A Review of Platelet Rich Plasma Classification Systems

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Platelet rich plasma (PRP) is quickly becoming a standard injectate for orthopedic conditions in the United States. The trend of total PRP injections have shown a significant increase over the past decade, with an estimated year-over-year increase by 7.1% from 2010 to 2020 and have been projected to increase by 66% in annual usage by 2030[1].

The Ehrenfest Classification system (2009), one of the first systems, divided PRP into four categories based on cell composition and fibrin content. The categories included Pure PRP (P-PRP), which contains no leukocytes and low fibrin, Leukocyte-Rich PRP (L-PRP), includes leukocytes and low fibrin, Pure Platelet-Rich Fibrin (P-PRF), no leukocytes, high fibrin, and Leukocyte-and Platelet-Rich Fibrin (L-PRF), includes leukocytes and high fibrin[2]. It is used widely for its simplicity and practicality in categorizing PRP products.

In 2012 the DeLong Classification system aka "PAW" system, categorized PRP based on the absolute number of **P**latelets, the manner in which platelet **A**ctivation occurs, and presence or absence of **W**hite cells[3]. The categories help tailor PRP treatments to specific clinical scenarios, optimizing therapeutic outcomes based on the biological needs of the tissue being treated. It also allows for a more accurate comparison of PRP preparations and their outcomes in clinical and research settings.

The Mautner Classification system in 2015 created the "PLRA" system based on **P**latelet concentration, **L**eukocyte content, **R**ed blood cell content, **A**ctivation status differed from the PAW system by including the presence or absence of red bloods and the total volume of PRP delivered in its classification system[4].

Magalon in 2016 proposed the "DEPA" classification system based on the **D**ose of injected platelets, **E**fficiency of production, **P**urity of the PRP, and **A**ctivation of the PRP. Activation of PRP followed similarly as other classification systems. Each category is given a letter grade (A-D), an example is AAA[5].

Finally, the MARSPILL classification system of PRP introduced in 2017 focuses on highlighting the mononuclear cell population in PRP. It is composed of the **M**ethod of preparation, **A**ctivation, **R**ed blood cell content, **S**pin method, **P**latelet concentration, **I**mage guidance, **L**ight activation, and **L**eukocyte content[6]. An example of platelet-rich plasma, rich in mononuclear cells through MARSPILL would be **M** (H), **A**(A-), **R**(RBC-P), **S**(Sp2), **P**(PL[4–6]), **I**(G+), **L**(Lc-R[2–3]), **L**(A-).

Given the increasing advances in the regenerative medicine field, having a method to classify PRP injections is extremely important to not only provide information to patients

about the product that they are receiving, but to allow physicians to better evaluate if their treatments in an objective manner.

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