



## HAIR TRANSPLANTATION

Hair transplanting for Male Pattern Baldness (MPB) began in 1959 with the publication of Norman Orentreich's seminal article on "punch grafting". Initially, it consisted of using a small trephine that was 4 mm in diameter to punch out grafts from areas of the persisting "rim" of hair, peripheral to the areas of MPB, and to insert those grafts into small holes made with the same trephine in the alopecic "recipient" area. Although punch grafting was successful in growing hair in alopecic areas, there were many problems associated with the technique. The most important one was that growth was pluggy-looking until any given area was treated multiple times, and even then, there were very few surgeons who were able to produce a natural-looking result. As a consequence, over the years, a trend towards smaller grafts developed, which minimized the problem of noticeable plugginess; nevertheless, it was not until the early 1990s, when Bob Limmer first described Follicular Unit Transplanting (FUT), that the results of hair transplanting became truly natural looking. Hair restoration surgeons now use FUT almost exclusively.

For those unfamiliar with FUT, it is based on the fact that hair exits the scalp for the most part in small groups of two and three hairs. Approximately 15% to 20% grow as single hairs and another 15 to 20% grow in groups of four or five hairs. These small groups are referred to as follicular groups, micrografts, or follicular units (FU). Limmer's concept was to excise a strip of hair-bearing skin from the "permanent" rim hair, to dissect out microscopically the individual FU from the strip, discarding the alopecic skin between the FU, and to insert the FU into small incisions made with ordinary hypodermic needles in the recipient area; the hair was thereby transferred in naturally occurring groups from one area to the other. For many hair restoration surgeons, initially, the two most important drawbacks of FUT were:

- Only low densities of hair could be produced per session
- Because of the small size of the grafts, they were also more susceptible to lethal injury

Fortunately, over a period of 10 to 15 years, those problems were gradually overcome. For example, Table 1 demonstrates the percentage of hair growth at different FU densities per cm<sup>2</sup> in a series of studies carried out from 2000 to 2005 by the same FUT proponent and principal investigator. During that period of time, hair survival of the now commonly used 30 FU/cm<sup>2</sup> increased from an unacceptable 72.5% to 98% because of a variety of technique changes.

Year	10 FU/cm <sup>2</sup>	20 FU/cm <sup>2</sup>	30 FU/cm <sup>2</sup>	40 FU/cm <sup>2</sup>	50 FU/cm <sup>2</sup>
2000*	97.5%	92.5%	72.5%	78.10%	---
2003**	---	95.0%	76.7%	70.0%	82.0%
2005***	---	95.0%	98.0%	90.0%	84.0%

\*Leavitt, M., Perez-Meza, D., Barusco, and M. Research Symposium 1999-2000: Clinical Update on Research Studies (Mayer, M) reported at the World Hair Restoration Society/International Society of Hair restoration Surgery Live Surgery Workshop, Int. J. Cosm. Surg., and Aesth. Dermatol 2001; 3:135-138.

\*\*Mayer and Keene's Study Comparing FU Growth with Different Planting Densities, presented at the 2003 annual meeting of the International Society of Hair Restoration Surgeons.

\*\*\*Mayer, Keene, Perez 2004 Study Hair Transplant Orlando Workshop, presented at the 13th Annual Meeting of the International Society of Hair Restoration Surgery, Sydney Australia, August 2005.

In order to compensate for the low hair densities associated with early FUT, at the turn of the century a new trend also began in which more grafts were transplanted per session and higher FU densities were used. If enough grafts are planted densely enough, the results still look good even if a sizeable percentage of the hairs do not grow. By approximately 2004-2005, one could expect acceptable hair survival rates, especially when FUT was performed, with up to 2500 FU per session at 30 to 35 FU/cm<sup>2</sup> densities. Very few clinics are able to do larger sessions and a higher FU density and still obtain acceptable hair survival rates. There are also other concerns about “dense packing” of more than 35 to 40 FU/cm<sup>2</sup> and “mega sessions” of more than 2500 to 3500 FU per session. The most important of these concerns are:

- One can achieve very acceptable hair density with approximately 30 FU/cm<sup>2</sup> if hair survival rates are good and there is an appropriate distribution of one, two, three, and four hair FUs in the recipient area. This is particularly so if there is still some persisting hair in the recipient area into which transplanted hair is added to produce quite dense-looking results. Thus, there is no need, in most patients, to use higher FU densities to create more density, especially because,
- It is wise to save as many of the limited number of available “permanent” FU for the unknown future need. Thus, it seems most sensible to not be too greedy about hair density—especially if a patient is young and the future donor/recipient area ratio is therefore less predictable. Moreover, as noted below, a 1500-2500 FU session is nearly always adequate to give good coverage of any one of the frontal, mid-scalp and vertex areas.
- Hair survival in mega sessions may also be reduced because of the higher total length of scalp incisions and because the grafts are “out of body” longer when very large sessions are done. Why “walk on thin ice” re: hair survival to save one session?
- The wider donor strips necessary to yield higher numbers of FU/session are also more likely to produce unacceptable donor area scar widths.

Currently, accepted FUT practice is to excise a strip from the middle of the densest hair in the persisting rim and, as indicated above, carefully dissect out the FU with the aid of a 6X to 10X stereomicroscope. In any subsequent session(s) the preceding scar is excised within the new donor strip so that there is never more than one scar lying well-concealed in the center of the densest hair of the donor area. This region of the scalp not only produces the most grafts per session, but more importantly is the least likely to become affected by MPB as it progresses from both the superior and inferior borders of the rim hair.

Incisions are generally made in the recipient area with either 18-21g solid or hollow hypodermic needles or specially prepared small blades that are .6 mm to 1.1 mm wide. Incisions are always made at the same angle and direction as the existing or original hair in the area.

The days of plugginess are gone; the days of multiple rows of scars in the donor area are gone. In addition, the minimally invasive nature of FUT allows transplanting into areas of early MPB without injuring existing hair, as well as the treatment of many women with acceptable donor hair reserves who have Female Pattern Hair Loss (FPHL) that is refractory to medical treatment. Transplanting hair into scars secondary to injury, disease, or cosmetic surgery, can also be expected to be successful.

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