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## LPT and PRP: A Powerful Combination for Fighting Alopecia



# Abstract

With plastic surgery on the rise, natural integrative solutions to cosmetic and dermatological problems are quickly gaining popularity amongst state-of-the-art restorative clinics. These natural solutions are often used as stand-alone remedies or in conjunction with surgical procedures to promote fast healing, boost the overall results of surgery and increase patient satisfaction. Hair loss, from which millions of people suffer around the world, can now be remedied with revolutionary, ultramodern technologies that have no harmful side effects. These include Platelet-Rich Plasma (PRP) injections into scalp areas affected by alopecia and Laser Phototherapy (LPT), which uses the concepts of Low-Level Laser Therapy (LLLT) to treat hair loss with coherent laser light. While separate clinical studies show results of hair density increases ranging from 31% to 39%, degrees of success using a combination of both therapies will vary with treatment length and the exact mechanism of action followed. These two next-generation technologies both offer a supremely superior natural solution to hair loss, which make them an astoundingly powerful therapy when used in conjunction.

## INTRODUCTION

In a fast, technologically oriented society that places significant emphasis on physical appearance, people are geared towards finding quick solutions to problems that offer instant gratification. According to the American Society for Aesthetic Plastic Surgery (ASAPS), the total number of cosmetic procedures in the U.S. has increased by 155% since 1997.

A significant portion of the cosmetic and dermatological industry is geared towards treating hair loss, medically known as alopecia. Along with smooth, wrinkle-free skin and a bright, healthy complexion, a thick head of hair is also associated with youth and vigor. Hair loss affects millions of people around the world for a plethora of reasons. Although genetics often play an important role, other factors include hormonal

imbalances, stress, following an inadequate diet and various underlying medical conditions. Alopecia in itself is not dangerous to human health but can often negatively impact an individual's life, resulting in emotional distress and feelings of social rejection.

Natural integrative therapies and remedies to cosmetic and dermatological problems are gaining more and more traction around the world. Since these types of solutions allow the body to heal from within, there are generally no dangerous side effects associated with treatment. Furthermore, these natural therapies can be used in conjunction with various surgical procedures to greatly improve their results and accelerate the recovery time of patients.

## TRADITIONAL HAIR LOSS SOLUTIONS



Figure 1: Finasteride, minoxidil and hair transplantation, 3 common hair loss solutions used today

Many remedies and solutions to hair loss have been put forth by pharmaceutical companies. Two mainstream hair loss medications carry the chemical compounds minoxidil and finasteride as their main ingredients. Minoxidil is an OTC topical application which can be used by both men and women. It is commonly used to treat androgenetic alopecia, and its effects on other types of hair loss are not well known. Common side effects include stinging, burning, and dryness of the scalp. A small percentage of the population can also experience unwanted body hair or more serious side effects, such as heartbeat irregularity, tachycardia, dizziness, chest pain, swelling

of the face or other body parts, as well as weight gain and difficulty breathing.<sup>1</sup>

Finasteride is only intended for men, (thus making hair restoration choices for women extremely minimal), and reduces the production of testosterone and dihydrotestosterone (DHT), which is a major cause of hair loss. Finasteride is used for treating androgenetic alopecia and its effects on other types of hair loss are still under study. Side effects can include skin rashes, weakness and decreased sexual ability. More serious side effects can include breast lumps, nipple discharge, breast enlargement/tenderness/pain, testicle pain, as well as serious allergic

reactions, such as severe swelling and trouble breathing.<sup>2</sup>

Both minoxidil and finasteride are on-going expenses, can cause shedding, and hair loss resumes once treatment is discontinued.

A third, more costly option to traditional hair loss treatment is undergoing hair transplant surgery. In this case, hair follicles are harvested from the back of the head, (once again making this an unlikely treatment for women), and are transplanted to other areas

of concern. Hair transplants are traumatic for the scalp and often result in a significant loss of hair during the following year; patients can experience scarring and poor wound healing with hypopigmentation of the surgical areas.<sup>3</sup> Due to necrosis of the surrounding hair (known as shock loss) and of the transplanted donor follicles, most hair restoration surgeries usually require a second procedure.

As discussed, men have many more options than women when it comes to hair loss

treatment; and even so, they are not very cost-effective, can create a burden to their lifestyles, and can lead to complications and troublesome side effects. Both genders would greatly benefit from alternative therapies that would be effective, affordable, convenient and less invasive.

