

## Noninvasive Mechanical Body Contouring: A Preliminary Clinical Outcome Study

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**Abstract.** L.P.G.'s Endermologie is a massage method consisting of positive pressure rolling, in conjunction with applied negative pressure to both the skin and subcutaneous tissues (L.P.G. Endermologie U.S.A., 3101 North Federal Highway, Suite 301 Fort Lauderdale, Florida 33306, U.S.A., (800) 222-3911). Devised in France during the 1970s, L.P.G.'s original purpose was to soften scars and standardize physical therapy; however, patients treated with the L.P.G. machine also showed an improvement in body contour and skin texture. Since then, several thousand machines have been in use in France as an alternative method for altering fat distribution in the subcutaneous plane. The authors began a study to determine the safety and efficacy of this machine. This study is composed of 22 women between the ages of 24 and 48. All 22 women completed at least seven sessions of treatments. Six of these 22 women completed all 14 sessions of the prescribed treatments. The study group exhibited a wide range of body habitus, initial weights, and final results. Of the 22 women who completed seven sessions of treatment, three had an increase in body weight and a mean index (see Materials and Methods) reduction in body diameter of 1.38 cm (0.5 in). Three of the six patients who completed all 14 treatment sessions had an increase in body weight and a mean index reduction in body diameter of 2.85 cm (1.12 in). All but one of the patients had

a decrease in their mean body diameter index, regardless of their loss or gain in weight.

**Key words:** L.P.G. Endermologie—Subcutaneous tissue—Body contouring

In the late 1970s, Louis Paul Guitay (L.P.G.) suffered muscle and skin damage as a result of a motor vehicle accident. That damage left part of Guitay's body covered in scar tissue. In an effort to loosen the scar tissue and restore muscle function, Guitay was prescribed skin massages several times a week. Each session required 3.5-4 hours of massage by several masseuses. The massage therapy consisted of "rolling" the scarred skin to produce elasticity, however, this manual method was both time consuming and labor intensive, and the results varied wildly depending on the therapist. To standardize the process, Guitay devised a similar massage method using mechanical means. Guitay's machine provided the same type of massage in a fraction of the time, with less effort, and variable pressures.

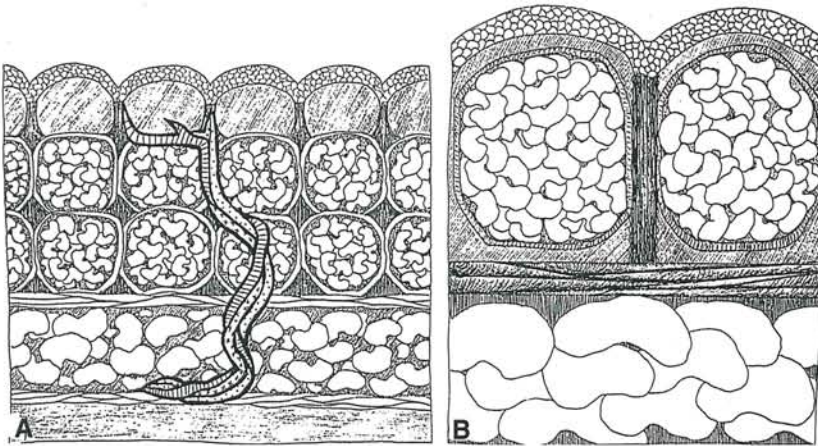
The initial use of L.P.G. Endermologie was in the treatment of trauma and burn scars similar to those suffered by Guitay, however, physicians soon noticed that treatments with L.P.G. Endermologie reduced the appearance of cellulite and altered fat distribution perhaps by pulling on vertical connective tissues and stimulating lymphatic flow (Fig. 1A, B). That effect has been thought to be due to some sublethal damage to the subcutaneous fat caused by the extremes of positive (rolling) and negative (suction) pressures. It is well known that mechanical force can rupture fat cells, and when these cells heal they may be collapsed leaving an indentation in the overlying skin. A common example of sublethal damage is seen in the shoulder grooves created by pres-

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**Fig. 1.** The increased volume of the fat lobes (fat storage in the adipocytes) within the Hypodermis causes the following: (A) Swelling of the lobes which pushes out the epidermis. (B) The vertical connective fibers shrink, thicken, and with age pull down the anchor points [2].

sure from brassiere straps in large breasted women. The overlying skin, muscle, or bone are not damaged by the constant mechanical pressure, but the subcutaneous fat is damaged leaving an indentation where the force was the greatest (Fig. 2). The LPG machine generates substantial negative pressure, and the technician can apply positive pressures simultaneously. The effect is very user dependent. If the force is too great, then bruising may result (Fig. 3). While this may be objective evidence that damage has occurred, such bruises are to be avoided because patients may be embarrassed by them.

