



## Controversies

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### What is a hair transplant megasession?

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The term megaession has gone through a significant evolution in the 25 years this author (Rassman) has been performing hair transplantation. I remember when I did my first hair transplant in November 1991 with small grafts. It was about 500 grafts and took me all day. After not suffering enough pain at that time, I increased the next surgery to about 750 grafts; again it took all day and I had far too much bleeding, even for me (a general surgeon). Over the next couple of years, I kept increasing my suffering with 1,000, then 2,000, 3,000, and eventually 4,000 grafts in late 1993-1994. I quickly realized that it took a huge labor force to cut and place these grafts, and by mid-1992 I had developed a very large staff of about 35 people who were doing as many as four surgeries a day. Like others of my era, I set the standard on cutting and placing speed by mastering it myself. Drs. Ron Shapiro, Brad Wolf, and Paul Rose also became masters of cutting and placing. It was these large sessions, in particular, that set my practice apart from others at that time.

For the recent Asian Association of Hair Restoration Surgeons (AAHRS) meeting in Bangkok, I was asked to discuss FUE megasessions and it quickly became apparent that what constitutes a megasession for strip surgery is different than what constitutes a megasession for FUE. It was clear to me that the megasession is not an absolute number of grafts. It is a number that is relative to 1) the type of surgery (strip vs. FUE) and 2) the overall donor density as measured by the average number of hairs per follicular unit.

By definition, a megaession implies something huge, very large, above the ordinary. So, the 2,000-graft strip surgery, which now fits into the world of the ordinary surgical hair transplant, does not have the same meaning it had in 1993. After considerable thought, I realized that there is a mathematical relationship between the two variables listed (type of surgery and density) similar to  $E=MC^2$ . This relationship is evident once we agree that the average human scalp has 50,000 follicular units (FUs). I will make this presumption to define a megasession as a surgery that exceeds the absolute number defined in this mathematical relationship:

$$\text{Strip Megasession} = KD^2 \text{ where} \\ D = \text{Density and } K = \text{Constant of } 800$$

We suggest that an FUE megasession can be calculated by reducing a strip megasession by one-third and that a human scalp can easily heal the number of grafts equal to two megasessions over two or more sessions. An example of megasessions is defined as follows:

#### Donor Density

| Hairs/mm <sup>2</sup> | Strip Megasession (M) | FUE   | K   |
|-----------------------|-----------------------|-------|-----|
| 2.2                   | 3,872                 | 2,556 | 800 |
| 2                     | 3,200                 | 2,112 | 800 |
| 1.8                   | 2,592                 | 1,711 | 800 |
| 1.6                   | 2,048                 | 1,352 | 800 |
| 1.4                   | 1,568                 | 1,035 | 800 |

(Example:  $M = K \times D^2$ : Density (D) of 2.0 hair/mm<sup>2</sup>:  $2^2 = 4 \times (K) 800 = 3,200 \times 0.66 = 2,112$ )

What does this mean with regard to the total follicular unit donor availability for transplantation? Assuming that the donor area reflects 20% of the total hair population and that no more than 66% of the donor site can be harvested over time, a single strip megasession will harvest (according to this formula) approximately one-third of the total extractable donor follicular unit supply. FUE and strip surgeries are very different with regard to the density of FU extraction. In a 2,000 or smaller graft FUE session, the larger FUs are cherry-picked from the entire available donor area generally without causing depletion, while a 5,000 graft FUE megasession causes depletion by taking half the available FUs in the donor. These FUE donor removal patterns are markedly different than a 5,000 graft strip surgery in which all grafts are taken from a much smaller, specified area. Donor site depletion, therefore, is clearly more evident from an FUE megasession than from a strip megasession, and that justifies the lower graft limit for an FUE megasession.

Each surgeon can decide the constant, K, that is appropriate to his or her particular agenda. This type of analysis is important as we focus on a common language to address donor site depletion and donor area scarring. From the numbers of the above table, it is clear that there are limits for patients with lower donor densities (a problem with Asians and Africans) more than for people with higher donor densities (Caucasians). For the surgeon who routinely exceeds twice the above megasession numbers over time, more problems may appear and greater medical/legal problems may be harder to defend. It may be reasonable to say that two megasessions, as defined above, are a reasonable limit for the donor area in an average patient because this seems to be today's practice; however, the safe number may actually be lower than what is being done today. There are always exceptions to this rule, but that is where clinical judgment comes in to play. I believe that the risks of exceeding the

FUE megasession numbers in a single surgery increase the problems with vascular supply, the overall integrity of the donor area, and the degree of post-op scarring. I have not gone far enough in this discussion to address the combined strip/FUE procedures, which are now pushing the envelope for donor site harvesting even further.

