Good News and Bad News in Hair Restoration Surgery

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Introduction:

The purpose of this article is to present accurate, unvarnished truths and consequences of Internet information / misinformation on hair transplanting.

The Good News

The Recipient Area

Wonderful results are possible with modern follicular unit transplanting (FUT). FUT in men, consisting of 1500 to 2500 follicular units (FU) in each of the frontal and midscalp areas of the recipient areas at FU density of 30 FU/cm^2 (or sometimes less), and including evolving areas of future hair loss as shown in **Figures 1, 2, 3**, can be expected to consistently produce natural-looking and cosmetically very acceptable hair density for a large proportion of patients with male pattern baldness (MPB).[1] At those FU densities hair survival can also be expected to be consistently 95% or more since approximately 2004 (**Table 1**). Moreover, treatment of the frontal and midscalp areas as far posteriorly as the vertex transition zone produces excellent cosmesis from both frontal and lateral views. This can usually be accomplished with two (or three) sessions in most patients with Type VI (or Type VII) MPB (**Fig. 3**). As alluded to above, lower FU densities can also produce cosmetically very acceptable results for those patients who prefer a less obvious, more subtle change from alopecic or nearly alopecic areas to hair-bearing ones, because FUT looks natural at any FU density (**Fig. 4**).

Furthermore, if time, an inadequate graft supply, or limited finances are issues, the treatment of just the midscalp area can increase the hair density in that area while at the same time creating the *illusion* of more frontal and even vertex hair in some patients[1] (**Fig. 5**).

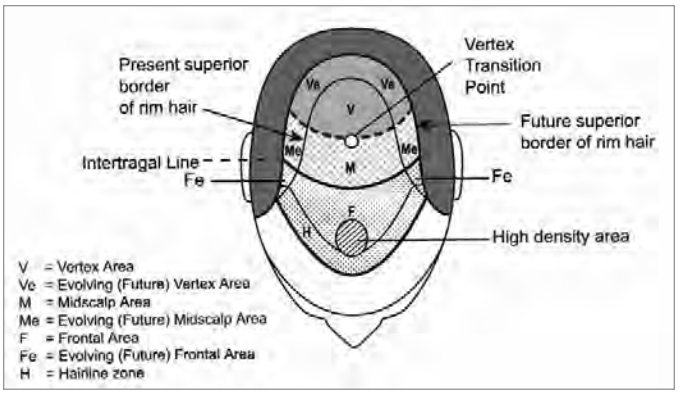

Figure 1 Conceptually, an area of MPB should be thought of as consisting of four areas: frontal, mid-scalp and vertex areas, as well as future areas of evolvement designated by a lower case e, following upper case F for the frontal area, upper case M for the mid-scalp area and upper case V for the vertex area.

Figure 2 (a) Patient A before transplanting. (b) Patient A after one FUT session to the frontal area at a density of 30 FU/cm2. (c) Patient B before transplanting. (d) Patient B after one FUT session to the midscalp at a density of 25-30 FU/cm2. (e) Patient C before transplanting. (f) After one FUT session to each of the frontal and midscalp areas at a density of 25-30 FU/cm2.

As will be discussed below, in the opinion of a large majority of experienced hair restoration surgeons (HRS) 40% to 50% or more women with FPHL can also benefit from FUT (**Fig. 6**). While it is generally agreed that a large majority of women with FPHL have, or will have, less satisfactory donor/recipient area ratios than most men, on the other hand, (a) women have more hairstyling options than men, (b) long hair optimizes hair coverage for any given number of hairs, (c) women very rarely lose all of the hair in an affected area. Therefore the potential cosmetic benefit from any given number of transplanted hairs or FU/cm^2 into any area, is greater than in men (both in the short-term and long-term). There are many instances in which a single session of 800 to 1200 FU at 20 to 25 FU/cm^2, in a cosmetically strategic area, produces a substantial improvement in appearance and a happy-to-thrilled patient (**Fig. 6**). Despite the foregoing, there still remains a great deal of debate amongst HRS as to what proportion of women has a long-term

Figure 3 Transplanting only as far posteriorly as the vertex transition zone produces excellent cosmesis from both frontal and lateral views. Upper photos: Type VI MPB patient transplanted to vertex transition zone with 2 sessions totaling 2808 FU. Lower photos: Type VII patient before and after 2 FUT sessions. Middle picture is intraoperative photo of 3rd session. Two photos farthest right, 1 year after the 3rd session (total of 5107 FU). Both were treated with 25 to 30 FU/cm2.

