HOW THE OUTGROWTH ANGLE OF THE HAIR FOLLICLES INFLUENCES THE DONOR AREA INJURY USING FUE - A mathematical approach to the problem

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DISCLOSURES:

The speaker has no relevant financial relationships or conflicts of interest to declare.

Have you seen this before?

The Factors which determine the donor area injury in FUE method are:

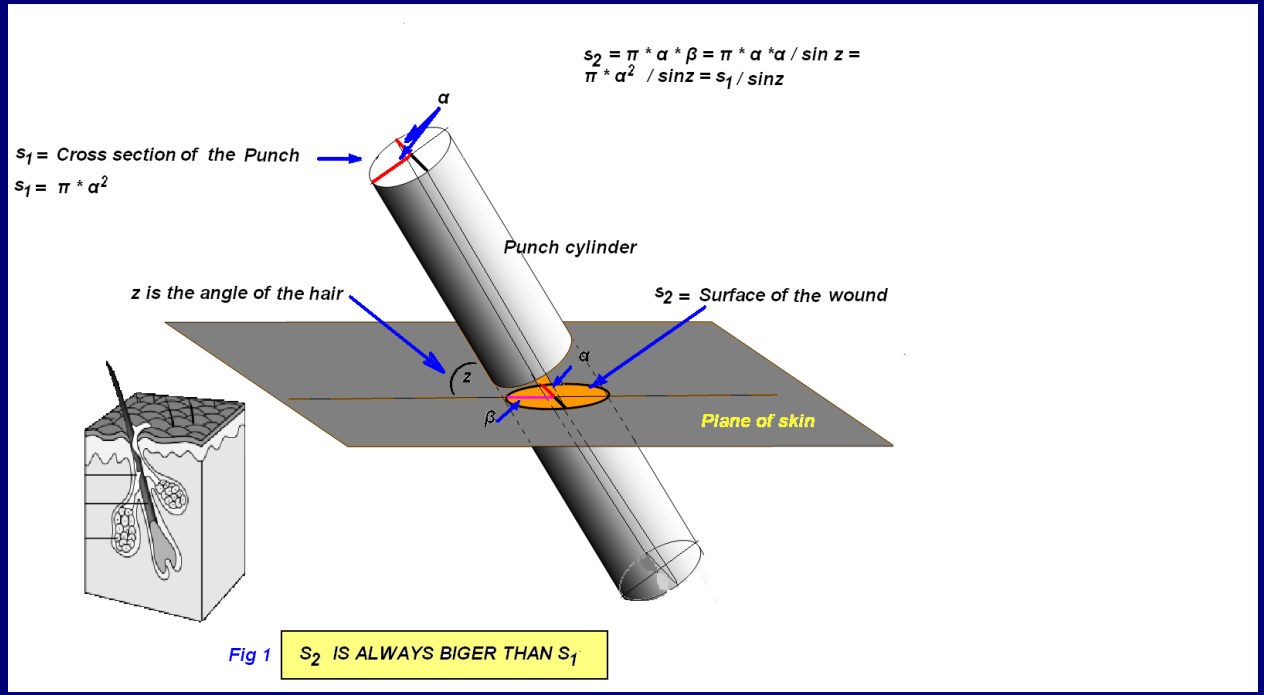
- *The cross section of the punch (punch size)*
- *The number of the extracted hair follicles*
- *The transection rate*
- *The previous operations*
- *The distance between the holes*
- *The outgrowth angle of the hair follicles*

Objective

The aim of this study is to address the effect of the outgrowth angle on the donor area injury mathematically:

- *By determining all the factors which are responsible*
- *By finding out a specific mathematic formula*
- *By calculating the exact percentage of the skin trauma*
- *Ultimately, how the trauma can be controlled*

The surface of the Wound is bigger than the surface of the Punch



The shape of the wound (S_2) is elliptic although the punch cross section is circular (S_1)

