Body Contouring
with shock waves
25 mm compared to 40 mm applicator

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and Osnabrück (D)
Präsident European Soc. Laser Dermatology

Disclosure

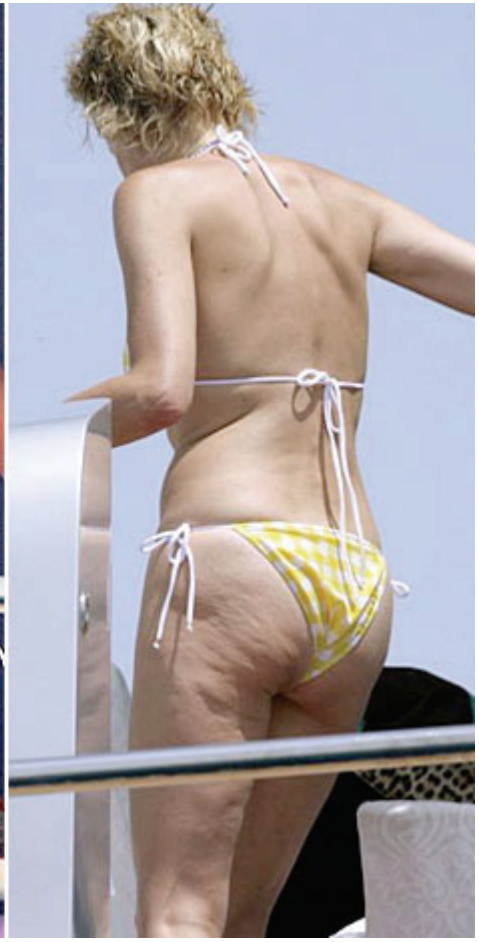
Clinical studies for

- Zimmer
- Smoothshape (Eleme)
- Endymed

Ideal Body Contours -
past and presence

Ideal body contours -
past and today

What is Cellulite ?
What can be done?



devices

invasive

Liposuction

semi invasive

Cellulipolysis

Injection lipolysis

Laser lipolysis

cryolipolysis

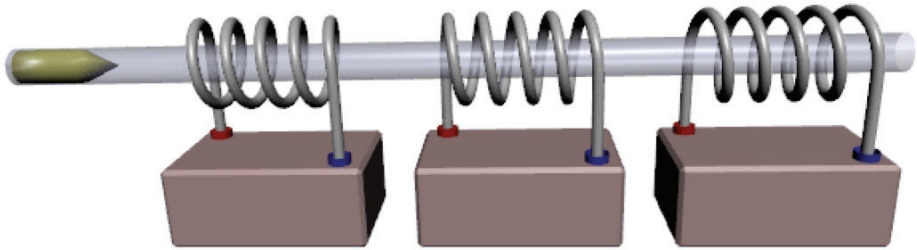
non invasive

- Lotion/Cream
- Mechanical Massage
- Vacuum/pressure
- Endermology
- IR
- Ultrasound
- Radiofrequency
- Shock wave

Radial Wave Technology (RWT)

- Unfocused low pressure acoustic waves are created by an electromagnetic projectile mechanism.

The electromagnetic energy creates a ballistic motion of the applicator (e.g. jack hammer).



The pressure waves are transmitted through the surface of the skin and spread radially (spherically) into the tissue effecting a large and deep treatment area.

Energy is effective in material of high density like

Calcifications and kidney stones

Indications > 20 years in Orthopedics and Urology

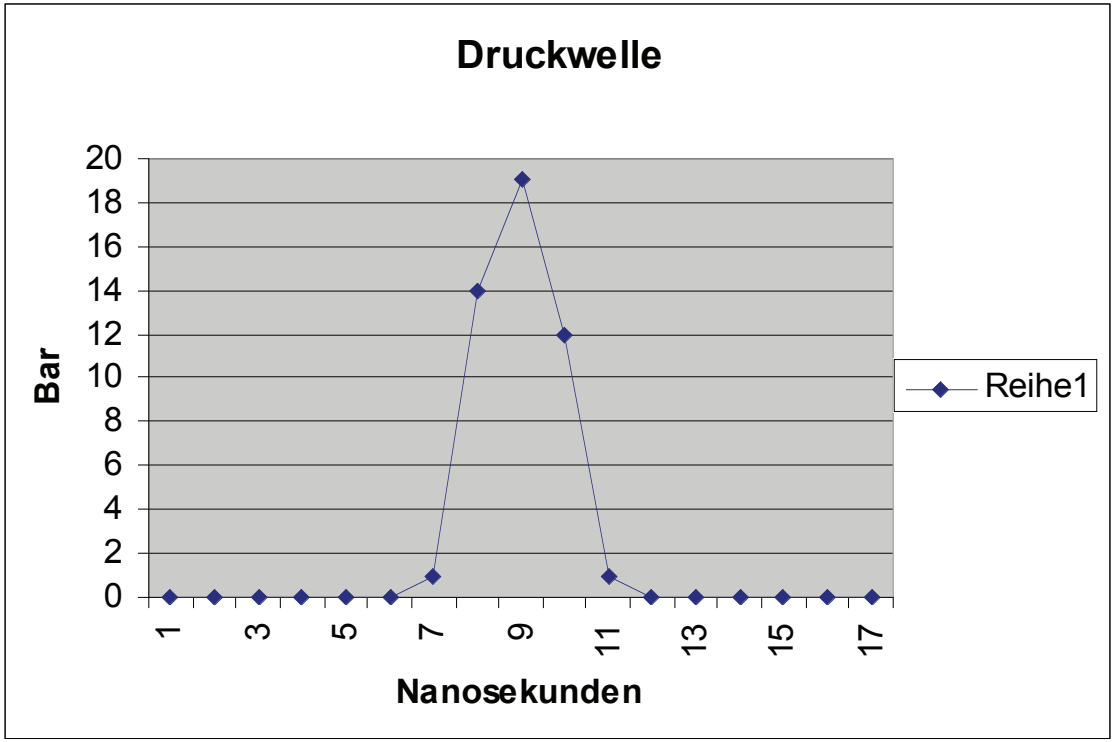
Tendinopathia

Enthesiopathia

Fractures and

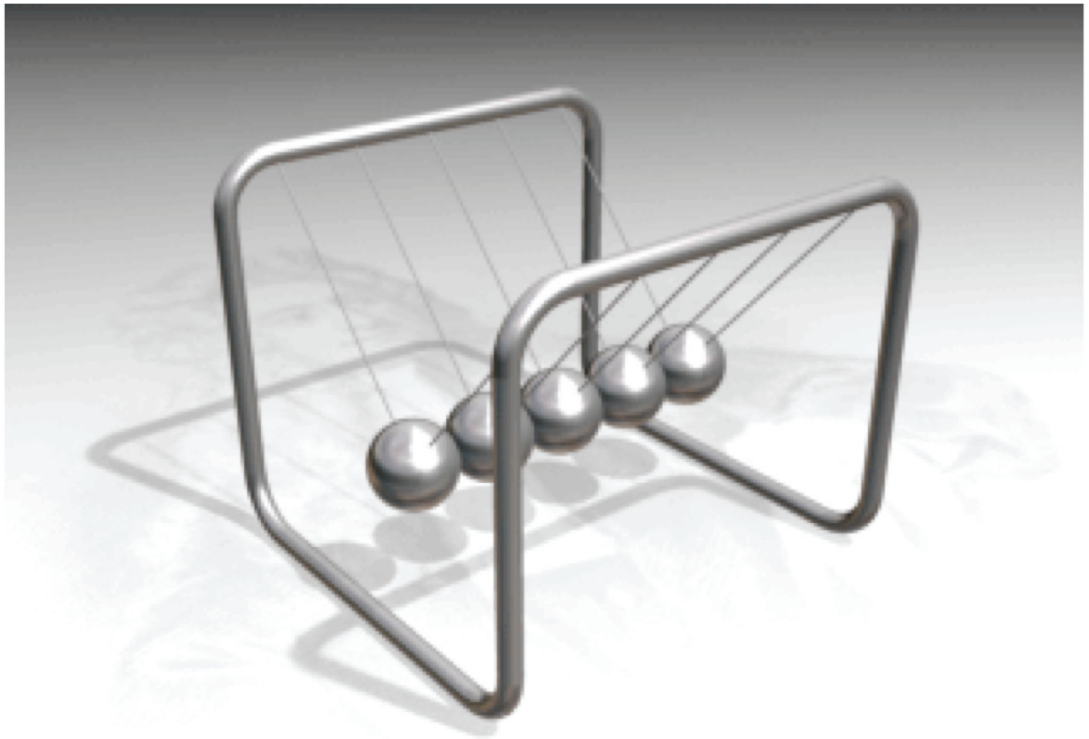
Woundhealing

Extracorporal Acoustic-Wave-Therapy (AWT)
- shock wave -

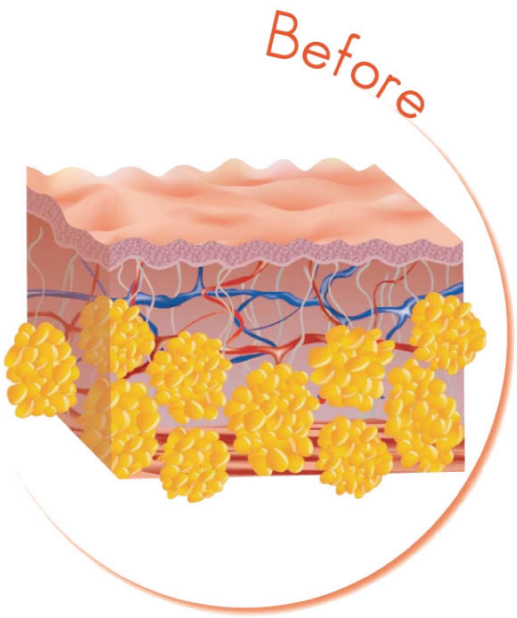


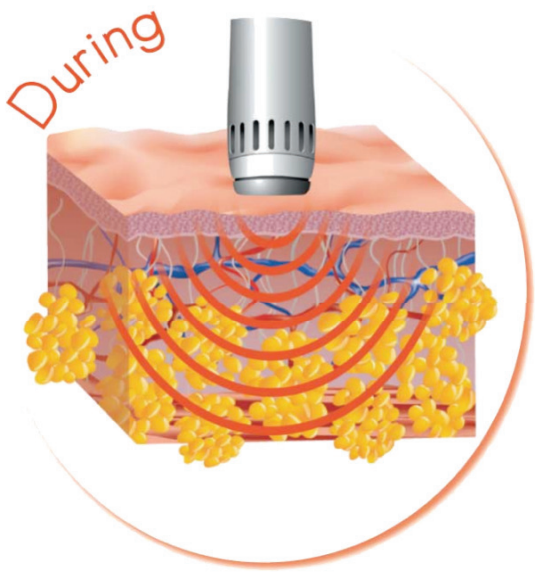
- Shock waves penetrate tissue as acoustic pressure with high amplitude with up to1000 bar.
- The pressure beam can be focused

