-80℃ Frozen platelets, efficient logistics, availa ble, compatible, safe and effective in the treatment of trauma patients with or without massive blood loss in military theatre.

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Background
The Netherlands military use -80℃ frozen platelets (DTC) for the treatment of trauma patients during land and sea based operations. Quality of DTC, efficiency, availability, safety and use of DTC in the 16 missions supported with DTC during Nov'01-Feb'12 were evaluated.

Methods
DMSO was added to leukodepleted, O RhDpos/neg apheresis platelet units (final conc. 5.1±0.2% DMSO), products were concentrated to 14±3 ml and frozen to -80℃ (Valeri method, max storage time 2 years -90 to-65℃,DTC). DTC were shipped (dry ice, average 2-4 days max 7 days -90 to-65℃).On demand DTC were thawed, resu spended in AB plasma and products were available for transfusion within 50 min. Pre-freeze and post-thaw quality control(N=1189) and hemovigilance(N=1082) data were reviewed. DTC, plasma, red blood cell (RBC) transfusion to, and survival of, trauma patients with massive transfusion (10 RBC within 24 hours (MT N=46) or without MT (≥1RBC, non-MT N=234) during the mission in Tarin Kowt were compared. High ratio DTC transfusion is defined as ≥1:8 DTC:RBC.

Results
Of the 2045 units frozen in the Netherlands, 5% is current stock, 9% is discarded due to production failures, 3% due to expiration (2 years), 6% is used for research, quality control and training. 1574 DTC were shipped (5837 mission days, 102 shipments) to maintain 5-40 DTC in stock (mission type dependent). Of the 1574 units shipped, 0,6% was discarded due to 1 transport failure, 9% due to -80℃ storage failure (>-65℃), 3% due to production failures, 5% was requested and not transfused, 69% was transfused and 13% was expired, returned or discarded at the end of the missions. Thawed DTC product yield (3.0±0.6 10^{11}/unit), volume (313±15ml), DMSO content (0.7±0.2 g) and freeze-thaw recovery (74±12%) were constant during time and independent of DTC age or location prepared. During 7 missions 1082 DTC were transfused to 333 patients. No transfusion reactions were reported. In Tarin Kowt, 110 trauma patients were treated with DTC. MT patients received more DTC compared to non-MT patients (4±2/patient vs 1±2/patient). Similar to liquid stored apheresis platelets and RBC (JG Perkins et al. 2009), survival of MT trauma patients with high ratio DTC (N=34; 5±2DTC/patient, surv.74%) was higher compared to MT patients with low ratio DTC (N=12; 1±1DTC/patient; surv.50%). There was no difference in survival of non-MT trauma patients with high (N=64; 2±2 DTC/patient; surv.86%) or low ratio (N=170; 0±0.1 DTC/patient; surv.90%).

Conclusions
-80℃ Frozen platelets can be efficiently produced, transported and stored in the support of blood banks in (military) environments with unpredictable logistics and patient frequency. Product quality is stable and within guidelines. Frozen platelets are readily available, compatible, safe and effective as shown by the improved survival of (military) MT trauma patients when treated with DTC in addition to RBC and DFP.

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