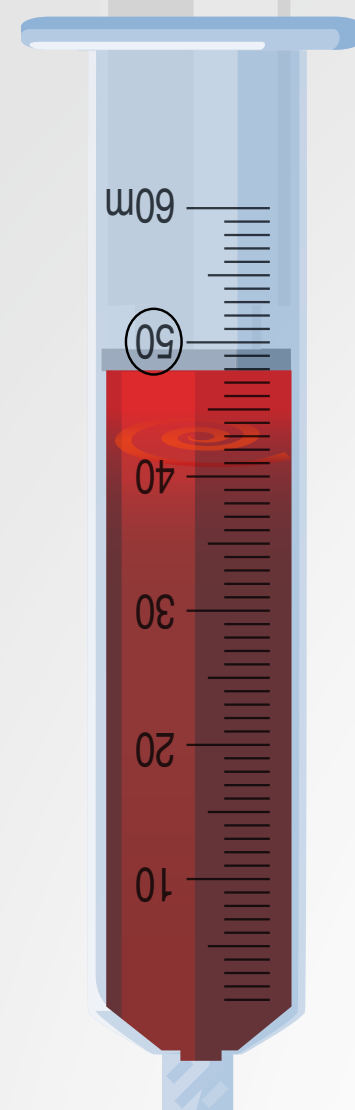


THE POWER OF PLATELET-RICH PLASMA



What Is PRP?

Platelet-rich plasma (PRP) is a biological product created from autologous blood plasma that is centrifuged and separated to achieve a platelet concentration above the baseline. In addition to the high platelet concentration, PRP contains the full complement of clotting factors typically at their normal, physiologic levels.¹

Platelets contain more than
1,100 different proteins

with numerous post-translational modifications, resulting in over
1,500 protein-based bioactive factors.²

Why PRP?

Autologous product: PRP is prepared from the patient's own blood, minimizing concerns about the risk of cross-contamination, disease transmission or immune reactions.²

Growth factors and proteins: These stimulate the healing process, a key factor in PRP's widespread clinical use.²

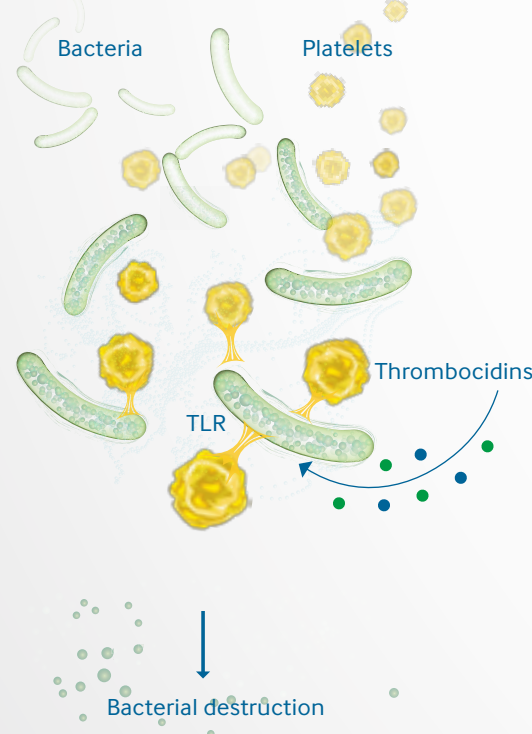
Increased blood supply: The use of PRP speeds up neovascularization and increases the blood supply and nutrient influx necessary for cell regeneration in damaged tissue.²

Mechanisms of Action

Activated platelets can mediate cell-to-cell interactions and affect innate immune responses by different possible mechanisms.^{3,4}

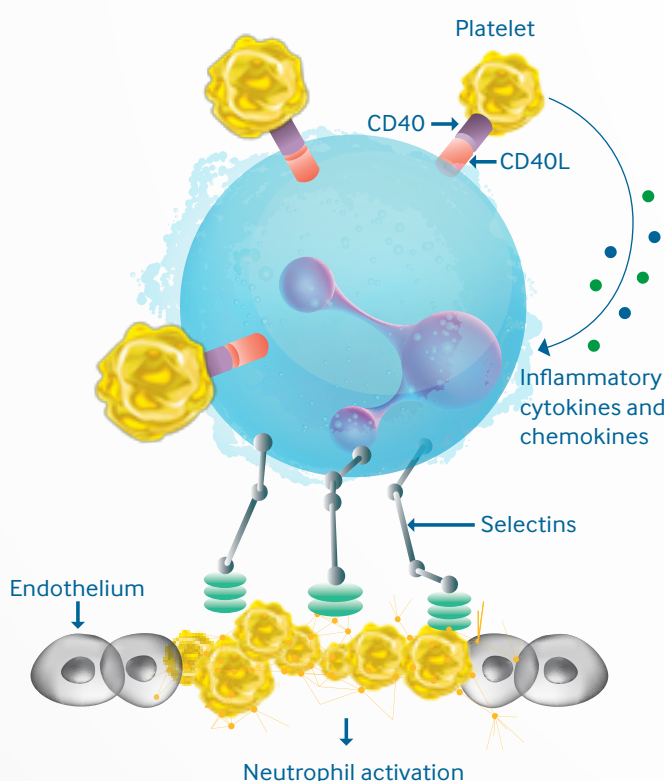
BACTERIAL DESTRUCTION

Platelet Toll-like receptor (TLR) expression enables activated platelets to bind and capture bacteria. The platelets may directly kill the bacteria by producing microbicidal proteins or by aggregating around the bacteria and "trapping" them for elimination.



