



## Hair Transplant for Treatment of Psoriasis

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**Abstract:** Psoriasis is an autoimmune disease with skin presentations in different parts of the body. We have noted improvement in psoriasis skin manifestation in a patient with long standing psoriatic lesions of the scalp. We actively sought additional patients with scalp psoriasis and transplanted hair into their scalp into, or in close proximity, of psoriatic lesions in order to elicit a response.

**Method:** We transplanted hair into the psoriatic lesions of three patients after having confirmed the clinical diagnosis with pathology from the psoriatic lesions. We observed the lesions after the hair transplant and evaluated them clinically and histologically for continued evidence of active psoriasis.

**Results:** We have documented clearance of the scalp psoriatic lesions in all three patients after one hair transplant procedure. All three patients were evaluated periodically within 7 to 15 months after their hair transplant. They underwent a repeat biopsy from the area of the original psoriatic plaque. The pathologic findings were consistent with post-operative changes. No histologic evidence of psoriasis was documented in any of the three patients.

One of the 3 patients has been followed for five plus years and exhibits no evidence of disease recurrence.

**Conclusion:** We suggest that transplantation of hair follicular units into psoriatic scalp lesions could be an effective method to alleviate the symptoms of psoriasis and possibly be used as a treatment option. More studies on the exact mechanism of this phenomenon may lead the way to novel treatments for this chronic disorder.

### Introduction

Psoriasis is an autoimmune disease usually characterized by skin patches with specific characteristics that are diagnostic for psoriasis [1]. These skin lesions are best described as raised reddish, inflamed patches with a silvery white, scaly build-up of dead skin cells. The psoriasis patches may vary in severity from small and localized lesions to more diffuse, confluent islands of inflamed skin.

Only one-third of cases of psoriasis have a genetic basis. This implies that external influences and possibly environmental factors can affect its presentation and severity [2]. Other factors such as medications, infections, trauma and psychological stress may exacerbate the expression of this disease. Psoriasis is an autoimmune disorder in which an overactive immune system fights the body's own tissue thus waging battle on the skin and joints.

As yet, there is no cure for psoriasis and treatment options are limited to controlling the symptoms. Treatment options to control the symptoms include topical steroids, light treatments, vitamin D analogues, topical retinoids and immune system suppressing medications such as methotrexate [1].

Psoriasis is characterized by an abnormal, excessive and rapid multiplication of the epidermal cells of the skin [3]. Abnormal multi-

plication of skin cells during wound healing and an overabundance/build-up of skin cells result from the sequence of pathological events occurring in psoriasis [4]. Epidermal skin cell turnover increases in psoriasis with replacement every 3-5 days unlike normal skin in which they are replaced every 28-30 days [5]. The alteration in cell proliferation seen in psoriasis is secondary to the accelerated maturation of keratinocytes induced by an inflammatory process in the dermis which involves different cells such as dendritic cells, macrophages, and T cells [6, 7]. These involved immune cells migrate from the lower layers of skin to the dermis then on to the epidermis. This process is involved with production of inflammatory chemical signals (cytokines) such as tumor necrosis factor- $\alpha$ , interleukin-1 $\beta$ , interleukin-6, interleukin-36 and interleukin-22 from the affected skin cells [8, 9].

These inflammatory signals are known to stimulate proliferation of keratinocytes [8]. One theory about the mechanism of psoriasis is that it involves a defect in regulatory T cells and other regulatory cytokine like interleukin-10 [8].

### Initial Observations

Transplantation of hair follicular units into the areas of the scalp with chronic psoriatic involvement in one patient has shown favorable changes in the psoriasis lesions after several months. Our initial observation inspired us to screen all hair loss patients who visited our clinic with any suspicious lesions that resembled a psoriatic plaque.

We confirmed our clinical diagnosis with a skin biopsy from the suspicious lesions before hair transplantation into and around the psoriatic lesions. We also arranged 6 month post hair transplant follow-up visits for clinical evaluation and a repeat biopsy of the scalp

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in close proximity to the original primary lesion. We identified three patients who met these criteria. The patients underwent a hair transplant into their psoriatic plaques after a histological confirmed diagnosis of psoriasis.

## Material and Method

After our clinical screening, we have identified three patients who qualified for the study. We used self-assessment, physician assessment and pathologic findings for assessing the post-operative improvement of their symptoms.

