MATHEMATICAL APPROCH OF LATERAL AND SAGITTAL INCISIONS

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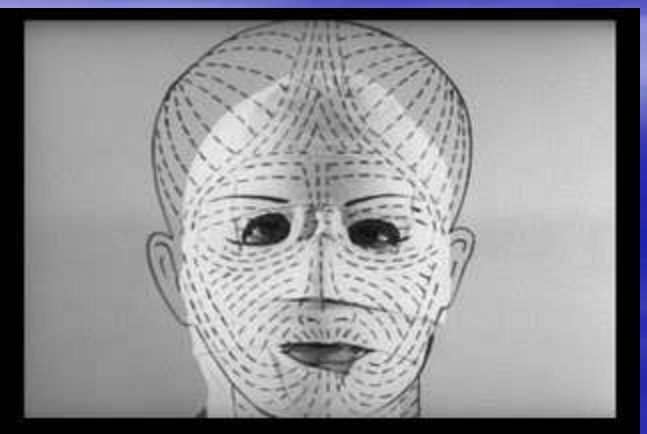
OBJECTIVE

- IN THIS STUDY WE ARE TRYING TO PRESENT A PRECISE AND OBJECTIVE EXPLANATION OF THE ADVANTAGES OF CORONAL RECIPIENT SITES AND INCISIONS .
- IN ORDER TO ACHIVE OUR MAIN GOAL .WHICH IS THE PREDOMINANCE OF CORONAL INCISIONS ,WE ARE TRYING TO APROACH THE PROBLEM MATHEMATICALLY .
- IT IS THE FIRST TIME WHERE MATHEMATICS HAS BEEN USED TO GIVE A REASONABLE EXPLANATION OF THE ABOVE ISSUE IN HAIR TRANPLANTATION FIELD

OBJECTIVE

- MANY HAIR SURGEONS PREFER TO USE SAGITTAL SLITS TO AVOID CUTTING ACROSS LANGER'S LINES AND TO MINIMIZE TRANSECTION OF BLOOD VESSELS ARISING FROM THE SUBDERMAL PLEXUS
- OTHER LIKE Dr HASSON BELIEVE THAT THE USE OF CORONAL RECIPIENT SITES

HAS MULTIPLE ADVANTAGES SUCH AS HIGHER COVERAGE,PRECISE CONTROL OF EXIT OF FU ,LESS INJURY ,AND LESS POPPING



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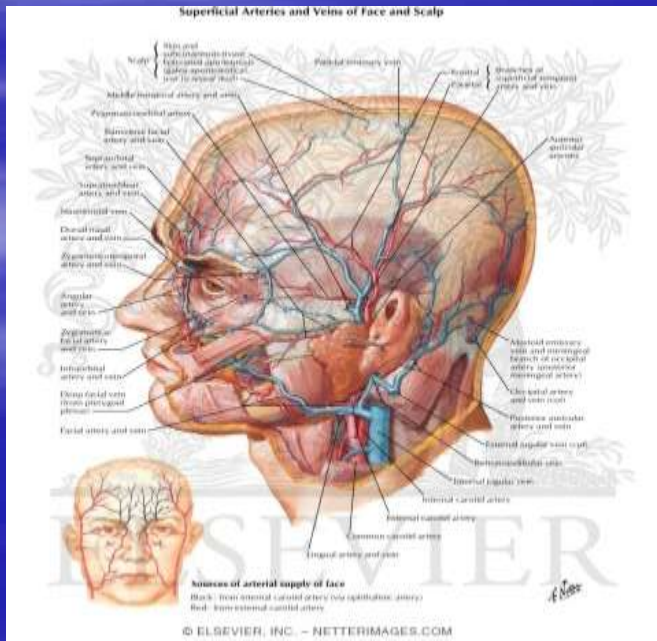
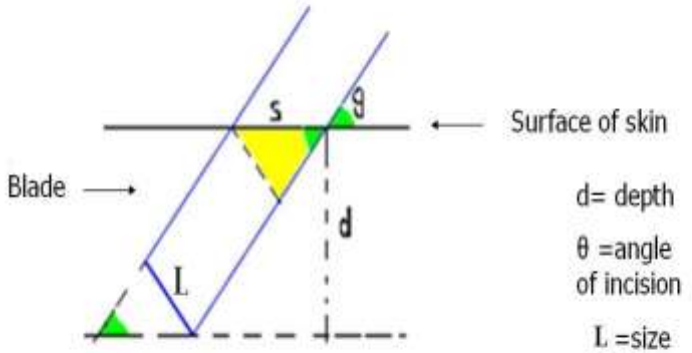