## TREATING ALOPECIA WITH PLATELET-RICH PLASMA

Platelet-Rich Plasma, often abbreviated as PRP, is a concentration of platelets found in human blood that are critical for blood clotting. Platelets are known to play an important role in all healing processes and in the regeneration of cells. Due to these innate restorative properties, PRP is becoming a fast-growing popular tool in surgical procedures to naturally promote quick healing. Studies indicate that substantial amounts of bioactive proteins (growth factors) are released by platelets, which are responsible for regenerating and repairing damaged tissue.<sup>4</sup>

Platelet-Rich Plasma is harvested from a patient's own blood with the help of a centrifuge – a medical device that uses centrifugal forces to separate liquids of different densities, including liquids held in suspension as in the case of blood cells in whole blood. Once PRP is collected, it can then be administered to injured areas with guided ultrasound technology or with the use of a syringe, based on the type of treatment.

Originally developed in the 1970s, and first used mostly in dentistry, physicians have found many applications for PRP, including orthopedics, sports medicine, neurosurgery, ophthalmology, dermatology, and cosmetic surgery.<sup>5,6,7,8</sup> It has also been successfully used in plastic surgery procedures to promote soft tissue recovery and in dermatology when treating active acne, scar revision and wrinkles.<sup>9,10,11,12</sup>



Figure 2: A female patient receiving PRP injections into her scalp

Concerns regarding long-term use of the FDA-cleared hair loss medications minoxidil and finasteride have prompted researchers to look for other modalities. New clinical studies show promising results for treating hair loss with subcutaneous PRP injections.

In numerous studies, <sup>13,14,15,16,17,18,19,20,21,22,23</sup> PRP injections into areas damaged by alopecia resulted in improved hair follicle function and improved follicle function and new hair growth. A significant reduction of hair loss accompanied by an augmentation of hair density was also observed due an

increased proliferation of dermal papilla cells. Additionally, results showed an increase in epidermis thickness, of follicular bulge cells and of small blood vessels around hair follicles, which improved follicle function. These positive results can be attributed to the platelet-derived growth factors present in Platelet-Rich Plasma.

The above successful outcomes were assessed by hair pull tests, macroscopic photos, clinical examinations and the overall satisfaction of patients. One particular study saw a 31% increase of follicular density over a

period of 8 weeks with a total of 4 injections with a volume of 2-3 cm<sup>3</sup> administered every 2 weeks.

It should be noted that there is no consensus for the frequency of PRP injections. The norm seems to indicate that 1-3 month treatment periods stimulate hair growth. To achieve best results, platelet concentration should be four to five times the normal count found

in whole blood. An optimum concentration of platelets for angiogenesis in human endothelial cells should be around 15 lacs/mm<sup>3</sup>.

Treating alopecia with PRP thus appears to be a simple, effective, feasible and natural therapeutic tool for fighting hair loss without any adverse side effects, in both males and females and with high overall patient satisfaction and tolerance. However,

possible contraindications for the procedure include patients with platelet dysfunction syndrome, anti coagulant therapy, and/or blood disorders.<sup>25</sup>

Numerous clinics around the world today offer PRP injections to treat alopecia in both men and women.