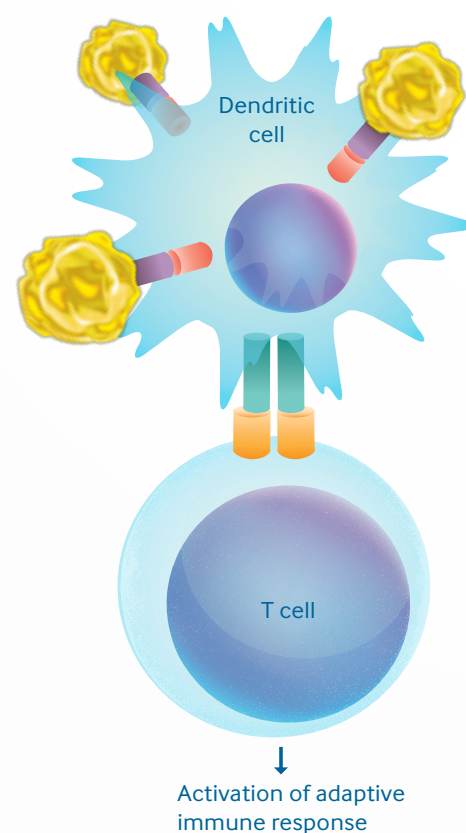
NEUTROPHIL ACTIVATION

Platelets can interact with a wide variety of cells, including leukocytes. Activated platelets promote neutrophil tethering and activation through the expression of selectins, CD40L, and inflammatory cytokines and chemokines.



ACTIVATION OF ADAPTIVE IMMUNE RESPONSES

Activated platelets can promote the activation of monocytes and dendritic cells. This leads to increased antigen presentation to T cells and enhances adaptive immune responses.



According to one 2016 study⁵ of 2,000 patients, PRP reduced:

DSWI
PRP reduced the incidence of deep sternal wound infection (DSWI) from
2% to **0.6%**

SWI
PRP reduced superficial wound infections (SWI) from
8% to **2%**

COST
PRP reduced the costs associated with deep and superficial wound complications from
USD \$1,256,960 to **USD \$593,791**

READMISSION
PRP reduced the readmission rate from
4% to **0.8%**

Components of PRP

PLATELET MICROBIAL PROTEINS (PMP)

PMPs — small antimicrobial peptides — have been shown to play a key role in infection control by exerting direct microbial activity against a broad spectrum of human pathogens, including *Staphylococcus aureus*.^{8,9}

PLATELETS

Platelets play a critical role in several aspects of the healing process. Activated platelets release several antimicrobial peptides that deliver properties for infection control.^{6,10,11,12}

WHITE BLOOD CELLS (WBCs)¹³

Granulocytes

- The "immediate response" cells to prevent infection
- Key mediators of inflammatory response through phagocytosis and release of reactive oxygen species (ROS)

Lymphocytes

- T-lymphocytes help regulate the function of other immune cells and directly attack various infected cells and tumors
- B-lymphocytes make antibodies, which are proteins that target unwanted bacteria, viruses and other foreign material

Monocytes

- Assist in pathogen recognition
- Eventually become macrophages, which engulf and destroy pathogens

GROWTH FACTORS²

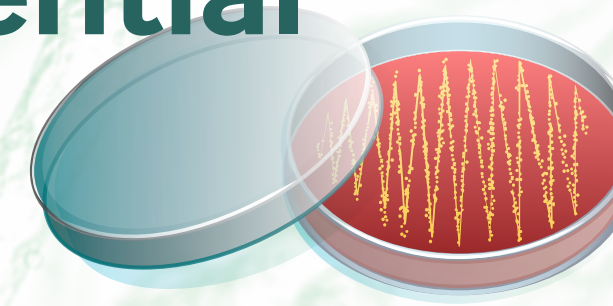
- **Platelet-derived growth factor (PDGF)** enhances collagen synthesis, proliferation of bone cells, fibroblast chemotaxis and proliferative activity, and macrophage activation.
- **Transforming growth factor β (TGF- β)** enhances synthesis of type I collagen, promotes angiogenesis, stimulates chemotaxis of immune cells, and inhibits osteoclast formation and bone resorption.
- **Vascular endothelial growth factor (VEGF)** stimulates angiogenesis, migration and mitosis of endothelial cells; increases permeability of the vessels; and stimulates chemotaxis of macrophages and neutrophils.
- **Stromal cell-derived factor 1 α (SDF-1 α)** actively modulates migration and homing of stem cells to the repair site.

The Potential

PRP FOR INFECTION CONTROL

PRP, with its antimicrobial activity and promotion of healing, has the potential to help prevent infection.

- Platelets have multiple functional attributes that suggest an integral role in antimicrobial host defense.⁶
- PRP that is rich in leukocytes can enhance healing by removing potential microbes and stimulating growth factor release.²
- Platelets support antimicrobial peptides that inhibit bacterial growth; neutrophils and macrophages phagocytose and destroy microbes. Together, they support the potent antimicrobial activity of PRP.⁷



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Terumo BCT is a global leader in blood component, therapeutic apheresis, cellular and autologous biologic technologies. We believe in the potential of cells to do even more for patients than they do today. This belief inspires us to share our expertise in cell separation and collaborate with customers to advance the practice of autologous biologic technologies together.

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