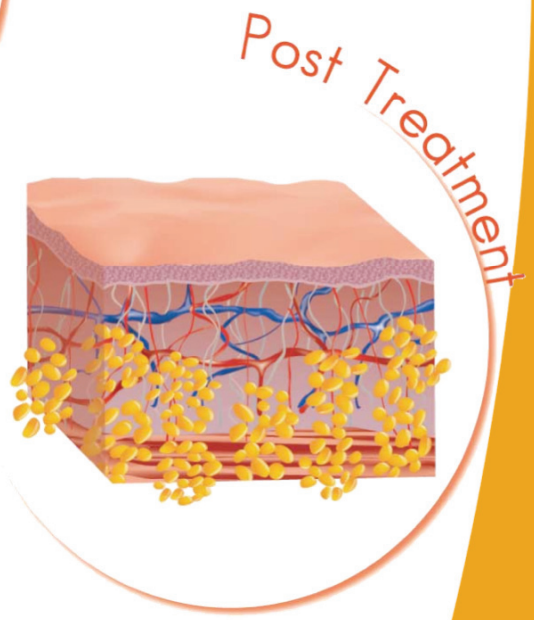
Radial Waves Principles



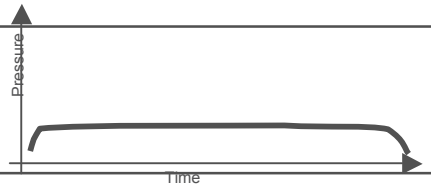
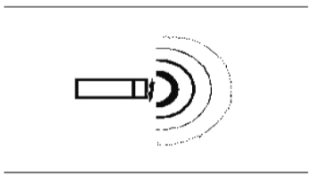
RWT for Cellulite







Physical Background: RWT

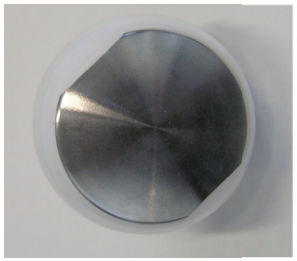
Therapy	RWT
Wave	Unfocused
Maximal Energy	On surface
Mechanical Effect	The deeper the tissue the lower the pressure
Pressure	Up to 11.9 MPa
Rise Time	1000 µsec
Penetration Depth	0-35 mm
Pressure of Wave Relative To Time	
Diagram of Pressure Wave Within Tissue	
No. of Treatments	10-12 treatments

Shock waves for Body contouring

Questions

- Which effects do shock waves show on body contours
- Does it reduce the circumference of the leg
- Is it depending on type and level of cellulte and age?
- **Does it depend on applicator size?**

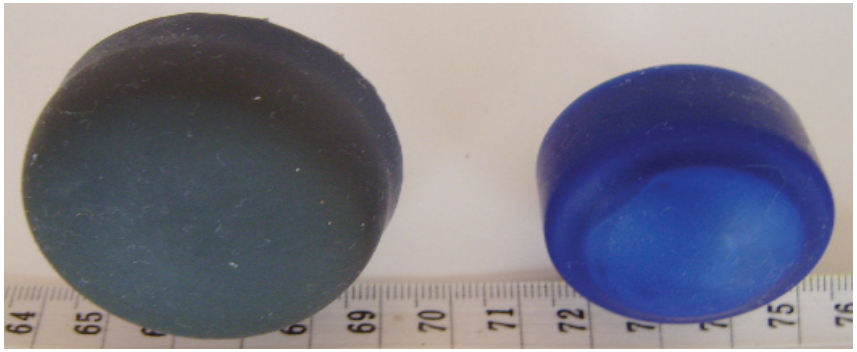
We used the shock wave device „enPuls „ of the comapany Zimmer , Germany , with



Comparison of 2 applicators

- 10 female volunteers
- Age 25-50 y,
- Cellulite 1-2 (3)
- One side **small 25 mm** applicator,
- contralateral **40 mm**

- Parameters controlled: circumference upper leg
- weight
- BMI
- Fat in % (Impedance)
- Pictures before and after
- 20 MHZ diagnostic ultrasound before and after
- Evaluation with modified. Wrinkle severety score



40 mm applicators and 25 mm applicator

Cellulite Classification : Nürnberger - Müller scale

Stage 0

No dimpling while standing and lying. pinch test reveals "folds and furrows", no mattress-like appearance

Stage 1

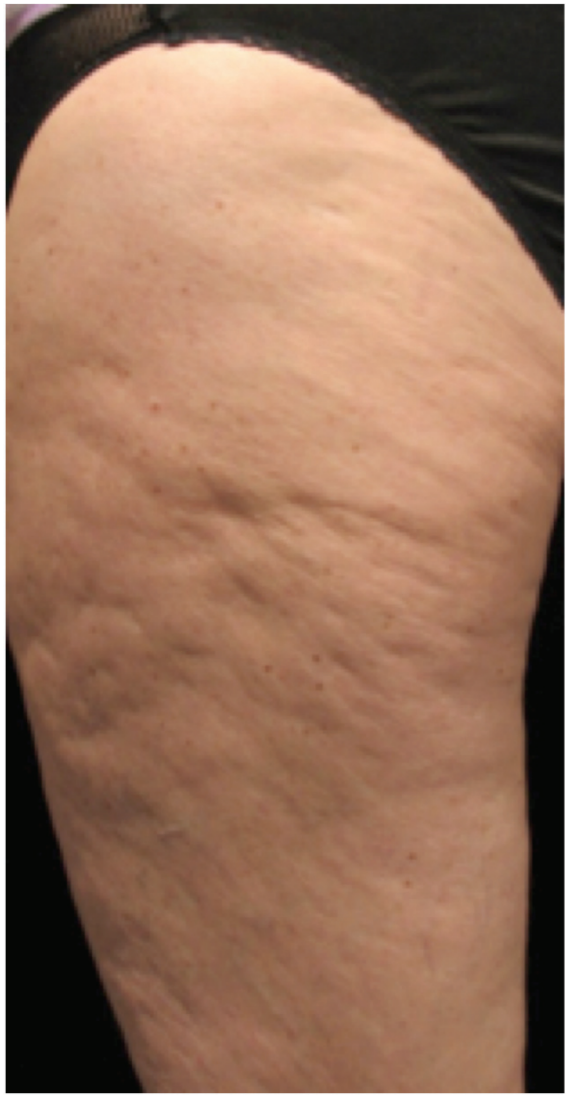
No dimpling while standing or lying, pinch test reveals the mattress-like appearance

Stage 2

Dimpling spontaneously when standing

Stage 3

Dimpling spontaneously positive standing and lying down



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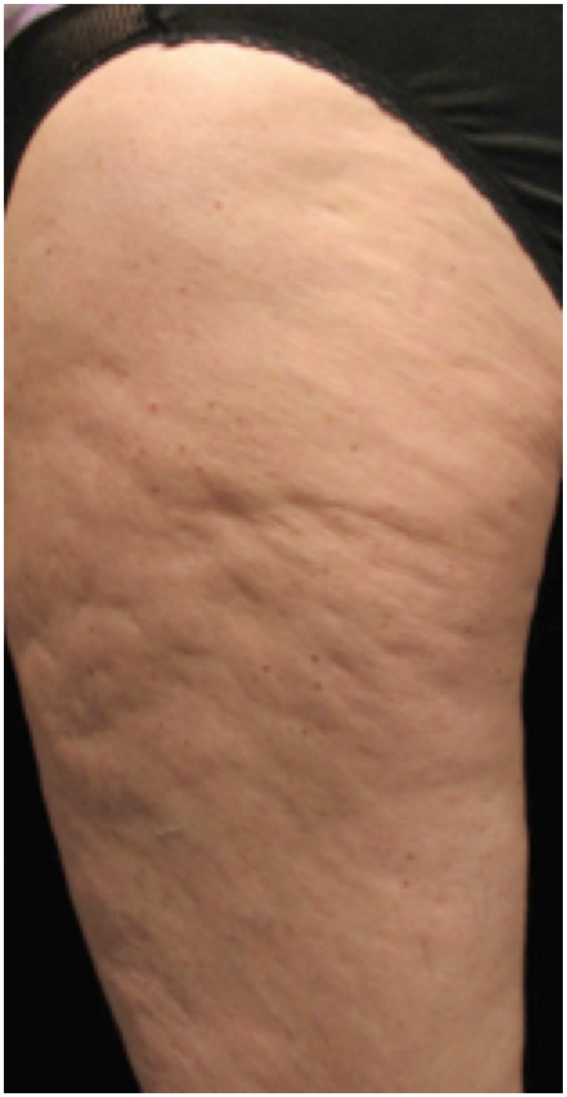

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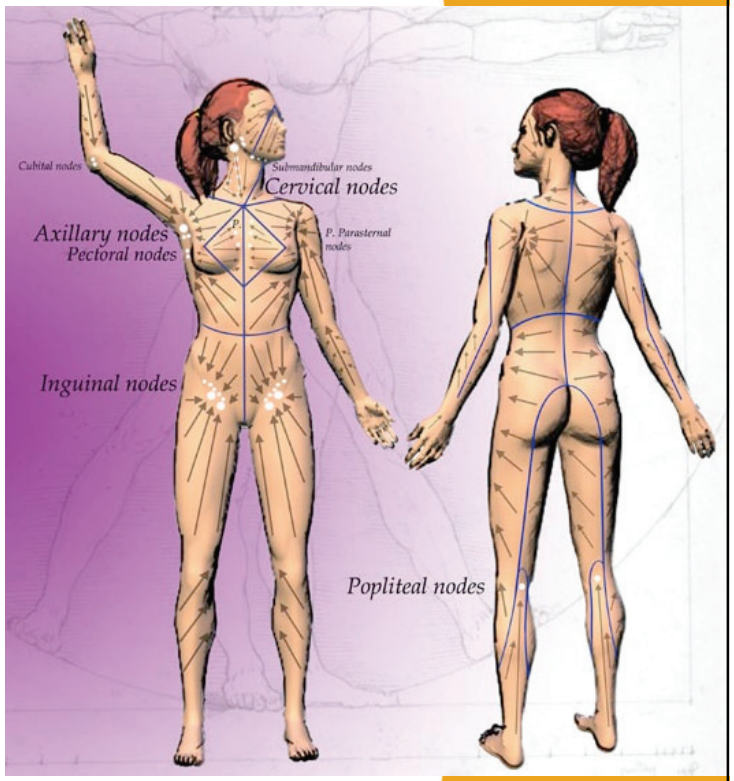
Indikation	Sitzungen gesamt	Aplication per week	Frequency	Power level (I / II / III)	Shocks per application (per area)
Cellulite stage I	8 to10	2 - 3	14 Hz - 16 Hz	60 mJ - 120 mJ	2500 to 3000
Cellulite Stadium II	9 to 12	2 - 3	10 Hz – 16 Hz	90 mJ – 120 mJ	2500 to 3400
Cellulite Stadium III	10 to 14	2 – 3	10 Hz -16 Hz	90 mJ – 120 mJ	3200 to 3700
Weakness of the muscle and connective tissue on the upper arm	8 to 10	2 – 3	12 Hz – 16 Hz	90 mJ – 120 mJ	2000 to 2500
Weakness of the muscle and connective tissue on the lower abdomen	10 to 12	2 – 3	10 Hz – 16 Hz	90 mJ – 120 mJ	1500 to 2000
Stretch marks (striae) on the hip	10 – 12	2 – 3	12 Hz – 16 Hz	80 mJ – 120 mJ	1500 to 2000
Stretch marks (striae) on the thigh	10 – 12	2 – 3	12 Hz – 16 Hz	90 mJ – 120 mJ	1800 to 2300
Stretch marks (striae) on the buttocks	12 – 16	2 – 3	12 Hz – 16 Hz	90 mJ – 120 mJ	1800 to 2300

