



Commentary

An updated proposal for terminology and classification of platelet-rich fibrin

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The terminology and classification of platelet-rich fibrin (PRF), probably the most commonly used platelet concentrates in regenerative dentistry, are changing as the preparation protocol is modified. Therefore, the basic concepts behind PRF terminology and classification should be updated with consensus.

For many drugs, one product has several names, such as generic, chemical, and brand names. In the United States, the generic name is assigned by the United States Adopted Names Council [1]. A brand name is created by the company requesting approval for the drug and identifies the drug as the exclusive property of that company. Doctors often use the brand name when preparing prescriptions because it is easier to remember and doctors typically learn about new drugs via their brand names. Nevertheless, government officials, doctors, researchers, and others who write about the new compound use the drug's generic name because it refers to the drug itself and not to a specific company's claim on the drug or specific product.

Abbreviations: PRF, platelet-rich fibrin; PRP, platelet-rich plasma; A-PRF, advanced PRF; i-PRF, injectable PRF; L-PRF, leukocyte- and platelet-rich fibrin; CGF, concentrated growth factors.

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Terminology is also important for biologics. Platelet-rich plasma (PRP) has been used routinely for functional tests of platelet aggregation and recently for surgical operations as a biologic. Since Marx first demonstrated its clinical applicability in skeletal tissue regeneration [2], many derivatives prepared by modified protocols have been developed. The basic characteristics of PRP and PRF and their representative derivatives are summarized in Table 1.

Regardless of its variations, "PRP" has served as a "generic name" to date. In addition, because "PRP" accurately represents this compound's actual contents, it can also be considered as a "chemical name." Therefore, although PRP is produced not by manufacturers but by individual clinics as necessary, "PRP" can be considered both a "generic" and "chemical name" in the field of pharmaceutical products. To our knowledge, there have been no objections to this terminology [3].

In contrast, the background of PRF development appears somewhat complicated. PRF can be identified as a second-generation, *i.e.*, derivative, of PRP [4]; however, to achieve a more comprehensive understanding, it would be useful to distinguish PRF from other platelet concentrates prepared in the presence of anticoagulants. PRF was developed using an innovative concept without either anticoagulants or coagulation factors. At the time, PRF was designated as L-PRF (leukocyte- and platelet-rich fibrin) and the preparation protocol has been modified later by the developer of PRF, Choukroun [4], to produce advanced PRF (A-PRF) and injectable PRF (i-PRF) as well as several other groups of products (Table 1). To our knowledge, most of these brand names are protected as trademarks.

Ironically, however, these efforts aimed at improvement have made "PRF" a generic name of a fibrin matrix enriched with platelets prepared without exogenous coagulation factors, as the group of the above-mentioned PRF derivatives has become widely used worldwide. Although blood cell contents can be modified by changing the centrifugation speed [5], these products share the same principle of preparation through activation of the intrinsic coagulation cascade. In fact, our previous findings demonstrated that the mechanical and degradation properties of the self-clotted A-PRF membranes are significantly different from those for the exogenous thrombin-clotted platelet-poor fibrin gel membranes, but not self-clotted concentrated growth factors (CGF) membranes

Table 1
Classification of platelet concentrates.

Category	Family (generic name)	Principle of preparation and specific materials or procedures required	Subfamily	Individual (brand name)	Vender	Comments
Platelet concentrate	PRP	Exogenous coagulation factor-dependent matrix formation - Whole blood samples collected with exogenous anticoagulants (e.g., ACD-A) - Exogenous coagulation factors (e.g., thrombin, Ca ²⁺)	Home-made type	Single-spin method Double-spin method SmartPrep 2	Harvest	
			Machine (kit)-made type	GPS III Magellan SELPHYL	Biomet Arteriocyte UBS Aesthetics	PRP fraction is mixed with CaCl ₂ to produce PRFM (Platelet-Rich Fibrin Matrix)
				Accelerate Platelet Concentrating System PEAK Autologous Platelet System Ycellbio-PRP PurePRP PRGF etc.	Exactech Inc. DePuy Synthes Cascade	
	PRF	Glass surface-dependent matrix formation through activation of intrinsic coagulation pathway - Whole blood samples collected without exogenous anticoagulants - Glass tubes - Immediate centrifugation - Endogenous coagulation factors and intrinsic coagulation pathway	Choukroun's PRF	L-PRF	Intra-Lock	Genuine centrifuge and blood collection tubes should be used
			Sacco's PRF Other machine-made types	P-PRF A-PRF i-PRF CGF PRFM	Intra-Lock Process for PRF Process for PRF Silfradent srl FIBRINET	As above As above As above
			Home-made type	Vivostat PRF	Vivostat	Depending on Choukroun's protocol but using machines/products made by third parties

Family names are given in accordance with the principle of preparation protocols and/or representative characteristics. A subfamily is created in accordance with its recognition levels and preparation types. Individual names are commercial names and typically protected by trademark.

[6]. Therefore, particularly when compared with thrombin-clotted fibrin matrices and according to the custom of drug terminology, it is generally preferred to express self-clotted fibrin matrices by their generic name “PRF” rather than their individual brand names. However, for comparative studies of several PRF derivatives, individual brand names would be useful for precise identification.

In academia, based on search strategies and terms used, many systematic reviews may have analyzed data obtained not only for genuine PRF (Table 1), but also for PRF derivatives [7–9]. Accordingly, the situation around PRF is changeable and likely changing. Even after improvements in growth factor levels and/or fibrin architectures, minor modifications in preparation protocols [5] may not substantially overcome possible individual differences.

As another example related to commercial activity for PRF analogs and derivatives, CGF developed by Sacco [10] is the compounds with a major market share in Japan. The distributor of the Medifuge centrifuge (specified for CGF preparation) recommends that clinicians use the term “CGF,” but significant numbers of CGF users use the term “PRF” in their conference presentations and research articles. The major reasons for this “replacement” in Japan may be the worldwide popularity and general recognition of PRF, as well as the mismatch of the name “CGF” with its concept/image. Therefore, many users consciously or subconsciously accept “PRF” as a generic name [3].

Finally, we again propose that investigators reach a consensus regarding the terminology and classification of “PRF,” which would be beneficial for further expansion of this therapeutic field. Rather than relying on initial concepts and/or commercial backgrounds, scientists should be flexible and revise terminology and classification as needed.

Conflict of interest

The authors have no commercial, proprietary, or financial interest in the products or companies described in this article.

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