We performed a hair transplant in all three patients with follicular unit transplants from healthy donor areas directly to the recipient areas including the psoriasis plaques. Following is the history of each patient, their procedure and follow-up clinical and histologic findings.

We used our standard methods of follicular unit hair restoration for all these patients. In two patients, we used strip FUT method to harvest donor follicular unit grafts and one received a hair transplant through an FUE method. Post-op treatments including hair wash, shampoo and medications were in accordance with our standard post-transplant procedure and protocol. In office, we evaluated these patients for their final results at 8-14 months after their procedures at which time we again performed a biopsy from the involved area. Histologically, we compared the before hair transplant and the 8-14 month post hair transplant specimens.

## Results

### Case: 1

#### Initial presentation

44-year-old man was seen and evaluated in our office for male patterned baldness. He had a family history of male patterned baldness and substantial thinning in front, top and crown areas of scalp indicating male patterned baldness with Norwood Class IV.

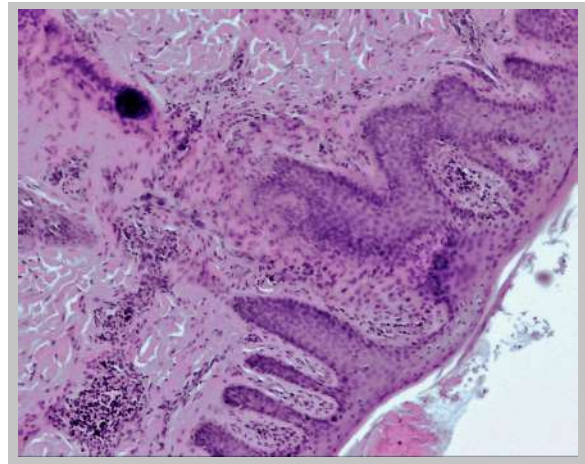
During our initial evaluation the patient presented significant scalp scaling over the majority of his balding scalp in front, top and crown area to the point that normal skin was not visible. The patient reported persistent and essentially lifelong significant scaling of his scalp. Despite his condition, he had never pursued medical attention to receive a diagnosis or treatment. We performed a scalp biopsy from the affected areas to rule out other skin conditions such as Cicatricial Alopecia that could be contraindication for a hair transplant procedure. The histologic findings were diagnostic for psoriasis and included: chronic peri vascular inflammation with psoriasis form features such as elongation of rete ridges, supra papillary thinning, and the cardinal finding of psoriasis, Munro micro abscesses [Figure 1].

#### Hair transplant

Patient underwent a FUT hair transplant with 2921 follicular unit grafts that were distributed in front, and top of scalp. Patient was also started on finasteride to prevent further hair loss in other areas of scalp.

#### Final assessment (clinical/histologic)

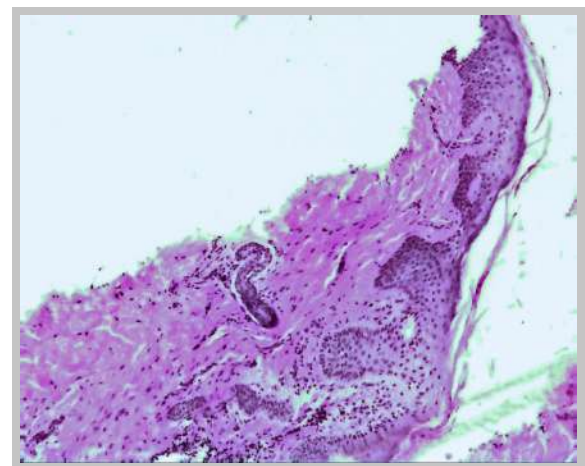
We evaluated the patient at 6 and 12 months after his hair transplant. At the six-month evaluation, the top of his scalp, (where most of the transplanted grafts had been placed), showed no evidence of scalp inflammation or scaliness. In order to minimize the effect of concomitant variables, we discontinued finasteride which were started in conjunction with the transplant and thereafter, respectively.



**Figure 1:** Biopsy from before hair transplant - Diagnosis was positive for chronic perivascular inflammation with psoriasiform features including: Munro microabscesses, elongation of rete ridges, suprapapillary thinning.

During his 14-month evaluation post hair transplant, a repeat scalp biopsy was performed. Upon examination, visual inspection did not show evidence of inflammatory plaques or scaling on the front and top of his scalp. The biopsy was obtained from the same level of the scalp and from the vicinity of the area that was preoperatively biopsied.