The cosmetic use of L.P.G. Endermologie has been widespread in Europe, Japan, and South America for the past 10 years, and over 4000 L.P.G. Endermologie machines are in use in France alone [1]. Recent approval in the United States allows for the use of the L.P.G. Endermologie system in helping reduce the appearance of cellulite and distribution of fat in the subcutaneous plane [2]. Dr. Steven Lamm, a Bariatric physician, has been using the LPG machine in his practice and finds that it makes a measurable difference in circumference measurements even if patients do not lose weight [3].

This body contouring system has also been used by others in conjunction with liposuction. This combination of techniques may help to shorten the recovery period of liposuction and allow the results of liposuction to be more predictable [4].

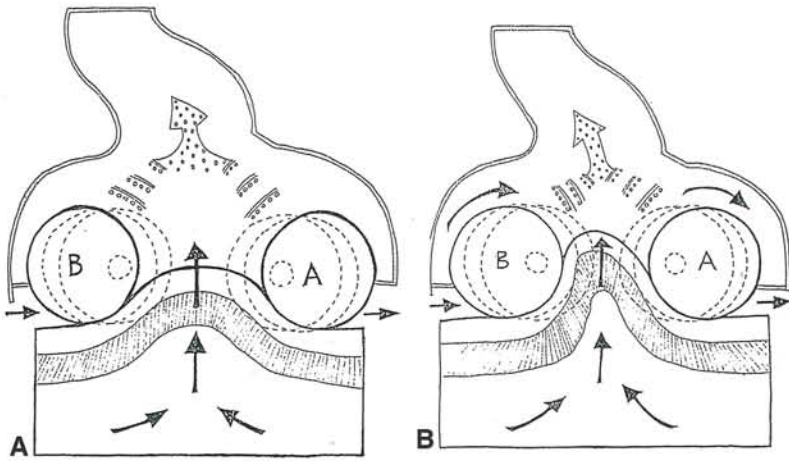
**Materials and Methods**

Our data was obtained from 22 women between the ages of 24 and 48 during the first 4 months of operation. All 22 women completed at least seven of the 14 prescribed L.P.G. sessions. Only six of these 22 women completed

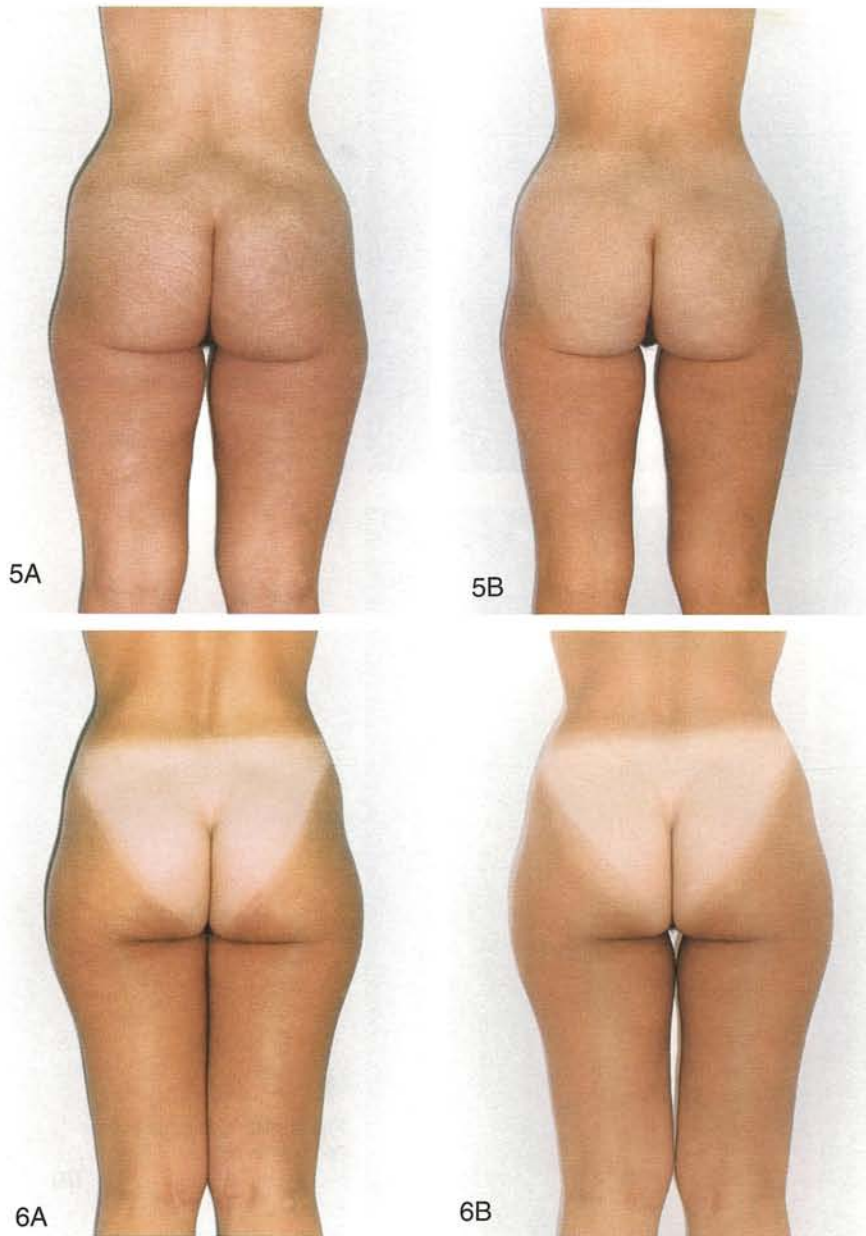
**Fig. 2.** This 28-year-old female has grooves from the straps of her brassiere that cause positive mechanical pressure. Neither the skin, underlying muscle, nor bone are altered, but the subcutaneous fat has sublethal damage that results in alteration of the surface contour.