donor area, satisfactory enough to produce 800 to 1200 FU. Twenty-eight highly experienced and respected HRS were asked that question. The results are shown in **Table 2** and are discussed in more detail in a recently published article.[2] In 20 women, with worse than average donor areas but who the author deemed acceptable hair transplanting candidates, a satisfactory donor area was found at approximately the level of and/or inferior to the occipital protuberance[2] (**Fig. 7**). This area would virtually never be assessed during consultations with magnification for "miniaturization" if the same areas used for male assessment was studied. Thus the patients would be incorrectly rejected. In brief, hair transplanting into hair-bearing areas, whether in men with relatively early MPB or, as indicated above, in many women, can consistently produce excellent results.

Figure 4 (a) Before transplanting. (b) 1 year after transplanting at 15 FU/cm2.

The Donor Area

In the donor area, strip harvesting by experienced and skilled HRS can be expected to produce 1500 to 2500 or more FU per session and while leaving only a single easily camouflageable scar, regardless of the number of sessions carried out (**Fig. 8**). The strip is always excised from the densest hair-bearing fringe area, always includes any scar from a prior session or sessions and is only as wide as can be closed with minimal closing tension.[3] In the minority of patients who for any reason get scars that are wider than usual, if the scar prevents them from wearing their hair as short as they would like to, follicular unit extraction (FUE)[4], in which FU are inserted into the scar (**Fig. 9**) or a "trichophytic closure" [5] (**Fig. 10**) can be used to improve it considerably and allow for shorter hairstyles to be worn.

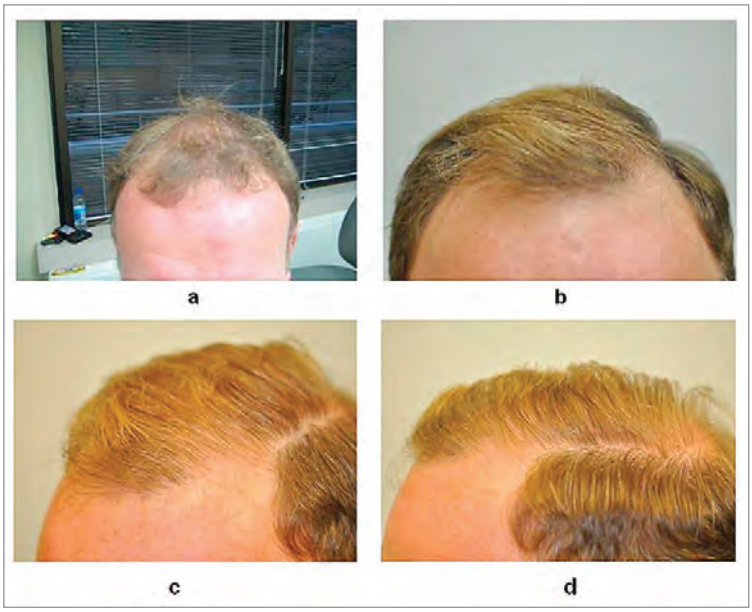

Figure 5 (a) Frontal view "before" transplanting. (b) 11 months after transplanting only in the midscalp, but indirectly creating the illusion of increased frontal hair density. (c) Antero-lateral view 11 months after transplanting only in the midscalp. (d) Lateral view 11 months after only midscalp transplanting.

How many grafts are available in men with varying severities of MPB? I received a reply from 40 HRS experts who were asked the following question: "Keeping in mind that over the years, the hairs closest to the superior, inferior and anterior borders of the fringe will be lost, how many FU **containing very likely permanent hairs** can be harvested from: (a) a 30-year-old patient who you believe is destined to develop Type V MPB and has: (1) higher than average; (2) average hair density; (3) less than average hair density. (b) the same question but for a patient you believe is destined to evolve to Type VI MPB."

Their answers are shown in **Table 3**. These numbers are worthwhile keeping in mind by anybody carrying out or undergoing hair restoration surgery. Acceptable donor tissue is always limited, so one must therefore be cautious about how many grafts are used in areas being transplanted and how many should be left in reserve for future needs.