- Energy should be chosen according to sensitivity of the patient, treatment should be painless

- Allow 2 -3 days between the sessions = 2-3 sessions /Week

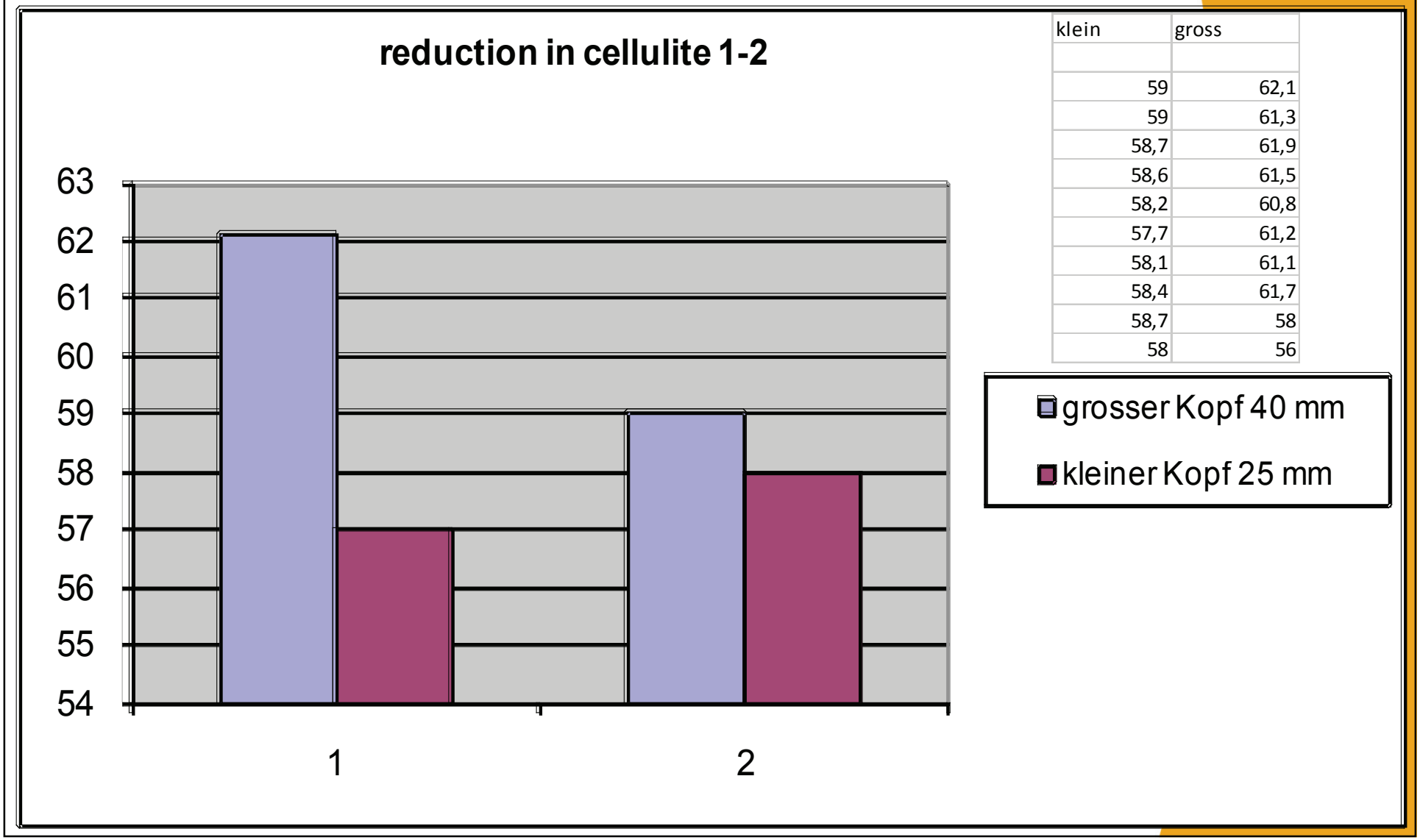
- Use Gel for complete transmission of energy.

Treatment should be performed along the ways of lymphatic drainage activation of lymph nodes before treatment might improve the drainage.



Results 1: Reduction of circumference

40 mm applicator showed better results



klein	gross
59	62,1
59	61,3
58,7	61,9
58,6	61,5
58,2	60,8
57,7	61,2
58,1	61,1
58,4	61,7
58,7	58
58	56

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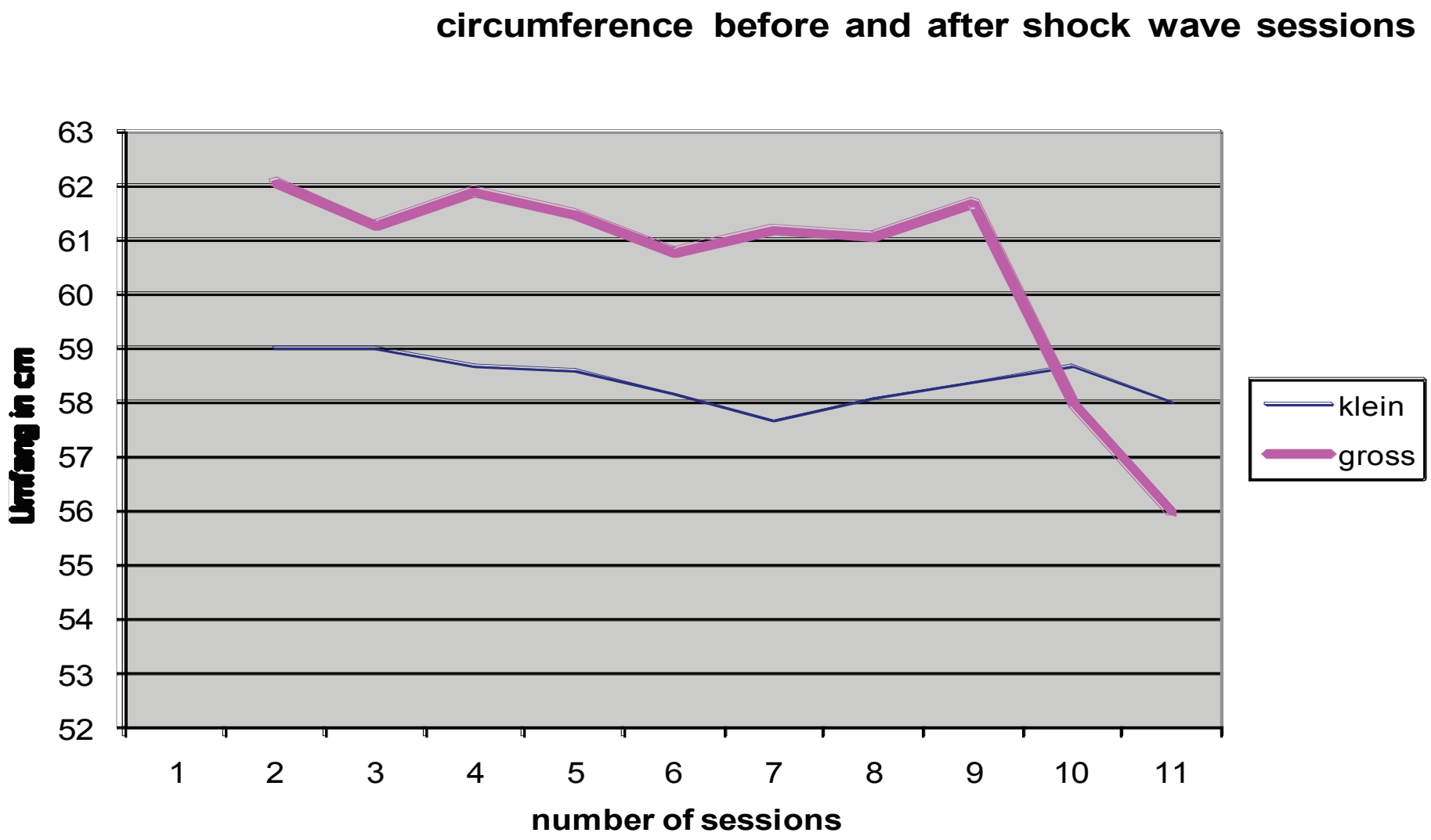
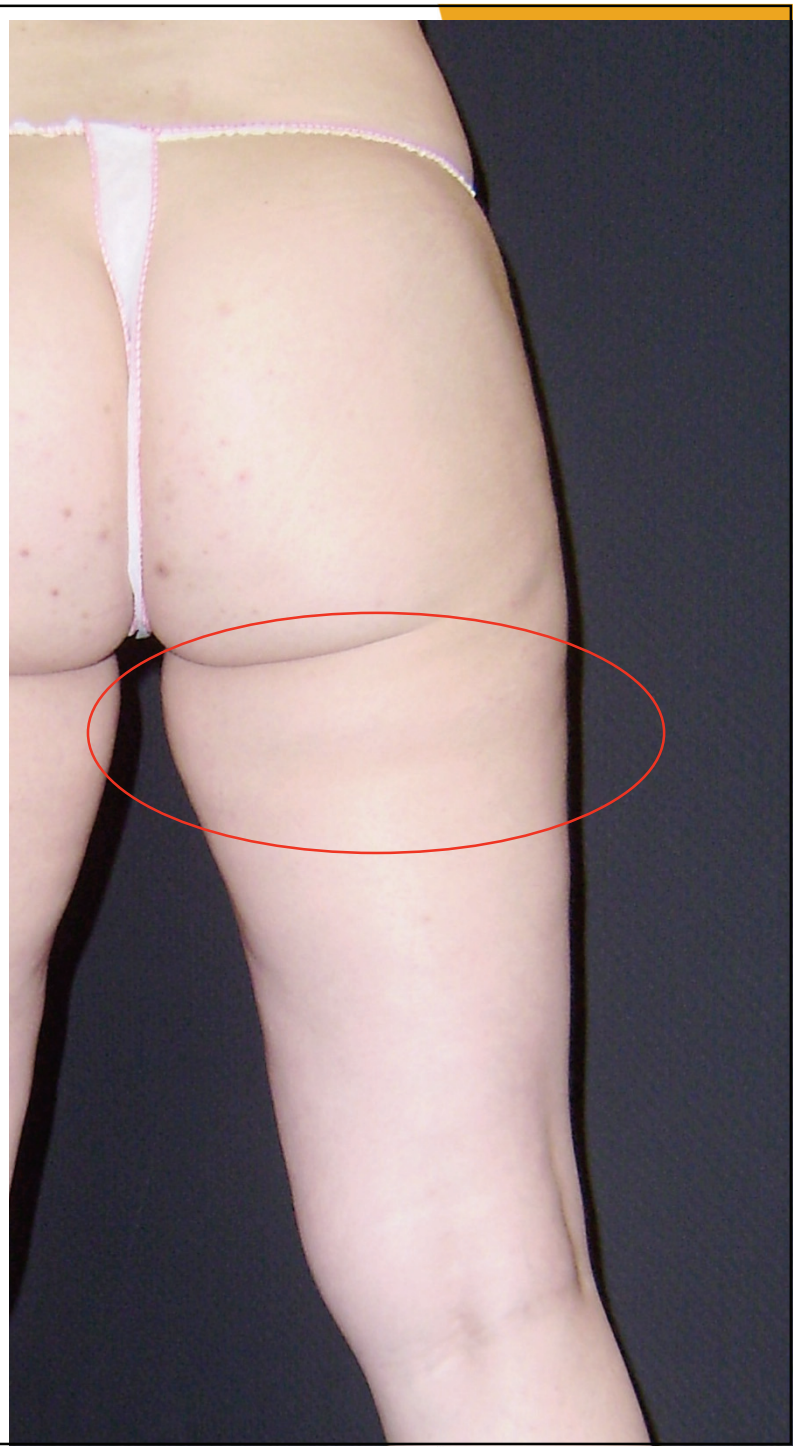


