CAVITATION SUMMARY, (October the 7th):

WHAT IS CAVITATION:

Cavitation, used both in cosmetology and in aesthetic medicine and surgery, is an innovative technique mainly for reducing localised adiposity and cellulite in a non-surgical manner, which uses low frequency ultrasound (from 30 to 70 KHz). It is a safe, efficient method, which is non-invasive, causes no pain or collateral effects, consisting of diluting fat through movement, safely, with no anaesthetic or recovery time required.

ULTRASOUND APPLIED TO CAVITATION:

The ultrasound used in medical therapy and in aesthetic treatments is represented by a mechanical vibration (mechanical energy waves) which are propagated through an elastic conductor medium, liquid or solid (for example, body tissue), as a longitudinal wave that alternatively produces compression (high pressure) and rarefaction (low pressure), producing elastic oscillations in its molecules of a sinusoidal type in relation to the original position of balance.

The frequency of ultrasound waves is greater than 20,000 Hz (or 20 Khz) and ultrasound waves are not audible to the human ear. The human ear's capacity to capture sound lies between 20 and 20,000 Hz because the organ of Corti in the inner ear does not contain appropriate receptors for sound waves outside this frequency, such as ultrasound waves. This also explains why in rare cases, some patients are particularly "sensitive" (possibly due to a hyper-specialisation of the auditory nerve receptors) during the application of frequencies employed in cavitation (30-70 KHz). They perceive an annoying whistle.

ACTION AGAINST FAT:

Cavitation acts against the adipose tissues, causing the fatty material to fragment and subsequently diffuse the lipidic matrix, which will later be dissolved into the interstitial fluid. Emulsification of the lipidic content favours its metabolic assimilation. This fluid is conducted through the vascular and lymphatic systems towards the liver. Once there, it is processed normally by the organism.

TYPES OF ULTRASOUND:

***1.** Ultra-low frequency US (20-100 KHz) used mainly in the industrial sector (for example for cleaning metals or glass), and also nowadays in the medical environment of cavitation.*

2. *Low-frequency US (100 KHz-1 MHz), used in medicine in physical therapy for its significant therapeutic effects on tissues.*

3. *High-frequency US (1-10 MHz) employed in the medical environment in doppler sonographies.*

PHYSICAL PRINCIPLE:

Acoustic cavitation is the physical principle that manifests when a liquid is subjected to a sufficiently intense sound or ultrasound (frequencies from 20 KHz upwards). If the intensity of the sonar field is high enough, this can cause the formation, growth and rapid rarefaction or implosion of gas bubbles (charged with energy) in the liquid, micro-bubbles of gas that increase their volume until their energy is greater than that exercised by the external pressure pushing against them.

CHEMICAL PRINCIPLE:

The first products generated were molecular hydrogen (H2) and hydrogen peroxide (H2O2). High-energy intermediate products are also generated.
In studies performed on organic liquids it has been seen that the total gas pressure is low, enough to allow the implosion effect of the bubbles. Almost all the organic liquids generate free radicals (Suslick KS).

EVOLUTION OF THE CAVITATION BUBBLES:

A) Creation of bubbles; B) Increase in size; C) Implosion of the bubble; D) Hot spot: by imploding, suddenly bursting, the cavitation bubbles create vibration pressure impulse characterised by extremely high temperatures, pressures and changes of heat in fractions of time around the length of a micro-second. The hot spot impulse develops from the principle of an adipocyte structure, also managing to break the cell wall of the adipocytes, thereby causing a resulting reduction in permanent fat.

CAVITATION APPLIED TO THE FIELD OF AESTHETICS:

Cavitation enables micro-bubbles (or cavities) to be generated in the fatty mass and adipocytes. The continual formation and bursting of these bubbles close to the

cell walls, facilitates break-down of the fat molecule by bombarding it from all directions (three dimensional cavitation), liquidising it and encouraging evacuation without damaging the cell membranes.

EFFECTS OF CAVITATION ON ADIPOSE TISSUE AND ON THE TREATED AREA:

Cavitation, applied correctly at a suitable power, is highly selective with respect to adipose tissue and any other organ or tissue that could be affected. It eliminates the adipose cells permanently in a painless, non-invasive manner. Due to the fact the effect is localised at a specific depth (the subcutaneous adipose stratum) the tissues surrounding it are not damaged.

By passing the probe head over the treatment area, the low-frequency ultrasound produces focused "cavitation", attacking the adipose tissue and causing gas bubbles to form in the treatment area at the level of the adipose stratum.

The bubbles increase in volume causing the mechanical breakage of the adipocyte cellular membranes, releasing this material into the interstitial fluid of thetriglyceride cells (which occupy up to 75% of adiposity volume). These will be eliminated from the body through a natural metabolic process (physiological cleansing or purifying organs: liver, lymphatic system and venous system); and utilised partially by the energy metabolism in the 4-5 days following treatment.