For example, it has been estimated that the hairline zone is approximately 30 cm/^{2}, the frontal-third of a patient with Types V to VI MPB is approximately 70 cm/^{2}, the frontal-half of the area of MPB is approximately 100 cm/^{2}, the frontal two-thirds approximately 130 cm/^{2}, and the full area of MPB approximately 230 cm/^{2}.[6] Other practitioners have estimated larger total areas of alopecia in Type VI MPB. Yet, even if the frontal-third of an area of MPB is only 100 cm/^{2} and it were proposed to treat that area with an average density of 60 FU/cm^2, 6000 grafts would be required to accomplish that. Reviewing **Table 3**, one can see that virtually all of the grafts in a patient who was destined to develop Type V MPB would have been used to treat only a small portion of the eventually alopecic area and if he were destined to develop Type VI MPB, not even the frontal-third of the area of MPB could be transplanted. Yet, as will be discussed below, on the Internet "dense packing" of 60, 80, 100 *and more* FU/cm2 continues to be touted as one of the latest and best options for young men who want high hair density results! Which leads us to…..

The Bad News

Virtually everybody under the age of 40 years unfortunately now often begins their search for a medical specialist not by asking their family doctor, or with regard to hair transplanting their dermatologist, but rather with a Google search. The result is that too many HRS (and other cosmetic surgeons) engage in an on-line promotional competition with their colleagues. Several hair transplanting information sites, run by non-physicians, attempt to do some of the screening for patients and present lists of "approved practitioners" for the public to consider. While those physicians on the list are nearly always technically good, some of them are more commercially aggressive than ideal. Furthermore, nearly all of the patients I have seen in consultation and who have previously reviewed the websites of these

organizations and their member doctors, are unaware that those doctors are paying substantial fees to be on the lists, while many excellent practitioners are not listed only because they are not willing to do likewise, or be judged by laymen site owners. In any case, the result is that there is a tendency for some of the listed doctors to offer patients what they *want* rather than what they *should want*, given the uncertainty of the likely ultimate severity of MPB and the limitations of their donor hair supply. This currently often manifests itself in the form of overly aggressive hairlines, "dense packing" of FU, as discussed earlier, and a new type of donor area harvesting also referred to earlier—"FUE". Each of these are discussed below and have potential negative consequences that are more often than not ignored by some of their proponents who are more interested in luring patients to their surgical suites than to giving them full disclosure of their pros and cons.

Figure 6 (a) A 52-year-old female patient before hair transplanting in a frontal midline area with embarrassingly low hair density. (b) 7 years after a hair transplant consisting of 843 FU and 113 double FU (a total of 1069 FU). The patient was being seen for possible transplanting posterior to the first recipient area. (c) A photo taken at the same time as (b), with the hair combed back for critical evaluation. A little hair placed properly and with good hair survival goes a long way cosmetically. The fear of relatively soon loss of transplanted hair is also misplaced if the donor area has been appropriately chosen.

Overly Aggressive Hairlines

The patient shown in **Fig. 11** was a young man who was undergoing hair transplanting. He had originally wanted transplanting up to the most anterior-temporal and frontal hairlines ourlined in that photo. He had seen websites in which that sort of objective was presented as being a reasonable one for young men fighting their receding hairline. The more superior hairline was the one I advised him to accept. The area between the more anterior hairline and the one that I had chosen would have required "dense packing" of approximately 4000 FU according to the website that this patient consulted. After examining him, there was little doubt in my mind that he would eventually (and probably soon) evolve to a Type VI or worse MPB. As noted in Table 3, it is likely that this man will ultimately on average, only have approximately 5393 FU available over his lifetime. If he had gone to the doctor who offered him the lower hairline, he would have ended up with a very dense frontal hairline zone which he would have been very happy with for the time being; but eventually he would have had an extraordinarily large area of alopecia posterior to that. The result would have been a grossly unnatural appearance. Many doctors on Internet sites suggest the lower hairline or one similar to it because this is what the patient *wants* rather than what he *should want*.

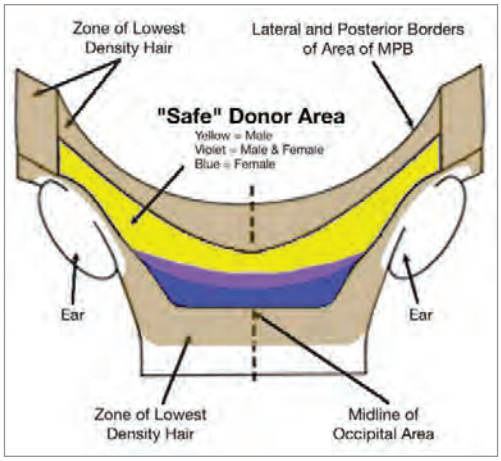

Figure 7 A schematic of the "Safe" Donor Area: The violet area represents the acceptable donor area for male and female patients; the yellow area represents accepted donor area for males only; and the blue area represents the accepted donor area for females only.