Clinical results:
Smoothening of persisting fat depots
40 mm applicator showed better results

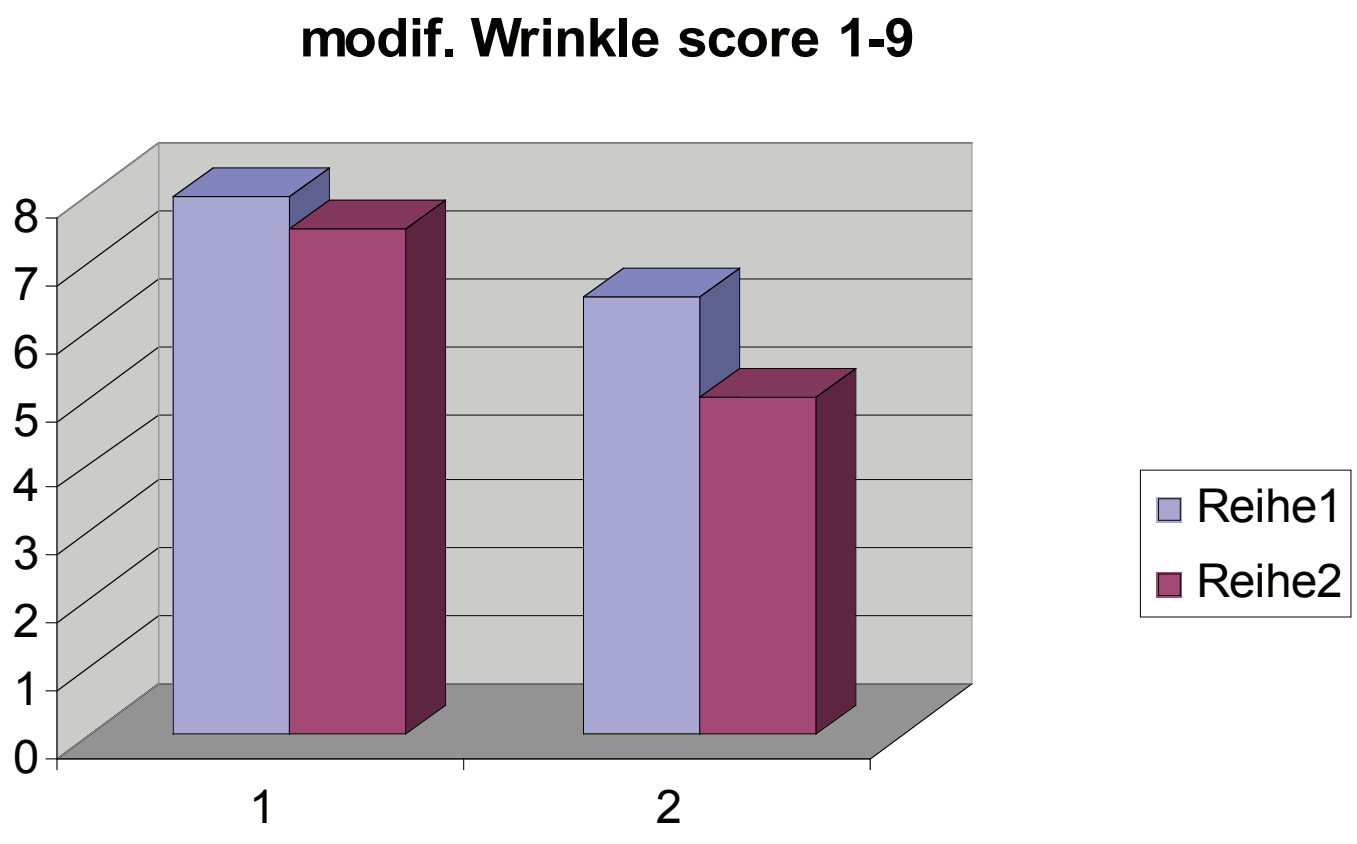


pre

and

post 1 month pat m-h m

Results 2:
Smoothening and tightening depending on level of Cellulite



1) = Cellulite 4 // 2) = Cellulite 1-2

pre and post 1 month pat ty

pre and post 1 month pat m-h m

No sufficient effect in :

1. Cutis laxa und
2. Lipedema and
3. Lymphedema (both need more sessions)
4. Cellulite level 4

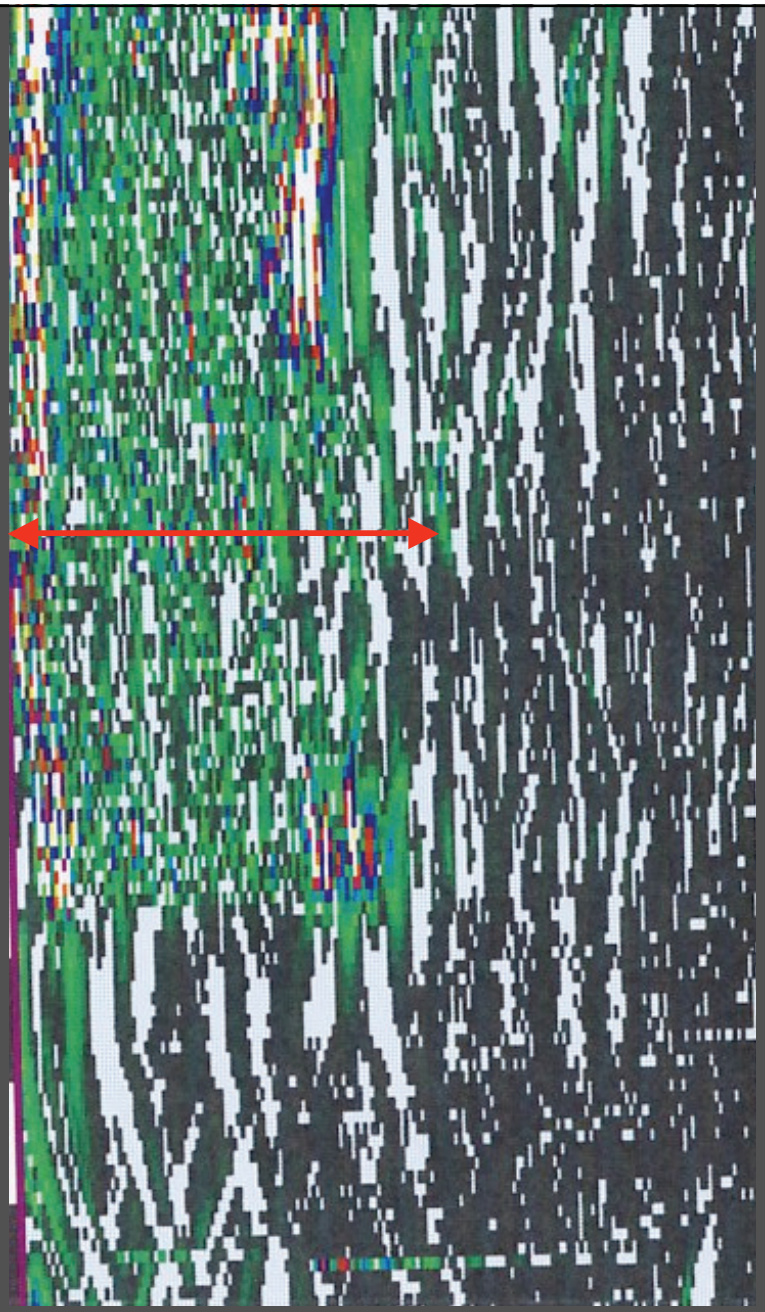
Diagnostic ultrasound results with 20 MHZ (DUB 20 MHZ)

