and possible expansion of the donor area.

Robots have successfully been deployed in complex operations such as prostate surgery, hip and knee replacement, interventional cardiology and neurosurgery. We hypothesize that the repetitive, tedious and precise characteristics of hair restoration tasks lend themselves to robotic automation.

Objectives:
The aims of this study were to demonstrate the safety and the feasibility of the robotic-assisted harvest and implantation of follicular units.

Methods:
The prototype robotic device is an interactive image-guided robotic system ("System") consisting of six main components: Robotic Arm (Adept, Inc.), Needle Mechanism, Disposable Dermal Punch and Implantation Needles, Disposable Cartridge, Video Imaging System ("Imaging System") and a computer control system for user interface. The robotic procedure mimics the FUE and follicular unit implantation technique ("stick and place"). A conventional sharp dermal punch of 1.37mm I.D. was used for harvesting follicular units. A hypodermic needle design of 1.37mm I.D. was used for implantation. Post-operative follow-up occurred at 24hrs.
16G

Results:
Eleven male patients were treated between October 2006-February 2007. Mean age of patients is 44.7. Ten of the patients were either Norwood Classification II or III male pattern baldness. The mean number of follicular units transplanted per patient were 20. The System successfully identified and aligned to follicular units. Transection rates measured by visual inspection of all follicular units was 30%. Implantation success measured by accuracy of follicular unit depth insertion was 70%. There were no adverse events.

Conclusion:
Robotic-assisted harvest and implantation of follicular units is safe and feasible. Technical refinements in harvesting techniques to decrease transection rates and improve the implantation task are underway.
11 M - 20 FU each
30% transection rate
70% implantation success

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Safely Placing 20 Grafts per Minute - Is it possible?

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anter Lab, Taipei Ownership Interests (stocks, stock options, or other ownership interest excluding diversified mutual funds); **I. Shiao**, International Microimplanter Lab, Taipei Ownership Interests (stocks, stock options, or other ownership interest excluding diversified mutual funds).

ABSTRACT:

Introduction:

At the 14th annual scientific meeting of ISHRS, we introduced a safe, disposable, easy-to-use microimplanter. Microimplanters make graft placement easy for beginners and eliminate handling of the bulb by forceps. At the time, our study showed a 30% higher rate of graft placement with the microimplanters than forceps alone. However, this high rate is achieved only through the extra labor of a designated loader who must keep loading the grafts into the microimplanters.

We attempted to overcome this extra labor cost by focusing on achieving a higher rate of placement, which would translate into a shorter surgical time. After trying many different methods, we recently developed a special silicon sleeve that holds two microimplanters. This sleeve can also hold two needles to create a twin-bladed recipient-site maker that matches the spacing between recipient sites to the distance between the tips of twin-microimplanters. Our preliminary tests using these prototype sleeves appear promising, achieving a rate that nearly doubles the rate of forceps alone, and is 50% higher than the rate of single microimplanters (see Table I).

To determine if the twin-microimplanters can really deliver what our preliminary findings suggested, we are starting a non-controlled study.

Objective:

In this study, the author determines the rate of graft placement using twin-microimplanters. This rate will be compared to the rate of graft placement using single microimplanters and the rate of graft placement using forceps alone as published in a previous study.

Materials and/or Methods:

The twin-microimplanter is composed of two Shiao microimplanters (figure 1) inserted through a silicon sleeve. By threading two needles through the same sleeve, a twin-bladed recipient-site maker can make recipient sites with the same spacing as that from the twin-microimplanter. A twin-microimplanter and a twin-bladed recipient-site maker are both shown in figure 2.