**Fig. 3.** If the vacuum pressure is too great, then subcutaneous petechia may be produced. While these bruises may be objective evidence of sublethal damage to the fat, patients are alarmed by the appearance.





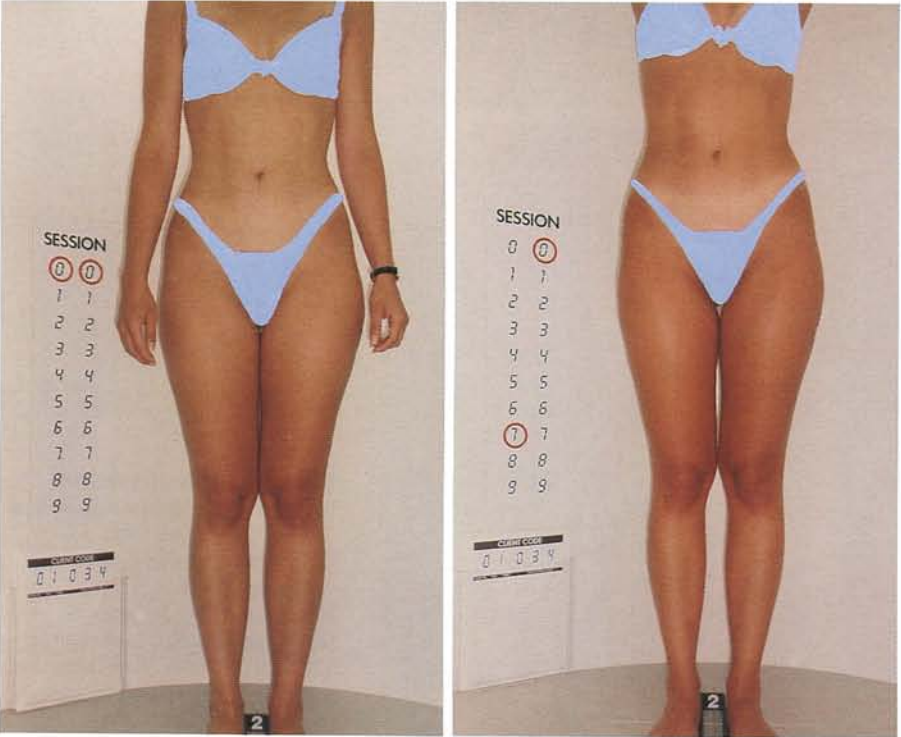
**Fig. 4.** (A) Aspiration makes a cutaneous skin fold while roller A rolls this fold and roller B unrolls it. (B) The repetition of these maneuvers squeezes and traumatizes adipose tissue. Through the course of these sessions and the progression of the treatment, the rollers adapt, allowing them to reach increasingly deeper layers.



