

Sonography clinical study – a unique method of objective adipose tissue measurement after UltraContour® High Focalised Ultrasounds and UMD treatment – June 2008

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ABSTRACT. AIMS: This study is aimed to propose a unique method of objective adipose tissue measurement by sonography after non invasive focal ultrasounds and multi-drainage ultrasounds. **METHOD :** We have performed 5 treatments protocols of Ultracontour equipment from Medixsysteme, France (High Focalised Ultrasounds (132 or 264 shoots+ UMD treatments) and executed sonography procedure before the first treatment and within 14 days after the fifth treatment, using a linear stylus 10MHz device in maximum compression, measuring in two fix points and lengthwise proportion. **RESULTS:** Age, BMI, and waist, hip, thigh circumference were measured at each session. After 5 sessions, abdomens were significantly different after 14 days consolidation; in average 4.251cm less, hips report a difference of 3.51cm less and thigh 3.61cm less. **CONCLUSION:** By sonographic measurement of fat thickness, we proved a real, objective fat thickness reduction after the UltraContour® High Focalised Ultrasounds and UltraContour® UMD treatment. We also objectified the absence of lymphedema, haematoma or skin modifications. A given sonographic measurement method with the possibility of obtaining picture documentation

INTRODUCTION

Adipose tissue or fat is one of the largest tissues in a human body. In adult men it forms 15-20% and in adult women it forms 20-25% of body weight. It is the major free energy storage site (triacylglycerols). Subcutaneous adipose tissue, found directly bellow the skin, is an especially important heat insulator and it also cushions the body.

Adipose tissue is formed by adipocytes, the cells specializing in fat storage. Ideal adipocytes know their duties and their place: they absorb excess lipids in the blood and change the shape and form to create good-looking body curves and

eventually to fill in a few internal spaces not required by more important tissues. Otherwise, they rest until starvation calls them to attention. (1)

Two types of adipose tissues exist:

1. Brown adipose tissue

Multilocular cells contain fat droplets with a high number of mitochondria and cytochromes but with only a low ATP activity. It means, that in the course of glucose oxidation, no ATP

(Adenosinetriphosphate) is created so that energy is converted into heat. It is found mostly in newborn babies where it forms up to 5% of body weight. In adults it can be found in the upper part of thorax and neck, in obese adults it is reduced or it is completely missing.

2. White adipose tissue

Unilocular fully developed cells in a shape of sealing ring – signetring cells with a flattened excentric nucleus. Each adipocyte is surrounded by a basal lamina.

Accumulated fat is semi-liquid consistency and consists mainly of triacylglycerols and cholesterol esters. White fat cells belong to the largest cells of the human body. In slim adults adipose tissue forms about 20% of body weight; nevertheless in obese adults it can form up to 50% of body weight. It is not just the major energy storage but it also is an important heat insulator and provides protection for internal organs.

Adipose tissue is metabolically, endocrinologically and paracrinologically active. It produces adipokines, which participate in storage of periphery energy sources and in mobilization of energy from triacylglycerols. It also produces hormones, cytokines, enzymes, prostacyclins, growth factors or complement factors. Nowadays it is known several dozens of substances that are produced by fat tissue such as leptin, adiponectin, resistin, AFABP, visfatin, perilipin or omentin. The protein nucleic acid study conducted by the methods of molecular genetics and biochemistry proved that many proteins, secreted adipocytes - including leptin – turn out to be cytokines, identical to those, produced by lymphocytes and other immune cells. It changes the overview of fat tissue: it is not just a passive component of human body but also an active participant of physiological processes. (1)

What happens first is the mobilization of subcutaneous, than mesenteric and at last retroperitoneal fat depots.

We can use UltraContour® High Focalised Ultrasounds and UltraContour® UMD mainly for abdomen, hips, buttocks and thighs reshaping. This method is suitable if the fat depots are located in so called problematic areas of body and they cannot be got rid of by exercise and dieting. It is not possible to apply this method for excessive overweight or even obesity! Adipose tissue full of fat, as we can see in typical obese person, is harmful for a man. This condition unable to perform its physiological function. Fat cells in obese people form unsuitable hormonal spectrum, and at the same time they are not able to absorb more fat. (4) A new fat cells tuning by a so-called mild weight loss for about 5-10 % (it is realistic for any patient), a part of which is also fat thickness reduction in a typical areas, has also another effect on the patient health. For example, it reduces the risk of diabetes and some tumors related to obesity up to 50 %. That way it is possible to retune fat cells from a harmful to protective role. (5)

MATERIALS AND METHODS

Ultracontour technology:

Ultrasound liposuction technology is based on the combined dual therapy of the High focalized aesthetic ultrasounds and Multi drainage ultrasounds UMD. The number of pulses applied during one session range between 132-264.