The pathology result of his post-operative scalp biopsy displayed normal hair shafts and adjacent skin appendage structures with no significant inflammation and no evidence of psoriasis [Figure 2].



**Figure 2 :** After hair transplant pathology - Normal hair shafts and adjacent skin appendage structures with no significant inflammation, flattening of ridges and lack of Munro microabscesses.

This patient had been observed yearly in our office including his last visit 5 years after his hair transplant. He reported being satisfied with his hair coverage and his scalp has been clear with no scaling or erythema. During routine examinations in our office, he did not exhibit signs of scalp inflammation or any other lesions on his scalp.

### Case 2

35-year-old female was seen in our office for repair of a small scar in/behind the frontal hairline of her scalp using hair transplantation into the scar. She has a long history of psoriasis with typical psoriatic plaques on the extensor surfaces of her upper extremities and several

areas on her scalp. The patient was very motivated to have hair transplanted on some of the chronic psoriatic scalp lesions in conjunction with her scalp scar repair procedure. The patient did not present with any patterned hair loss. Her two most persistent psoriatic plaques were located on mid-occipital and left posterior auricular area.

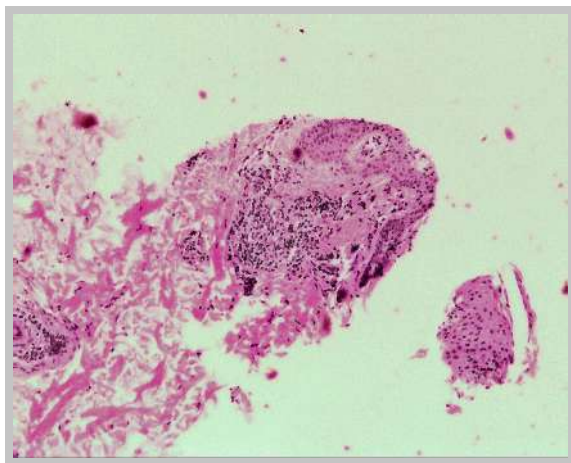
She had been clinically diagnosed with psoriasis five years prior and had been on multiple topical steroids with only a partial temporalizing clinical effect.

The patient maintained an inflamed lesion behind her left ear since she was diagnosed 5 years ago. We tattooed the edge of the psoriatic lesion in the post auricular area to identify the plaque location and to keep our histologic evaluations consistent. A biopsy was obtained from the periphery of the lesion before the hair transplant procedure to confirm the diagnosis histologically [Figure 3].



**Figure 3:** A small dot tattoo was placed behind the ear located 0.5cm anterior to the erythematous lesion where the preoperative biopsy was taken.

Initial biopsy result was consistent with psoriasis and showed parakeratosis with upward migration of acute inflammatory cells [Figure 4].



**Figure 4:** Case 2 - post-auricular skin pathology before hair transplant. Parakeratosis with upward migration of acute inflammatory cells and perivascular infiltration suggestive of psoriasis.

### Hair transplant

The patient received a hair transplant for a small linear scar behind her frontal hairline. In addition, we implanted follicular unit grafts into her chronic psoriatic plaque in the left posterior auricular area

during her hair transplant procedure. We used strip FUT method for harvesting and implanting hair with 130 follicular unit grafts into the entire psoriatic plaque [Figure 5].



**Figure 5:** Transplanted hair into the left posterior auricular psoriatic lesion with 130 follicular unit grafts.

Since the psoriatic plaque extended from a hair bearing area behind the ear to the skin posterior to the external ear, the transplanted area was easily identifiable especially with the aid of the tattoo dot. Future post auricular biopsies following the hair transplant procedure could be effortlessly done due to its easy accessibility and visibility of the marked area.

### Final evaluation (clinical/histologic)

The patient was evaluated at 6 and 12 months after her hair transplant procedure. She had a smooth recovery with no post-op complications. Her clinically evident inflammation in the transplanted area was minimal to none at postoperative months 6 and 12. She did not present any of the typical symptoms of psoriasis in the transplanted area at her 6 and 12-month follow-up visits [Figure 6]. As a result, she no longer requires daily topical steroids applied to her post auricular area.