**Fig. 5.** (A) This 31-year-old female is seen before treatment at 118 lb. (B) Patient after 14 L.P.G. Endermologie treatments weighing 108 lb.  
**Fig. 6.** (A) This 26-year-old female seen before treatment at 124 lb. (B) Patient seen after 14 L.P.G. Endermologie sessions, weighing 125 lb.



**Fig. 7.** (A) This 29-year-old female is seen before treatments at 139 lb. (B) Patient seen after 14 L.P.G. Endermologie treatments at 135 lb.



**Fig. 8.** (A) This patient is a 26-year-female seen before treatment, weighing 124 lb. (B) Patient after 14 L.P.G. Endermologie treatments at 123 lb.



**Fig. 9.** (A) This is a 44-year-old female seen before treatment weighing 128.5 lb. (B) Patient seen after 14 sessions, weighing 130 lb.

all 14 L.P.G. sessions to date, however, our results were still significant among all the women studied.

Each patient included in our study had 45-min L.P.G. Endermologie sessions with a trained L.P.G. technician. These treatments were conducted once or twice every week. Treatments varied only in intensity of the negative pressure applied, which was determined by patient tolerance (Fig. 4A, B). We have included all of our consecutive patients who conformed to the protocol and had completed seven of 14 sessions (Figs. 5–9). Those whose treatments occurred at irregular intervals or who did not complete at least seven sessions were not included.

Our patients were encouraged to drink eight to 10 glasses of water per day and maintain a low-fat diet, however, no specific diet plans were given or followed by our patients in this initial series.

The methods used to collect data were very simple. Before the initial L.P.G. treatment, circumference measurements were taken of the patient's waist, hips, thighs, knees, and calves. The patient's weight was also recorded. Identical weight and circumference measurements were collected on visits nos. 7 and 14. From this data, differences in circumference between sessions 1 and 7 and between sessions 1 and 14 were obtained. A mean body circumference loss was then determined for each of the five categories (i.e., waist, hips, thighs, knees, and calves). These five parameters were then averaged into a mean index of average overall loss. All measurements were included in the calculations regardless of whether the patient exhibited a positive (gain), negative (loss), or zero (neither loss nor gain) change in circumference.

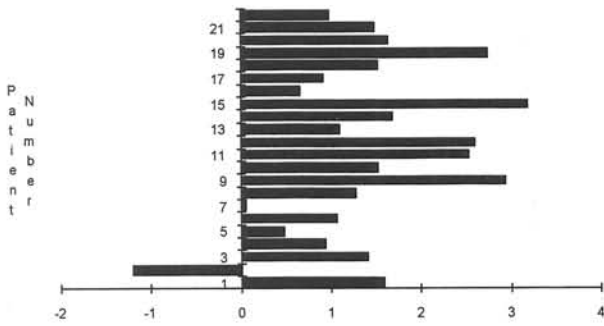
Two index categories were determined using this

method. The first index represented a mean loss in body circumference of all 22 patients who completed seven L.P.G. sessions (Fig. 10). A second mean index was then determined for the six patients who had completed all 14 sessions (Fig. 11). These indices show the average overall loss or gain in body circumference of the patients included in the study.

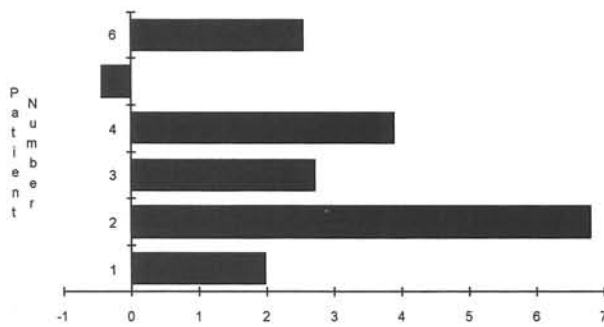
A separate mean was devised to track weight fluctuations over the course of a patient's treatments. One mean was established to track the overall weight fluctuations between L.P.G. sessions 1 and 7 (Fig. 12). Another mean was established to track the weight fluctuations of the women who had completed all 14 sessions (Fig. 13). The methods used to determine each mean were similar to those used above. Each patient's weight was recorded before session 1, and after sessions 7 and 14. The difference between the two weights was then calculated and given a positive or negative sign to denote gain or loss. These differences were then averaged to show a mean weight fluctuation between L.P.G. sessions 1 and 7 and 1 and 14. Nineteen patients were used to determine weight fluctuations between sessions 1 and 7, and six patients were used to determine weight fluctuations between sessions 1 and 14. Three patients had uncharted initial weights.

