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Hair Therapy and Transplanatation

Commentary

Comparative Study of PRP (Platelet-Rich Plasma) *vs.* Stem Cell Therapy in Early-Stage Androgenetic Alopecia

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DESCRIPTION

Andro-Genetic Alopecia (AGA), commonly referred to as male or female pattern baldness, is the most prevalent form of hair loss affecting both men and women globally. The condition is characterized by progressive thinning of scalp hair in genetically predisposed individuals and typically begins in early adulthood. With advances in regenerative medicine, two prominent non-surgical interventions have gained traction in early-stage AGA management: Platelet-Rich Plasma (PRP) therapy and Stem Cell Therapy. PRP is an autologous concentration of platelets derived from the patient's own blood. The mechanism by which PRP supports hair regrowth lies in the high concentration of growth factors it contains, such as Platelet-Derived Growth Factor (PDGF), Transforming Growth Factor-Beta (TGF-β), Vascular Endothelial Growth Factor (VEGF) and Epidermal Growth Factor (EGF). These bioactive molecules promote neovascularization, stimulate dermal papilla cells and enhance the proliferation of hair follicle stem cells. PRP is usually administered *via* multiple microinjections into the scalp over a series of sessions.

Stem Cell Therapy, on the other hand, utilizes Mesenchymal Stem Cells (MSCs) often sourced from adipose tissue, bone marrow or hair follicle bulge regions. These cells possess a unique ability to differentiate into various cell types and exert potent paracrine effects through cytokines and exosomes. In the context of AGA, MSCs are believed to stimulate dormant follicles, increase angiogenesis and reduce inflammation around hair follicles a common feature in AGA pathology. While autologous methods are the most common, allogeneic approaches are being explored in controlled clinical settings. A key differentiator between PRP and stem cell therapy is their mechanism and duration of effect. PRP acts more as a bio-stimulant, encouraging existing follicular cells to function optimally. Stem cell therapy, conversely, focuses on regeneration and structural support of miniaturized or damaged follicles, potentially offering longer-term benefits in hair follicle cycling and density restoration.

Several comparative observational and controlled studies have begun emerging in high-income countries like the United States, South Korea and parts of Europe, where both technologies are more widely accessible. Preliminary findings indicate that PRP shows more immediate visible results within three months, especially in patients with early stage AGA, due to the stimulation of existing follicles. Stem cell therapy, while slower to show external improvements, appears to offer longer lasting follicular support and improved hair density at the six- to twelve-month mark. Safety profiles for both therapies are relatively favourable, with minor discomfort, swelling, or bruising being common for PRP. For stem cell treatments, the invasiveness of harvesting procedures, particularly from adipose or bone marrow sources, carries higher procedural complexity and cost. Moreover, the regulatory environment surrounding stem cell use remains stringent in several countries due to concerns about ethical sourcing, standardization and long-term safety.

Cost is another distinguishing factor. PRP treatments are generally more affordable and widely available in clinical dermatology settings. Stem cell therapy remains expensive and is often limited to specialized regenerative medicine centres or research-based institutions. The financial barrier makes stem cell therapy less accessible for the general population, even in high-income countries. Another point of consideration is the durability of clinical outcomes. While PRP may require maintenance treatments every 4-6 months to sustain benefits, stem cell therapy is currently being studied for its potential to provide extended results with fewer repeat sessions. Longitudinal studies are underway to determine whether combining these therapies could result in synergistic effects, providing both immediate stimulation and long-term regeneration.

CONCLUSION

In conclusion, both PRP and stem cell therapies offer potential avenues for treating early-stage androgenetic alopecia, but they do so through distinct biological pathways. PRP remains the more accessible and affordable option with rapid results and

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minimal invasiveness, making it ideal for short-term improvement. Stem cell therapy, though more complex and costly, may provide deeper regenerative benefits with longer-lasting outcomes. The decision between the two should depend on patient expectations, financial capacity, stage of hair loss and long-term goals. In clinical practice, a personalized approach, possibly integrating both modalities, could optimize outcomes. As ongoing research continues to clarify mechanisms, efficacy and safety, these regenerative therapies are likely to reshape the future landscape of hair restoration.