

Follicular Unit Plain Speak

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First there were FUs, the acronym for follicular units – the natural occurring groups of 1-4 hairs present in the human scalp. Next there were FU Bundles and FU Families, then FU Coupling and FU Pairing, and now DFUs and even MFUs. And of course we can't forget FUE and FIT. But what do all these terms mean? And are they all really needed?

Background

The follicular unit was first defined by Headington in 1984. He described an FU as consisting of “two to four terminal follicles, and one, or rarely two, vellus follicles, the associated sebaceous lobules, and the insertions of the arrector pili muscles... a single follicular unit is circumscribed by the investing stroma, the perifolliculum.” He went on to say that “the normal density of follicular units is about one per square millimeter.” (1)

In the first paper on follicular unit hair transplantation, published in 1995 (2), Bernstein and Rassman used this definition of Headington. Limmer, who had been referring to these naturally occurring groups as “stereoscopically assisted micrografts”(3) and Seager, who called them “follicular bundles” (4) soon began to use the term follicular unit as well.

Limmer's technique of using stereo-microscopic dissection, the backbone of follicular unit transplantation, required expensive equipment, special technical skills and was very labor-intensive. Because of this and because many doctors at that time did not grasp the importance of microscopic dissection, or of even using follicular units in the hair transplant, other, more easily to perform procedures were being performed.

Surprisingly, due to the increasing power of the internet, follicular unit transplantation became a buzz word in the hair loss chat groups more quickly than it was accepted by their doctors. (5) This put significant pressure on hair restoration surgeons to learn about the new procedure and adopt its technology. Although many quickly adapted their practices to perform FUT, others merely changed their marketing – some advertising that they performed follicular unit transplantation, even before buying microscopes.

Partly as a response to the misrepresentation, but mainly to further the science, in 1998, a group of 21 hair transplant surgeons, that included Bob Bernstein, Bill Rassman, David Seager, Ron Shapiro, Jerry Cooley, O'Tar Norwood, Dow Stough, Mike Beehner, Jim Arnold, Bobby Limmer, Marc Avram, Bob McClellan, Paul Rose, Guillermo Blugerman, Marcelo Gandelman, Paul Cotterill, Bob Haber, Roy Jones, Jim Vogel, Ronald Moy and Walter Unger joined forces to write “Standardizing the classification and description of follicular unit transplantation and mini-micrografting techniques.” (6)

In their words, the purpose of the publication was to “provide hair restoration surgeons with guidelines to... facilitate communication among physicians, stimulate research,

increase the accuracy by which hair transplant procedures can be represented to our patients and, ultimately, improve the quality of the care that we offer them.

In the paper, the following definitions were agreed upon:

Follicular Unit The follicular unit of the adult human scalp is a naturally occurring entity that consists of 1-4, and occasionally 5, terminal hair follicles, 1, or rarely 2, vellus follicles, the associated sebaceous lobules, the insertions of the arrector pili muscles, its neural and vascular plexuses, and the fine adventitial collagen which surrounds, and defines, the unit (the perifolliculum).

Follicular Unit Graft A graft that is obtained by dissecting out the individual, naturally occurring follicular unit. This is also referred to as a **follicular unit implant**, a term which implies that (unlike most grafts) the ratio of hair/skin is greater in the follicular unit implant than in the original donor area, since some of the non-hair bearing tissue has been trimmed away in the dissection.

Micrograft A 1-2 hair graft. It may consist of naturally occurring one and two-hair follicular units or be derived from larger units which are subdivided.

Minigraft A 3-6 hair graft derived from either a single follicular unit, multiple follicular units, or multiple, partial follicular units. As suggested by Walter Unger, this may be further classified into small minigrafts of 3-4 hairs, and large minigrafts of 5-6 hairs.

