Letter to the Editor

Shedding light in the controversial terminology for platelet rich products

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In their letter to the editor "What do we use: platelet-rich plasma or platelet-leukocyte gel?,"[1] Everts et al. provide an interesting discussion on the terminology for platelet-rich preparations. Authors propose different names depending on the cellular content and activation level of the biological preparations. For example, they suggest the term "platelet-leukocyte-rich plasma" for the nonactivated product rich in platelets and leukocytes and "platelet-leukocyte gel" for the same product after its activation.

We agree with the authors that there exist currently a controversy on the terminology used for platelet rich products. The lack of a suitable standardization and definition for these products has provoked the appearance of a wide range of biological preparations and a jungle of terms easily confused by mistakenly being used interchangeably, which is a fallacy. In many cases, the term "platelet rich plasma" is used to identify these preparations even if they are prepared using different protocols and differ from a qualitative and quantitative point of view. Therefore, it is easy to understand that differences in some key properties of these "platelet rich plasmas" including the platelet concentration, the type of anticoagulant and clot activator, the number of centrifugations and centrifugation speed, the presence or not of leukocytes, and the level of activation among others can markedly influence the final biological effects.[2–6] In addition, the latter is not only a consequence of the qualities of the product, which are directly related to the preparation process, but also of the critical application procedure in the patient, when, how, and where.

Particular ideas and developments in Regenerative Medicine have raised the concept of "Preparation Rich in Growth Factors (PRGF) Technology" based on the general view (idea, concept) of using an autologous biomaterial and its multiple configurations for regenerative purposes in different medical conditions. Assuming the general state of confusion and the necessity of using a defined terminology associated to well-characterized products and their application procedures, we suggest the term of PRGF to identify not only standardized elaboration and characterization protocols but also the ability to produce different formulations with therapeutic potential from the same patient's blood.[7–9]

The term "PRGF" identifies 100% autologous and biocompatible products elaborated using one-step centrifugation process and sodium citrate and calcium chloride as anticoagulant and activator, respectively. PRGF has a moderated platelet concentration, which has been related with optimal biological benefit.[10] Additionally, leukocyte content has been eliminated from PRGF with the aim of avoiding the proinflammatory effects of the proteases and acid hydrolases contained in white blood cells, which may be of special interest for example in the blade sharp lesions made during the surgical approach to the target pathological tissues.[11]

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On the other hand, the term "technology" addresses the versatility of this procedure as four different formulations with therapeutic potential can be easily obtained depending on the degree of activation.[8] The formulations include the nonactivated and activated liquid PRGF, the scaffold-like PRGF composed of fibrillar and cellular components and the elastic, dense, and haemostatic fibrin. This biotechnological regulation over the formulations increases the therapeutic options of this approach.

In conclusion, we only pretend to shed light on the jungle of terms used to identify platelet rich preparations. It is our opinion that "platelet rich plasma" is a highly controversial and excessively general vague concept that demands novel and more precise terms. In the same way, agreeing with Everts et al. in the distinction made for platelet and leukocyte rich products, we propose the concept of PRGF technology to define a versatile technology aimed to produce totally autologous preparations composed only of platelets at a standardized concentration and produced following reproducible protocols.

References

1. Everts AM, Zundert AV, Schönberger JPAM, Devilee RJJ, Knape JTA. What do we use: Platelet-rich plasma or platelet-leukocyte gel? J Biomed Mater Res A 2008;85:1135–1136.
2. Uebel CO, Braga da Silva J, Cantarelli D, Martins P. The role of platelet plasma growth factors in male pattern baldness surgery. Plast Reconstr Surg. 2007;118:1458–1466.
3. You TM, Choi BH, Zhu SJ, Jung JH, Lee SH, Huh JY, Lee HJ, Li J. Platelet-enriched fibrin glue and platelet rich plasma in the repair of bone defects adjacent to titanium dental implants. Int J Oral Maxillofac Implants 2007;22:417–422.
4. Rai B, Teoh SH, Ho KH. An in vitro evaluation of PCL-TCP composites as delivery systems for platelet rich plasma. J Control Rel 2005;107:330–342.
5. Borzini P, Mazzuco L. Platelet gel and releasates. Curr Opin Haematol 2005;12:473–479.
6. Christensen K, Vang S, Brady C, Isler J, Allen K, Anderson J, Holt D. Autologous platelet gel: an in vitro analysis of platelet rich plasma using multiple cycles. JECT 2006;38:249–253.
7. Anitua E, Sánchez M, Nurden AT, Nurden P, Orive G, Andía I. New insights into and novel applications for platelet-rich fibrin therapies. Trends Biotechnol 2006;5:227–234.
8. Anitua E, Sánchez M, Orive G, Andía I. The potential impact of the preparation rich in growth factors (PRGF) in different medical fields. Biomaterials 2007;28:4551–4560.
9. Anitua E, Sánchez M, Orive G, Andía I. Delivering growth factors for therapeutics. Trends Pharmacol Sci 2008;29:37-41.
10. Weibrich G, Hansen T, Kleis W, Buch R, Hitzler WE. Effect of platelet concentration in platelet-rich plasma on peri-implant bone regeneration. Bone 2004;34:665–671.
11. Schnabel LV, Mohammed HO, Miller BJ, McDermott WG, Jacobson MS, Santangelo KS, Fortier LA. Platelet rich plasma (PRP) enhances anabolic gene expression patterns in flexor digitorum superficialis tendons. J Orthop Res 2007;25:230–240.