## TREATING ALOPECIA WITH LASER PHOTOTHERAPY

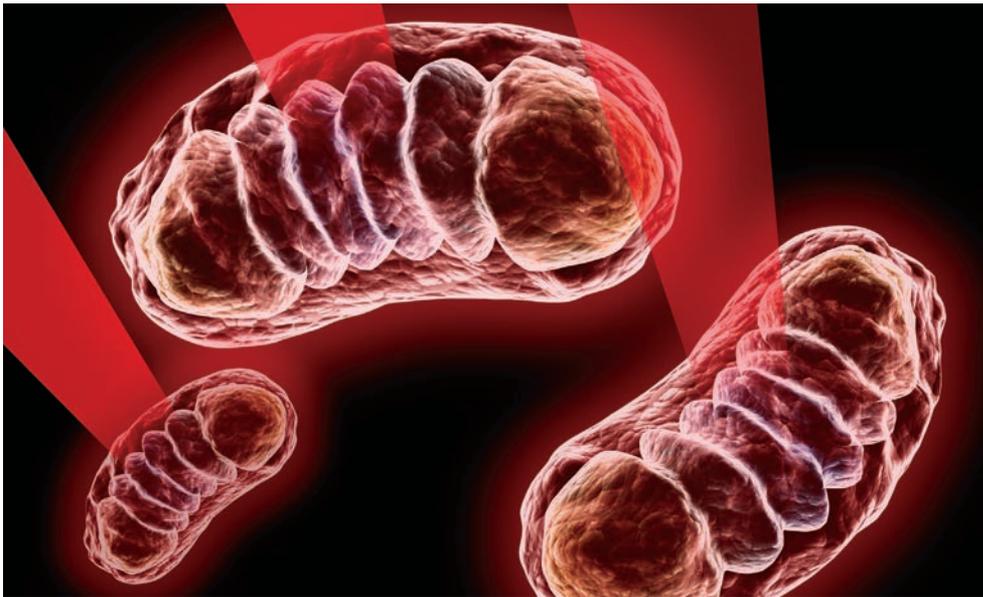


Figure 3: Mitochondria of hair cells absorbing laser energy during LPT treatment

The principles of laser hair therapy rely on the science of Low-Level Laser Therapy (LLLT), which were accidentally discovered in the 1960s by a Hungarian physician named Dr. Endre Mester. While irradiating shaven mice with cold laser light (at energies much lower than hot, surgical lasers), he realized that the fur of the exposed mice was growing back more quickly than the control group of the experiment.<sup>26</sup> Low-Level Laser Therapy (or cold laser therapy) has many applications in medicine other than hair growth. Stimulating human tissue with low energy densities increases the production of adenosine triphosphate (ATP), a nucleotide that acts as the primary source of energy in human cells and is generated by their mitochondria. This induces the release of nitric oxide (NO) into cells and triggers healing. Thus cold lasers accelerate the healing process, increase

microcirculation and reduce inflammation and pain. Since the same cell structure is present throughout the entire human body, cold laser therapy is effective for remedying an impressive abundance of different diseases, such as lumbar disc herniation, gingivitis, nerve injuries and epicondylitis, just to name a few. Included in this long list is cutting edge laser phototherapy (LPT) treatment for hair loss.<sup>27</sup>

Laser Phototherapy is a new, state-of-the-art natural solution to hair loss that can be effective at treating androgenetic alopecia in both genders with no side effects. LPT treatment is available by visiting laser hair clinics or by using more convenient and affordable at home LPT devices. An optimum LPT device should reach the stem cells forming at the base of hair follicles to cause

stimulation. In essence, LPT provides light energy to hair cells affected by DHT and which have been cut off from their arterial blood supply of nutrients. Through a new photonic pathway, these damaged cells can then benefit from a device's revitalizing laser energy.

Since studies indicate that treated hair follicles shift into the growing anagen phase, LPT can also serve as an effective hair loss prevention tool;<sup>29</sup> stronger hair follicles with increased tensile strength can also be added to the long list of LPT benefits.<sup>35</sup>

The applications of LPT are gradually expanding from Eastern and Asian countries, where they are regarded as mainstream, and coming into America. Articles from around the world, written by experts, scientists, and doctors are publishing their clinical studies regarding hair loss conditions, such as androgenetic alopecia, alopecia areata, and chemotherapy-induced hair loss, including the manufacturing of different types of LPT units. Their findings are often published in reputed international journals that focus on the fields of dermatology, cosmetology, hair restoration and plastic surgery.<sup>28,30,31,32,33,34,36,37,38,39,40</sup> Overall, more than 3,000 articles have been published on the treatment of medical conditions with LPT and over 170 double blind studies have been conducted. One particular LPT study on hair loss shows a 35%-39% hair count increase in patients undergoing LPT treatment every other day for 16 weeks.<sup>41</sup>

When selecting an LPT device, a patient, physician, or hair restoration clinic should always exercise caution. There is a precise

therapeutic window for LPT in which hair follicles should be stimulated by light energy. Since human tissue can only absorb specific wavelengths of visible light, LPT devices only emit red light, which ranges from 620 to 690 nm. This happens to dangerously overlap with the absorption wavelength range of hemoglobin, which has an upper limit of 690 nm. In order to avoid cell mutation and damage, which can lead to cancer, it is thus

crucial for an LPT device to emit light at a minimum of 660 nm.

However, CDs and DVDs happen to use 635 and 655 nm lasers, so these are often purchased in bulk overseas by manufacturers for cost-saving purposes. Other LPT manufacturers use Light-Emitting Diodes (LEDs) and attempt to add lenses to fabricate ineffective hair rejuvenation devices that

result in emitting collimated light beams, as opposed to true, powerful, coherent laser light.

The efficacy of an LPT unit relies majorly on several factors without which hair restoration will be unsuccessful.

