
بسم الله الرحمن الرحيم

Hematology Journal Club

Title:

Clinical application of platelet-rich plasma for cartilage defects and osteoarthritis

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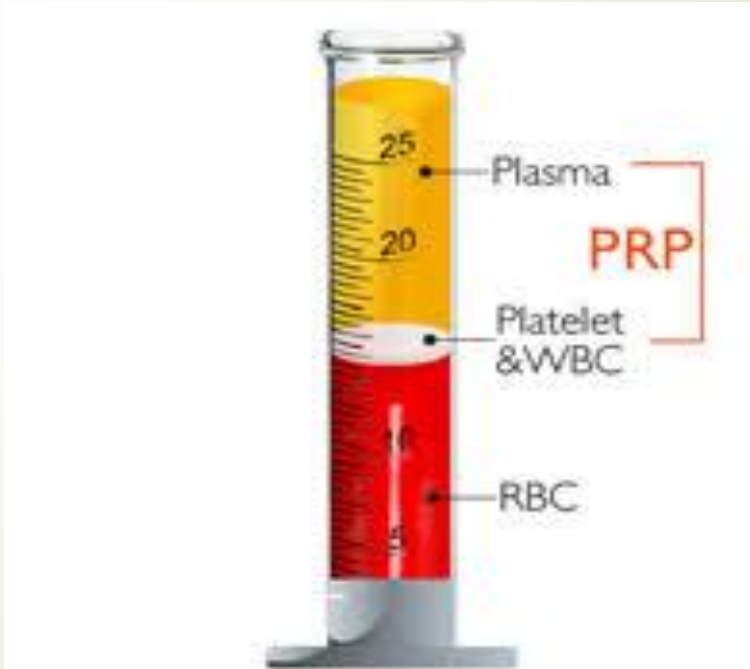
PRP Definition

Platelet-Rich Plasma Therapy (PRP) is defined as a sample of autologous blood with concentrations of platelets in a given volume of plasma that is above the concentration found in whole blood.



Growth factor in platelets

- PDGF (platelet- derived growth factor)
- TGF-B1 (transforming growth factor B1)
- VEGF (vascular endothelial growth factor)
- EGF (epidermal growth factor)
- IGF-1 (insulin-like growth factor)
- HGF (hepatocyte growth factor)
- b FGF (basic fibroblast growth factor)