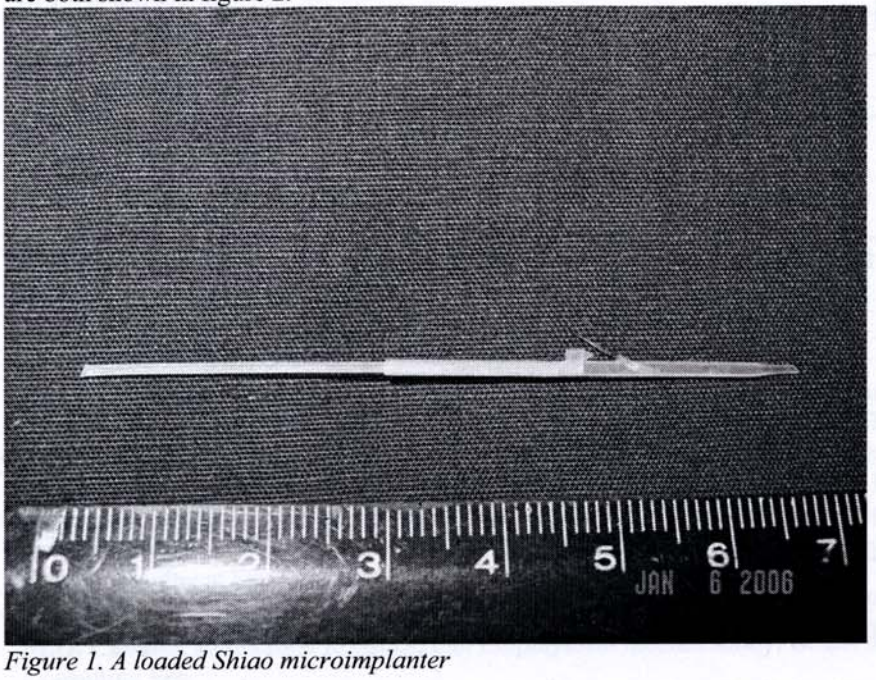

Figure 1. A loaded Shiao microimplanter

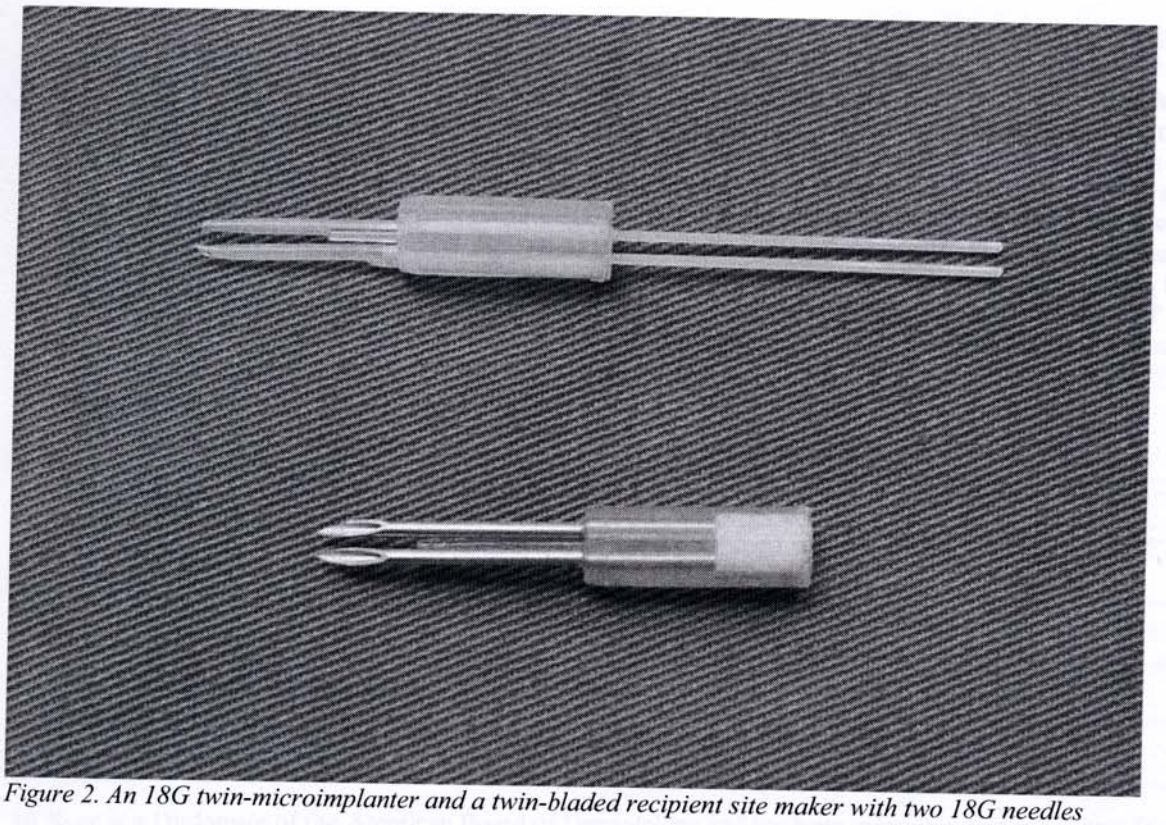

Figure 2. An 18G twin-microimplanter and a twin-bladed recipient site maker with two 18G needles

For this non-controlled study, consecutive patients are recruited. 50 recipient sites on each side of the scalp are pre-made by the surgeon using 18-gauge twin-bladed recipient-site makers. A total of 100 grafts are placed by two assistants using 18-gauge twin-microimplanters. Time to completion is recorded. At the conclusion of this study, the rate of placement is determined and measured against the data from our previous study comparing Shiao microimplanters and forceps.

Discussion/Results:

Our preliminary test (not statistically valid) using prototypes and very limited number of grafts showed graft placement rates from 9.6 grafts/min to 20 grafts/min and an average of 13.5 grafts/min (see Table I).

Patient ID 120408			
Trial	**# of grafts**	**Time**	**Rate (grafts/min)**
1	8	50"	9.6
2	8	25"	19
3	8	35"	14
4	6	25"	14
Summary	30	135"	13
Patient ID 110817			
Trial	**# of grafts**	**Time**	**Rate (grafts/min)**
1	10	48"	13
2	10	54"	11
3	10	30"	20
Summary	30	132"	14
Average of two patients:			**13.5**

Table I. Result from preliminary speed trials

In our previous study that involved 8 consecutive patients, the average rate of placement using microimplanters with forceps was 9.0 grafts/min and the average rate of placement using forceps alone was 6.9 grafts/min. The preliminary results from twin-microimplanters indicate a rate that is 50% faster than single-microimplanters and 95% faster than forceps alone. After the rate study has concluded, the result will be disclosed at the ISHRS 15th

Annual Scientific Meeting.

Conclusions:
Based on our limited experience thus far, placement using the twin-microimplanters requires precise placement of the twin recipient sites and in-depth analysis of relationship between hair direction and scalp curvature. Careful selection and planning can yield a very high rate of graft placement.
If the result our study shows a significantly increased rate of placement as suggested by the preliminary tests, the twin-microimplanters could hold promise as a real alternative to forceps. With one assistant loading and another assistant placing at high speed, the total labor cost could easily approximate that of two assistants placing using forceps. The benefits of using the microimplanters such as minimizing handling of follicular units (potentially reduce trauma) and short learning curve for assistants could then be realized at minimal costs.

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The Tissue Spreader: Analysis of Transection Reduction

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R.S. Haber, Ellis Instruments Royalty, includes trademarks or patents.

ABSTRACT:
Introduction: The tissue spreader has been shown to qualitatively reduce transection during strip donor harvesting. Thus far however, no quantitative analysis has been performed to more accurately determine the actual reduction in transection.

Objective: To validate the use of the tissue spreader by determining quantitative reduction in transection rates.

Materials and/or Methods: A series of patients were evaluated in which both traditional blade dissection and spreader dissection was performed.

Discussion/Results: Data will be presented detailing the benefits of the spreader use.

Conclusion: The use of the tissue spreader takes advantage of natural dissection planes within the donor region, producing significant reduction in actual rates of hair shaft transection, as compared with traditional dissection techniques.