MATERIAL AND METHODS

- THE TWO MOST COMMON SLIT-MAKING TECHNIQUES ARE PARALLEL (SAGITTAL) AND PERPENDICULAR (LATERAL/CORONAL). BY DEFINITION, SAGITTAL INCISIONS RUN PARALLEL(VERTICAL) ALONGSIDE AND IN-BETWEEN THE EXISTING HAIRS(figure 1) WHILE THE LATERAL INCISIONS BISECT EXISTING HAIRS PERPENDICULAR (HORIZONTAL) LIKE A T (figure 2)

MATERIALS AND METHODS

SAGITTAL INCISION

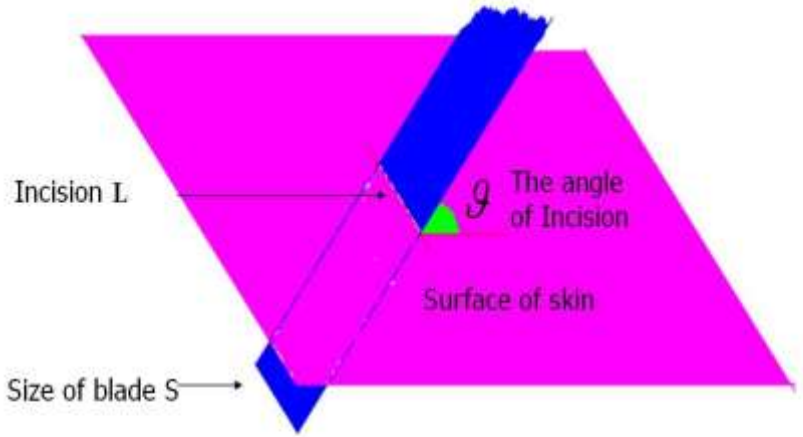


The colored triangle is rectangle, so from trigonometry theory we have:

$$\sin\theta = \frac{L}{S} \Rightarrow S = \frac{L}{\sin\theta}$$

Dr G. Zontos (FIGURE 1)

LATERAL INCISION



In lateral incisions we have S= L

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MATERIAL AND METHODS

- USING SIMPLE GEOMETRY AS SHOWN IN FIGURES 1AND 2 WE CAN ASSUME THAT :S=L/SINΘ FOR SAGITTAL INCISIONS
- S=L FOR LATERAL INCISIONS
- WHERE S IS THE SIZE OF INCISION ,L IS THE SIZE OF INCISION ,L IS THE SIZE OF BLADE ,AND Θ IS THE ANGLE OF INCISION.

ADVANTAGE OF LATERAL INCISIONS

- 1. Lateral incision is smaller than the sagittal incision
- $\Rightarrow S = \frac{l}{\eta\mu\theta}$ $0<\eta\mu\theta<1$
- According to the previous formula the length of sagital incision depends upon the angle of incision.
- For example for region with angle that oscillates from 20^o – 30^o with mean value 25^o, sagital incision length is: ($S=L/\eta\mu 25^o=2,36L$),

SO :

INCREASE OF LENGTH : 236% !!!

ADVANTAGES OF LATERAL INCISIONS

ANGLE Θ=25^{O}, LENGTH BLADE (L)=0,9 mm

	NUMBER OF INCISIONS	LENGTH OF WOUND
SAGITTAL	**1.000**	**212,4 cm**
LATERAL	**1.000**	**90 cm**

In a few words 1.000 sagittal incisions causing same wound with 2.360 LATERAL INCISIONS!!!

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DENSITY CALCULATIONS IN SAGITAL AND LATERAL INCISIONS

We want to calculate the density of sagittal incisions in surface 1 cm^2 under angle 25^o.

DATA :

a) Size of blade S=0,9 mm

b) Width of blade=0,1 mm

c) Medium distance between incisions 1 mm

d) Length of sagital incisions = 2,36 * 0,9 mm = 2,1 mm

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IN VERTICAL PROVISION WE CAN HAVE :

10 /(2,1+ 1)=3,22 OF SAGITAL INCISIONS

IN HORIZONTAL PROVISION WE HAVE :

10 / (1+0,1)=9 OF SAGITAL INCISIONS

SO: MAXIMUM DENSITY / CM^2 = 3,22 * 9 = 29 incisions per cm^2

WOUND OF SKIN = INCISION LENGTH X INCISIONS NUMBER =2,1*29=60,9 mm

DENSITY CALCULATIONS IN SAGITAL AND LATERAL INCISIONS

We want to calculate the density of LATERAL incisions in 1 cm^2 using angle 25^o.