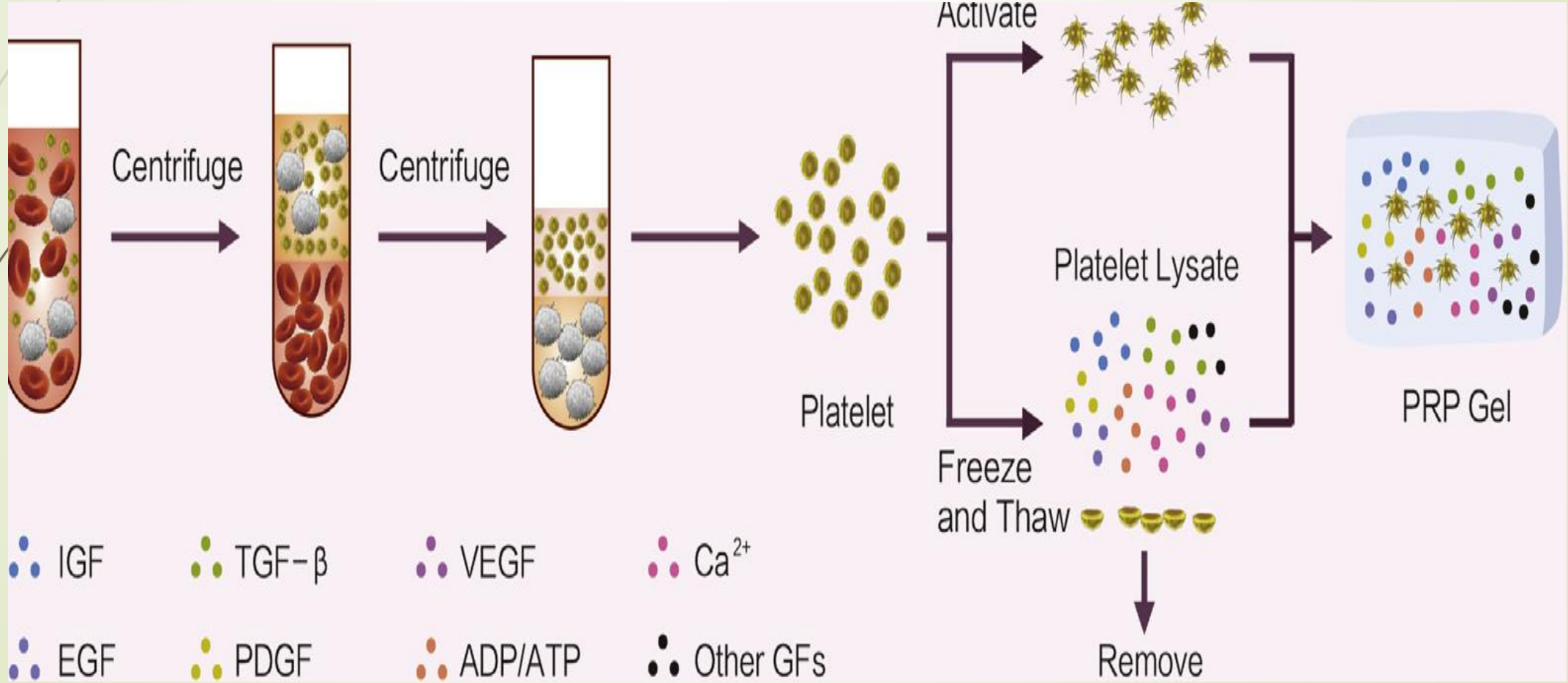
Products of PRP

- P-PRP (pure platelet-rich plasma)
- PRGF (plasma rich in growth factor)
- L-PRP (leukocyte and platelet-rich plasma)
- P-PRF (pure platelet-rich fibrin)
- L-PRF (leukocyte and platelet-rich fibrin)

cartilage defects and osteoarthritis:

- Cartilage defects (CDs) and the most common joint disease, osteoarthritis (OA), are characterized by degeneration of the articular cartilage that ultimately leads to joint destruction.

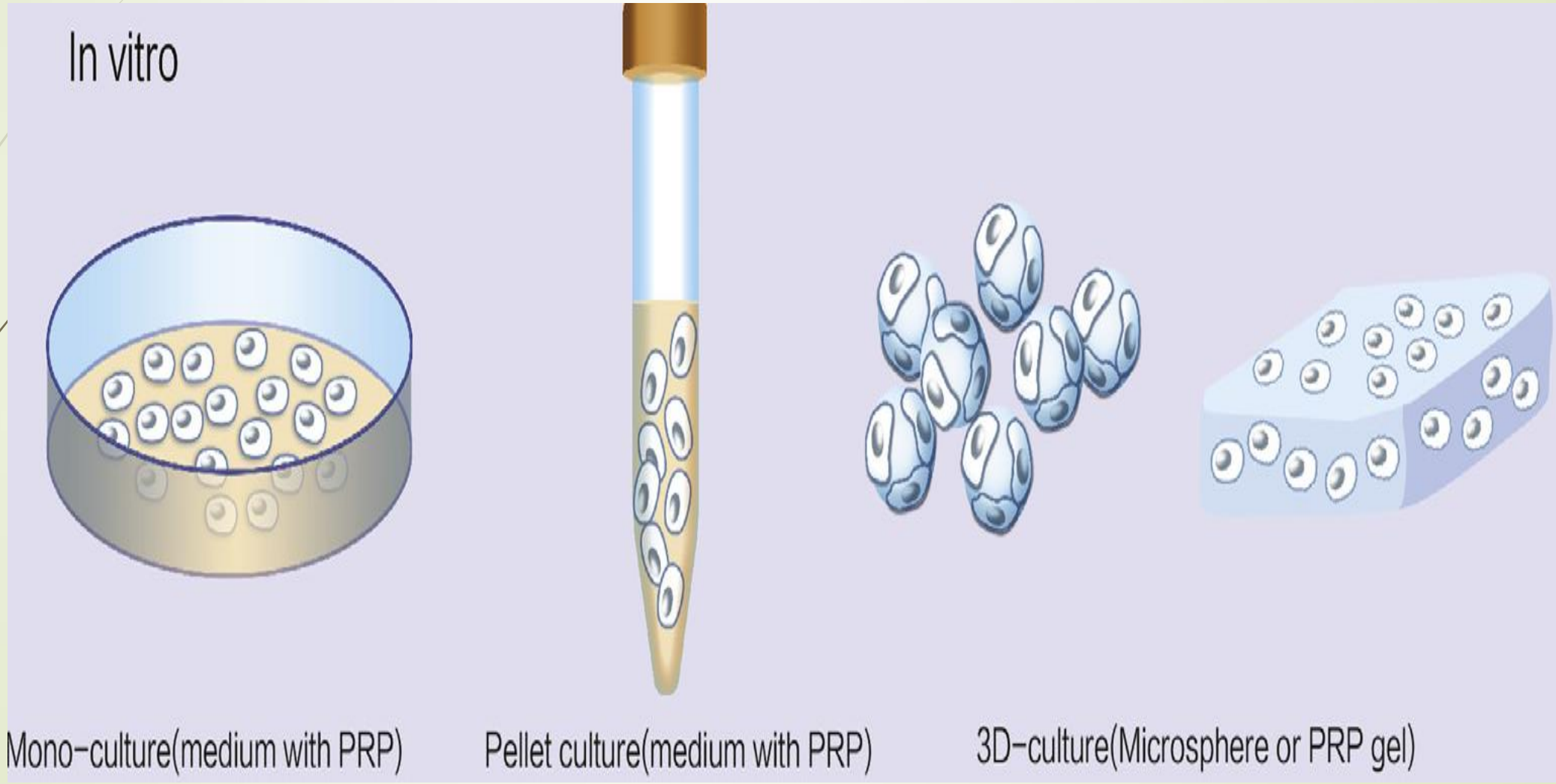
- The most basic method to prepare PRP is centrifugation, divided in to a one-step and two-step-centrifugation protocol