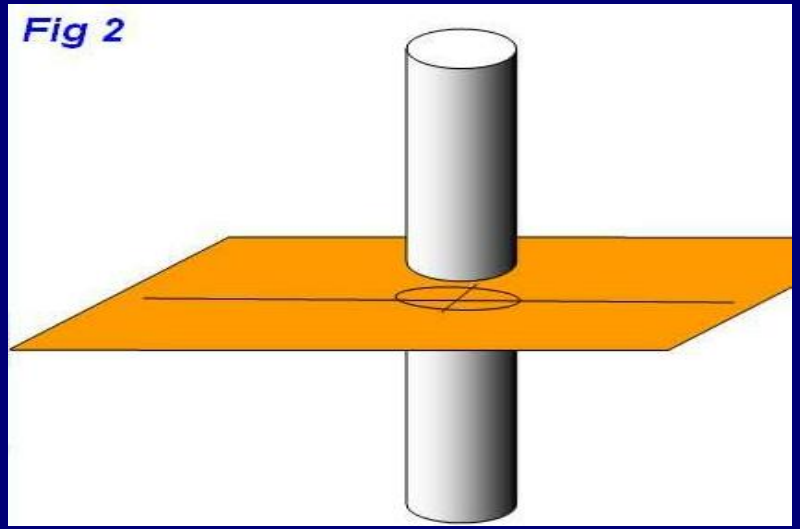
It is proven that $S_2 = S_1 / \sin z$

Because $\sin z < 1$ => S_2 is bigger than S_1

The higher the angle z, the smaller the wound's surface.

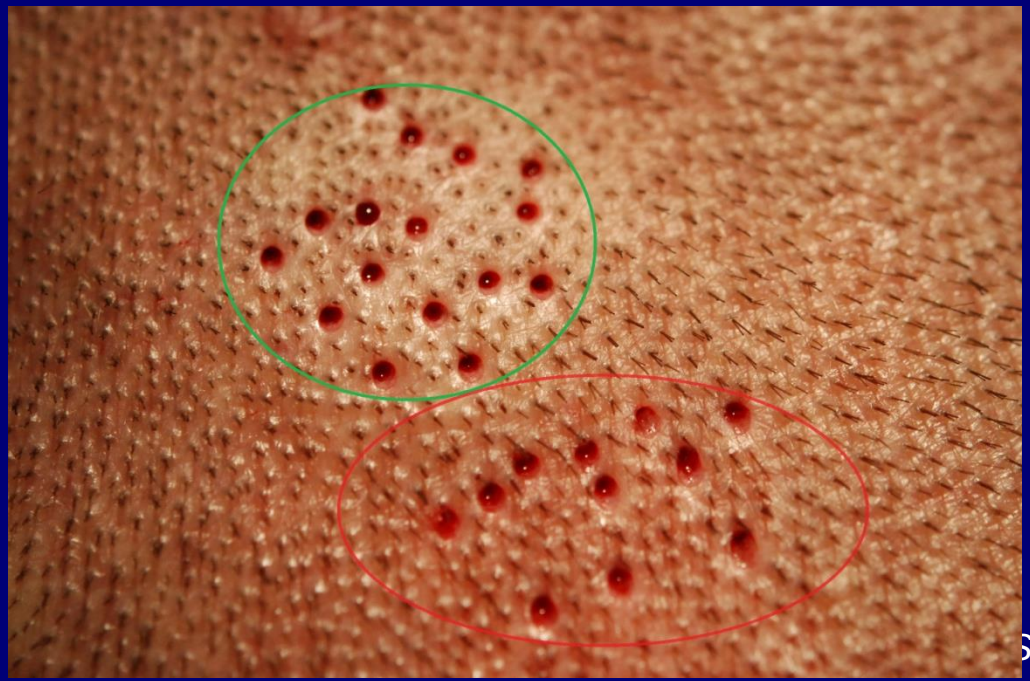
If the outgrowth angle is at 90º, then the surface of the Punch is equal to the surface of the Wound

- *This happens when the axis of the punch is perpendicular to the surface of the donor area*