First stage of treatment: UltraContour® High Focalised Ultrasounds
Highly intensive ultrasound waves with triple effect targeted on problematic areas have three therapeutic effects:

1. The separation of adipose tissue into individual cells and the gate opening of cell membrane.
2. Drainage of the contents (fat - triacylglycerides) from the individual cells.
3. The destruction of the fibrous partitions between the fat cells.

Second phase of the treatment: UltraContour® UMD

Through the immediate application of ultrasound lymph drainage the released fat is transported via natural metabolic channels into the liver and processed.

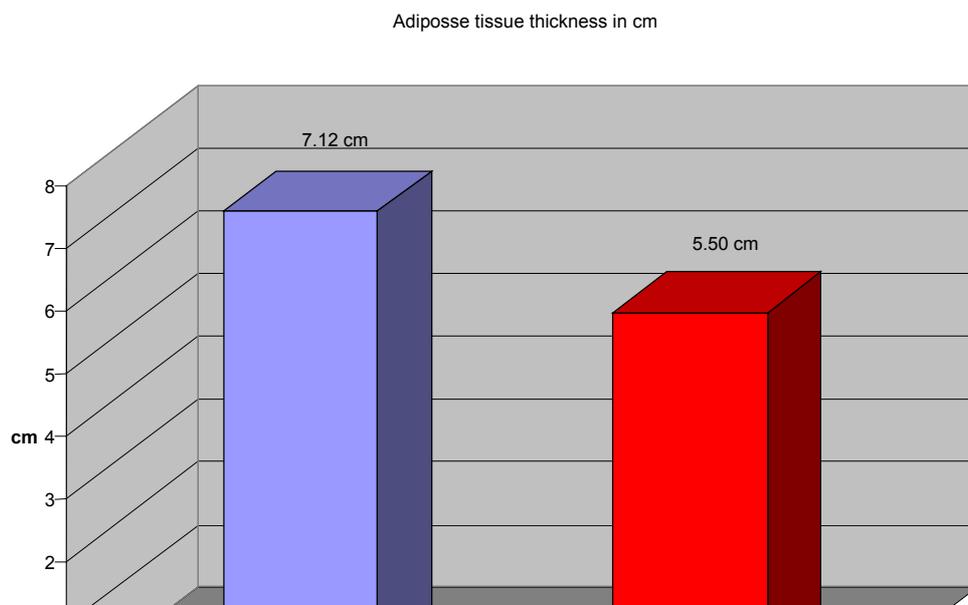
In addition, this phase of the treatment intensifies overall function of the metabolism system.

A group of selected patients:

We selected 25 women with an average age 40.6 years, neither of them had a BMI higher than it is typical for obesity. There were no clients with oncology diseases, with serious liver, kidney or haematogenesis disorder. We used the Ultracontour device especially for stomach, hip, thigh and buttock contouring.

