Microvesicles in Stored Blood

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Microvesicles (MV)/Microparticles

What are they?!?

• Traditional categorization is submicron particles which are between 0.1 to 1µm in diameter.

• MV can be derived from different haematological and non-haematological cell lines - platelets, monocytes, erythrocytes and epithelial cells.

• MV are formed when a membrane vesicle is released by an activated parent cell. Mechanisms for cell vesiculation vary.

• Importantly, the MV reflect the composition of the parent cell.

• Every one has them in low levels.
Stored Red Cells

- Storage lesion. *In vivo* aging different to *in vitro* aging.
- After 50 days of storage, around x20 increase in MV. More pronounced between 60 and 120 days.
- Haemolysis in stored blood is indicated by the concentration of extracellular haemoglobin, 50% of which may be attributed to haemoglobin-containing ErMVs.
- Filtration removes platelets and a significant number of platelet and red cell microparticles. Depends on filter.
- Aging red cells = increased PS = procoagulant.
  
  Is this why up to 30% cells are ‘lost’ once transfused?
**Stored Red Cells**

- Erythrocyte-derived MV can promote coagulation by initiating thrombin generation independent of Tissue Factor.
- Studies show that transfusion of older red cells carries a higher risk of DVT and multi-organ failure.
- Platelet activation may activate and bind white cells present in non-leucoreduced packed cells > inflammation and procoagulant state.
- ErMV have also shown a balancing anti-coagulant effect by prolonging the consolidation of fibrinogen to fibrin, especially if the red cells are washed.
Stored Plasma

- Plasma derived from whole blood or apheresis collection.
- Processing of plasma for transfusion may induce MV.
  - Filter for leucodepletion may remove MV, but also reduce clotting factors and fibrinogen.
  - Mixed findings coagulation results
  - Recommend leucodepletion within 10 hours of collecting whole blood.
Thank you
References


References