- after 10 Session with

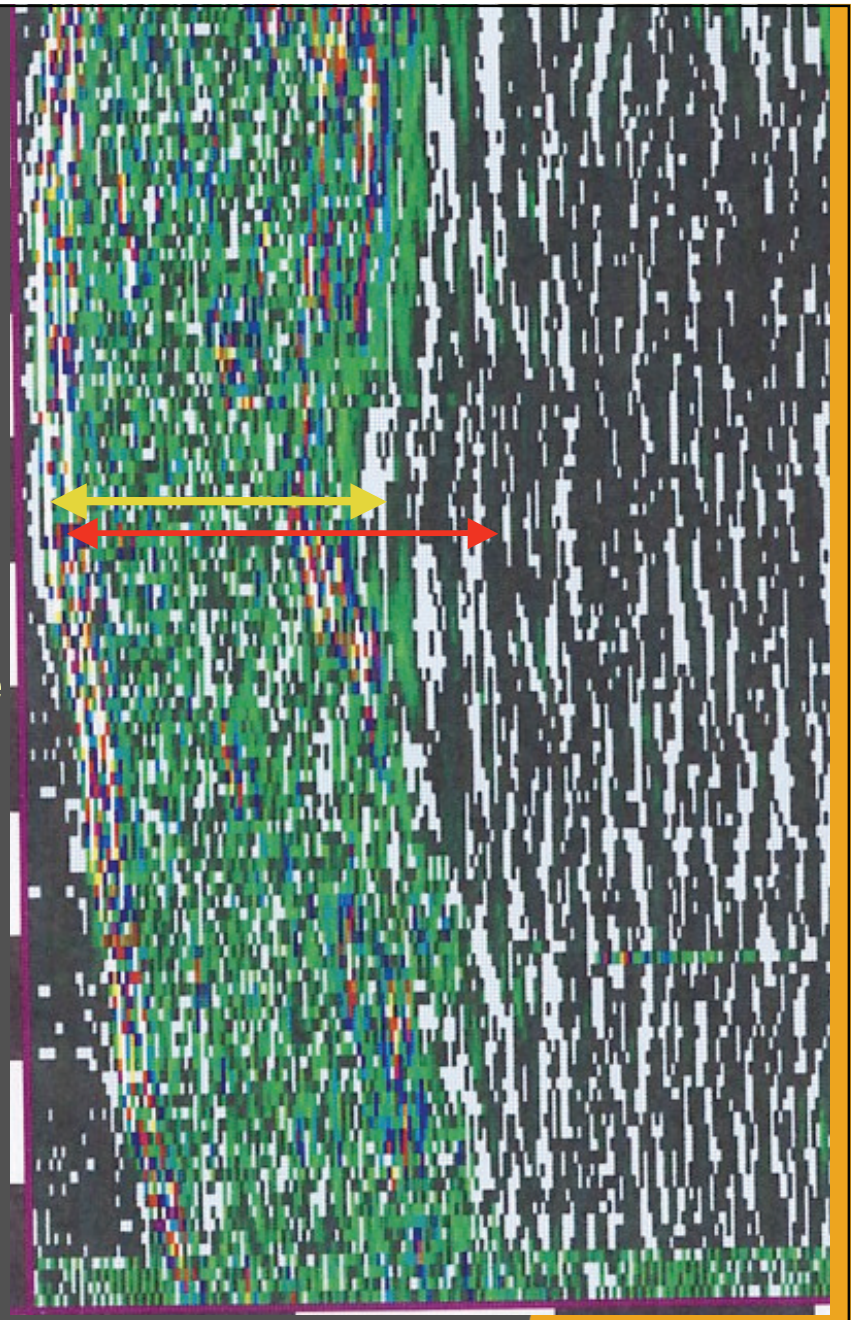
  40 mm applicator
- **Increase of tissue density**
- **More homogenous tissue appearance**

Due to

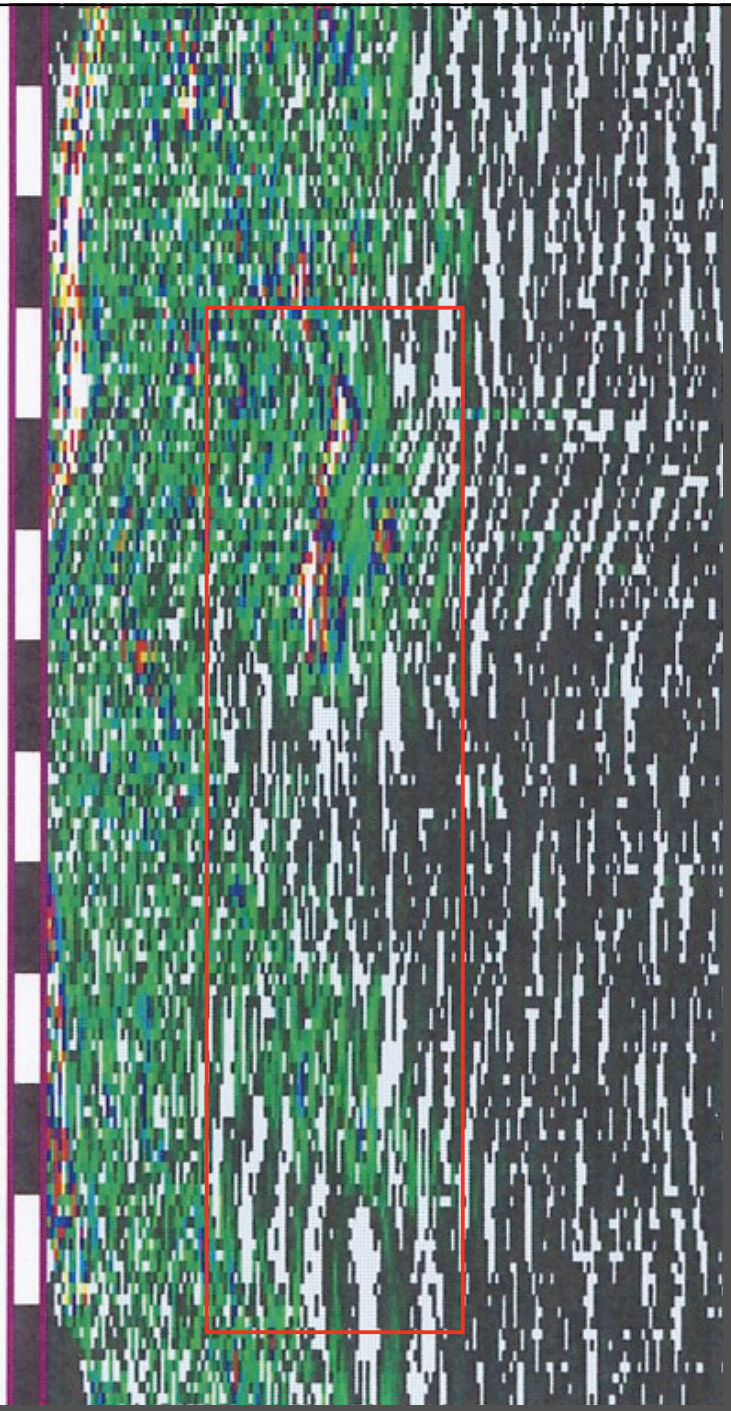
- Better lymphatic drainage
- Less edema
- Tissue tightening
- Initiation of new collagen