"Dense Packing"

As alluded to above, young patients quite frequently would also like to have their hair density restored to its original state. The transplanting of 50 to 100 and more FU per $cm/^2$ are sometimes recommended to achieve those goals. I have already explained

I have already explained why this is a very uneconomical use of a limited number of FU, but in addition I have seen the medical records of several men who have been operated on by other physicians recommending the same course, and whose HRS did that by using only 1-hair grafts—nearly all of which were obtained by dissecting naturally occurring multi-hair FU into only single hair grafts. No more hair was transplanted into the area than might have been accomplished by using one-half to one-third of the FU density but leaving the original FU intact! The patients were also paying per graft and their hairs were being endangered by unnecessary handling, possibly leading to lower hair survival rates.

Suffice it to say, with regard to both hairline design and "dense packing", patients should be advised that the more grafts they use in one area, the fewer they have left for other areas and the younger they are, the more cautious they should be with both parameters rather than the reverse. Some younger patients will still prefer "dense packing" and are also suitable for dense packing (**Fig. 12a**). Nevertheless, 30 FU/cm^2 will produce excellent cosmesis and good density in nearly all patients (**Fig. 12b**).

Follicular Unit Extraction (FUE)

Any discussion on ideal donor area hair harvesting technique should begin with two imperatives being recognized: (a) the technique should result in the largest number of hairs that can ultimately be obtained without donor area scarring being noticeable, both short-term and long-term, as the fringe hair gets narrower and narrower, as well as sparser and sparser with the passage of time. (b) Inherent in the preceding and just as importantly, the hairs that are harvested should be obtained from areas that are the most likely to contain those hairs that are the most likely to persist for the lifetime of the patient. (Recall that transplanted hair will

only last as long as it would have been in its original site.) As one ages, some of the hairs from throughout the fringe will be lost. However, the area of the fringe with the largest majority of hairs that are most likely to be permanent is the area with the densest hair, which by its density is in fact declaring its greater than average resistance to the balding process.

Figure 8 (a) The donor scar in a large majority of patients will typically be no wider than that shown in this photo. (b) This photo was taken at the same time as that shown in (a) but the hair has been combed as normally worn. More than 90% of our patients have scars similar to that shown in (a) and can wear their hair as short as in (b) without the scar being noticeable.

There are two methods of obtaining hair for transplanting into areas of Male Pattern Baldness (MPB) and Female Pattern Hair Loss (FPHL): Strip harvesting and FUE. In strip harvesting a strip is excised from the donor area and FU are microscopically dissected out of it. In FUE, a small trephine is used to directly punch out the individual FU from the scalp, either manually or with the aid of a power-driven device, (for example, "Neograft"). There are advantages and disadvantages in both techniques that can be reviewed elsewhere because of space constraints,[4] but the permanence of the hair in the grafts obtained is critical and will therefore be discussed here:

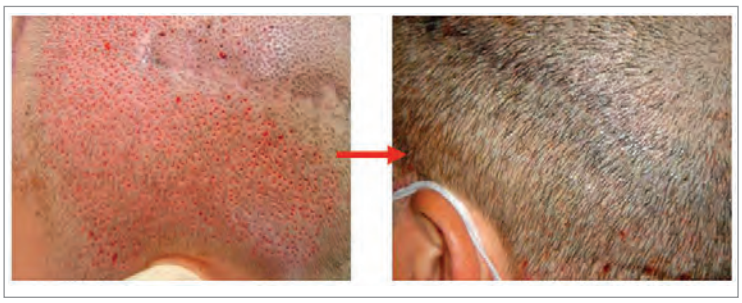

Figure 9 FUE to camouflage a wider than usual scar would typically be done/planned for after the last procedure. (a) An intraoperative photo. The small red dots are the donor sites after the grafts were extracted. (b) 6 months after the FUE grafts were inserted into the scar, it is cosmetically insignificant.