## THE THERADOME® LH80 PRO

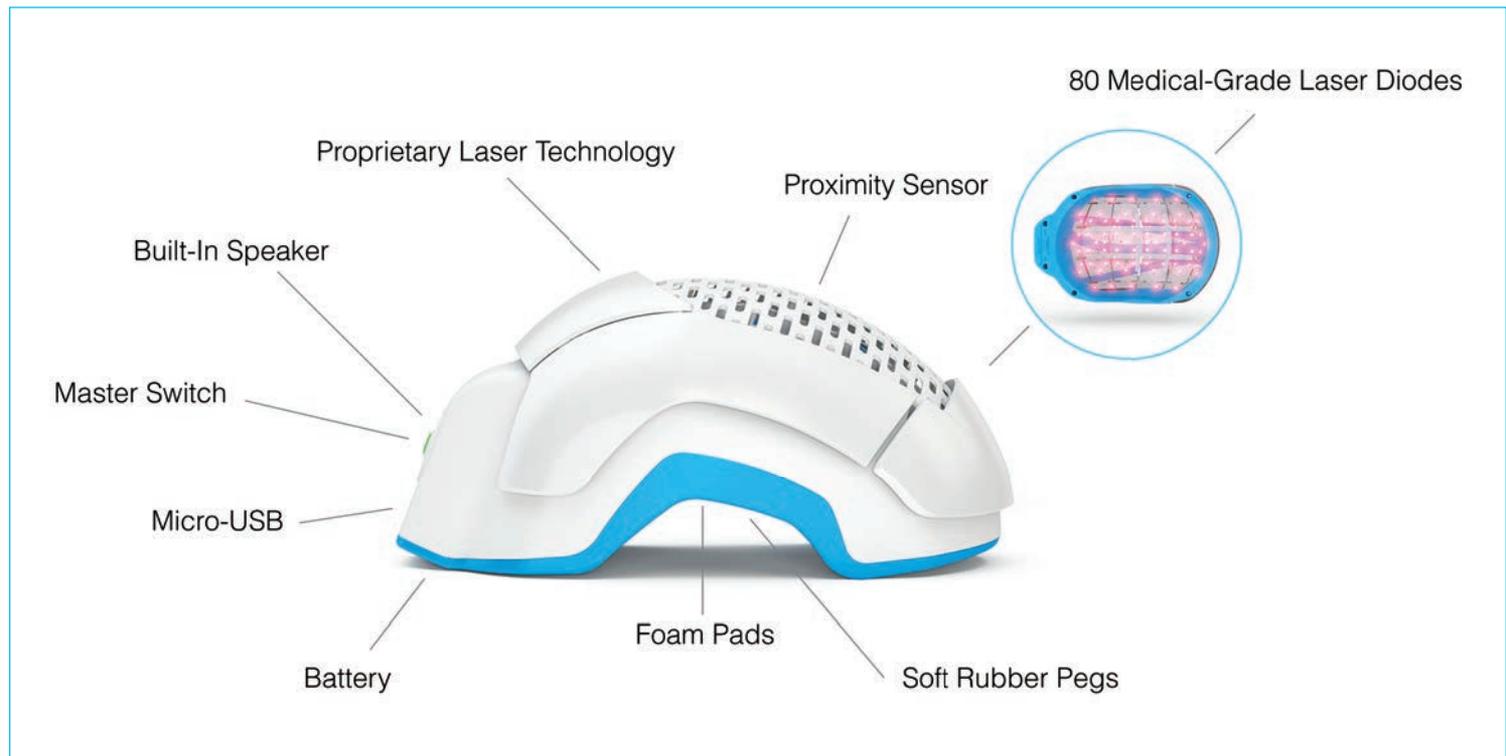


Figure 4: Technological Features of the Theradome® LH80 PRO

The Theradome® LH80 PRO is the most powerful FDA-cleared OTC LPT helmet that can be used in the comfort of a patient's home. Developed by a former NASA scientist and biomedical engineer, the Theradome® LH80 PRO relies solely on science and cutting edge technology to regrow hair; the Theradome® LPT helmet has been proven to be effective for 100% of patients<sup>42</sup> with only 20-minute, twice-a-week sessions. There are four crucial scientific principles involved in its hair restoration capabilities, which together have been clinically proven to minimize shedding, increase hair shaft diameter and promote new hair growth.

By only using powerful laser diodes, the Theradome® LH80 PRO ensures that coherent laser light reaches the base of hair follicles, which are situated at a depth of 3 to 5 mm underneath the scalp. This allows the mitochondria of hair cells to absorb energy, resulting in effective photobiostimulation; the mitochondria then produce energy which can be used by hair follicles to grow into strong, terminal hairs. Any LPT device that fails to reach the base of hair follicles will be ineffective at treating hair loss.