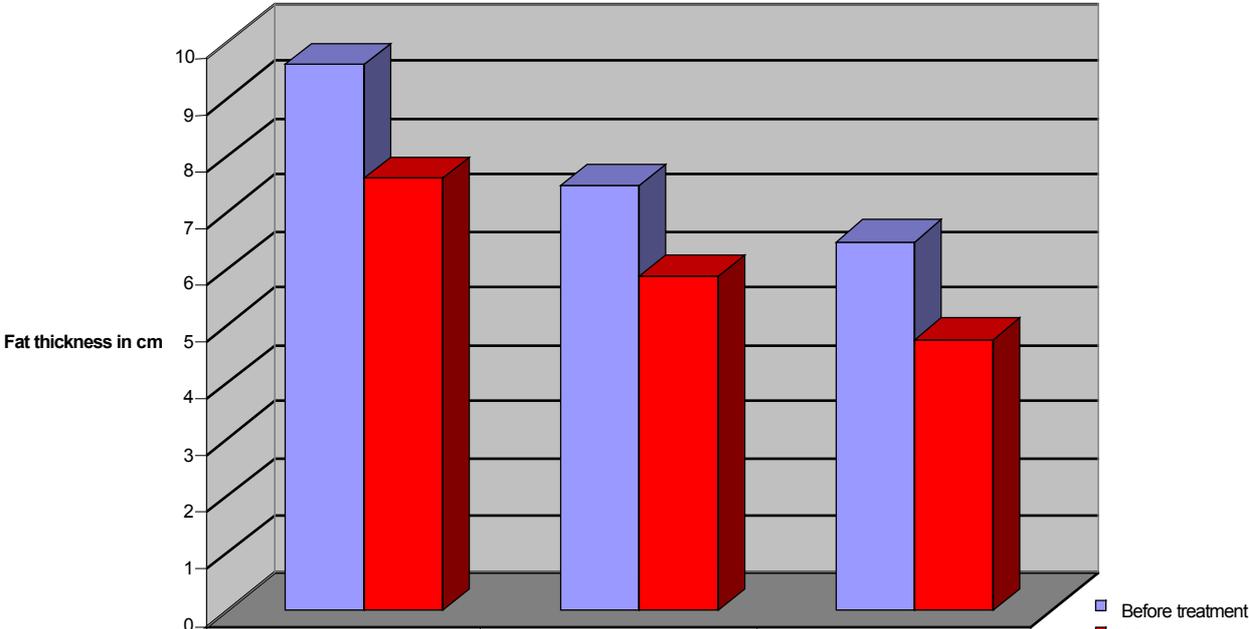
Procedure: To measure the thickness of adipose tissue at the focal areas objectively, we used sonography, which was performed by a sonographic diagnostic device MyLab 50 with a 10- 12 MHz linear probe. We performed the measurements in all selected clients before the first Ultracontour treatment and then again within 14 days after the fifth treatment. The thickness of adipose tissue was measured at the standard locations in maximal compression, i.e. maximal pressure was exerted on skin by upright positioned probe, and without compression where we measured the adipose tissue thickness in lateral and axial direction before and after the ultrasound liposuction treatment by UltraContour High Focalised Ultrasounds and UltraContour® UMD.

RESULTS: The adipose tissue thickness measured by upright positioned probe before UltraContour® UMD treatment was 7.12cm in average and after the fifth session was the average thickness of adipose tissue 5.50cm, i.e. after the UltraContour® UMD treatment, the thickness of fat tissue reduced in average by 1.62cm. Graph.1

