Low frequency ultra sound technology for localised fat reduction
First developed in World War II to locate submerged objects, the technique is now widely used in virtually every branch of medicine.

In obstetrics, to study the age, sex, and level of development of the foetus and to determine the presence of birth defects or other potential problems.
In cardiology to detect heart damage.
In ophthalmology to detect retinal problems.

Also used to heat joints, relieving arthritic joint pain, and for procedures such as lithotripsy.
RATIONALE

High-frequency therapeutic ultrasounds (1 to 3 MHz) have long been used for their analgesic, coagulating, de-fibrotic properties.

However high-frequency ultrasounds do not produce desired results on subcutaneous fat. Hence, the use of low-frequency ultrasounds for the treatment of lipodystrophies.

Ultrasound technology is non invasive, involves no radiation, and avoids possible hazards such as bleeding, infection, or reactions to chemicals.
TARGET = FAT

Ultra Sound Transducer

Epidermis
Dermis
Hypodermis & Subcutaneous fat
Parallel fat
Muscle

Targeted Area
AESTHETIC APPLICATION

- Improve shape
- Reduce volume
FUNCTION

Low-frequency ultrasonics waves have three principal effects:

- Depolymerization or the molecular dislocation of triglycerides and the increase of their fluidity.
  - Lipolysis or the ejection of fatty acids from adipocyte cells due to stable cavitations and an increase in adipocyte cellular permeability.

- Adipocyte lysis (disruption)

- Defibrosis through the defibrinolytic mechanical action on bulk tissue present in the hypoderm.
Lipolysis & Fat reduction

**TG** with **LPL** $\rightarrow$ FFA $+$ Glycerol (water soluble)

FFA binds to **Albumin** (2 – 3 molecules of FFA binds to 1 of albumin) transported away

FFA is metabolised by Liver
Acoustic cavitation occurs whenever a liquid is subjected to sufficiently intense sound or ultrasound (frequencies of 20 kHz up to 10 MHz).

When sound passes through a liquid, it consists of expansion waves (negative-pressure) and compression waves (positive-pressure). If the intensity of the sound field is high enough, it can cause the formation, growth, and rapid recompression of vapour bubbles in the liquid.

The implosive bubble collapse generates localized heating, a pressure pulse, and associated high-energy chemistry.
CAVITATION PHENOMENON

A new bubble is born & cycle repeats itself
SPECIFICITIES

Twin Transducers Technology with spot surface = 17.5 cm²
SPECIFICITIES

- **Power**: 3 watts / cm²
- **Frequency**: 30 kHz – 70 kHz
- **Sweep Time**: 3” – 30”
- **Changeable parameters**
  - Treatment time
  - Power
  - Sweep time
Interval between treatment sessions 15 - 21 days (related to patient basal metabolism and lifestyle)

Total number of sessions 2 – 6 (4 on average) varies according to assessment of overall volume, area to treat and structure of tissue.
AVERAGE TREATMENT TIME PER AREA.
NOTE: SOME AREAS CAN BE DIVIDED (ACCORDING TO NEED AND OBJECTIVE) IN FOUR (4), THREE (3) OR TWO (2) SUB AREAS.

<table>
<thead>
<tr>
<th>POSITION</th>
<th>SESSION TREATMENT TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRONE</strong></td>
<td></td>
</tr>
<tr>
<td><strong>AREA</strong></td>
<td>PER AREA</td>
</tr>
<tr>
<td>BACK</td>
<td>15’ x 4</td>
</tr>
<tr>
<td>LOWER BACK &amp; BOTTOM</td>
<td>15’ x 4</td>
</tr>
<tr>
<td>LATERAL EXTERNAL POSTERIOR THIGH</td>
<td>30’ x 2</td>
</tr>
<tr>
<td>CALVES</td>
<td>15 - 20’ x 2</td>
</tr>
<tr>
<td><strong>SUPINE</strong></td>
<td></td>
</tr>
<tr>
<td>EXTERNAL ARMS</td>
<td>20 - 30’ x 2</td>
</tr>
<tr>
<td>EXTERNAL PART BREAST/PECTORAL</td>
<td>20’ x 2</td>
</tr>
<tr>
<td>ABDOMEN 4 SEGMENT</td>
<td>15’ x 4</td>
</tr>
<tr>
<td>INNER, MEDIUM THIGH</td>
<td>30 - 40’ x 2</td>
</tr>
<tr>
<td>INNER KNEE</td>
<td>15 - 20’ x 2</td>
</tr>
<tr>
<td>EXTERNAL THIGH</td>
<td>30’ x 2</td>
</tr>
</tbody>
</table>
## CORRELATION BETWEEN POWER & DEPTH

