

# Is Lipedema Resistant to All Diets?

## The Impact of a Protein-optimized Ketogenic Diet on Women with Lipedema

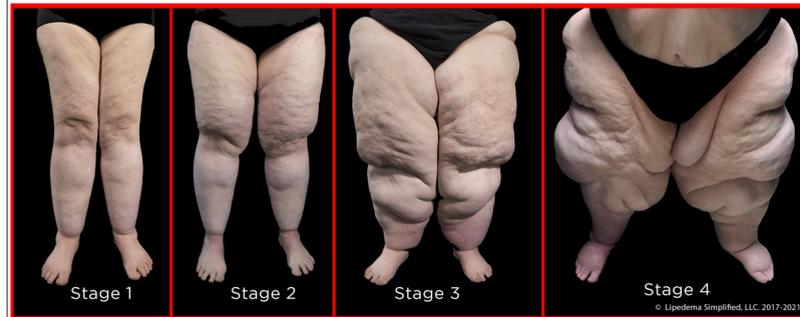
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### What is Lipedema?

Lipedema is a fat disorder distinguished by a disproportionate lower body fat accumulation, hypersensitivity and pain, swelling, bruising with minimal trauma, and apparent resistance to traditional diet and exercise regimens.<sup>1</sup> Up to 85-88% of patients with lipedema may have a comorbidity of obesity.<sup>2</sup> Obesity can exacerbate lipedema symptoms and is associated with further health complications. Mobility can be severely impaired due to additional masses of fat especially at the inner sides of the thighs, making walking increasingly difficult and often causing later deformities such as valgus malalignment (genu valgum).

Although lipedema is still considered as diet resistant, the 2015 German guidelines for the diagnosis and treatment of lipedema, presently under revision, clearly states that it is mandatory to include nutrition therapy, physical activity as well as compression and possibly decongestive lymphatic therapy (DLT).<sup>3</sup>



### Protein-optimized Ketogenic Diet

For any successful dietetic concept, it is obligatory to combine nutrition, physical activity and behavior therapy to comprise weight reduction as well as long term stabilization. Since hyperinsulinemia stimulates adipogenesis and edema, it is important to prevent both blood glucose and insulin peaks and observe breaks in between eating. Another mandatory requirement is weight reduction at the expense of the fat mass not of the muscle mass. These criteria are all met using a protein-optimized ketogenic diet.<sup>7</sup>

A protein-optimized ketogenic diet is used when weight loss is intended or wanted. Proteins are increased to improve satiety and to increase thermogenesis. Proteins are also utilized for preservation of lean body mass and to meet the demand-driven gluconeogenesis necessary for certain cells such as erythrocytes.<sup>4</sup>



### Methods

A retrospective analysis was performed using a telephone survey with 58 patients with lipedema who had undergone nutrition therapy using a protein-optimized ketogenic diet. Patients were interviewed prior to treatment, immediately post-treatment, and an additional follow-up interview at a mean of 44 months. They were asked regarding utilization of manual lymph drainage treatments, compression garment wear, and severity of symptoms such as pain.

The second study analyzed pre- and post-intervention measurements of 92 patients with lipedema or lipedema with secondary lymphedema, comparing two groups: nutrition therapy only (Group A, n=50) and nutrition with additional physical treatment including sonolipolysis and Endermology® (Group B, n=42).

### Intervention

The intervention in both investigations was a protein-optimized ketogenic diet. Total carbohydrate intake is restricted to less than 50g/day. Protein intake is optimized by encouraging daily intake of 1.2-1.5g of protein per kg of normal weight. Fat intake is moderate with healthy fatty acids encouraged (more Omega 3, less Omega 6, saturated fatty acids from pasture raised animals).

The second study also used sonolipolysis (ultrasonic cavitation) and Endermology® (vacuum-assisted physical treatments) in Group B.

### Results

Results from the telephone interview included persistent pain reduction in 82.7% of participants, 24.5% had a reduced need for MLD treatments and 24.8% were able to use compression garments with reduced intensity.

