Liberty MTX
PRFM Characteristics
Platelet Recovery, Concentration, and Viability

Platelet Rich Plasma products are intended for the capture & formation of platelet-rich plasma (PRP) and platelet-rich fibrin matrix (PRFM) from human blood. Extensive review of the literature and discussions with key opinion leaders support the following requirements for a biologic as a stimulant for *tissue healing, repair and regenerative processes*:

- *An appropriate number of functional, viable, intact, and unactivated platelets*
- *Platelets that can persist long enough, and serve as a reservoir of growth factors, to enable the intended tissue to progress through the early healing phases & regeneration, including fibrin deposition as the precursor to collagen remodeling*
- *Appropriate growth factors (in the correct ratios) that can affect a variety of tissues at different stages of the regenerative process*
- *A fibrin matrix or **scaffold** will encourage surrounding cells to migrate, proliferate, and assist in tissue deposition for remodeling & regeneration*

A. Platelet Recovery and Concentration in PRP

When using PRP systems for injection, the question of platelet concentration is often discussed in great detail. ***Liberty MTX* PRFM separation system offers a unique sterile, self-contained system for the recovery of greater than 80% of intact platelets**. The platelets in the PRP are then concentrated, based on the volume of the PRP, versus the total volume of the blood specimen. The volume of the PRP is dependent on the individual's hematocrit level. Starting with 9 mL of blood, a 50% hematocrit will yield 4.5 mL of PRP and a 2x concentration of platelets, while a 60% hematocrit will yield 3.6 mL of PRP and a 2.5x concentration.

There is no indication that a higher platelet concentration is better than a 2x concentration in an injection application. In fact, there is growing evidence that too much of certain growth factors can have a negative effect on repair [Giusti et al. 2008]. For example, increased VEGF was associated with adverse effects on mechanical characteristics after ACL reconstruction [Yoshikawa et al, 2006].

B. Platelet Viability and Growth Factors

PRFM is an autologous biologic matrix, which is made from a patient's own blood by separating and concentrating intact platelets and fibrin and incorporating them into an amorphous matrix without the use of exogenous thrombin or saline dilution, concentrated autologous thrombin, or other exogenous protein. Excess thrombin, saline and calcium used in competitive systems saturate all the platelet receptors, thus the platelets are activated, releasing most of the growth factors within 2

to 8 hours [Swift et al, 2005]. As these growth factors have an in vivo half-life of minutes to hours, they are soon eliminated from the site and contribute with minimal benefit to the healing cascade over an extended period of time.

The absence of concentrated exogenous or autologous thrombin in PRFM prevents premature platelet activation and degranulation. **Therefore, PRFM contains intact, viable, unactivated platelets; which are functional, productive, and able to slowly release platelet-derived growth factors (in the correct ratios for healing) that are available for the healing process over an extended time period [Carroll et al, 2005; O'Connell et al, 2006; Visser et al, 2010].**

This means that the activity and unique properties of PRFM are embodied in the viability and function of the platelets in addition to the concentration of the platelets.

C. Fibrin

PRP is recalcified and made into PRFM by different centrifugation methods, which further concentrate the platelets and fibrin into a fluid (membrane or gel). The fibrin in the PRFM serves to provide a scaffold for cell migration and new matrix formation (collagen). In addition, the fibrin lattice serves to hold the platelets and their growth factors at the injection site. There is some evidence that without fibrin the platelets and the secreted growth factors will not remain at the injection site.

In addition to the viability and function of the platelets, the scaffold provided by PRFM allows capable healing cells to migrate, proliferate, with fibrin deposition for tissue for remodeling and healing.

D. PRP Without Red and White Blood Cell Contamination

Finally, it is important to note the sterile all inclusive system which produces PRP/PRFM that is free of red and white blood cell contamination. Which in turn can inhibit fibrin formation, cell migration, collagen matrix synthesis, and revascularization [Brezniak et al, 1994; McCarrel and Fortier 2009].

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