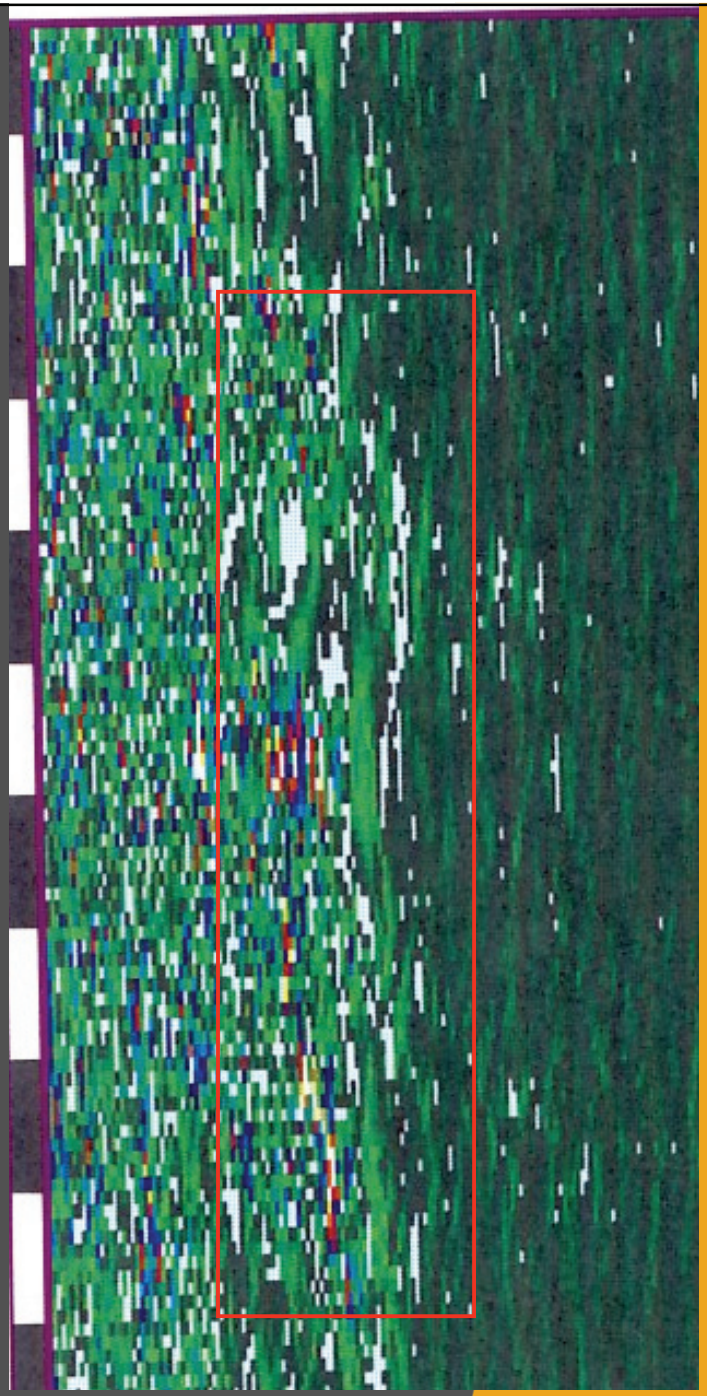
Increrase of density



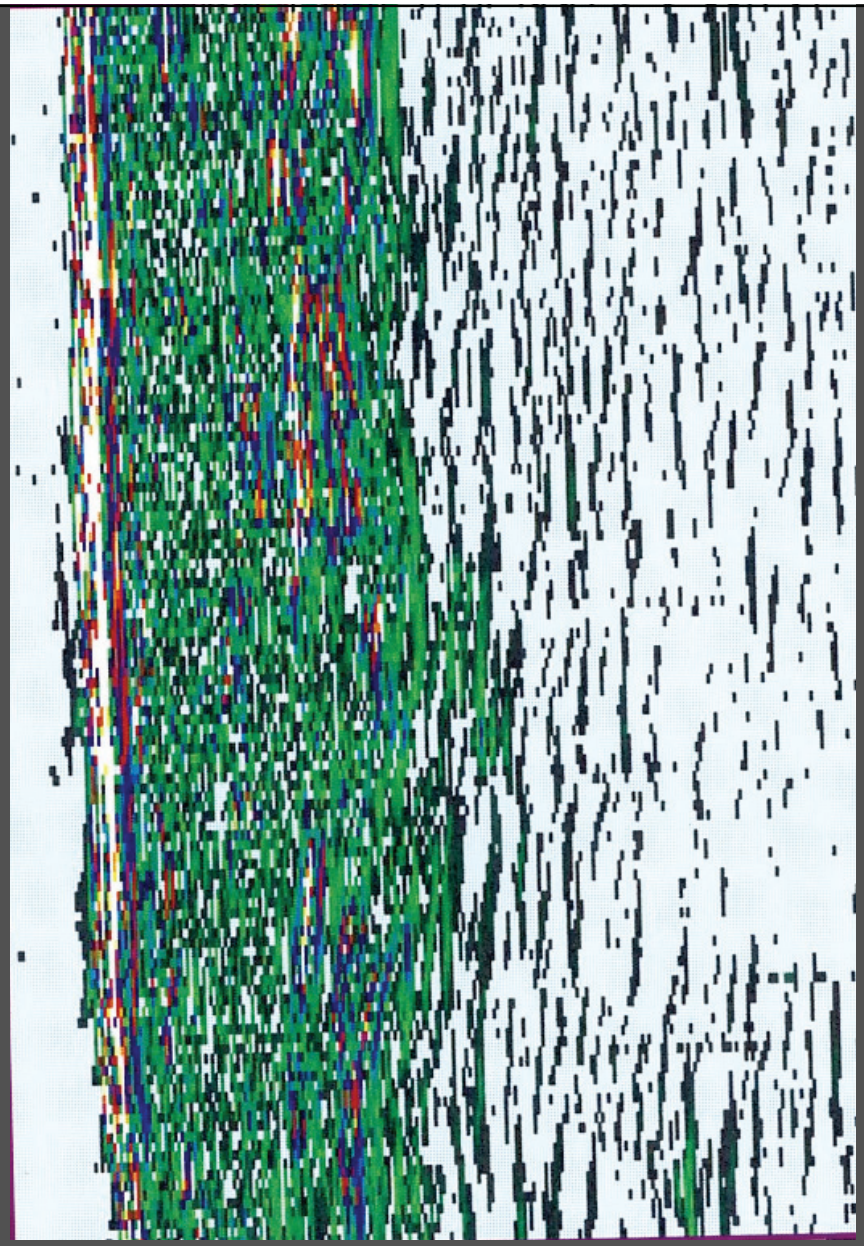
pre and post 3 weeks pat ic

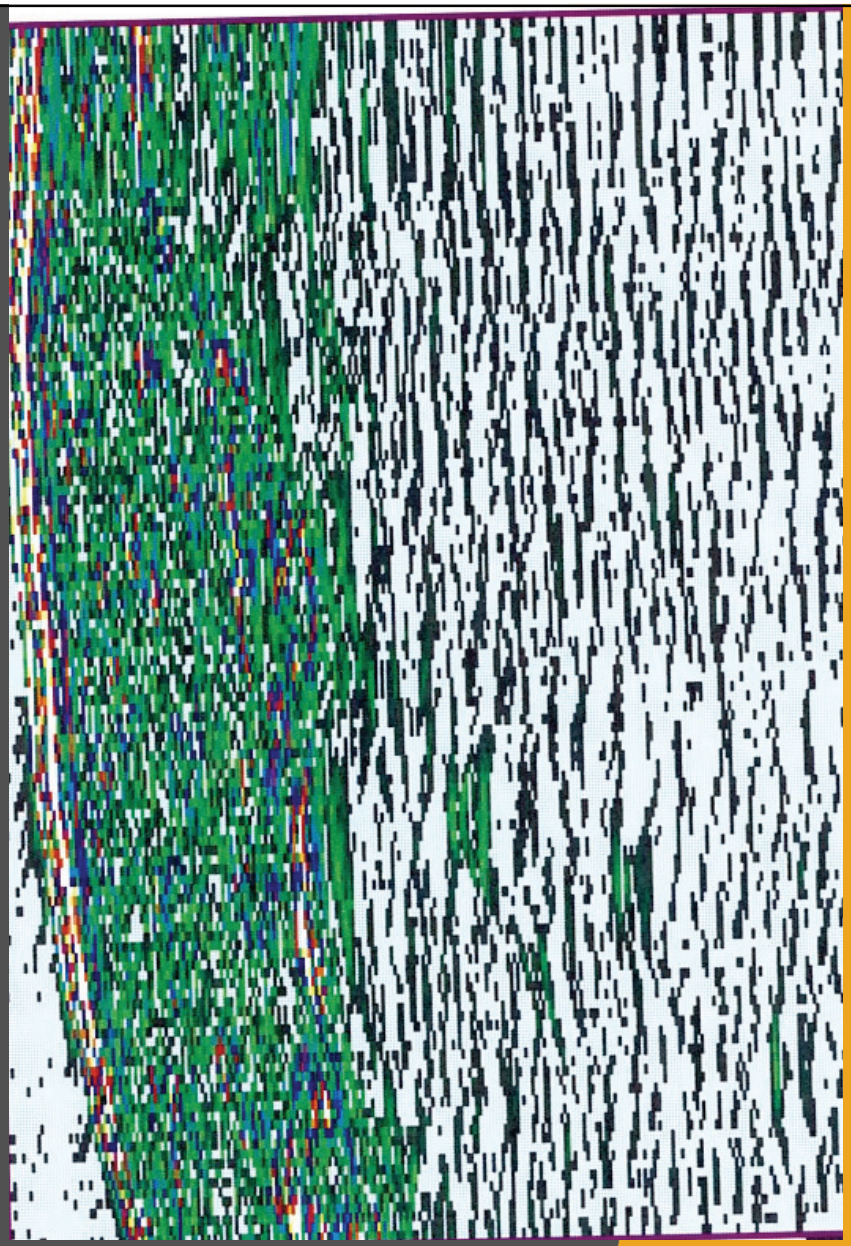


More homogenous tissue



pre and post 2 weeks pat nc





Increase of density and homogenous tissue

pre and post 3 weeks pat sp

summary

Large 40 mm applicator

More effective than small (25 mm)

Indications

Cellulite level 1and 2 (3)