The main advantage of strip harvesting is that because every FU in a strip can be utilized, excising a total strip width of only approximately 50 mm to 65 mm (over the course of 2 to 4 sessions) is usually sufficient to completely transplant an individual who is destined to develop Type V or Type VI MPB (**Fig. 1**). Such a total strip width can commonly be removed from well within the "Safe Donor Area", which is typically approx - imately 70 mm – 80 mm wide in the occipital and parietal areas, respectively. (The long-term "Safe Donor Area" was arrived at by studying 328 men over the age of 65 years in whom good hair density was maintained within that area.)[7] Hair is lost sooner—and in some areas completely—the farther outside the safe donor area you harvest and the closer you get to the anterior, superior and inferior borders of the fringe hair in a man with evolving MPB. Put simply; you can harvest the maximum number of the most likely permanent hairs by using strip harvesting, while staying within the "Safe Donor Area".

The main disadvantage of strip harvesting is that a linear scar is always produced; unfortunately, if the excision isn't done properly or a complication occurs it can be quite wide, but it is important to emphasize that such complications are very rare in an experienced hair restoration surgeon's office. Also, as noted earlier, a single scar is all that should ever be present regardless of the number of transplant sessions, and if a wider than usual scar does occur—secondary to the patient's suboptimal healing characteristics or other causes—it can be made cosmetically immaterial with the use of FUE or a trichophytic closure during the last donor area harvest planned for the future.

The main advantage of FUE is that there is *never* a linear scar—just small punctuate ones, that *if done properly* will be unnoticeable even if the hair is *very* short—almost shaved. FUE, however, is *not scarless* as it is very often advertised to be by its proponents. And of course FUE can also be improperly done, in which case the scars may be larger and very short hair might not be cosmetically possible (see below).

On the other hand, the main disadvantage of FUE is that if large numbers of grafts are, or will one day need to be harvested, more of the grafts will only have temporary hair. Why?

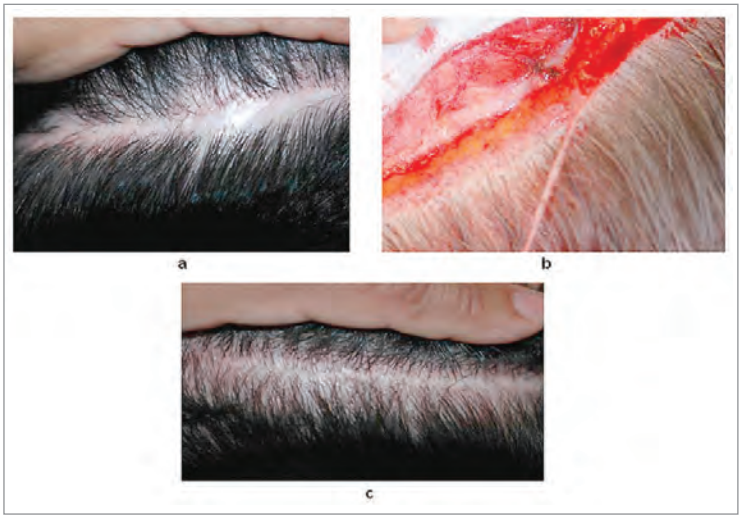

Figure 10 (a) Before scar revision. (b) Intraoperative photo as a narrow strip of epidermis/high dermis tissue is being trimmed off the inferior flap of the wound. (c) The wound had healed with a narrower scar and hair is growing through it at multiple sites due to the trimming described in (b). (Photos courtesy of Dr. Robin Unger).

With FUE, only every third to fifth FU can be punched out. If you tried to take all of them in any area you would end up with a large hairless patch. If you tried to take too many too close, you would end up with a moth-eaten looking donor area (**Fig. 13**). This means that to get as many grafts as you would from a strip, you would have to harvest an area three to five times as wide as the strip—and therefore you would often need to exceed the Safe Donor Area and get closer to the borders of the fringe where—as discussed earlier—there are more temporary hairs. Not incidentally, the

punctuate scars that are present in hair-bearing fringe areas today, will become noticeable if that hair is lost in the future. FUE is therefore far from the panacea that some of its Internet proponents suggest it is—especially for young men in whom the ultimate size of the alopecic and donor areas are far less certain than in older men, and even more so for women who typically have substantially smaller acceptable donor areas than most men. (Long-term donor area hair density is also less certain in younger individuals.) FUE should not be the first choice but rather the last choice for a very large percentage of young men, (who currently seem to be the most attracted to it) and virtually all women.

