

## **DONOR DOMINANCE REVISITED**

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In 1959, Dr. Norman Orentreich provided the scientific basis for the field of Hair Transplantation. In his landmark paper "Autografts in Alopecias and other Selected Dermatological Conditions" published that year in the *Annals of the New York Academy of Science*, he put forth the concept that in androgenetic alopecia "the transposed grafted skin maintains its integrity and characteristics independent of the recipient site."

He called this phenomena "Donor Dominance" and, since its first proclamation, there has been no concept more fundamental, or immutable, in the field of hair restoration surgery. The term he coined was an appropriate one, for it has "dominated" our thinking in hair transplantation for the past 40 years. At least until now!

The first inkling that the powers of the donor tissue were not omnipotent came from Dr. Norwood's clever observation that transplanted hair took on the characteristic wave of the hair that originally grew at that spot. Just the fact that transplanted hair could "wave" spoke for recipient site influences, since a hair transplant surgeon is not capable of orienting each hair so that it will grow in perfect spatial harmony with its neighbor.

The second challenge came in 1999 when Dr. Lee transplanted hair from the scalp into the eyebrows of patients who had alopecia caused by Leprosy (a condition called madarosis). He showed that the graying and growth rates of the transplanted hair gradually conformed to the eyebrows, rather than the scalp from whence it came.

The present study of Dr. Hwang, mounts the third formidable challenge to Dr. Orentreich's famous hypothesis. In this work, Dr. Hwang and Company provide additional evidence that the recipient area can influence hair growth rate, the cell cycle and even graft survival. They showed that hair transplanted from the occipital scalp (the author's) to the lower leg, took on the growth characteristics of leg hair and then partially reversed itself when transplanted back to the nape of the neck. There was no placebo effect here. This was firm scientific proof of recipient site influences.

The early hair transplanters in Japan must have had some appreciation for these effects as they began to transplant scalp hair to the pubic region in the 1930's and 40's. As surgeons become more creative in finding new areas of the body to take hair from and new places to put it, the influences of the recipient region take on additional significance. Wouldn't it be nice if that coarse hair taken from a bald man's beard during a face-lift could be placed on the top on his bald pate and grow to approximate the quality of his original hair. And wouldn't it be comforting to the female patient that has had an eyebrow hair transplant to know that the hair growth would slow and that she could eventually stop trimming it.

The greatest significance of the powers of the recipient scalp, however, lies further into the future. When hair cloning finally arrives, it will probably not follow the model of "Dolly" the sheep, where an unlimited supply of complete follicles are grown outside the body and then transplanted into the scalp. Rather, it will likely follow the model that Dr. Jahoda described where a component of the follicle is multiplied and then used to induce the

remainder of the follicle in vivo (Trans-Gender Induction of Hair Follicles. Nature, Vol. 402; 1999).

In Dr. Jahoda's experiment, cells from the outer root sheath of the hair follicle were shown to induce the growth of a complete hair and since these cells were fibroblasts they could theoretically be cultured in a test tube to produce an unlimited supply. In addition, it was shown that these "immunologically privileged" cells could be transferred from one person to another without rejection. The success of these experiments would, therefore, rest largely upon the ability of the patient's recipient area to regenerate a cosmetically acceptable follicle from these primitive cells.

In the future, when the dream of hair cloning becomes a reality, the ability to understand exactly how the recipient area modulates the follicle, and how it affects the characteristics of the growing hair, will ultimately determine this new technologies success...or failure. With this paper, the authors have taken an important first step towards achieving these goals.

Surgical hair restoration has undergone a surprising number of changes over the past 40 years, but throughout we have been secure in the belief that Dr. Orentreich's dictum would be upheld. Now that donor dominance has yielded to the forces of the recipient site, what other immutable law will be the next to fall?