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Recovery of ATP Concentration in Platelets Suspended in 100% Platelet Storage Media (PSM)

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Introduction: Platelet concentrates (PC) suspended in 100% PSM is recommended for patients with severe reactions to PC in plasma. Currently, these components have a 24 hours shelf-life due to reduce *in vitro* quality after 24 hours. ATP is required for platelet function and inhibition of ATP production markedly affects shape change, aggregation and granule secretion. An ATP concentration above 4 µmol/10^{11} platelets is considered to indicate good post transfusion survival (Holme et al. Br. J. Haematol. 1987; 66: 233-238). This study investigated the potential recovery of platelet ATP concentrations in PC suspended in 100% PSM.

Methods: On each of the 6 occasions, two buffy coat derived PC units were pooled, split and stored on an agitator (22±2°C). On day 3, the plasma was removed (2700g for 7 minutes) & 200ml of SSP+ PSM was added to each unit. The units were agitated for 2 hours before analysis (T=0). At 24 hours (T=24) units were tested prior to removal of SSP+ and re-suspension in either their original SSP+ or fresh plasma. PC were tested 2 hours after agitation (T=24+2) and further samples were taken at 48 & 72 hours following re-suspension.

Results: PC Unit: Volume = 198ml (185-309); Platelet count/unit = 327 (291-393) x10^{9}

	ATP (µmol/10^{11}plt)				
Time (hours)	**0**	**24**	**24+2**	**48**	**72**
SSP+	4.26 (3.58-5.12)	3.83 (3.02-4.36)	3.78 (3.17-4.48)	3.21 (2.63-4.09)	2.60 (2.33-3.92)
SSP+ followed by plasma at T=24+2	4.14 (2.54-6.69)	3.77 (1.61-5.77)	3.52 (3.02-5.24)	4.18 (3.48-5.06)	4.20 (3.91-5.66)

Data (n=6) are median (min & max).

Platelet ATP concentration declined in PC suspended in SSP+ from T=0 to T=24. ATP concentration recovered 24 hours after re-suspension in plasma to levels above 4 µmol/10^{11} platelets. ATP concentration continues to decline in SSP+.

Conclusion: The decline in ATP concentration in SSP+ observed after 24 hours recovers once platelets are re-suspended in plasma. The fresh plasma appears to have provided the constituents required for synthesis of ATP. Platelets suspended in SSP+ for longer than 24 hours, may have the potential to restore ATP levels following transfusion despite reduced ATP concentrations in vitro.