Figure 11 (a) The more anterior hairline outline is one suggested by some Internet sites the patient had reviewed. The more posterior line was the one I recommended. (b) An intraoperative photo. The patient had taken my advice.

All the same, FUE has other advantages that make it useful in certain individuals—for example in some men who have very tight scalps or bad scars from prior hair transplanting and in older men, in whom one can more accurately predict than in younger men, a relatively small alopecic area developing over their lifetime. As alluded to above, it is also useful for getting hair to transplant into a wider than usual linear scar—cosmetically eliminating it. It is worthwhile emphasizing that it is very likely that ultimately using a *combination* of first strip harvesting followed by selectively extracting multi-hair FU superior and inferior to the strip scar with a trephine, will result in the harvesting of the most hairs that are the most likely to not be lost with time—but that is a discussion for another time.

Figure 12 (a) Close-up view of a hairline created by Dr T. Nakatsui using 60 FU/cm2 density (Photo excerpted from Hair Transplantation 2011 edition). (b) This photo is a close-up of the hairline of the patient shown in Fig. 3 and was produced with 30 FU/cm2. While some patients might be suitable for high density FUT, 20-30 FU/cm2 produces excellent cosmesis in virtually all patients and leaves more FU in reserve for the treatment of other or future areas of MPB.

Conclusion

Modern hair transplanting is far better than it has ever been and much more can be accomplished for many more patients than even 5 to 7 years ago. This article only deals with some of the advances, and only briefly. More of them and more details can be found in the 2011 edition of *Hair Transplantation* and on my website www.drwalterunger.com for those who are interested. On the other hand, the use of the Internet to aggressively market transplanting and some of its innovations can have serious negative consequences in the short-term as well as in the less obvious long-term if they are used improperly or in the wrong patients. The readers are urged to try and anticipate those patients who might be inclined to undergo hair restoration surgery and provide them with appropriate cautionary advice on the relatively new innovations discussed in this article—or perhaps to provide excerpts from it.

Figure 13 (a) 1000 FU were extracted by another physician via FUE, 3 years ago, leaving the donor areas with an unnatural moth-eaten bilateral parietal and occipital appearance with the hair worn at the length shown here. The patient had undergone FUE in the hopes of being able to shave his donor area without scar noticeability. (b) Punctate oval/round FUE scars are obvious with the donor area buzzed very short for additional FUE just superior to the original donor sites. This time the FU were harvested by the author with a smaller punch and wider site spacing than the prior surgeon had employed. The grafts obtained in the second FUE session were placed into the worst scars from the first session. FUE is not scarless.

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Good News and Bad News in Hair Restoration Surgery - Tables

Hair Survival
Studies by Mayer with and without Keene and Perez

Year	20 FU/cm²	30 FU/cm²	40 FU/cm²
2000*	92.5%	72.5%	78.10%
2003**	95.0%	76.7%	70.0%
2005***	95.0%	98.0%	90.0%

*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, *Intl. Jl. Cosm. Surg., and Aesth. Derm.* 2001; 3(21):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.

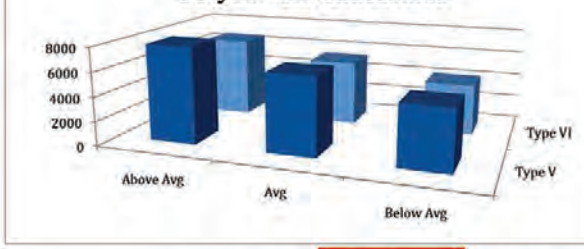
Table 1

Expert replies to the question, *"What percentage of women with FPHL you see in consultation have a long-term satisfactory donor area large enough to produce 800 – 1200 FU?"*

Number of experts	Percent Acceptable
6	20% - 25%
2	"approximately" 35%
7	40% - 50%
5	60% - 65%
8	70% - 80% or more

Table 2

Average Usable FU Estimates in 30-year-old Caucasians



	Above Avg Density	Avg Density	Below Avg Density
Type V	7904 (3,000-12,000)	6404 (2,000-10,000)	4963 (1,000-9,000)
Type VI	6661 (2,000-10,000)	5393 (1,250-9,000)	4204 (500-8,000)

Numbers represent mean of each category with range in parentheses

Table 3