Persisting fat deposits

Pre and post Liposucction

or Laserlipolysis

May be combined with

Endermology and Lipolysis

Less effective in

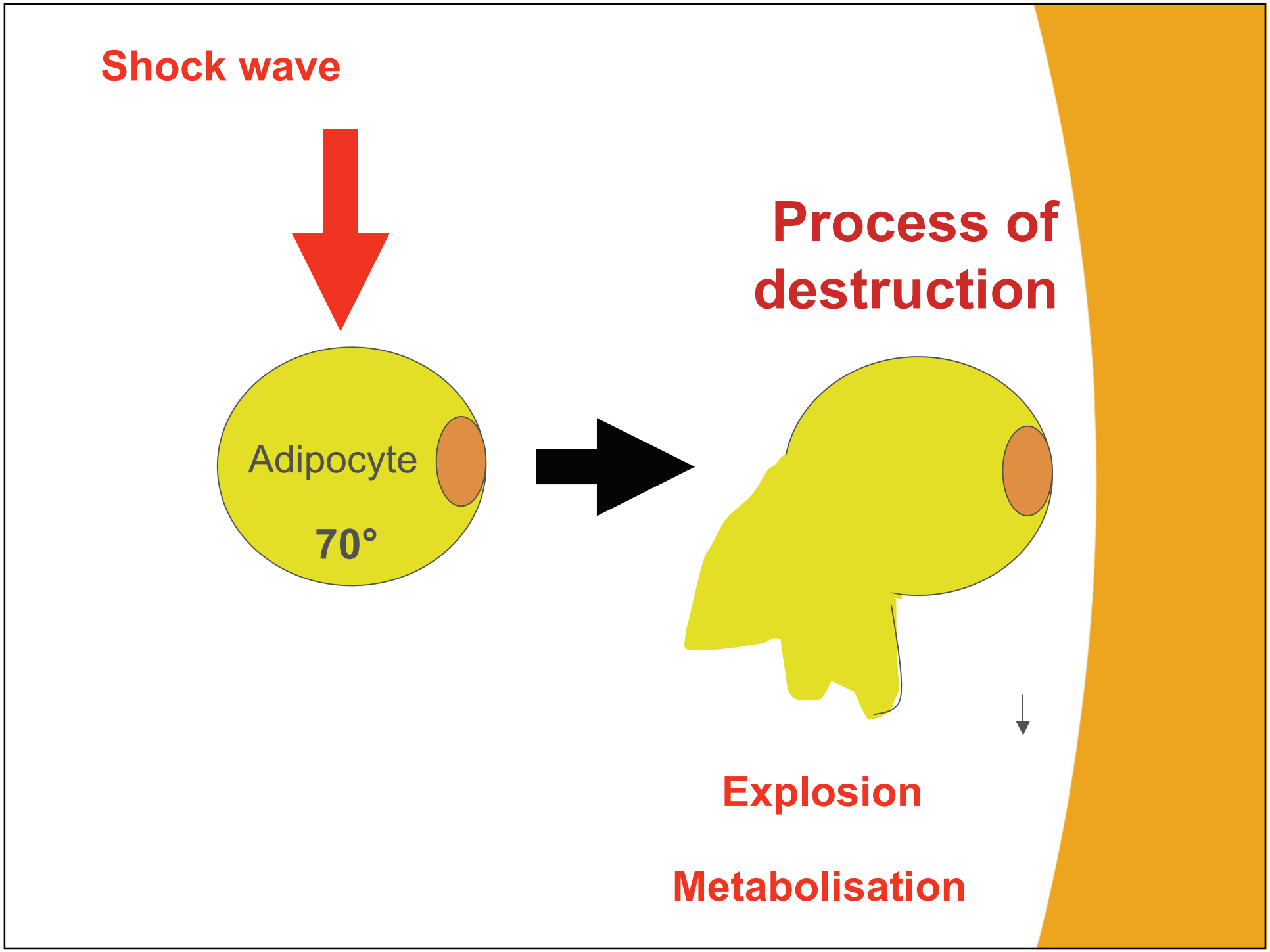
Cutis laxa

Cellulite level 3-4

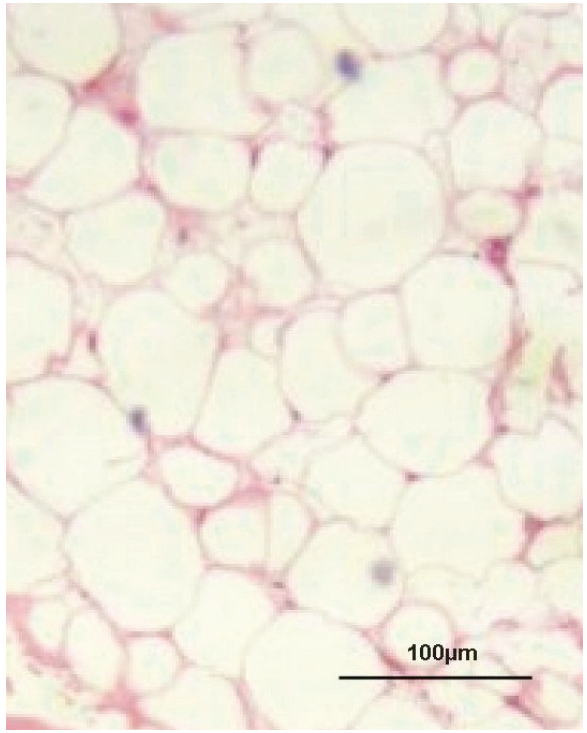
Adipositas

RWT Mechanism of Action

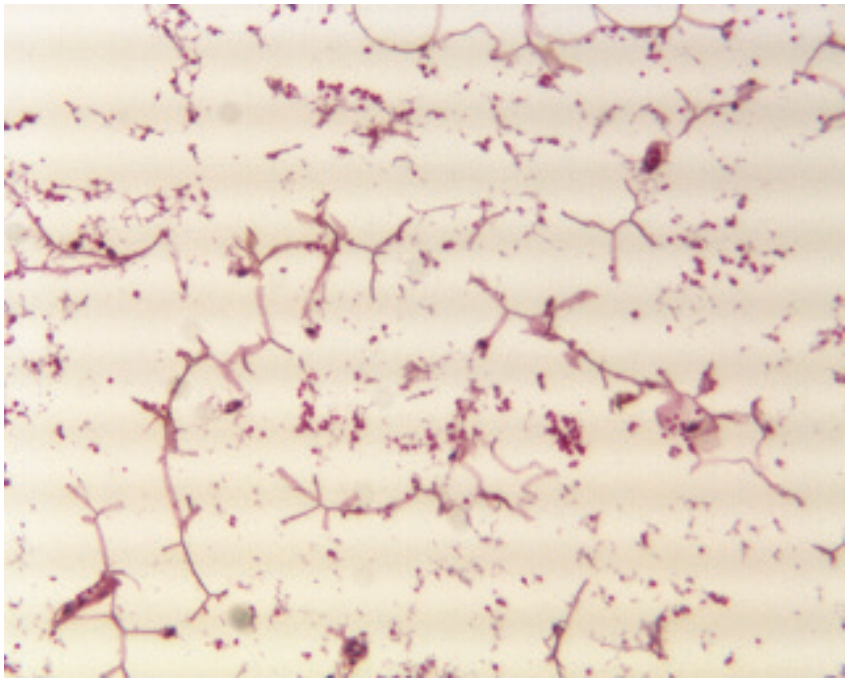
What Can Radial Waves Do?	How Can It Decrease Cellulite Severity
Mechanical Massage	Improving Lymph Circulation, and decreasing fat cells oedema
Increasing local blood flow	Decreasing local toxins and oxidative products
Neovascularization	Increasing “normal” metabolism of the area, less toxins, anti-oxidative effect, less fibrosclerotic effect of the septa
Increased Dermal Connective Tissue growth	Firmer skin and less bulging


Shock wave
Process of destruction
Adipocyte
70°
Explosion
Metabolisation

Results on the adipose cells



Adipocyte
in normal state



Bursting of the
adipocyte
membranes

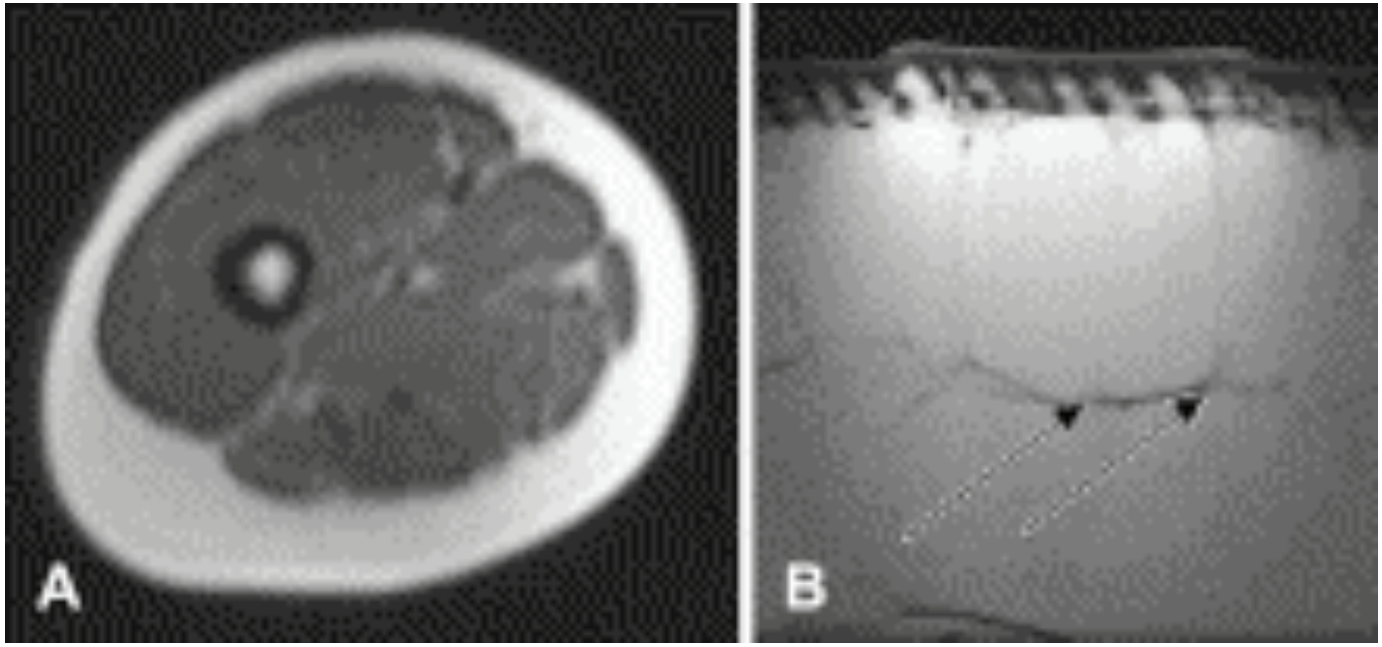
The damage to the dermis leads to :

→ **Excitation of the fibroblast**

→ Collagen production

→ **Tightening of the skin**

Massage effect Magnetic resonance images of adipose tissue.



A, normal Hypodermis is hyperintense. Dermis is not visible.
B cellulite 3 mm thick hypodermis
Camper fascia separates the adipose tissue into two layers.
Fibrous tissue septae appear as thick, hypointense structures.

Querleux B, Cornillon C, Jolivet O, Bittoun J. Anatomy and physiology of subcutaneous adipose tissue by in vivo magnetic resonance imaging and spectroscopy: relationships with sex and presence of cellulite. Skin Res Technol. 2002;8:118–124.

Massage effect

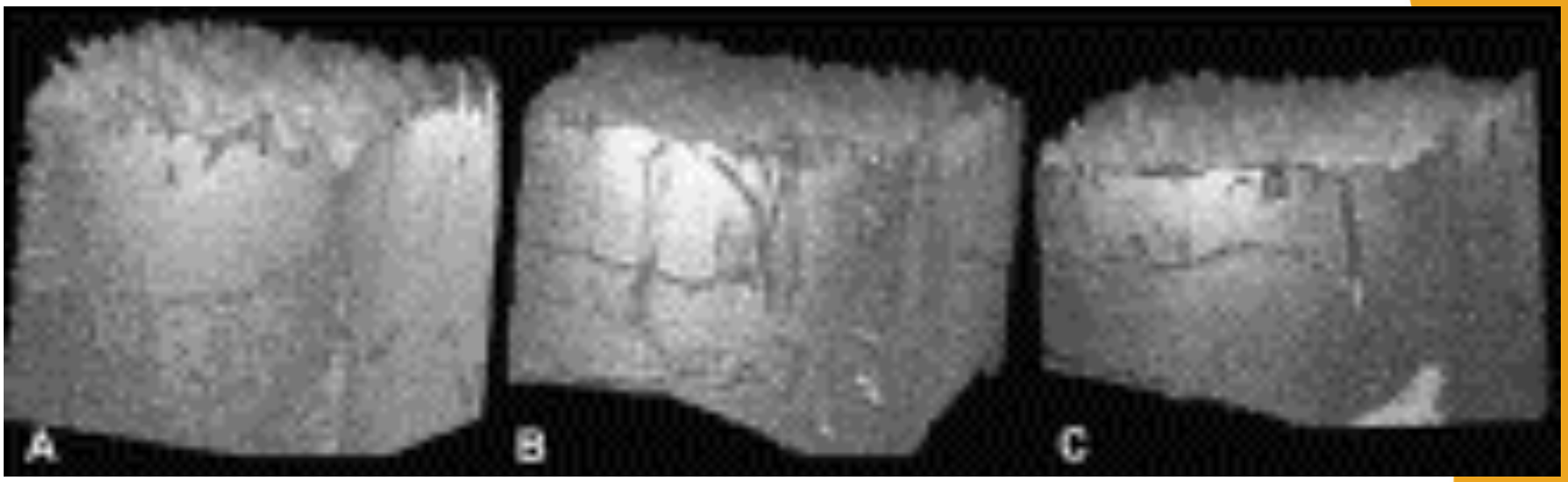
- Deterioration of the dermal vasculature,
- particularly in response to altered precapillary arteriolar sphincters
- is coupled with the deposition of hyperpolymerized glycosoaminoglycans (GAGs) in the dermal capillary walls and within the ground substance between collagen and elastin bundles.
- GAGs have hydrophilic properties, which leads to elevated excessive fluid retention.
- Edema can also lead to vascular compression, hypoxia

Rossi AB, Vergnanini AL.CelluliteJ Eur Acad Dermatol Venereol.2000;14:251–262

Misbah H. Khan, MDa , Frank Victor, MDa, Babar Rao, MDa, Neil S. Sadick, MD**Treatment of cellulite: Part I. Pathophysiology** Volume 62, Issue 3, Pages 361-370 (March 2010)

Massage effect

A, Woman with cellulite B, Unaffected woman C, Unaffected male.



