

Haemotherapy in the Norwegian Armed Forces.



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Regulations

- Haemotherapy in the Norwegian Armed Forces is performed according to the **Directive for Transfusion in the Norwegian Armed Forces** (2008), whether domestically or abroad.
- The Directive aims at securing transfusion service comparable to civilian standards in all military situations.
- **Blood components and plasma products are supplied by Norwegian blood banks. Fresh whole blood** may be drawn from **fellow personnel** in the expeditionary corps upon request from the responsible surgeon / anaesthesiologist.
- Blood and plasma products are only given at surgical installations.

Haemostasis: Coagulation

- **Coagulation factors:**
- Solvent-detergent treated fresh frozen plasma (**Octaplas®**) **blood group AB** is used to **secure concentrations of coagulation factors**. Octaplas® is kept at -20°C.
 - Current stock: 20 units
 - **Problems:**
 - Thawing of Octaplas® takes about 20 minutes.
 - Octaplas® expands plasma volume
- **Freeze-dried fibrinogen** may prove an alternative, possibly in combination with **prothrombin complex**.
 - No thawing delay
 - Almost no volume effect
 - This alternative remains unestablished, however
- **Recombinant coagulation factor VIIa (NovoSeven)** is available – but it's use is not evidence based

Oxygenation


- **Leukocyte filtered** erythrocyte concentrates of blood group O in SAGMAN solution are used to secure adequate oxygen supply. These are transported and kept at 4-8°C.
- Hgb should preferably exceed 6 g/dl
- **Current stock:**
 - 8 units O Rh(D) +
 - 4 units O Rh(D) –
- **Routine supply:**
 - Every second week



The early use of Octaplas® is emphasized

- In case of acute, uncontrolled bleeding, Octaplas® is thawed immediately, and a SAG/Octaplas® ratio = 1:1 is seen as optimal
- Octaplas® should be thawed before arrival of an announced patient with uncontrolled bleeding
- Recombinant FVIIa (NovoSeven®) is given after 4 units of SAG - (90 microgram/kg/body weight, single dose) – if bleeding remains out of control – effect not evidence based

Current source of thrombocytes

- **Fresh whole blood** given by fellow personnel, pretested for transmissible diseases ("walking blood bank")


Disputed, but unestablished, specific advantages over component therapy in acute bleeding
- **Donation initiated if bleeding remains uncontrolled after 4 units of SAGMAN erythrocytes**
- Initially only blood group O; only 2 units allowed if minor incompatibility (O to A, B or AB). Thereafter group similarity is preferred

Thrombocyte concentrates

- Not available
- This is inferior to civilian trauma haemotherapy
- Alternatives for discussion:
 - Freeze-thawed thrombocytes (NL)
 - Seem to work, despite valid theory
 - Frequent supply of buffy-coat derived thrbc from domestic sources or by cooperation with other NATO groups (GB)
 - Expensive, difficult transportation, large waste
 - Apheresis of fellow personnel or supply from other NATO groups (D, US)
 - Needs special technical skill locally
 - Long and difficult transportation from other NATO groups
- Can a universal NATO system for thrombocytes be created?

Fresh whole blood: Pro et con

- **Advantages:**

- Easily available, no need for blood stock
- Fresh thrombocytes
- Fresh erythrocytes
- High coagulation activity

- **Disadvantages:**

- Contains large numbers of leukocytes
 - Can induce TRALI
 - Can transmit viral diseases not tested for (CMV, others?)
 - Can induce HLA antibodies – refractoriness to thrombocyte transfusion in later life
- Contains anti-A and anti-B
 - Minor incompatibility with A, B and AB recipients
- Suboptimal testing for infection
 - Performed prior to leaving Norway
 - Safety depends on donors' correct information
 - Post-transfusion testing not satisfying

Conclusion

- Haemotherapy in Norwegian military missions abroad needs revision
- Main problems:
 - Stock may be insufficient in mass casualties
 - Thawing time of Octaplas®
 - Fresh whole blood remains controversial
- Collaboration between NATO nations on provision of blood products and guidelines for haemotherapy is needed