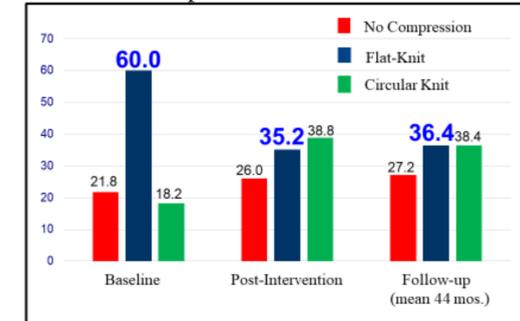
Measurement analysis in the second study showed no statistically significant difference with the addition of physical treatments in Group B (see below).

### Measurements

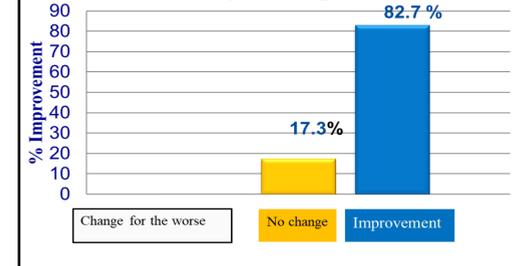
	Baseline (Mean)	Baseline (Standard Deviation)	Post-Intervention (Mean)	Post-Intervention (Standard Deviation)	% Change	P-value (t-Test)	Effect (d Cohen)
Inter-ankle Distance	35.26	12.1	19.18	11.62	<b>45.6</b>	<b>&lt;0.001</b>	-1.92
Poaximal Thigh	73.96	7.75	64.47	7.15	12.83	<b>&lt;0.001</b>	-1.27
Distal Thigh	62.43	6.85	54.93	5.86	12.01	<b>&lt;0.001</b>	-1.17
Knee	46.74	6.2	41.8	5.1	10.57	<b>&lt;0.001</b>	-0.87
Calf	45.75	5.21	41.34	4.16	9.64	<b>&lt;0.001</b>	-0.93

### Results

#### Compression Garments



#### Change in Symptom Severity



Patient 1 - Before Patient 1 - After Patient 2 - Before Patient 2 - After

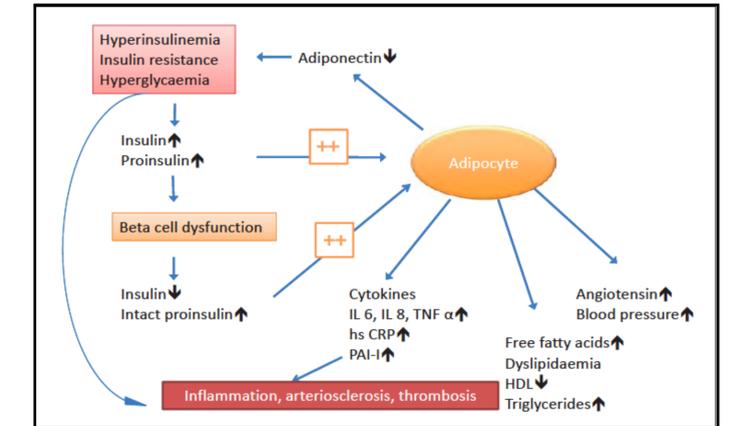
### Discussion/Conclusion

Symptoms improved in over 80% of participants. Positive outcomes included pain reduction, decreased frequency/intensity of MLD and compression, reduced leg measurements and reduction in the distance between the ankles. Outcomes were not affected by the addition of physical treatments. Because symptom improvement was seen before substantial weight loss was achieved, we believe that normalization of metabolism was the primary driver of improvements. These findings are promising and show that symptoms of lipedema may be responsive to a protein-optimized ketogenic diet. Further research using case controlled or randomized studies is needed to confirm these results.

### Insulin, Inflammation & Lipedema

Several papers have implicated inflammation as a driving force in lipedema pathology.<sup>4-6</sup> Lipedema patients general seem to be at a lower risk for diabetes than BMI-matched controls.<sup>4</sup> However, in the presence of the comorbidity of obesity, and especially if abdominal fat is increased, insulin resistance and hyperinsulinemia may result. The presence of these two conditions are in themselves pro-inflammatory and may exacerbate the inflammation present in lipedema.<sup>7</sup>

Studies have consistently shown that a ketogenic diet can reduce inflammatory markers such as insulin and CRP.<sup>7</sup> Additionally, the predominant ketone beta hydroxybutyrate (BHB) has been shown to directly interrupt the inflammatory pathway by blocking NLRP3 inflammasome activation and improving mitochondrial respiration, which may lead to improved adipose tissue function.<sup>8</sup>



(From Faerber, 2018)

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