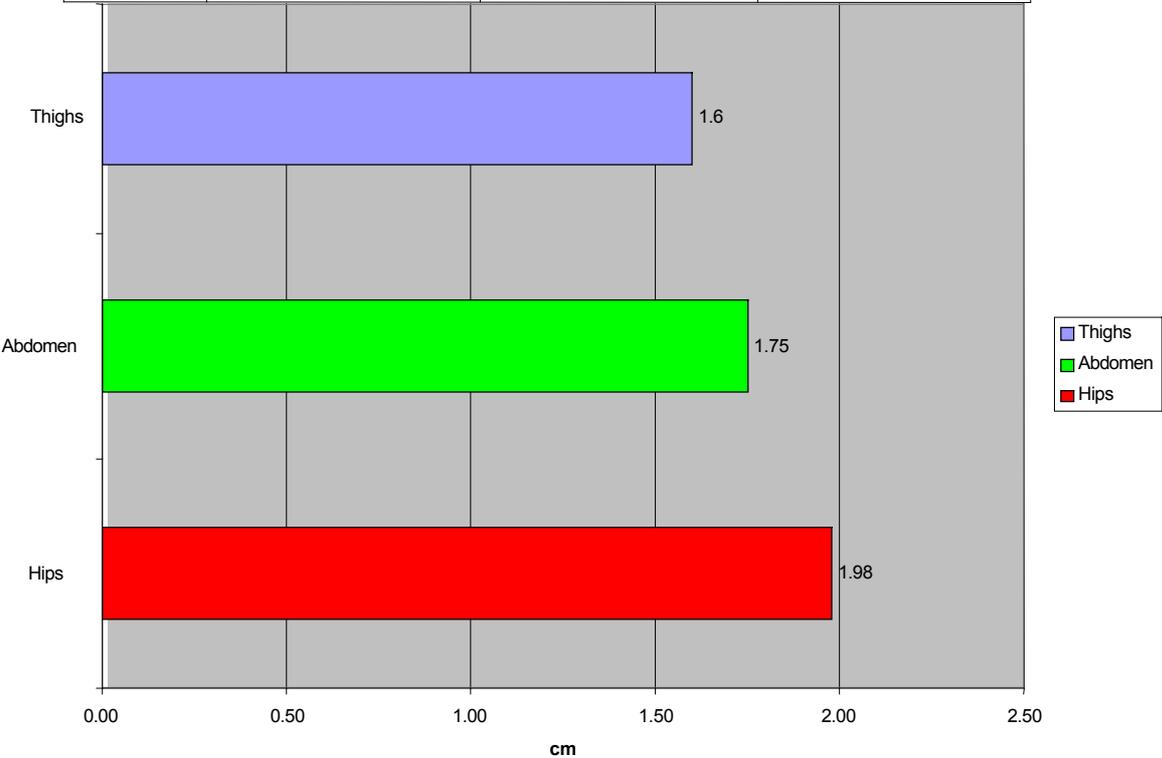


The next graph shows the adipose tissue thickness before and after the UltraContour treatment measured objectively by sonography in cm in the concerned locations – the average adipose tissue reduction. Graph 2 and Graph 3

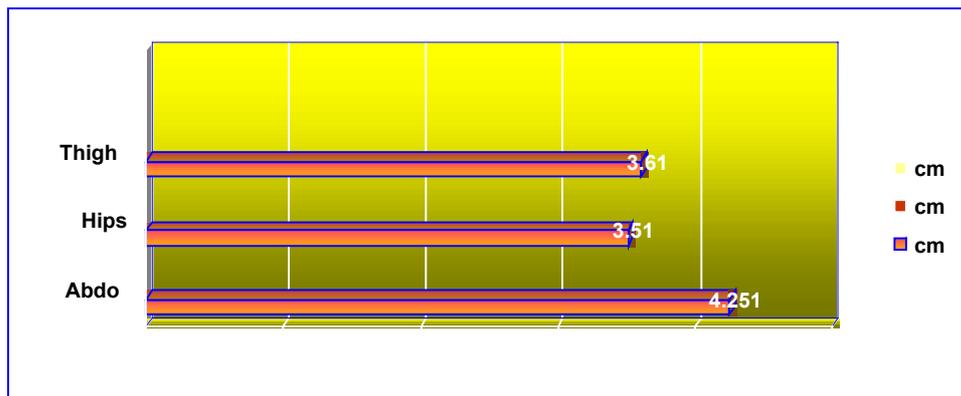
Adipose tissue reduction at concerned locations in cm



	Thickness reduction in cm after 5 treatments		
Before	9.6	7.47	6.5
After	7.62	5.87	4.75



To compare findings we show the reduction results measured subjectively by a tape measure in cm in concerned locations of application in the same clients. Graph 4



The highest reduction measured subjectively by a tape measure in cm was taken in the abdominal area, the lowest in hip area.

CONCLUSION

In all clients, with the exception of one, fat thickness reduction was documented after 5 UltraContour® High Focalised Ultrasounds and consequently UltraContour® UMD treatments.

The highest reduction of adipose tissue – measured objectively by sonography, accrued in the clients who underwent the application of pulses in the hip areas – the average fat thickness reduction per client measured by a probe placed without pressure was 2.18 cm in the hip area, 1.60 cm in the inner thigh area, 1.75 cm in the abdominal area – paraumbilicaly.

The average fat thickness reduction measured by sonography was 1.62 cm.

The average fat thickness reduction measured by a tape measure in the concerned areas ranged from 3.5cm in the hip location to 4.3cm in the abdominal location. The highest reduction subjectively measured was in the abdominal location.

The client, with a minimal fat thickness reduction in the abdominal location, had a history of liposuction treatment. The fat thickness measured by sonography without pressure was 1.6cm and measured under pressure 0.4cm before the treatment and measured without pressure after the treatment it was 1.4cm.