I have performed more than 10,000 grafts per patient in multiple sessions on dozens of patients over the past 26 years, and I have observed the impact of pushing the donor area harvesting to greater and greater numbers. These were all strip surgeries, and I have always kept the scars in the sweet spot just above the posterior occipital protuberance. With each subsequent surgery, when possible, the strips were removed at or above the surgical scars. This approach has kept the donor area above the scar pristine. Eventually, FUE harvesting of this pristine area becomes possible. Some people tolerate these large sessions with minimal scarring and some do not. All of these strip surgery patients have had their donor area skin stretched so that a uniform proportional reduction of the remaining donor density throughout the donor area is seen in each successive surgery.

Large FUE sessions are another situation altogether, because rather than take the grafts from a localized discrete anatomic area in the center of the donor region and having the donor skin stretch in the surgical recovery phase, the FUE scars probably do not stretch in proportion to the increased area of the FUE wounds themselves when compared to a strip scar. Repeated FUE sessions produce visible punctate scarring at the FUE sites and some of this scarring extends below the skin to alter the directional growth of the FUs in the area where the FUs were removed (possibly collagen dependent). There is almost certainly some damage to the microvasculature of the donor scalp itself, more and more as the FUE megasession numbers are exceeded.

In a presentation at the Asian Association of Hair Restoration Surgeons (AAHRS) meeting in April 2017, some surgeons reported that adding FUE above and below a donor wound reduced the tension on a tight wound closure. Tension measurements were offered to confirm this belief. In a previous publication, Dr. Bob Bernstein and I discussed the variations in collagen among people in a study of 200 patients and I am certain that these collagen differences impact the FUs next to the extracted follicles as the supporting stroma for each FU extracted interacts with the remaining FUs. As the FUE session numbers significantly increase above the numbers defined in the proposed formula, many

of these patients may show extensive patchy macroscopic scarring that appears significantly larger than the FUE (Figure 1.)

Hair shaft thickness alters what we see because coarser hair covers FUE punctate scars better. People with high donor densities don't show

the patchy punctate FUE scars either because there is enough hair bulk present to hide the scars.

## CONCLUSION

Hair transplant megasession surgeries are attractive to patients because they reduce the number of procedures that a patient may have to undergo to achieve any given result. The mathematics of the megasession sheds light on the upper limits of hair transplant planning from a "master plan" perspective, something that always should be discussed with the patient. The donor supply is absolutely finite for each patient and it is our responsibility to teach our patients what these limits actually are. Megasession FUE surgeries have a distinct pathology that impacts all subsequent FUE surgeries that are offered to the patient.

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### Editor's note from Dr. Wolf:

Some experienced hair movers who perform both FUT and FUE (including me) have noticed that for some reason or reasons FUT seems to be more efficient, causes less scarring, and, during multiple sessions, more total hairs can be harvested using FUT. Here, Drs. Rassman, Pak, and Knudsen give us their reasoning as to why this is.

Others have attempted to explain this phenomenon. Walter Unger wrote, "When I do the math for a 24cm long strip that in many patients could be expected to produce 2,000 (or more) FUs, I get a total incision length of 48cm plus a little more for the tapering ends, whereas if you used FUE with a 1mm punch for 2,000 FUs, the total peripheral LENGTH of the incisions would be 628cm!!" He continues, "The total AREA of scar from 2,000 1mm punches vs. a not uncommon 1mm-wide, 24cm-long strip are respectively 17.5cm<sup>2</sup> vs. 2.4cm<sup>2</sup>, and many of us typically get scars that are less than 1mm wide. Could someone please explain what I'm not understanding?"<sup>1</sup>

Carlos Puig stated: "The variable contributing to these FUE cases not yet mentioned is the absence of biological creep in FUE surgery. Just as with scalp reduction, strip harvesting stimulates some small degree of biological creep in the donor, thus creating new skin, which reflects light less than scar. I believe this is more significant than most realize, especially in patients who have more than 5,000 grafts harvested."<sup>1</sup>

Bill Reed echoes the words of Jim Arnold in that "taking a strip of hair from the donor included taking out the interfollicular alopecic skin as well as the follicle. What was placed back in the recipient area was only the hair without the bald interfollicular skin, hence the 'scalp reduction.' ... This principle, as it applies to the FUE harvesting of donor hair, means that with FUE, only hair is removed from the donor leaving behind the bald interfollicular skin that would have been removed with the strip harvest."<sup>2</sup>

More and more physicians are offering FUE only. We welcome their opinions on this matter at [forumeditors@ishrs.org](mailto:forumeditors@ishrs.org).

## References

1. Wolf, B.R. Cyberspace Chat: Exploring the limits of follicular unit extraction. *Hair Transplant Forum Int'l*. 2016; 26(5):208-213.
2. Reed, W.H. Editor Emeritus. *Hair Transplant Forum Int'l*. 2017; 27(2):49-50. ■

FIGURE 1. Patient who had 5,000 FUE grafts in a single session