Lipiduria (presence of lipids in urine) occurs above all in the first 24 hours and peaks around the 18th hour.

APPLIED CAVITATION:

1. *Treatment of Cellulite. Best results are obtained by treating adipose areas that are not overly extensive.*
2. *Localised adiposity, or rather, the presence of a tissue that is particular rich in adipose cells compared to other body zones.*
3. *Localised fat is responsible for points of low aesthetic value such as enlarged stomach, thighs or hip areas. In such cases, part of the body's fat is concentrated in specific regions that become preferential for storing excess lipids.*
4. *Post-liposuction imperfections with remodelling after surgical liposuction.*
5. *Pre-liposuction treatment (assisted liposuction).*
6. *Body remodelling.*
7. *Re-absorption of the lipomas; treatment preceding surgical extirpation for the purpose of reducing the size of the lipoma, encouraging less obvious scar formation.*

DEFINING AREA TO BE TREATED:

Applying cavitation is recommended in all areas where there is excess fat, excluding the face, neck and female breasts.

METHOD OF APPLICATION RECOMMENDATIONS:

- *Use the conductor gel in suitable amounts, ensuring that there is always a layer between the probe head and the patient's skin.*
- *20-minute session per area according to its size (this can be repeated if you are treating large areas), but under no circumstances must you surpass 60 minutes total of treatment. The moving of the probe head should be slowly over the treatable area.*
- ***It is essential to recommend that the patient drinks at least 1.5 – 2 litres of water a day from the week before the session, to stimulate the liver and kidneys' cleansing actions.***
- *One should pay particular attention to the correct placing of the probe head. It should not be aimed at pubic regions, hypogastric, kidney or osseous regions. It would be ideal to take the folded adiposity area between the practitioner's fingers so that the ultrasound waves penetrate the tissue almost horizontally without damaging deeper structures.*
- *Ensure the surface of the head is always in perfect contact with the skin to avoid defects in applying the treatment.*

CONSIDERATIONS FOR THE CAVITATION TREATMENT:

- *Treatment is painless and non-invasive, although in all cases, after the first application, a mild to moderate edema can appear in the treated area, which could last on average 7 to 10 days.*
- *Sometimes, particularly predisposed subjects could notice a light whistle produced by the equipment. This should not lead to suspension of treatment, except when such a whistle becomes unbearable and causes a headache.*
- *Keeping to a diet rich in vegetables and drinking a lot of water will enable the adipose waste and toxins in general to be easily eliminated from the organism, because these open the body's natural "taps".*

CAVITATION EFFECTS:

1. *Lipoclasy and progressive remodelling of the silhouette*
2. *Reduction of the "orange peel" look of skin and elimination of the cellulite's adipose fibrous nodules*
3. *Oxygenation and revascularisation of asphyctic skin.*
4. *Drainage of retained liquids*
5. *Reactivation of the peripheral circulation.*
6. *Absorption of revitalising or lipolitic active principles*
7. *Improvement in tissue tone and elasticity. In effect, ultrasound induces a distension of tissues which become more elastic thanks to reactivation of the micro-circulation and stimulation of the fibroblasts (that is the typical and most numerous cells in connective tissue, capable of producing the components of the extra-cellular matrix: collagen, glycosaminoglycan, elastic and reticular fibres and glycoproteins). These cells are therefore highly important in regenerating tissues.*

CORRECT DIET:

- *It is highly important to keep to a suitable diet, extremely low in fat.*
- *Lipolitic treatment causes fragmentation of the adipose cell membranes and releases fat into the interstitial fluid.*
- *When the fat cell membrane is destroyed, the triglycerides are released into the interstitial fluid. Glycerol, soluble in water, is absorbed by the circulation system. Fatty acids, which are by nature hydrophobic, are conducted by transport or carrier proteins, predominantly albumins, to the liver where they are metabolised.*
- *You should keep to a very low-fat diet at least during the following five days, to allow the liver to metabolise these fatty acids released by the treatment.*
    - *In the case of sedentary, totally inactive patients, it is essential to advise them to engage in at least 30 minutes of exercise a day. (Nordic walking, strolling, swimming, stretching).*
    - *Patients are recommended to drink a lot of water before and after each treatment.*

COMPLEMENTARY TREATMENT:

• Cavitation: You destroy fat using ultrasound. Apply conductor gel containing active, anti-cellulite ingredients to tone your body.

• Electroporation: Using magnetic fields, this process opens pores and introduces reducing, or draining agents.

• *Pressotherapy: Using pressure sleeves, this increases drainage, naturally helping to eliminate the destroyed fat.*

• *Vibrating platform: Among other benefits it helps to reaffirm and tone the treated area.*

SECONDARY EFFECTS:

If the application protocol is followed and the correct parameters set, the collateral effects will be non-existent or else minimal.

In any case, the episodes leading to mild edemas can be verified (which can last 7-15 days) or bruising on the treated area, in more sensitive patients with greater application frequency of treatment.