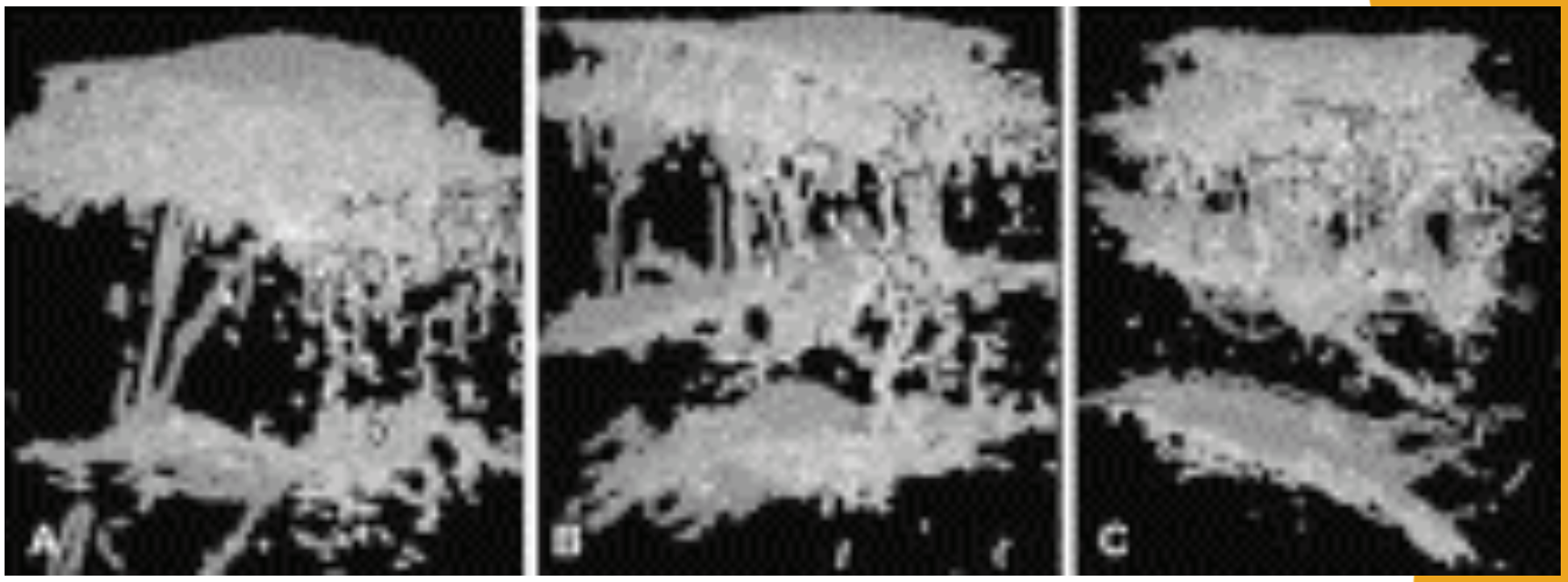
3 principal orientations of septae: perpendicular, parallel, and angulated at 45°

Women with cellulite had a higher percentage of perpendicular septae than unaffected women ($P < .001$)

Skin dimpling in cellulite and dermal stretch marks, or so-called "striae," may be similar conditions with forces of distension acting in a perpendicular versus parallel fashion

Querleux B, Cornillon C, Jolivet O, Bittoun J. Anatomy and physiology of subcutaneous adipose tissue by in vivo magnetic resonance imaging and spectroscopy: relationships with sex and presence of cellulite. Skin Res Technol. 2002;8:118–124.

Fibroblast stimulation effect on uneven ,thin and vertical septae

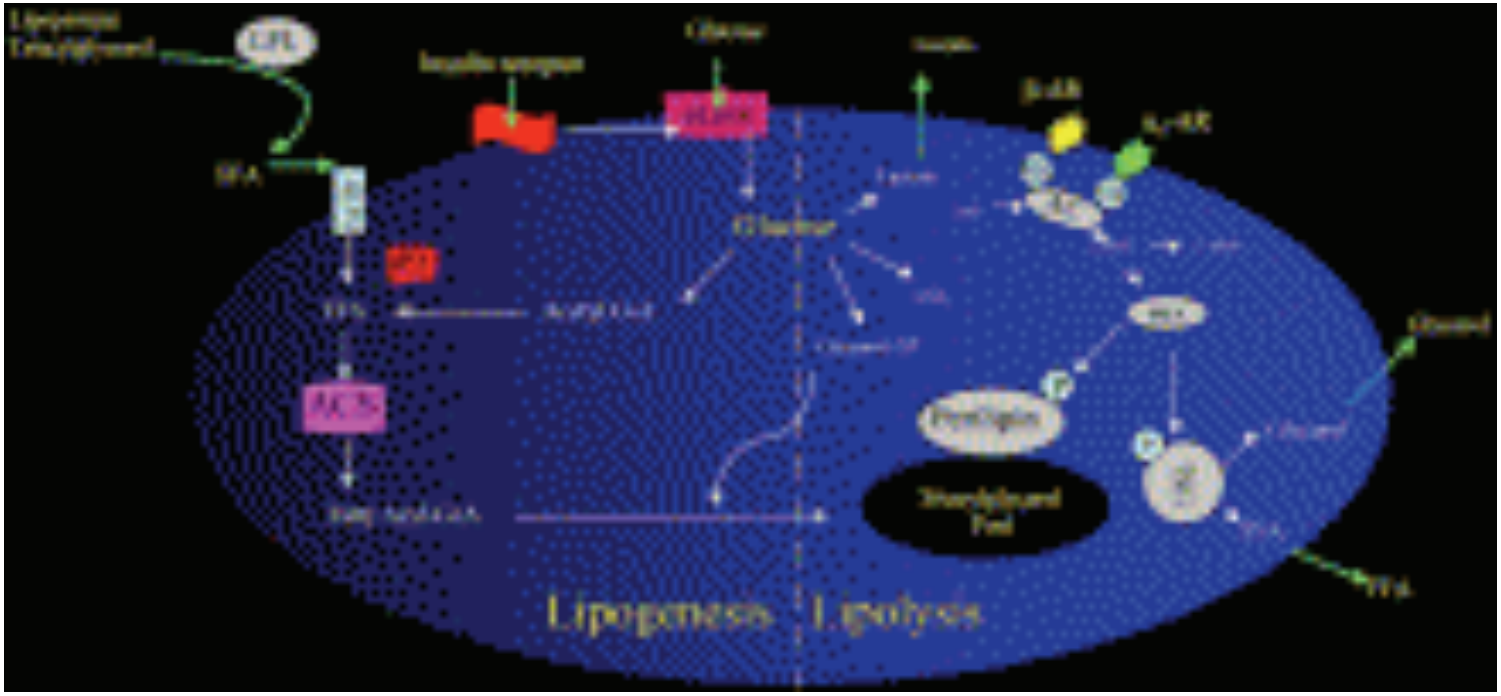


A, Woman with cellulite. B, Unaffected woman. C, Unaffected male.

Visualization of the three-dimensional architecture of fibrous septae in subcutaneous adipose tissue as viewed by magnetic resonance imaging. Women with cellulite have a higher percentage of thinner, perpendicularly oriented hypodermal septae and uneven thickness of connective tissue septae correlating with the “mattress phenomenon, than unaffected women and men.

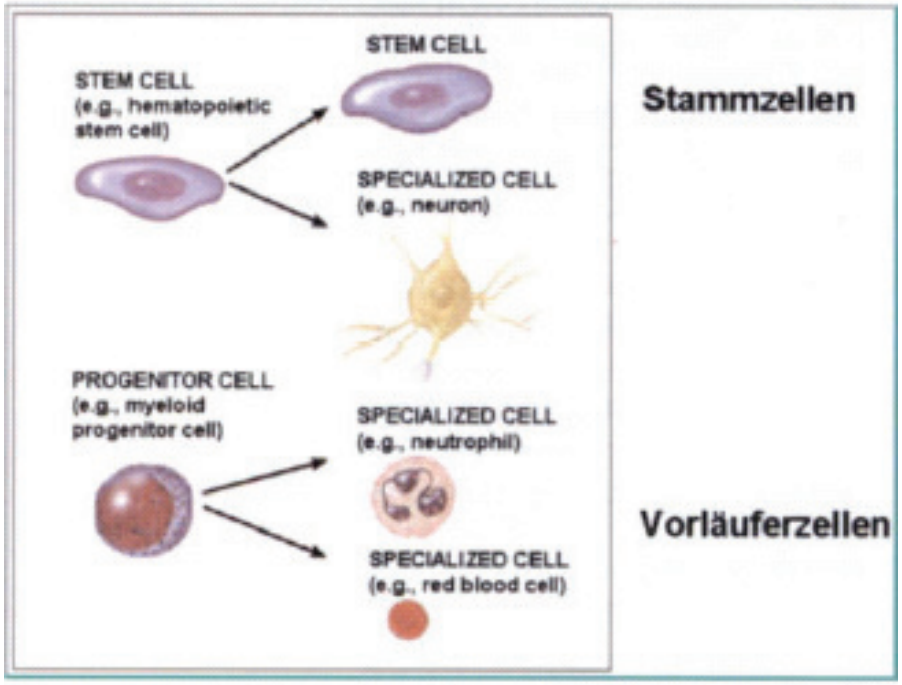
Querleux B, Cornillon C, Jolivet O, Bittoun J. Anatomy and physiology of subcutaneous adipose tissue by in vivo magnetic resonance imaging and spectroscopy: relationships with sex and presence of cellulite. Skin Res Technol. 2002;8:118–124.

Initiating Lipolysis



- **Fig 5. Overview of fatty acid uptake, lipogenesis, and**
- **lipolysis: aP2,, α2 adenoreceptor; β-AR; HSL, hormone sensitive lipase; LPL, lipoprotein lipase**
- Marks DB, Marks AD, Smith CM. Basic medical biochemistry: a clinical approach. Philadelphia: Lippincott, Williams and Wilkins; 1996.)

Stem cells



Shock wave treatment of stem cells showed Increase of migration activity

Thiel, Michael :Application of Shock Waves in Medicine
Clinical Orthopaedics and Related Research: June 2001 – Volume 387 - Issue - pp 18-21

Neuland, Schmidt: Induktion adulter mesenchymaler Stammzellen durch extrakorporale Stosswellen zur Regeneration muskuloskelettalen Gewebes .Orthopädische Praxis 42,4(2006)

Additional or potential indications

Mechanism

- Microfracturing initiates Woundhealing
- Release of growth factors from tissue
- Increas of revascularisation
- Microfracturing may be used for drug delivery

Sofia Mariotto ,Elisabetta Cavalieri ,Ernesto Amelio ,Anna Rosa Ciampa et al:Extracorporeal shock waves:From lithotripsy to anti-inflammatory action by NO production. Nitric Oxide 12 (2005) 89–96

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Adipositas

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Christine Dierickx

Maurice Adatto

Klaus Fritz

David Goldberg

Michel Gold

Henry Chan

Moshe Lapidoth

September 2011 – Cannes - France

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with shock waves
25 mm compared to 40 mm applicator

Thank You

Klaus Fritz
Landau and Kandel private practices
Zimmer medical instruments Germany
Consultant and lecturer Universities Bern(CH)
and Osnabrück (D)
Präsident European Soc. Laser Dermatology