<table>
<thead>
<tr>
<th>ADIPOSE TISSUE DEPTH</th>
<th>POWER/DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.8 - 1.3 cm</td>
<td>20%</td>
</tr>
<tr>
<td>1.3 - 1.8 cm</td>
<td>30%</td>
</tr>
<tr>
<td>1.8 - 2.3 cm</td>
<td>40%</td>
</tr>
<tr>
<td>2.3 - 2.8 cm</td>
<td>50%</td>
</tr>
<tr>
<td>2.8 - 3 cm</td>
<td>60%</td>
</tr>
<tr>
<td>3.0 - 3.5 cm</td>
<td>70%</td>
</tr>
<tr>
<td>3.5 - 4.0 cm</td>
<td>WARNING!!</td>
</tr>
<tr>
<td>4.0 - 4.5 cm</td>
<td>WARNING!!</td>
</tr>
<tr>
<td>4.5 - 5 cm</td>
<td>WARNING!!</td>
</tr>
</tbody>
</table>
## POST SURGICAL

- These are options the surgeon can choose to use in order to complement the surgery (3 months to 1 year after surgery) so as to optimize the result of the surgery and prevent tissue transformation.
- When tissue has become uneven due to fibrosis (1 year after the surgery and more) the Proslimelt can be used to correct the condition and improve appearance.

<table>
<thead>
<tr>
<th>TISSUE TYPE</th>
<th>SWEEP TIME RANGE</th>
<th>POWER RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORMAL ADIPOSE TISSUE</td>
<td>10&quot;- 20&quot;</td>
<td>30% - 70%</td>
</tr>
<tr>
<td>EDEMATOSE ADIPOSE TISSUE</td>
<td>20&quot;- 30&quot;</td>
<td>30% - 60%</td>
</tr>
<tr>
<td>FIBROSE ADIPOSE TISSUE</td>
<td>5&quot;-10&quot;</td>
<td>30% - 50%</td>
</tr>
</tbody>
</table>

### POST LIPO

<table>
<thead>
<tr>
<th>3 mths – 1 year after surgery (1-3 sessions)</th>
<th>5&quot;- 20&quot;</th>
<th>30% - 60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year and more after surgery (2 – 4 sessions)</td>
<td>5&quot;- 20&quot;</td>
<td>30% - 60%</td>
</tr>
</tbody>
</table>

NB: A Pre Liposuction treatment can be performed when appropriate as close as possible before the surgery to condition the tissue and facilitate and enhance the surgery.

**PRE LIPO :(1session)** 10"- 20" 30% - 70%
PROCEDURES

The selected area is treated following a grid pattern.

The transducer is moved over the grid slowly addressing each part of the grid with a circular motion for the determined seconds.

Treated areas: waist & abdomen, gluteus, outer thigh, posterior thigh, inner thigh and knee.
CLINICAL RESULTS
CAMERA PICTURES

RESULTS
AFTER ONE SESSION
PERIMETRIC EVALUATION

Abdomen after 4 sessions

Thigh after 6 sessions
Echographic evaluation

Measurement of the subcutaneous fat layer

Abdominal area.
Initial: 1.5 mm  Post: 1.3 mm
Perimetric reduction: 3 cm
Upper flank area.
Initial : 0.9 mm                   Post : 0.8mm
Perimetric reduction : 1 cm

The amount of fat loss is related to layer thickness
Mid flank area.
Initial : 1.2 mm                    Post : 1.1mm
Perimetric reduction : 2 cm

Density loss due to adipocytes disruption with no damage to surrounding tissues
CONTRAINDICATIONS

ABSOLUTE

• Pregnancy
• Breast feeding
• Serious Liver dysfunction
  (Hepatitis, Cirrhosis)
• Serious kidney dysfunction
• Evolutive disease
• Metal implant
• Pace maker
CONCLUSION

- Time efficient & non invasive procedure
  - Efficient & Safe body contouring treatment
  - Visible reduction of body circumference after each treatment
  - Adipose tissue lysed and cleared through natural mechanism
- No down time / Walk in procedure
- Office base treatment / no surgical theater
- No anesthesia / comfortable procedure
- Possibility to treat 2 areas at the same time
REFERENCES


5. Bailey M.R., Halaas D.J., Martin R. (Center for Industrial and Medical Ultrasound, Applied Physics Laboratory, University of Washington, Seattle, WA, USA); Cavitation Control by Dual Frequency Hingh Intensity Focused Ultrasound. Chulichkov A.A., Khokhlova V.A. (Department of Acoustics, Faculty of Physics, Moscow State University, Moscow, RUSSIA).
REFERENCES

8. Vykhodtseva N., Mcdannold N., Sheikov N., Martin H., Hynynen K. Effects of cavitation induced by Low power Focused Ultrasound in the presence of an US Contrast Agent: Study on Rabbit Brain in Vivo. Focused Ultrasound Laboratory, Department of radiology, Brigham and Women’s Hospital, Harvard Medical school, Boston USA)