Slit-graft A 3-6 hair graft derived from either multiple follicular units, or multiple, partial follicular units where the dissection technique specifically attempts to produce a linear arrangement of follicles, or follicular units. This may be further classified into small slit-grafts of 3-4 hairs, and large slit-grafts of 5-6 hairs.

Follicular Unit Dissection A technique in which naturally occurring, individual follicular units are dissected from donor tissue that has been removed as a single strip (rather than with a multi-bladed knife of more than two blades) in order to keep the follicular units intact. Some non-hair bearing tissue is removed to decrease the overall bulk of the implant. Stereo-microscopic dissection is required.

Mini-Micrografts or Slit-grafts Cut to Size A dissection technique whereby the donor strip is subdivided to produce grafts of specific sizes as defined by the number of hairs they contain and/or the size of tissue that will fit into a specific recipient site. The removal of excess skin is not required. The dissection can be performed with or without magnification and the donor tissue may be removed as a single strip or with a multi-bladed knife.

Follicular Unit Transplantation A method of hair restoration surgery where hair is transplanted exclusively in its naturally occurring, individual follicular units. Single strip harvesting and stereo-microscopic dissection are required. The grafts must be placed into small recipient incisions.

Mini-Micrografting A method of hair transplantation which uses grafts containing 1-6 hairs, in groups that do not necessarily correspond to the naturally occurring follicular units. The recipient sites may be either incisions, excisions (tissue removed), or both.

Two Terminology Extremes: Science vs. Marketing

Soon after the publication, Seager suggested to add another term, the “Follicular Family Unit.” (7) To paraphrase Dr. Seager:

When dissecting follicular units, it is sometimes unclear as to which unit a seemingly “stray” hair belongs. In other words, occasionally it is not completely obvious where one follicular unit ends, and an adjacent one begins. When one is specifically trying to create increased density, a stray hair would be included with an (unusually) close neighboring, larger follicular unit, containing possibly three hairs. This technique would create a four-haired unit, when there may have been no four-haired units there at all. One must find two separate units that look close enough to almost “belong together.” If the two contiguous units are chosen correctly, the resulting unit can be very difficult, sometimes impossible, to distinguish from a naturally occurring follicular unit.

The key to success in this endeavor is the concept of the “Follicular Family Unit.” If any (“non-family”) two-follicular units are randomly doubled up, the resulting graft will be more the size of a minigraft, rather than a micrograft. It would need a larger recipient site, which would preclude dense packing because of both technical planting limitations and impairment of scalp vasculature. If, on the other hand, despite their larger size, they are forced into minute micrograft-sized recipient sites; they would be normalized during attempts at insertion.

Although the term “follicular family unit” was introduced to account for the variability in the anatomy of the follicular unit and to take advantage of these variations in the surgery, other terms were not necessarily based on purely scientific considerations.

A blatant misrepresentation of the term follicular unit was “Follicular Unit Coupling – The Role of Slot Grafting in Hair Transplantation.” (8) In this case, the author attached the new term to the original slot grafting method. This was a technique that used slit grafts harvested with a multi-bladed knife and then cut into thin pieces and placed into large slots of skin removed with a rectangular punch. The term was new and a marketing campaign followed, but the technique was the same as the original one, with no attempt whatsoever to use, or preserve, follicular units.

Between these extremes, is the ongoing struggle to describe what we do in a clear, precise way – in the face of ever evolving concepts and techniques, and an ever increasing number of terms. The issue at hand is to be able to distinguish which terms are adding to the science and which are just blurring it.

Making Sense of the FU Salad

From the opening list of acronyms, all used at the recent ISHRS meeting, it seems that we again need to step back and examine the new terms, to see which represent distinct ideas or techniques and which are, perhaps, redundant. What follows is a first-pass attempt at sorting out the six terms that, in our opinion, are the most confusing, and have the most overlap. They come in two groups: The first is FU Coupling, FU Pairing, Double FUs (DFUs) and Multiple FUs (MFUs). The second group includes FUE and FIT.