In one client, there was no fat reduction in the abdominal area at all. After a careful study of her personal history she admitted that she was observed for diabetes mellitus type II compensated by a diet.

After the UltraContour® High Focalised Ultrasounds and UltraContour® UMD treatment, there was no lymphedema in subcutis, intraparenchymal hematoma or focal reactive abrasive skin objectively registered by sonography in any patient. Subjectively, only sporadically, the clients talked about burning at the application spot, one client had a blister, and the clients negated allergic reaction during the applications.

Subjective fat thickness measurements, by the tape measure in cm, lead to over or under valuation of the findings. Fat thickness measurements performed in maximal compression or by a probe placed without constraint, by a linear 10-12 MHz probe, appear as the most objective control method of the fat thickness reduction and of the local complications after the application. There didn't develop any symptoms of lymphedema, haematoma or dermatitis. In our group of clients, we recorded only one case of allergic skin reaction to the gel. The pulse application was tolerated without complications.

By sonographic measurement of fat thickness, we proved a real, objective fat thickness reduction after the UltraContour® High Focalised Ultrasounds and UltraContour® UMD treatment. We also objectified the absence of lymphedema, haematoma or skin modifications. A given sonographic measurement method with the possibility of obtaining picture documentation from the fat thickness measurements, from the evaluation of adipose tissue structure and from the presence or absence of the local complications as lymphederma, haemetoma and abrasive, we consider to be a unique method for objectification of obtained findings.

Picture documentation:

Fig.1:

Abdominal location measured in maximal compression before UltraContour® High Focalised Ultrasounds and UltraContour® UMD treatment

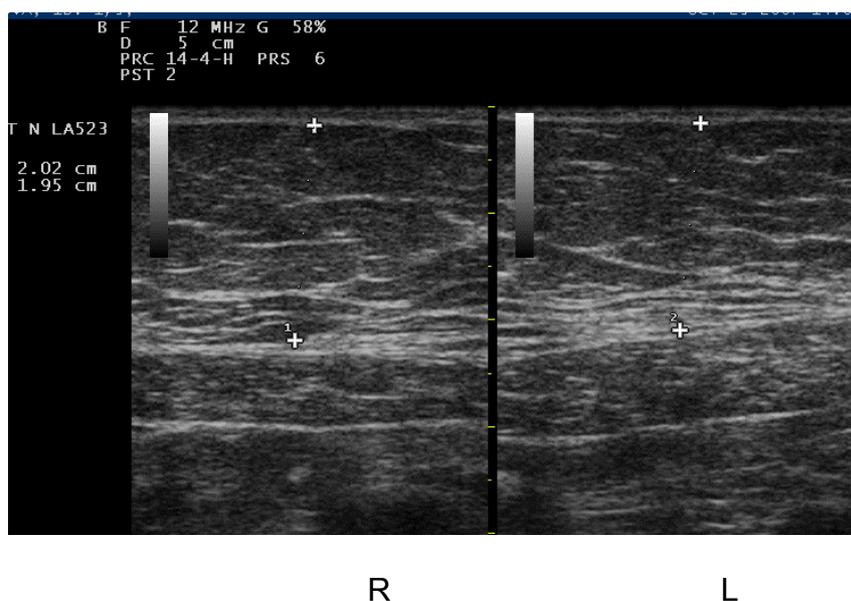


Fig 2:

Abdominal location measured in maximal compression after 5 UltraContour® HIFU and UltraContour® UMD treatments