## Results

The 22 patients included within our study showed a mean body circumference index loss of 1.3815 cm (0.5439 in) after completing seven L.P.G. sessions (Fig. 10). Nineteen of these patients also showed an average



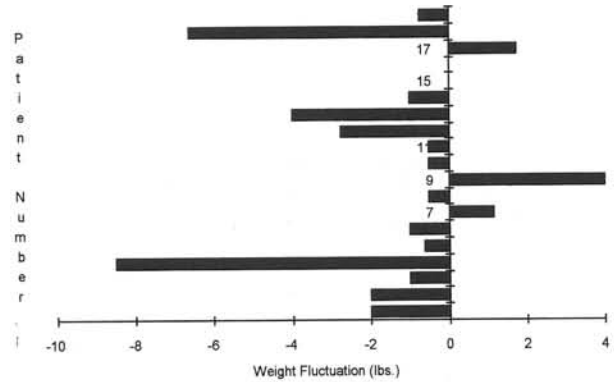
**Fig. 10.** Mean loss in body circumference index of 22 patients after seven L.P.G. Endermologie sessions. Positive values denote circumference loss, whereas negative values denote circumference gain.



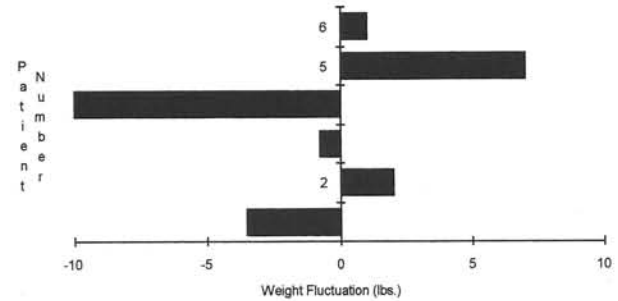
**Fig. 11.** Mean loss in body circumference index of six patients who completed 14 L.P.G. Endermologie sessions. Positive values denote circumference loss, whereas negative values denote circumference gain.

weight loss of 0.612 kg (1.35 lb) over the same time period (Fig. 12). The six patients that completed all 14 L.P.G. sessions showed a mean body circumference index loss of 2.8484 cm (1.121 in) and an average weight loss of 0.321 kg (0.708 lb) (Figs. 11, 13). Two patients included in the weight mean for sessions 1 through 7 showed a mean weight gain of 0.655 kg (1.445 lb) and a mean body circumference index loss of 1.149 cm (0.452 in). Three of the six patients that finished all 14 L.P.G. sessions showed an average weight gain of 1.51 kg (3.33 lb), but a mean body circumference index loss of 0.718 cm (0.283 in).

Only one patient included in our study showed an actual gain in mean body circumference index. Patient no. 32 was a 35-year-old competitive female bodybuilder seeking treatment for persistent cellulite. After 14 L.P.G. treatments, she saw an overall weight gain of 3.175 kg (7 lb) and mean body circumference index gain of 1.209 cm (0.476 in), however, she retained an average of 11% body fat during the time period of her 14 L.P.G. treatments and experienced significant increases in her lean muscle mass. Patient no. 32 also saw an improvement in the appearance of her cellulite. We concluded that her increased measurements and weight were not a direct result of her L.P.G. treatment, but likely to be due to her intense physical activity and increased lean body mass.



**Fig. 12.** This chart depicts the weight fluctuations of 19 patients after seven L.P.G. Endermologie sessions. Positive values denote weight gain, whereas negative value denote weight loss.



**Fig. 13.** Weight fluctuations of six patients after completing 14 L.P.G. Endermologie sessions. Positive values denote weight gain, whereas negative numbers denote weight loss.

### Discussion

Our studies indicate that if patients lose weight during the treatments they will have a maximum benefit, however, several patients had an improvement in their circumferential measurements even though they gained a few pounds.

The effectiveness of the Endermologie method is technician dependent: If the treatments are carried out by someone who is well trained, enthusiastic, and concerned, then patients are more likely to continue treatment and be pleased.

### Conclusion

From our observations, we conclude that the L.P.G. Endermologie system is a mildly effective method for fat mobilization and body contouring. It is apparent that patients who undergo all 14 sessions show almost twice the mean body circumference index reduction of the patients completing only seven sessions. The results from our study vary widely, but significant measurement loss was seen regardless of weight change. We suggest that our

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colleagues develop a double-blind protocol in a controlled setting to better understand the effects and mechanism of action of this method.

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