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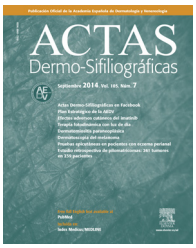

NOVELTIES IN DERMATOLOGY

Platelet-Rich Plasma: Applications in Dermatology☆

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Abstract In recent years, the use of platelet-rich plasma has increased notably in a range of diseases and settings. Uses of these products now go beyond skin rejuvenation therapy in patients with facial ageing. Good outcomes for other dermatological indications such as skin ulcers and, more recently, alopecia have been reported in case series and controlled studies. However, these indications are not currently included in the labeling given that stronger scientific evidence is required to support their real benefits. With the increased use of these products, dermatologists need to become familiar with the underlying biological principles and able to critically assess the quality and outcomes of the studies of these products in different skin diseases.

PALABRAS CLAVE
Plasma rico en plaquetas;
Plasma rico en factores de crecimiento;
Úlceras cutáneas crónicas;
Alopecia;
Rejuvenecimiento facial

Plasma rico en plaquetas: aplicaciones en dermatología

Resumen La aplicación del plasma rico en plaquetas ha experimentado un notable auge en los últimos años en una amplia variedad de enfermedades y situaciones clínicas. Su empleo en dermatología va más allá de su asociación con el envejecimiento facial. En la literatura se pueden encontrar series de casos y estudios controlados que muestran buenos resultados en aplicaciones diversas, como las úlceras cutáneas y, más recientemente, la alopecia. Sin embargo, estas indicaciones no están reconocidas en la ficha técnica en el momento actual, a falta de poder demostrar sus beneficios reales con mayor evidencia científica. Ante la expansión en el uso de esta técnica resulta fundamental el conocimiento de sus fundamentos biológicos y la evaluación de la calidad y de los resultados de los trabajos que estudian su aplicación en diferentes enfermedades cutáneas.

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Introduction

Although mention of platelet-rich plasma (PRP) may initially bring to mind supposedly novel applications in esthetic medicine, and facial aging in particular, the product has actually been used for many years in wide range of indications. After the discovery in the 1980s of the release of bioactive molecules with action in damaged tissue such as skin ulcers, PRP started to be used in regenerative medicine.[1] Ten years later, PRP started to be used in maxillofacial surgery, taking advantage of the potential of fibrin for adherence and its hemostatic properties.[2] Clinical observation revealed PRP could stimulate cell proliferation and have anti-inflammatory characteristics.[3]

Since Anitua[2] reported an outpatient method for obtaining PRP for application in implantology in 1999, different techniques have been developed and the range of applications has been extended. A timeline for the introduction of these different applications is shown in Figure 1. At least 16 different systems for obtaining PRP are available commercially at present.

This apparent widespread availability is at odds with the limited scientific evidence to support the different suggested applications. Most of the studies in the literature reflect benefits, at times rather striking, of application of PRP. However, few of these clinical trials have a robust design that enables the size of the effect to be evaluated. Furthermore, there is little consensus on the large variety of methodologies available. Thus, there is a lack of standardization in the use of PRP and, therefore, generation of readily reproducible scientific evidence is hindered. In this context, the Spanish Agency for Medicines and Health Products (AEMPS) issued a report in May 2013 with the aim of establishing a framework for the use of PRP in Spain, the obligations of the manufacturers, and the information that the patients treated with PRP should receive. This document recognizes PRP as a drug product for human use.[4]

The objective of this review is, first, to explain the mechanism of action of PRP in tissue regeneration and, second, to summarize the scientific evidence available at present for the different proposed indications.

Platelets in Tissue Regeneration

In addition to their recognized role in hemostasis, platelets have other essential functions in tissue regeneration. After tissue and vascular damage, platelets become activated and aggregate as part of their hemostatic function. This leads to secretion of proteins and other biologically active molecules which, in turn, trigger cascades of secondary messengers implicated in the tissue healing process. The theoretical basis for the biological benefit of PRP is that concentrations above the physiological one of platelets and plasma proteins may accelerate the repair process. In addition, reinforcement of the fibrin mesh may enable the viability of sustained release of bioactive molecules to be maintained.[5–8]

Definition of Platelet-Rich Plasma

There is no consensus on the definition of PRP. Some investigators have suggested that PRP should refer to the fraction with a platelet concentration 3 to 5 times greater than normal levels. However, the most accepted definition at present characterizes PRP as a volume of autologous plasma that contains a platelet concentration above basal concentration (150 000-350 000/μL).[8]

The platelet, leukocyte, and growth factor concentrations vary according to the concentration of platelets used in the preparation. As a result, the nomenclature for PRP products makes reference to the different fractions that can be obtained according to the method used: plasma-rich growth factors (PRGF), platelet-rich plasma and growth factors (PRPGF), platelet-rich plasma (PRP), platelet-poor plasma (PPP), leukocyte-rich platelet-rich plasma (LR-PRP), and leukocyte-poor platelet-rich plasma (LP-PRP).

Bioactive Molecules in Platelet-Rich Plasma

In addition to the known growth factors, PRP contains other bioactive molecules with an important role in tissue healing. These include platelet-derived growth factor (PDGF), transforming growth factor (TGF), platelet factor 4 (PF4), interleukin (IL) 1, platelet-derived angiogenesis

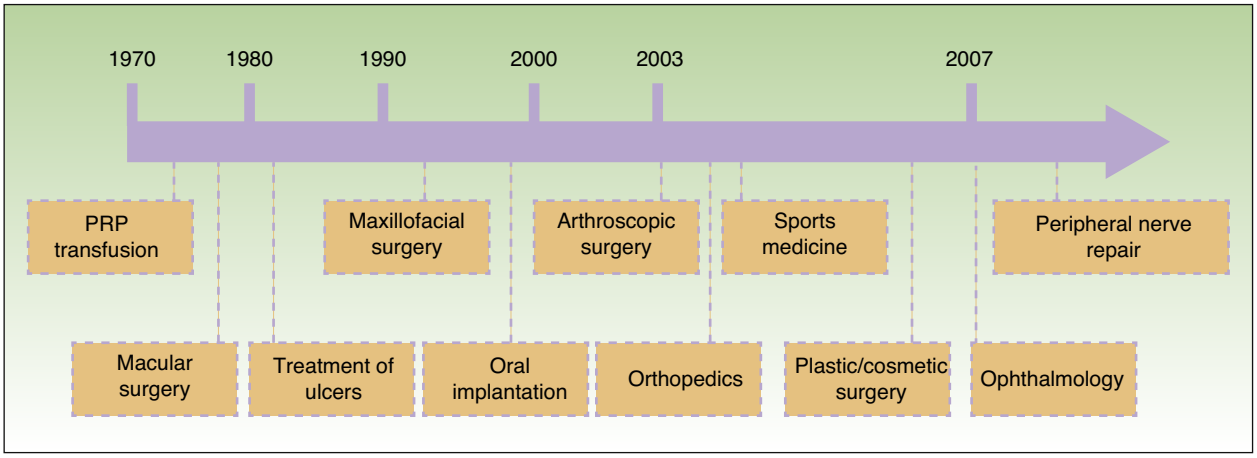

Figure 1 Temporal sequence of application of platelet-rich plasma (PRP) in different fields of medicine.[3]