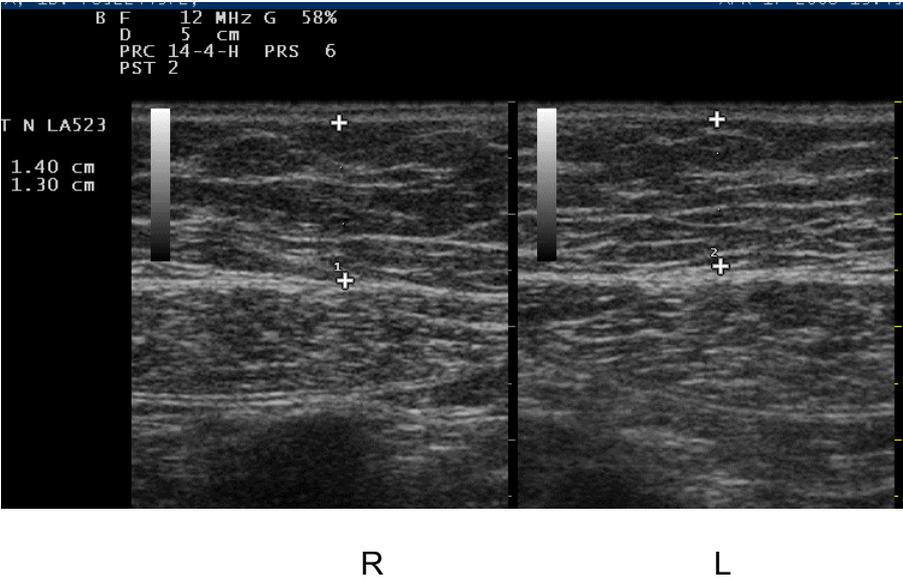


Fig 3 and 4:
At the place of focus, the adipose tissue reaction one day after the treatment displayed itself as a triangular fuzzy tissue structure with a distal veil on the basis of the destruction of the fibrous partitions between the fat cells, drainage of the contents from the individual cells - this finding sonographically resembles a focal swelling



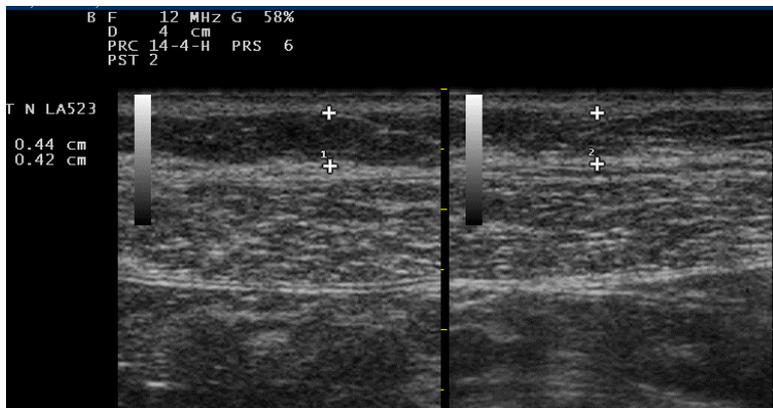
Fig 3 - R

Fig 4 - L



Fig 5

The client, with a minimal fat thickness reduction in the abdominal location, who had a history of liposuction – measured before the treatment



R

L

Fig 6

The client, with a minimal fat thickness reduction in the abdominal location, who had a history of liposuction –measured after 5 treatments. Sonographically identical adipose tissue structure before and after the treatment

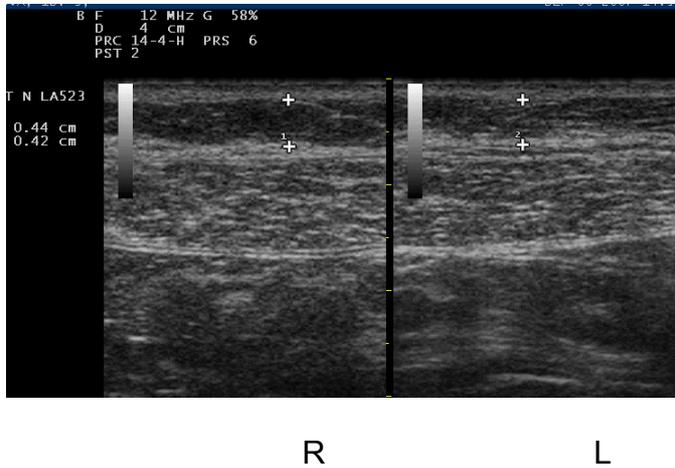


Fig 7- measurement technique

Right part of the picture, the measurements performed by a probe placed without pressure, left part of the picture, the measurements performed in maximal compression, during the measurements in compression there are well visible comprimed fibrous septa above the muscle fascia



Right abdominal part:
R (without compression)

Right abdominal part:
L (with compression)

Fig 8- measurement technique

Right part of the picture, the measurements performed in maximal compression, left part of the picture, the measurements performed by a probe placed without pressure, during the measurements in compression there are well visible comprimed fibrous septa on the right above the muscle fascia



Left abdominal part:
R (without compression)

Left abdominal part:
L (with compression)

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