TGF-B roles :

- Decreases type 1 collagen gene expression
- Increases type II collagen and aggrecan gene expression.

Application of PRP for cartilage cell culture:



- PRP for MSC differentiation to cartilage cells in vitro:

- PRP added to the culture medium retains the immune-regulatory effect of MSCs.

- It can decrease alloantigen- induced cytotoxic activity, favors differentiation of CD4 T-cell subsets expressing a Trig phenotype and increases early secretion of IL-10 as well as induces a striking augmentation of IL-6 production.

PRP for OA in animal model

- In an OA model induced by formalin, collagenase, or anterior cruciate ligament transfection, treatment with PRP/gelatin hydrogel injected in knee joints increased mRNA expression of proteoglycan core protein in the articular cartilage and decreased chondrocyte apoptosis and suppressed progression of OA.

PRP for CDs in animal model

- partial thickness defects, with the defect entirely contained in the cartilage layer.
- full-thickness defects, with the defect extending down to but not into the subchondral bone.
- osteochondral defects that extend into the subchondral bone.

- PRP for cartilage defects divided three modalities:

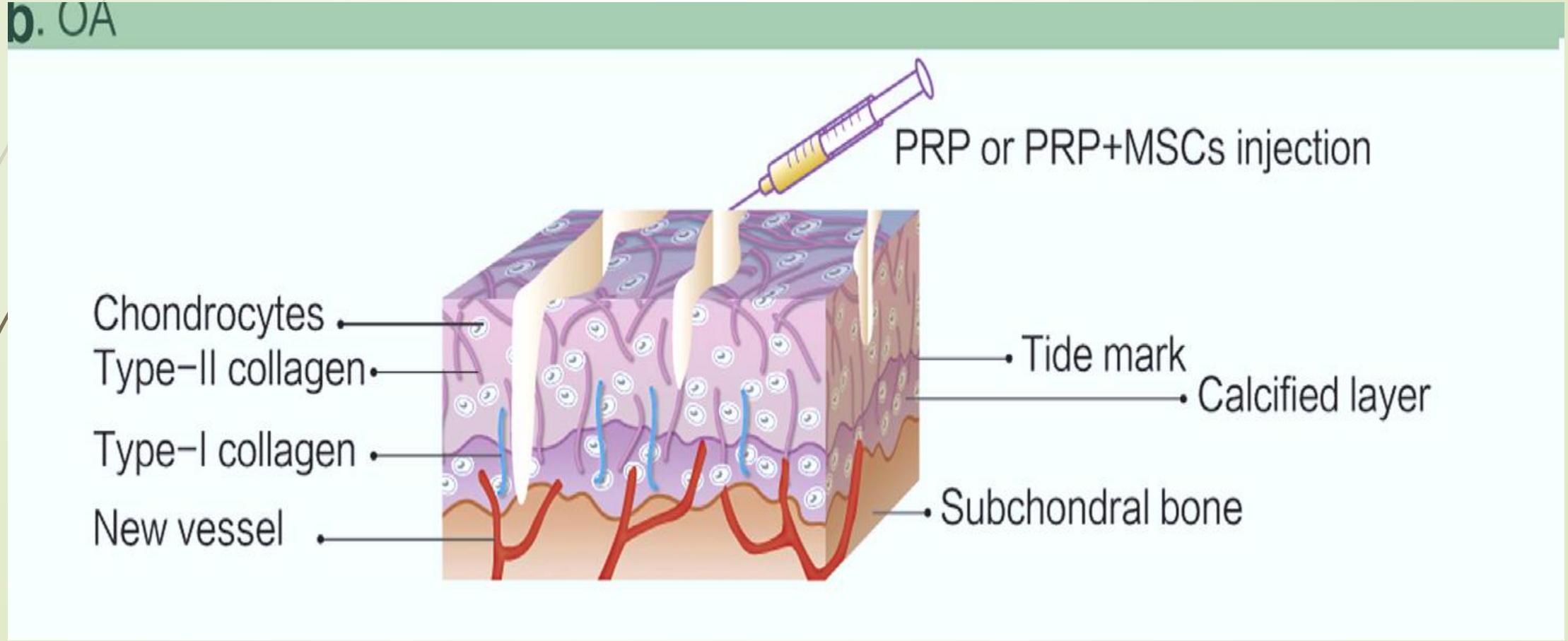
- Acellular repair technology

- PRP with cells

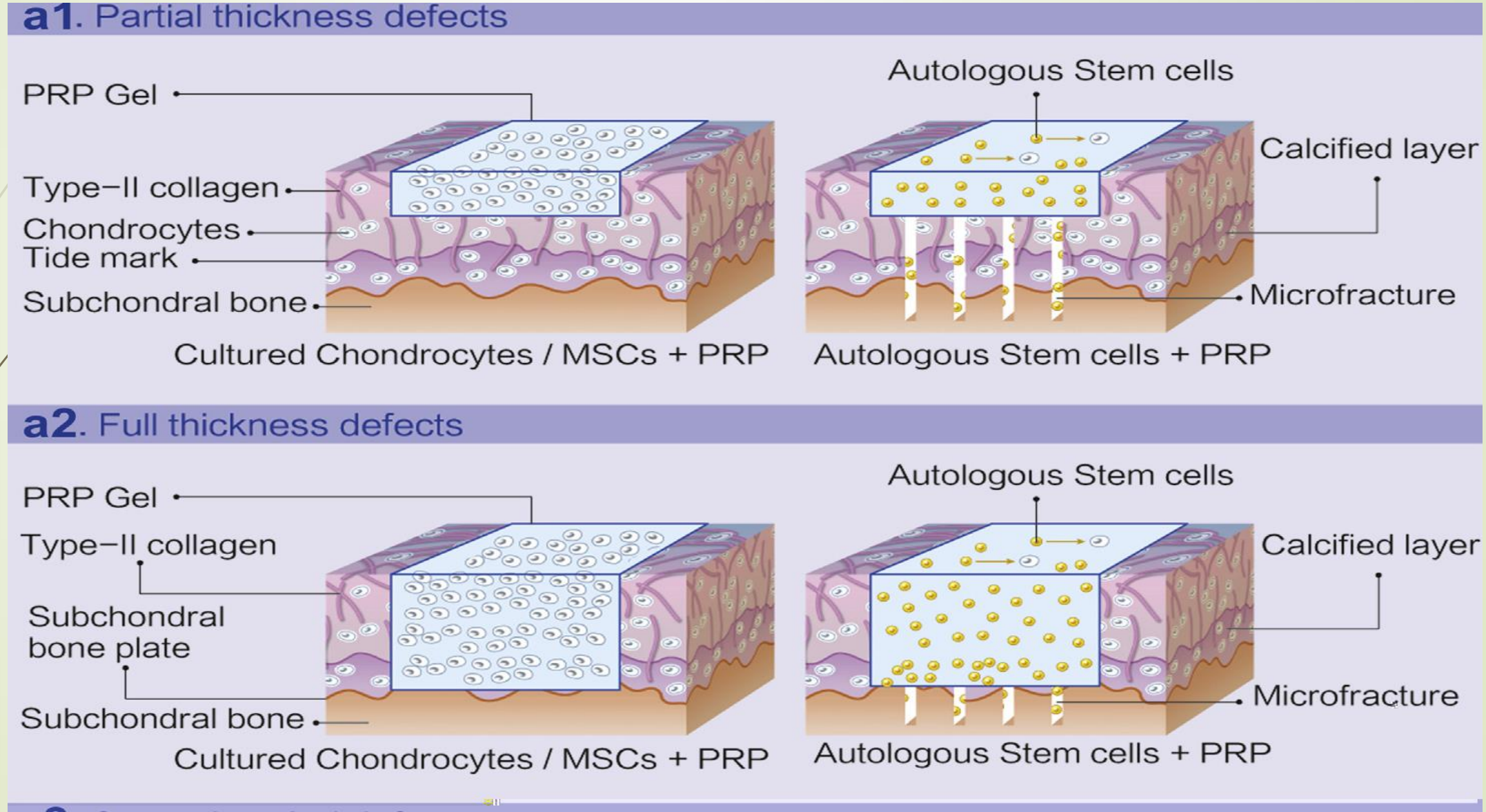
- Cell-based tissue engineering

PRP for clinical application in OA

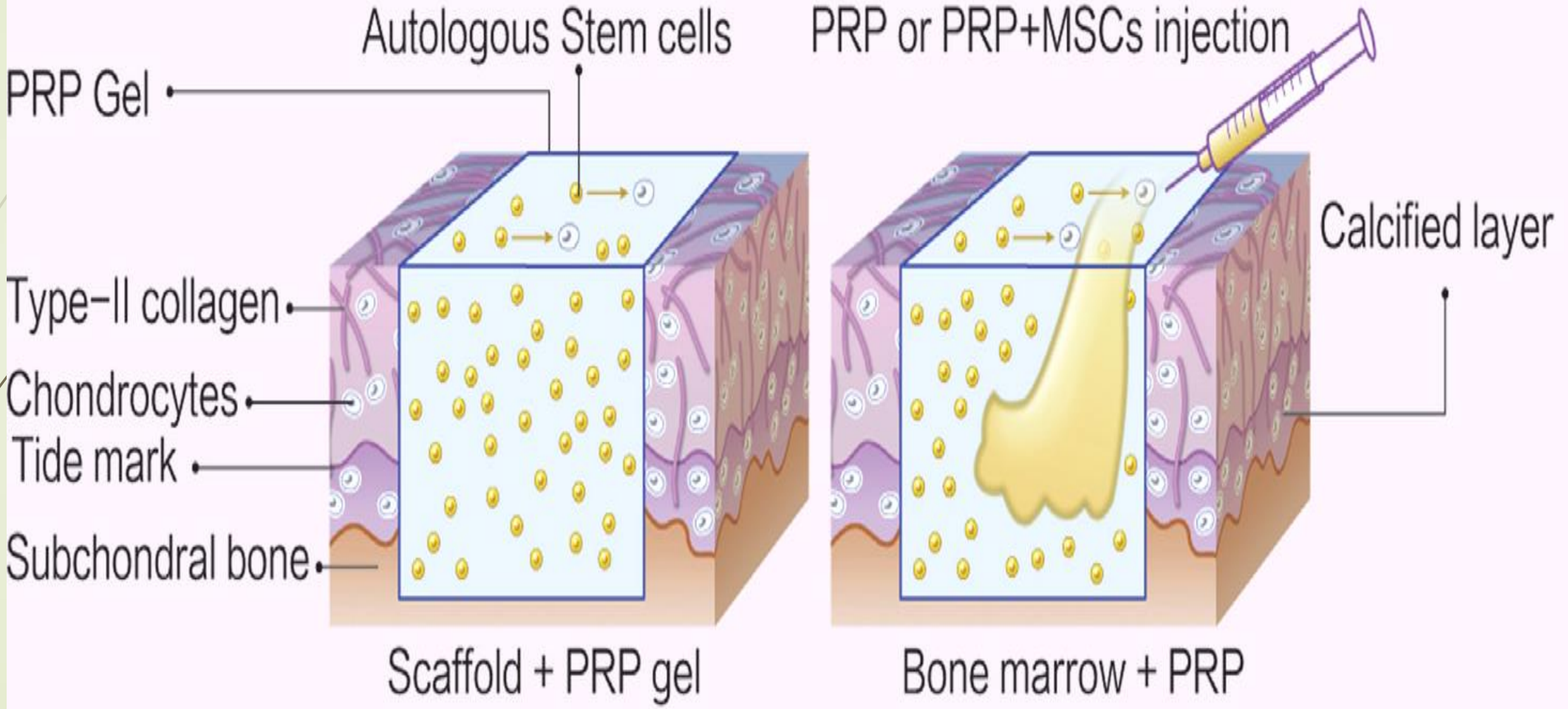
- PRP is used for hemostasis and for total joint arthroplasty for OA.



PRP for CDs in the clinic



a3. Osteochondral defects



Safety of PRP treatment

- Many studies have suggested safety, pain relief, and functional improvements with PRP injections for OA.

- adverse effects include infection, bleeding, bruising, peripheral nerve injury, allergy to local anesthetics.

Conclusions

- PRP when added on scaffolds of cartilage tissue-engineered constructs ،it can enhance the regeneration of cartilage cells and repair CDs .

- Future directions of PRP application may concentrate on seeking an appropriate and innocuous agent like anti-VEGF antibody that can modulate and control the effect of PRP.


Thank You!

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