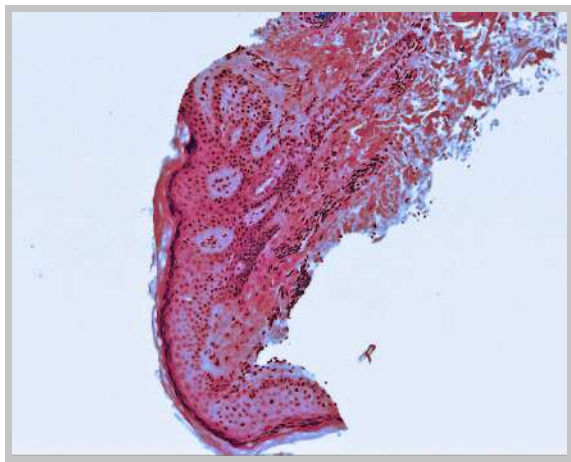


**Figure 6:** Transplanted area behind left ear 12 months after hair transplantation showing hair growth and minimal inflammation.

We obtained a scalp biopsy from the transplanted area, within the boundaries of the psoriatic lesion at postoperative month 7. We used the tattoo that was placed before the procedure as a guideline to obtain the follow-up biopsy from the previously identified psoriatic area. The post-op histologic evaluation showed post inflammatory change without any evidence of active psoriasis [Figure 7].



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**Figure 7:** Post-op biopsy of post auricular area with post inflammatory changes due to transplantation and the healing process. No psoriaform changes present near the site of the initial biopsy despite previous diagnosis of psoriasis.

### Case 3

#### Initial presentation

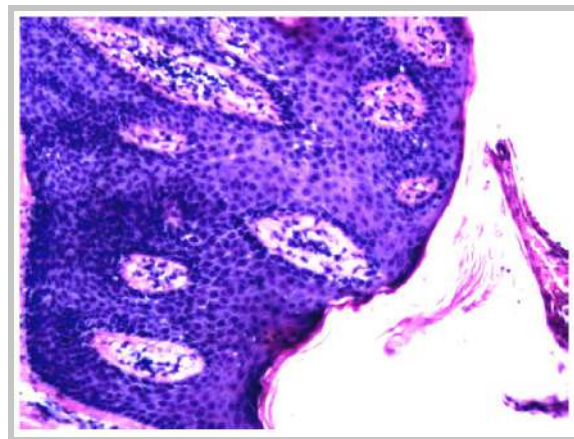
22-year-old male patient presented to our office with class III-v male patterned hair loss. Our treatment plan consisted of medical treatment with finasteride and surgical intervention with hair transplantation. We planned to transplant the balding areas with over 2000 FUE grafts which could provide adequate coverage to the front, corners and crown balding areas. During his initial consultation, the patient did not report a history of prior skin conditions.

We noticed a circular erythematous plaque with a surrounding perimeter of dry, scaly skin only after we shaved his head and where preparing to perform his hair transplant [Figure 8]. A 4mm punch biopsy was obtained within the margins of the inflamed area just before proceeding with the hair transplant.



**Figure 8:** Erythematous crown lesion with scattered scaling edges noted prior to hair transplant.

Pathology showed acanthosis with supra papillary thinning and inflammatory cells extending into these papillae with focal spongiosis. The stratum corneum showed pustule formation which is typical of Munro's Abscesses and indicative of psoriasis [Figure 9].



**Figure 9:** Intraoperative biopsy of a psoriaform lesion - Acanthosis with suprapapillary thinning. The inflammatory cells extend into the papillae with focal spongiosis. The stratum corneum showed pustule formation, typical of Munro's Abscesses and consistent with psoriasis.

#### Hair transplant

The patient received 2102 grafts via FUE method. We implanted 500 follicular unit grafts into the crown area and the rest to front and corner areas.

#### Final assessment (clinical/histologic)

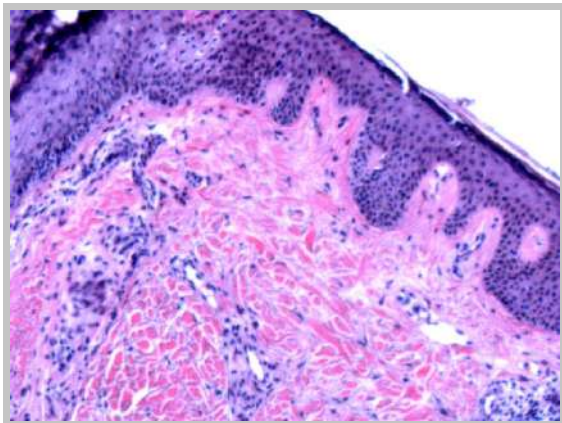
We evaluated the patient at 6 months after his hair transplant. During the postoperative evaluation, the patient did not voice evidence of crown irritation and clinically there was no inflammation or scaliness noted on the crown. We decided to bring him back in postoperative month 9 for reevaluation and to obtain a biopsy at that time.