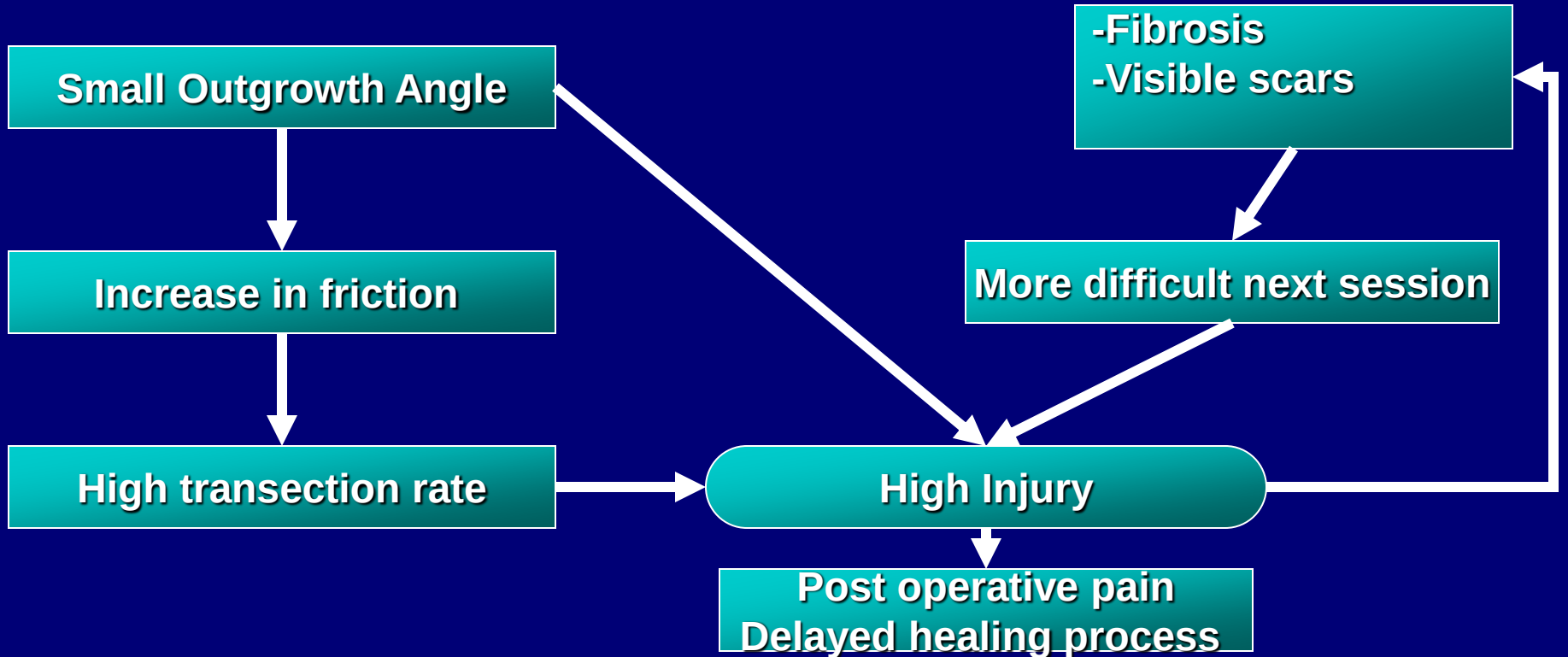
A common example

- *Very often the outgrowth angle is at 30°. In that case sinz = ½ => S_2 = 2 S_1*
- *There is a 100% increase in the trauma which is caused by the punch*