With respect to the first group, we think that there are two distinct situations that doctor’s are trying to communicate with these terms. The first is the technique of placing two separately dissected follicular unit grafts into one recipient site. This is distinct from the

commonly used term “Doubling-up” which many doctors have used to refer to placing two micrografts in one site. Our suggestion is to use the term FU Pairing to refer to the technique of placing two separately isolated follicular units into one recipient site. We suggest discarding the term FU Coupling as it has been incorrectly associated with slit grafting procedures in past literature and its use will be confusing.

The second situation is when a doctor places two (or more) follicular units, that have not been separated in the dissection, into one hole. In our view, this is clearly not follicular unit transplantation. The reason is that a main advantage of FUT was that in isolating FUs one would remove some of the non-hair bearing skin between FUs, to decrease the bulk of the graft. This, in turn, would allow the doctor to use a smaller recipient site, create less wounding, allow for safely transplanting a larger number of grafts in a single session etc, etc. Using multiple non-dissected follicular units, in our view, creates a larger wound and accomplishes none of these goals.

We are not suggesting that doctors should abandon this technique. Some excellent surgeons incorporate these grafts into their procedures. We are merely suggesting that it not be called FUT. Well then what should one call them? Our answer is to call them what they have always been called, namely micro-grafts, mini-grafts and slit grafts. If one argues that they are now different due to the use of the stereo-microscope, then we agree. In this case, the grafts should be called microscopically dissected micro-grafts, mini-grafts and slit grafts, to communicate the fact that follicular transection may be avoided. But these are still not follicular unit grafts any more than a pedicle flap is follicular unit transplantation. To avoid confusion, we suggest eliminating the terms DFUs and MFUs.

So what should we call eyebrow transplants? According to the technique used by most hair restoration surgeons, where they divide up the donor strip into single hairs, it should be called one-hair micrografting. If one uses the contra-lateral eyebrow for donor hair, then this can truly be referred to as FUT.

FUE and FIT

The increased transection rate of FUE harvesting techniques that use a sharp punch (relative to single-strip harvesting and stereomicroscopic dissection) had some doctors immediately question whether this procedure should be classified as a type of follicular unit transplantation. (9) With the introduction of the blunt dissection technique by Harris, that significantly decreased damage to follicles and increased the preservation of follicular units, the argument for classifying FUE as a type of FUT is considerably stronger – but certainly not bullet-proof – since in some cases significant transection remains and in others the entire follicular unit cannot be captured. (10)

The Follicular Isolation Technique (FIT), is a term used by Cole and Rose that refers to an FUE technique that uses a punch with a “stop” to limit the depth of penetration. Although these authors and other physicians question the need for a depth-stop in the extraction technique, FIT is possibly a better term than FUE if the entire unit is not being captured. In our view, when the goal is just to extract hair, rather than intact follicular units, the term FIT is preferable.

Conclusion

In sum, these authors suggest that the following four terms and definitions be added to the original classification.

Follicular Family Unit Two closely contiguous follicular units that are dissected as one graft, so that they can fit into the same size recipient site as the largest naturally occurring follicular unit normally used in the procedure.

FU Pairing The technique of placing two separately isolated follicular units into one recipient site.

FUE Direct donor extraction procedures where the intent is to extract the entire follicular unit. If a depth stop is used, this should be indicated.

FIT Direct extraction procedures where the intent is to extract individual or multiple hairs smaller than the entire follicular unit. (In other words, the direct extraction of micro-grafts.) If a depth stop is used, this should be indicated.

Micro-grafts, mini-grafts and slit grafts that have been dissected microscopically to prevent follicular transection should be referred to just that, namely: microscopically dissected micro-grafts, mini-grafts and slit grafts. These authors do not feel that these procedures should be classified as a type of follicular unit transplantation. We also suggest that the terms FU Coupling, DFUs and MFUs are confusing and should be abandoned.

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