Data:

a) Length of blade S=0,9 mm

b) Width of blade=0,1 mm

c) Medium distance between incisions 1 mm

d) Length of lateral incisions = 0,9 mm

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IN VERTICAL PROVISION WE CAN HAVE :

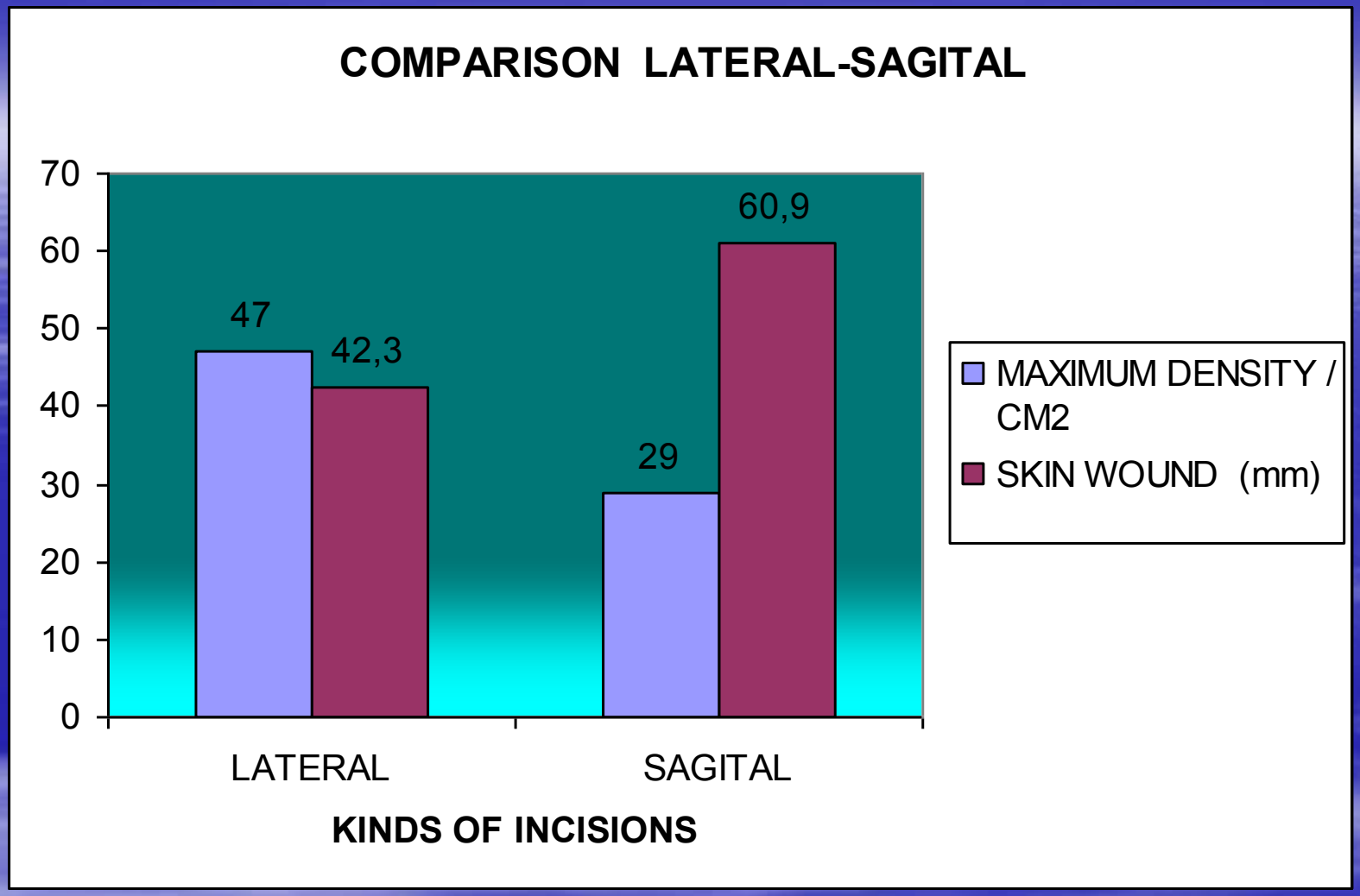
10 /(0,9+1)=5,26 OF LATERAL INCISIONS

IN HORIZONTAL PROVISION WE HAVE :