The Theradome® LH80 PRO uses 80 proprietary lasers at a  $678 \pm 8$  nm wavelength specifically

developed for hair rejuvenation. Treatment sessions are automated, conducted with voice-over technology and timed by a high-tech microchip processor to each last twenty minutes. Twenty minutes allow for an optimal dosage of energy to be delivered to the base of hair follicles, following guidelines set by the Swedish Laser Medical Society.<sup>43</sup> Unlike laser combs, which target different areas of the scalp with inefficient time during treatment, the cordless, mobile and hands-free Theradome® helmet offers full-scalp coverage and clinical strength results with an affordability and a convenience that cannot be trumped by any other LPT device.



## HAIR RESTORATION SURGERY WITH NATURAL INTEGRATIVE SOLUTIONS

As mentioned earlier, hair restoration surgery is often traumatic for the scalp and can lead to a significant loss of hair during the following year; however, integrating natural solutions such as PRP and LPT in conjunction with hair restoration surgery can greatly increase its outcome.

Clinical studies have examined the use of PRP in conjunction with hair transplants. Due to the healing, restorative properties of

PRP, it was noted that areas implanted with PRP-enriched grafts yielded a larger follicular density post-surgery.<sup>44</sup> One particular study yielded a wide range of results from a mere 3% of increased follicular density all the way up to 52%.<sup>45</sup>

Using an optimal LPT device, such as the Theradome® LH80 PRO, before and after a hair transplant can also result in stronger hair follicles with a higher probability of

surviving the operation. LPT induces the release of nitric oxide, which improves blood flow to hair roots and increases the reduction rate of swelling, redness and inflammation after a procedure.<sup>46,47,48</sup>

Both PRP and LPT allow a significant amount of extra hair grafts to survive the surgery and grow into healthy, terminal hairs, improving the satisfaction of patients with a low cost-to-benefit ratio.



Figure 5: A physician recommending a hair transplant patient the use of the Theradome® LH80 PRO

## PRP AND LPT USED IN COMBINATION

Clinical studies are starting to investigate the effects of LPT performed in conjunction with PRP. So far results show a positive, synergic relationship between both therapies when treating various medical problems, such as calcaneal tendon ruptures.<sup>49,50</sup> Other studies are focused on evaluating skin rejuvenation with PRP in conjunction with certain types of laser therapy.<sup>51</sup>

A benefit of using PRP in combination with LPT is that LPT is proven to reduce inflammation, which will surely be triggered after a receiving a series of PRP injections into the scalp. Professional clinics that treat hair growth with PRP injections are beginning to offer them along with LPT to optimize hair restoration treatment. National Hair Centers, the largest hair loss facility in the

U.S., is quoted as saying that although PRP is effective as a stand-alone treatment, research indicates that its efficacy can be increased with other modalities, such as laser light therapy.

Peer-reviewed medical journals have proven that PRP and LPT benefit hair restoration in the following ways:



Table 1: Proven Clinical Benefits of PRP and LPT on Hair

Benefit	PRP	LPT
Improves hair growth	✓	✓
Decreases hair loss	✓	✓
Increases hair density	✓	✓
Increases epidermis thickness	✓	✓
Few contraindications	✓	✓
Increases count of hair follicles	✓	✓
Increases count of follicular bulge cells	✓	✓
Increases blood vessels around hair follicles	✓	✓
Improves hair follicle function	✓	✓
Promotes fast healing	✓	✓
Can be used with medication	✓	✓
Decreases hair dystrophy	✓	✓
No harmful side effects	✓	✓
High patient tolerance for procedure	✓	✓
Natural and safe	✓	✓
Boosts effects of hair transplants	✓	✓
Cost-effective		✓
At home treatment		✓
Decreases inflammation		✓
Increases hair shaft diameter		✓
Prevents hair loss		✓

Platelet-Rich Plasma injections and Laser Phototherapy are both clinically effective, powerful tools for fighting hair loss; they are proven to increase hair density, minimize shedding and promote new hair growth by using natural medical alternatives that cause no harm to human health. They can be used in conjunction with popular hair transplants

and mainstream hair loss medication. Degrees of success using a combination of these therapies will vary with treatment length and the exact mechanism of action followed, such as LPT session frequency and the number of PRP injections during a course of treatment. By combining the healing, regenerative capabilities of PRP with the

photobiostimulation of hair follicles achieved by laser light, this optimum “PRP-LPT hair restoration treatment” is well on its way to becoming the most powerful and effective tool today for fighting hair loss.

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