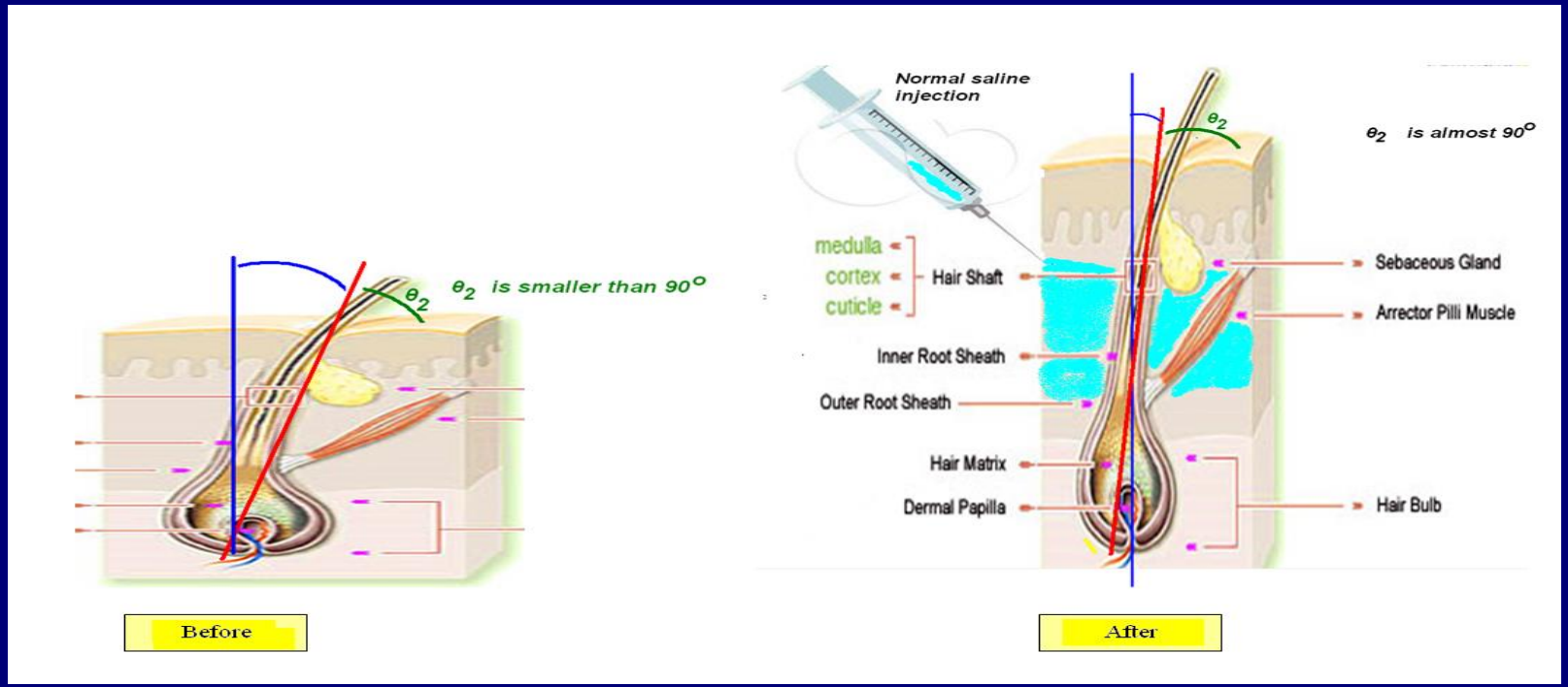
Same punch size: the surface of wounds depends on the value of outgrowth angles

The Damage Algorithm



How can we manage the problem?

By Injecting intradermally normal saline the hair follicles become more vertical



How can we manage the problem?

Before

After

By injecting intradermally normal saline

- *The skin becomes firmer*
- *The direction of the hair follicles is now more predictable*
- *Decrease in transection rate*
- *More intact follicular units can be extracted*

A simple example

Based on the principles that the surface of the circle s_1 is given by the formula:

