Platelet-rich fibrin can play an important role in oral and maxillofacial surgery, implant dentistry, periodontal regeneration and post-extraction site preservation.

The fibrin is a reservoir of platelets that will slowly release growth factors and cytokines, which are the key factors for regeneration of the bone and maturation of the soft tissue. Platelet-rich fibrin (PRF) is an autologous platelet concentrate prepared from the patient’s own blood at the dentist’s office just before the oral/ dental procedure.

Recent studies are focused on the development of natural therapeutic alternatives, which are easy to prepare, non-toxic or biocompatible to living tissues and economically inexpensive. The goal is the local release of growth factors, in turn accelerating hard and soft tissue healing.

PRF is a natural fibrin-based biomaterial prepared without anticoagulants or artificial additives (hemosynthetic modifiers) that allow us to obtain autologous fibrin membranes and plugs with a high concentration of platelets and white cells, releasing growth factors at the surgical site for seven to 14 days and accelerating the natural healing process.

Evidence from literature suggests the potential role PRF provides in the potential role PRF provides in growth factors at the surgical site for autologous fibrin membranes and PRF is a natural fibrin-based biomaterial prepared without anticoagulants or artificial additives (hemosynthetic modifiers) that allow us to obtain autologous fibrin membranes and plugs with a high concentration of platelets and white cells, releasing growth factors at the surgical site for seven to 14 days and accelerating the natural healing process.

Advantages of PRF compared with PRP
- A look at the advantages of PRF as compared with PRP:
  - No anticoagulants that affect the release of growth factors
  - No drugs (calcium chloride) that could affect fibrin polymerization
  - No animal products (bovine thrombin) that could affect the coagulation process and immune system activation
- PRF has the presence of natural fibrin network, which protects the growth factors from proteolysis
- PRF favors the development of microvascularization leading to a more efficient cell migration
- PRF has the presence of monocytes, leukocytes and other white cells that have an important role during the inflammatory phase of healing
- PRF manufacturing requires minimum time from the doctor

The manufacturing of all blood concentrates at the patient’s site of treatment brings new challenges to the dentists and staff members.

PRF is usually used less than two minutes after drawing blood, and the rest of the procedure to manufacture PRF can be performed by a property trained staff member.

How is PRF clot formed?
After the blood is collected into the glass tubes and during the eight-minute centrifugation, the contact of blood coagulation factors with the natural hydrophilic glass surfaces activates the clotting cascade leading to the conversion of fibrinogen to fibrin and forming a natural PRF clot.

If plastic tubes were going to be used for PRF clot, PRF membranes and PRF plugs, such tubes would likely have additives like silica and other dangerous chemical products to simulate the clotting characteristics of the natural glass, and the final product would be a chemically induced artificial PRF clot that will produce artificial PRF membranes and plugs.

The use of plastic tubes with silica coating and other chemicals to simulate the natural characteristics of the glass brings the challenge of not knowing what kind of damage the dentists would be causing to the patient’s health.

The literature and research evidence has shown that silica and other coating with chemicals or other additives in the plastic blood-collection tubes could be detrimental and contradictory to the basic philosophy of PRF when it was adapted from cardiovascular and general surgery to dentistry. “No anticoagulants and no additives.”

More research is needed to determine the final damage of silica and other additives in the plastic blood-collection tubes to the grafted area and grafted bone at post-extraction sites, maxillary sinus, periodontal defects and all other bone augmentation procedures. There is currently not available publication or research to evaluate possible cause and systemic effects of silica and all other chemicals used to simulate the natural glass in plastic laboratory tubes when used for PRF manufacturing.

When plastic blood collection tubes without any additives are used for blood collection and centrifugation, we obtain liquid PRF that is used to apply to the sticky bone and transform it into PRF sticky bone. This improves the handling characteristics of the bone and aids in keeping the bone-graft material in solid form and preventing small particles of bone from migrating between the patient’s bone and periodontal tissues.

Migration of small particles of bone could be a cause of increased inflammatory response and swelling after surgery.

Because the time in the centrifuge is reduced to process blood in the plastic tubes to manufacture PRF liquid, less heat will be generated thus slowing a greater number of live white cells without degradation. This will accelerate the healing process, and it is also possible that when the blood is processed at 700 RPM or less, some stem cells could also be concentrated in the PRF liquid.

PRF is the newest and most popular technique to accelerate healing in dentistry. During most large implant dental conventions and meetings
in oral and maxillofacial surgery, periodontics, OMS, endodontics, implantology and bone regeneration, the number of speakers presenting successful cases increases every year. We, as clinicians involved in regenerative procedures and the manufac-
turing of PBS are obligated to use only materials and supplies that guarantee patients’ safety and, at the same time, eliminate the clinician’s liability risks.

Note
Dr. Alvaro Betancur is the inventor of the Blood Collection Tubes Steri-Pack (BCTSP).

References
1) Interactions from blood collection tube components on clinical chemistry assays. Bullock A.R. Bowen and Alan T. Remaley. NCB – US Na-
2) A study on lung cancer mortality related to random, quartz, and ase-
7) Platelet-rich fibrin: Its role in peri-
odontal regeneration. Author Peerja Chandrananda Anur Sivadattaa, Depart-
ment of Periodontics, PDS College of Dental Sciences, Calcutta, Golden Hills, Vattappara, Verkode (P), Thriuvananthapuram 695026, Kerala, India. IndiabKerala Institute of Medi-
cal Sciences, Thiruvananthapuram 695029, Kerala, India. Received 26 June 2011, Revised 7 September 2011, Accepted 7 September 2011. Available online 20 October 2011. 8) W.V. Giannobile. The potential role of growth and differentiation factors in periodontal regeneration. J Peri-
odontol, 67(1996), p. 545-553
9) A.K. Deodhar, R.E. Rana. Surgical physiology of wound healing. a re-
10) W.V. Giannobile. Periodontal tis-
12) D.M. Dohan Ehrenfeucht, L. Rammus,
T. Albrektsson. Classification of platelet concentrates. From pure platelet-rich plasma (PRP) to leuko-
13) P. Cortellini, G.M. Bowers. Perio-
dontal regeneration of intrabony de-
fects: an evidence-based treatment approach. Int J Periodontics Restorat-
14) D.J. Moojen, P.A. Everts, R.M. Stare, B. J. Cieza, and Anders P. Hakansson, Bic
eflom Formation Enhances Female Survival of Streptococcus pneu-
moniae and Streptococcus pyogenes, Published ahead of print 26 December
2013, doi:10.1128/mBio.01324-
Editorial note: This article was origi-
nally published in Implantpro Magazine 4/2017 (international C.E. magazine of oral implants).