We evaluated the patient at month 9 after his hair transplant. At this visit, the patient did not have clinical evidence of psoriasis. A 4 mm punch biopsy from the vicinity of the original biopsy location was obtained [Figure 10].



**Figure 10:** Crown at post-op month 9 after hair transplant with good hair growth and no evidence of psoriasis.

The post-op pathology showed minimal chronic inflammation and increased collagen deposition throughout the dermis that was consistent with his post-op status after his hair transplant. There was no evidence of psoriasis in his histologic examination [Figure 11].



**Figure 11:** Histologic evaluation of scalp at 9 months after HT is consistent with post procedural change, flattening of epidermis, and absence of Munro abscesses.

### Clinical Pathology

In most cases, psoriasis form dermatosis is usually characterized by epidermal hyperplasia [10]. Psoriasis is known as chronic relapsing papulo squamous dermatitis characterized by abnormal hyper proliferation of the epidermis. Plaques of psoriasis consist of well-circumscribed erythematous patches with a silvery white scale. The scalp and nails are typical locations where psoriatic lesions may arise. Other common areas are the extensor surfaces of extremities including the elbows, knees and sacral regions. Scalp lesions of psoriasis are common but they rarely lead to scarring alopecia [32, 33].

The psoriatic lesions are generally defined morphologically as a presence of epidermal hyperplasia and elongation of the rete ridges in skin. Although psoriasis has a number of pathognomonic histologic features, they are not always present therefore clinicians must rely on the clinical/physical findings to make a diagnosis. We observed resolution of both the clinical and histologic findings of all three patients that were studied. All had clinically evident psoriasis and all had been diagnosed with psoriasis confirmed by pathologic/histologic findings commonly found in psoriasis. Complete transformation of both histologic findings along with significant improvement of the clinical signs and symptoms of psoriasis were noted in all three patients.

### Discussion

Hair transplantation in patients with psoriatic scalp lesions is not a new topic in hair restoration. We know that certain trauma can activate the skin plaques of psoriasis or they can exacerbate the existing lesions called the Koebner Phenomenon. This is quite commonly seen in psoriatic lesions. Although hair transplantation can safely be performed in and around the psoriatic lesions without the risk of aggravating the initial disease, no case reports to date have been published regarding temporary or permanent changes of the psoriatic lesions after hair transplantation.

Our study highlights several cases where hair was transplanted directly onto scalp that exhibited both normal regions admixed with areas of chronic psoriasis. Biopsies were obtained prior to the procedure to rule out other skin conditions and confirm the diagnosis of psoriasis with implied contraindications with respect to receiving a

hair transplant. Any reactivation of psoriatic lesions were not noted and, to the contrary, we noticed improvement of long standing psoriatic plaques which had been plaguing patients for years.

We know that implantation of hair follicles into the new areas of skin follows the natural path of wound healing. That means that the implantation of hair follicles is followed by a healing process that includes hemostasis, inflammation, proliferation and remodeling. It is not clear whether one or more of these steps in the processes of healing is likely responsible for the therapeutic effect observed during and after hair transplantation within a psoriatic laden zone or the improvement has to do with the hair follicles or its stem cells.

There are more and more studies that show skin grafting using hair follicle pluri potent stem cells that may help with healing of chronic wounds [11]. Punch grafts from hair bearing skin were suggested as a viable source of follicular stem cells in comparison to skin grafts from non-hair bearing skin for the treatment of chronic wounds. The use of hair follicle implantation in treatment of chronic wounds has been elucidated in the past without much research that shows the biomolecular mechanisms involved in the process. More studies are needed to clarify the exact processes involved in wound healing and the propagation of psoriasis. This paradigm may represent an alternative to traditional treatments or even possible eradication of skin lesions associated with psoriasis in hair bearing regions.

### Acknowledgement

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