10 / (1+0,1)=9 OF LATERAL INCISIONS

so: MAXIMUM DENSITY / CM^2 = 5,26 * 9 = 47

WOUND OF SKIN = INCISION LENGTH X INCISIONS NUMBER = 0,9*47= 42,3 mm



INCREASE OF DENSITY (%): 62,07 %

DECREASE OF WOUND (%): 30,5 %

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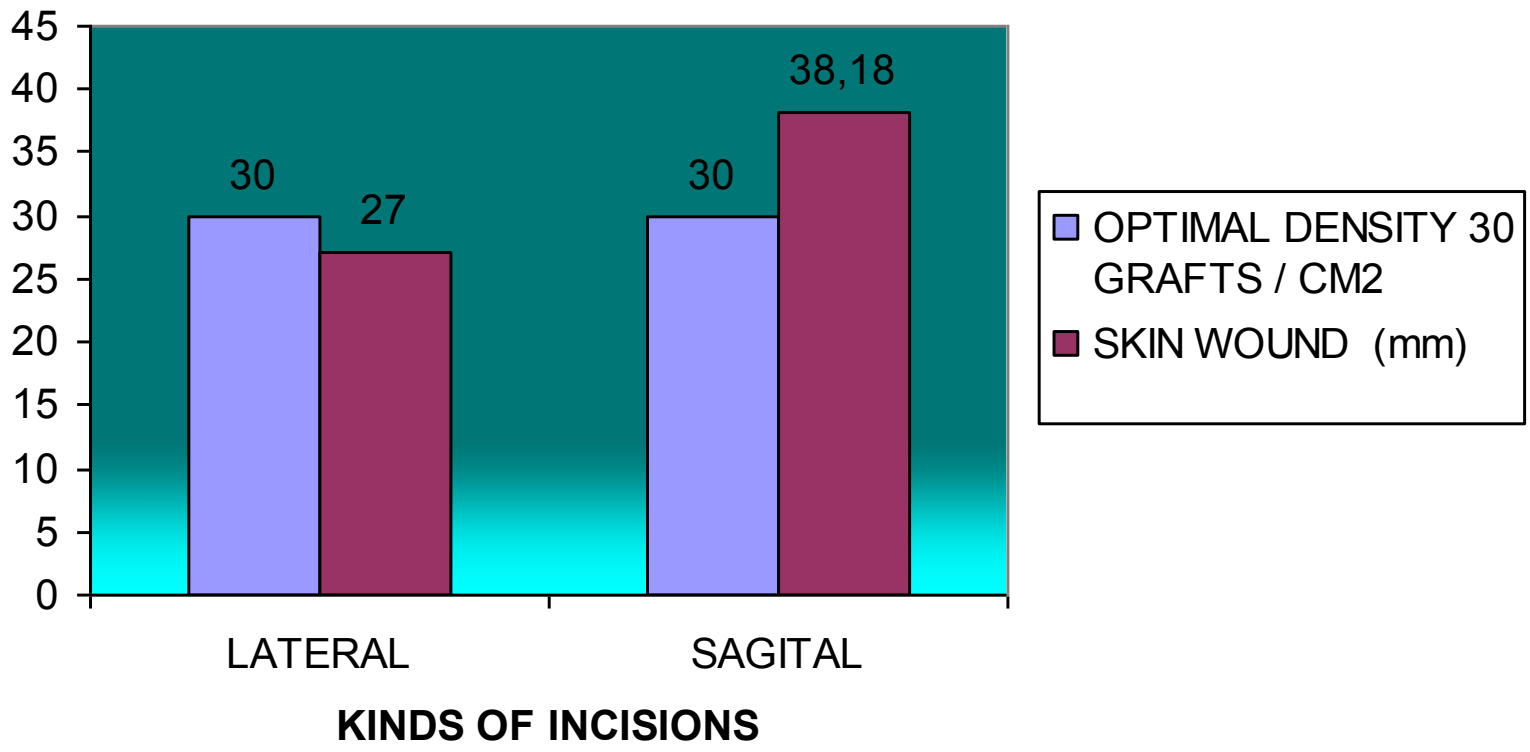
- Considering as mean value of θ = 45 degrees in a big session and taking into account maximum density 30 grafts / cm2 the wound of skin is:
- lateral incisions 27 mm / cm2
- Sagittal incisions 38,18mm / cm2
- % difference : 41,42 %

COMPARISON LATERAL-SAGITAL IN CASE OF SAME DENSITY



INCREASE OF SKIN WOUND IN SAGITAL (%) : 41,42%

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CONCLUSIONS

- THE USE OF LATERAL INCISIONS
- 1)DECREASES THE TRAUMA OF THE RECIPIENT AREA
- 2)REDUCES INJURE TO THE SUBDERMALVASCULAR PLEXUS
- 3)INCREASES THE % OF GROWTH
- 4)INCREASES SAFELY THE DENSITY
- 5)ACHIVES PRECISE CONTROL OF DIRECTION AND ORIENTATION OF HAIR FOLLICLES

EXAMPLE
2200 HAIR FOLLICLES
LATERAL INCISIONS

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