is expressed in units of factor IX activity; dosing must be individualized based on severity of factor IX deficiency, extent and location of bleeding, and clinical status of patient. Refer to product information for specific manufacturer recommended dosing. Alternatively, the World Federation of Hemophilia (WFH) has recommended general dosing for factor IX products.

-Formula to determine units required to obtain desired factor IX level: **Note:** If patient has severe hemophilia (ie, baseline factor IX level is or presumed to be <1%), then may just use "desired factor IX level" instead of "desired factor IX level increase".

-Number of factor IX units required = patient weight (in kg) x desired factor IX level increase (as % or units/dL) x 1 unit/kg

**For example, to attain an 80% level in a 70 kg patient who has a baseline level of 20%: Number of factor IX units needed = 70 kg x 60% x 1 unit/kg = 4200 units

-World Federation of Hemophilia (WFH) Guidelines (2012): Note: The following recommendations may vary from those found within prescribing information or practitioner preference.

-*Prophylaxis:* 15-30 units/kg twice weekly (WFH, 2012 [Utrecht protocol]) **or** 25-40 units/kg twice weekly (WFH, 2012 [Malmö protocol]) **or** 40-100 units/kg

administered 2-3 times weekly (National Hemophilia Foundation, MASAC recommendation, 2007); optimum regimen has yet to be defined.

Treatment:

2012 World Federation of Hemophilia Treatment Recommendations (When No Significant Resource Constraint Exists):

Site of Hemorrhage/Clinical Situation	Desired Factor IX Level to Maintain	Duration
Joint	40-60 units/dL	1-2 days, may be longer if response is inadequate
Superficial muscle/no neurovascular compromise	40-60 units/dL	2-3 days, sometimes longer if response is inadequate
Iliopsoas and deep muscle with neurovascular injury, or substantial blood loss	*Initial:* 60-80 units/dL *Maintenance:* 30-60 units/dL	*Initial:* 1-2 days *Maintenance:* 3-5 days, sometimes longer as secondary prophylaxis during physiotherapy
CNS/head	*Initial:* 60-80 units/dL *Maintenance:* 30 units/dL	*Initial:* 1-7 days *Maintenance:* 8-21 days
Throat and neck	*Initial:* 60-80 units/dL *Maintenance:* 30 units/dL	*Initial:* 1-7 days *Maintenance:* 8-14 days
Gastrointestinal	*Initial:* 60-80 units/dL *Maintenance:* 30 units/dL	*Initial:* 7-14 days *Maintenance:* Not specified
Renal	40 units/dL	3-5 days
Deep laceration	40 units/dL	5-7 days
Surgery (major)	*Preop:* 60-80	

2012 World Federation of Hemophilia Treatment Recommendations (When No Significant Resource Constraint Exists):

Site of Hemorrhage/Clinical Situation	Desired Factor IX Level to Maintain	Duration
	units/dL	
	Postop: 40-60 units/dL 30-50 units/dL 20-40 units/dL	*Postop:* 1-3 days 4-6 days 7-14 days
Surgery (minor)	*Preop:* 50-80 units/dL	
	Postop: 30-80 units/dL	*Postop:* 1-5 days depending on procedure type

Note: Factor IX level may either be expressed as units/dL or as %. Dosing frequency most commonly corresponds to the half-life of factor IX but should be determined based on an assessment of factor IX levels before the next dose.

-*Continuous infusion (for patients who require prolonged periods of treatment [eg, intracranial hemorrhage or surgery] to avoid peaks and troughs associated with intermittent infusions) (Batorova, 2002; Poon, 2012; Rickard, 1995; WFH, 2012):* Following initial bolus to achieve the desired factor IX level: Initiate 4-6 units/kg/hour; adjust dose based on frequent factor assays and calculation of factor IX clearance at steady-state using the following equations:

-Factor IX clearance (mL/kg/hour) = (current infusion rate in units/kg/hour) divided by (plasma level in units/**m**L)

-New infusion rate (units/kg/hour) = (factor IX clearance in mL/kg/hour) x (desired plasma level in units/**m**L)

Geriatric
Refer to adult dosing.

Common side effect:

- Central nervous system: Headache, Chills, dizziness, drowsiness, fever (including transient fever following rapid administration), headache, lethargy, lightheadedness, somnolence
- Cardiovascular: Cyanosis, flushing, hypotension, chest tightness, thrombosis
- Dermatologic: Angioedema, photosensitivity reaction, rash, urticaria
- Gastrointestinal: Abnormal taste, diarrhea, nausea, vomiting
- Hematologic: Disseminated intravascular coagulation (DIC)
- Hepatic: Alkaline phosphatase increased, ALT increased, AST increased
- Local: Injection site reactions: Cellulitis, discomfort, pain, phlebitis, stinging
- Neuromuscular & skeletal: Neck tightness, paresthesia, rigors
- Ocular: Visual disturbance
- Respiratory: Allergic rhinitis, asthma, cough, dyspnea, hypoxia, laryngeal edema, lung disorder
- Miscellaneous: Allergic reaction, anaphylaxis, burning sensation in jaw/skull, factor IX inhibitor development, hypersensitivity reaction
- Postmarketing and/or case reports: HAV seroconversion, inadequate response/recovery, nephrotic syndrome (associated with immune tolerance induction), parvovirus B19 seroconversion, renal infarction, superior vena cava syndrome (neonates).

Pregnancy Risk Factor: C