Platelet Rich Plasma

To Freeze, or Not to Freeze

By Corey Orava, DVM

In the spirit of saving their clients' money, veterinarians frequently inquire "can I freeze PRP?" Unfortunately, there is no simple yes-or-no answer. Arguments can be made supporting both sides, but ultimately the decision must be made by the veterinarian. First, we will examine the arguments supporting the freezing of PRP *(platelet rich plasma)*.

When PRP first became available on the veterinary market the retail price for most kits was in the $250 range, with some products running in excess of $400 per unit. Veterinarians recognize that many clients are price conscious when it comes to veterinary care. Not surprisingly, some veterinarians took to freezing excess PRP in order to save their clients some money. When surveyed to why they froze PRP, the list of answers was rather short, and conspicuously never was it mentioned that the goal was to improve outcomes.

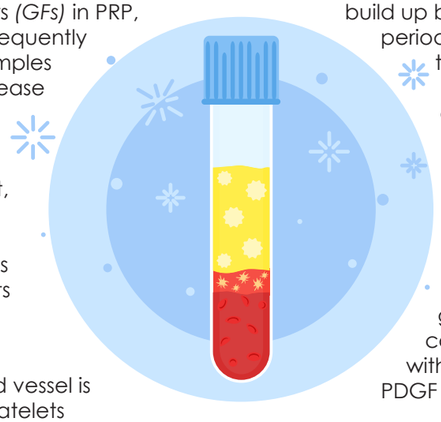
PROS:

Save Money – If a patient is likely to need more than one treatment, the veterinarian could reduce the cost of subsequent treatments.

Minimize Blood Collections – If a patient is on the small side or if they have a fractious nature, it would be beneficial to repeatedly collect blood.

Don't Waste Extra PRP – If a kit produces 6cc of PRP but the patient only needs 2, it may seem like a waste to throw 4cc's into the trash.

Before we discuss the potential downsides to freezing PRP it is important to address the difference between platelet activation versus freezing platelets. When evaluating the levels of various growth factors *(GFs)* in PRP, researchers frequently freeze the samples in order to release the GFs from the platelets. This has the desired effect, but it is not the same mechanism as when platelets undergo activation.



When a blood vessel is damaged, platelets recognize various molecules such as collagen, and become activated. During the activation process, platelets change in shape from roughly spherical to star-like, and actively move their a-granules *(organelles full of growth factors)* until their membranes merge with the plasma membrane *(or indirectly via the open canalicular system)* and their contents are secreted. The majority of the other cytoplasmic contents remain within the platelets. In contrast, when a cell is frozen, ice crystals form within the cytoplasm which tear apart the cell releasing, not only the contents of the a-granules, but everything within the cytoplasm. Thus, the products of activation and freezing are not quite equivalent.

A recent publication on effects of freezing equine PRP confirmed the above. First, a single freeze cycle was enough to release significant quantities of a catabolic enzyme, MMP-9. This paper also highlighted the problem with most 'frost-free' freezers. These units prevent frost build up by undergoing periods where the temperature rises from approximately -20°C to -3°C. Work by these researchers and others have shown that the following growth factors can decrease with storage: TGF-B, PDGF and IGF-1.

Another obvious risk of storing PRP is cross-contamination. Anytime humans are involved, errors can occur. Many inks and stickers do not work well under freezer conditions so labels can go missing or get smudged.

Often overlooked, but rather important, are the regulatory considerations around this issue. PRP kits are regulated as medical devices by the FDA. Removing any part of the body, storing it, then returning to same patient on a subsequent visit is equivalent to creating a drug and thus would need prior FDA approval.

Lastly, and possibly most importantly, is efficacy. While there are no in vivo data for our veterinary species, researchers have reviewed studies where PRP was used in humans with OA *(osteoarthritis)*. Their conclusion: the best results are associated with fresh rather than frozen PRP.

CONS:

Changes – Freezing PRP changes the levels of growth factors as well as inflammatory mediators.

Contamination Risk – Risk of cross-contamination.

FDA Approval – FDA does not permit storage of body parts with very few exceptions.

Effectiveness – In humans with OA, fresh PRP works better than frozen.

Clearly there are a variety of issues that should be taken into account if a veterinarian is considering freezing PRP. The PROS tend to focus on convenience and cost savings, while the CONS are more centered around safety and efficacy.

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