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## A New Advance in Baldness Surgery Using Platelet-Derived Growth Factor

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**W**e have performed an experimental study in 23 male patients with pattern hair loss using follicular units (FUs) and growth factors derived from autologous platelet-rich plasma to assess the effectiveness of those factors in the growth and density of transplanted FUs.

### Introduction

The first works on growth factors, derived from plasma, originate from the 1970s and 1980s, and they demonstrated usefulness in the healing process of ulcers and wounds. The growth factors contained in platelets of blood plasma are primarily of three types: the platelet-derived growth factor (PDGF), the transforming growth factor beta 1 (TGF beta 1), and the vascular endothelial growth factor (VEGF). These protein molecules interact with their respective receptors and enhance tissue angiogenesis. Their anti-inflammatory effects stimulate healing and the growth of new organic structures. Clinical use of growth factors consists of obtaining autologous platelet-rich plasma and applying it as a concentrate over the wound areas to be treated or implanted. Results have been most promising and are utilized in many plastic surgery procedures.

The action of growth factors on the germinative hair cycle has already been studied both in its embryological phase and in its adult phase, however, not in hair micrograft surgery. Growth factors are present in the bulge area, where stem cells are found, and they interact with cells of the matrix, thus activating the proliferative phase of the hair. Stem cells are more primitive and of ectodermal origin; they give origin to epidermal cells and sebaceous glands. Cells of the dermal papilla, which are found at the capillary base, are of mesenchymal origin. Both cells need each other, and when they interact through the action of various growth factors they will give rise to the future follicular unit.

In the first seven days after hair transplantation, there occurs an inflammatory process involving neutrophils, eosinophils, macrophages, platelets, fibroblasts, and growth factors. Both edema and erythema occur in the scalp. After this period, apoptosis occurs and the micrograft enters into an involution phase resulting in hair shedding. The next growth cycle begins after the third month and continues up to the seventh month. Up to 15% of these micrografts do not survive; they become atrophic and are absorbed or expelled.

In our research, we added platelet-rich plasma including growth factors to the FUs with the intent of activating the proliferative phase and increasing the survival of the FUs (Figure 1).

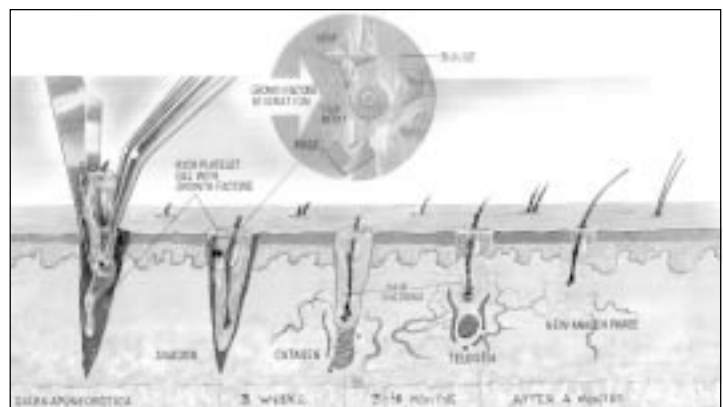


Figure 1. Schematic view of micrografts being implanted with platelet-derived growth factors.