$$s_1 = \pi r^2 \quad (1)$$

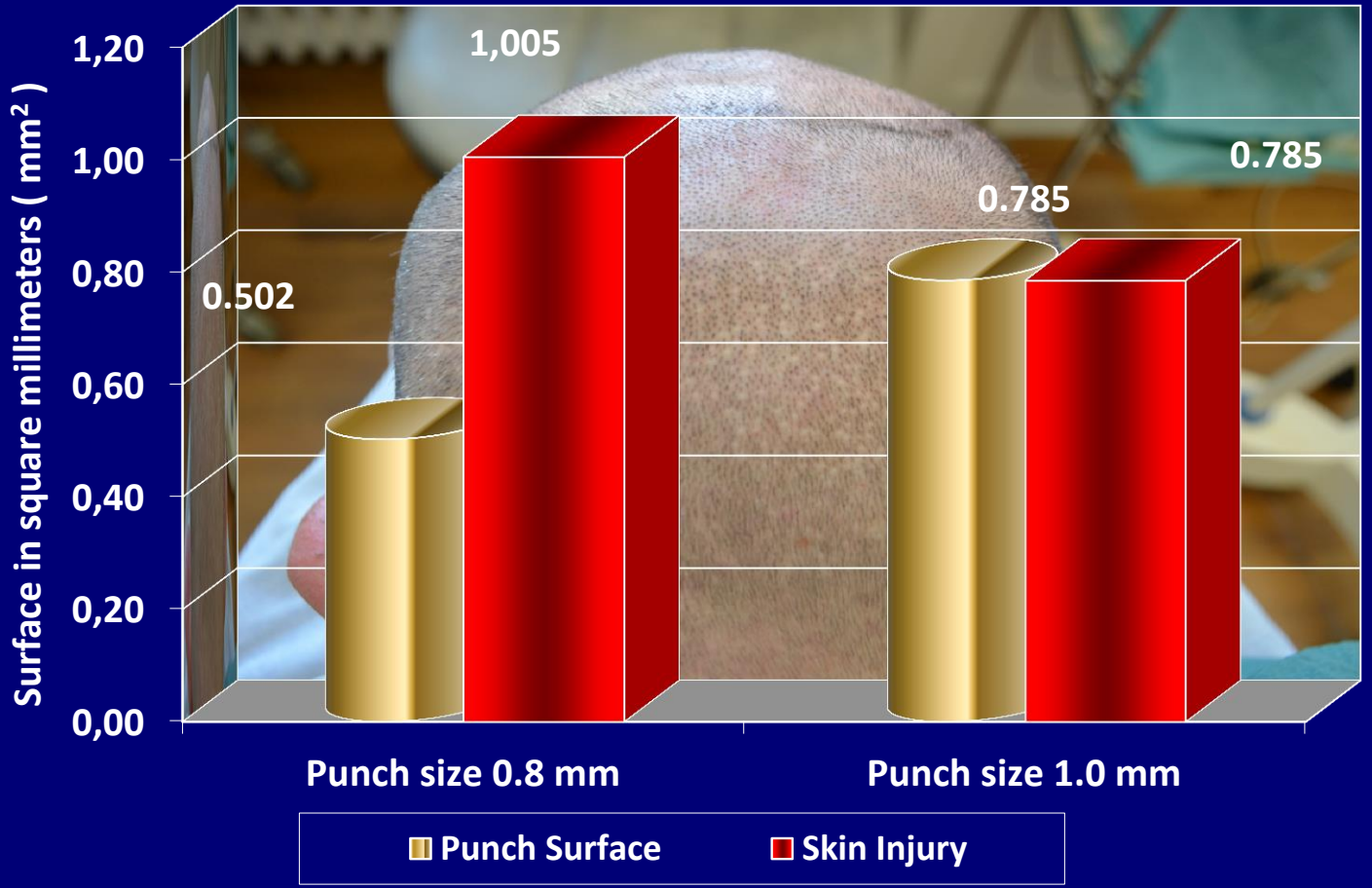
and the surface of the wound s_2 is given by the formula:

$$s_2 = s_1 / \sin z \quad (2)$$

we find that

A simple example

- *Punch size 0.8 mm (surface = 0.5024 mm^2) and angle 30^o causes wound's surface 1.0048 mm^2*
- *Punch size 1.0 mm (surface = 0.785 mm^2) and angle 90^o after injecting normal saline causes wound's surface 0.785 mm^2*



Even by using 56 % larger surface punch,
the skin injury is decreased by 22%

CONCLUSION

- Taking into consideration the outgrowth angle of the hair follicles and modifying it by injecting normal saline, we can:

Improve the quality of the extracted hair follicles using a larger punch size, while maintaining minimum skin injury

Thank you for your attention!