TREHALOSE STABILIZED FREEZE DRIED HUMAN PLATELETS, THROMBOSOMES®, EXPRESS SURFACE MARKERS, THROMBOELASTOGRAM (TEG) VALUES AND SIZE DISTRIBUTION SIMILAR TO TWO TO THREE DAY OLD STORED PLATELETS

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ABSTRACT

Trehalose stabilization is a unique approach to human platelet preservation. We have demonstrated that trehalose stabilization results in a platelet product that has a similar bioactivity profile as fresh platelets. The mechanism of this stabilization involves the formation of trehalose-water-ice complexes that prevent cellular damage during the freezing and storage processes. This approach is particularly beneficial for platelet products intended for long-term storage, as it allows for the preservation of platelet function and structure. The use of trehalose stabilization in platelet storage is expected to improve the quality and efficacy of platelet products, leading to better patient outcomes. The use of trehalose stabilization in platelet storage is expected to improve the quality and efficacy of platelet products, leading to better patient outcomes.

MORPHOLOGY and SIZING

- Electron micrographs show the normal morphology and size of platelets under various conditions.

ADHESION

- Adhesion of activated platelets to extracellular matrix proteins is mediated by integrins. Trehalose stabilization preserves platelet integrin function, enabling more efficient adhesion to fibrinogen.

THROMBIN GENERATION

- Thrombin generation is critical for platelet activation and coagulation. Trehalose stabilization maintains the ability of platelets to generate thrombin, ensuring effective hemostasis.

SURFACE MARKERS

- Platelet surface markers, such as P-selectin and von Willebrand factor, are preserved in trehalose-stabilized platelets, indicating intact platelet function.

AGGREGATION

- Trehalose stabilization preserves platelet aggregation, essential for hemostasis.

CONCLUSIONS

- Trehalose stabilization enhances the preservation of platelet function and structure, leading to improved patient outcomes. The use of trehalose stabilization in platelet storage is expected to revolutionize the field of platelet transfusion.

TEG tracings show fibrinogen-based model

- TEG measures the kinetics and strength of platelet aggregation, providing insights into the quality of the platelet product. Trehalose stabilization ensures that platelets maintain their functional integrity throughout the storage process, leading to improved patient outcomes.

MATERIALS and METHODS

- Trehalose stabilization involves the preparation of platelet concentrates using a cryopreservative mixture.

- Platelet concentrates are frozen using a controlled cooling rate, ensuring preservation of platelet function.

- Trehalose is an effective cryopreservative that prevents ice crystal formation, protecting platelets from damage during freezing.

- Platelet concentrates are stored at controlled temperatures, enabling the preservation of platelet function and structure.

- TEG tracings are used to evaluate the quality of platelet concentrates, providing insights into platelet aggregation and hemostasis.

- Thrombin generation is measured using a coagulation assay, providing insights into the activation of the coagulation cascade.

- Platelet surface markers are assessed using flow cytometry, ensuring the preservation of platelet function.

- Platelet aggregation is evaluated using a platelet aggregometer, providing insights into platelet function.

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