



VIII Nordic
Congress of
Lymphology

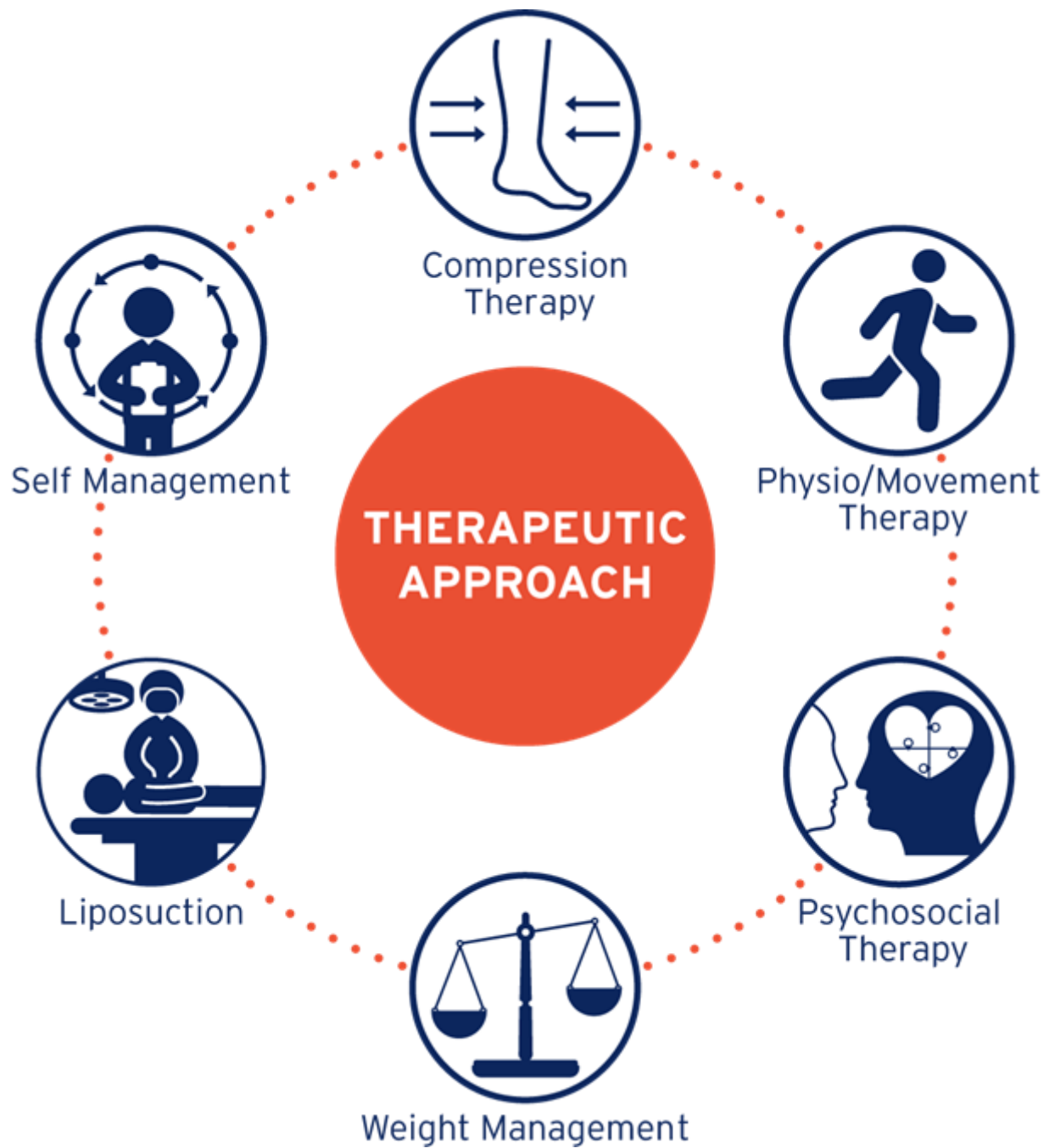
What do we know about diet for lip- and lymphedema?

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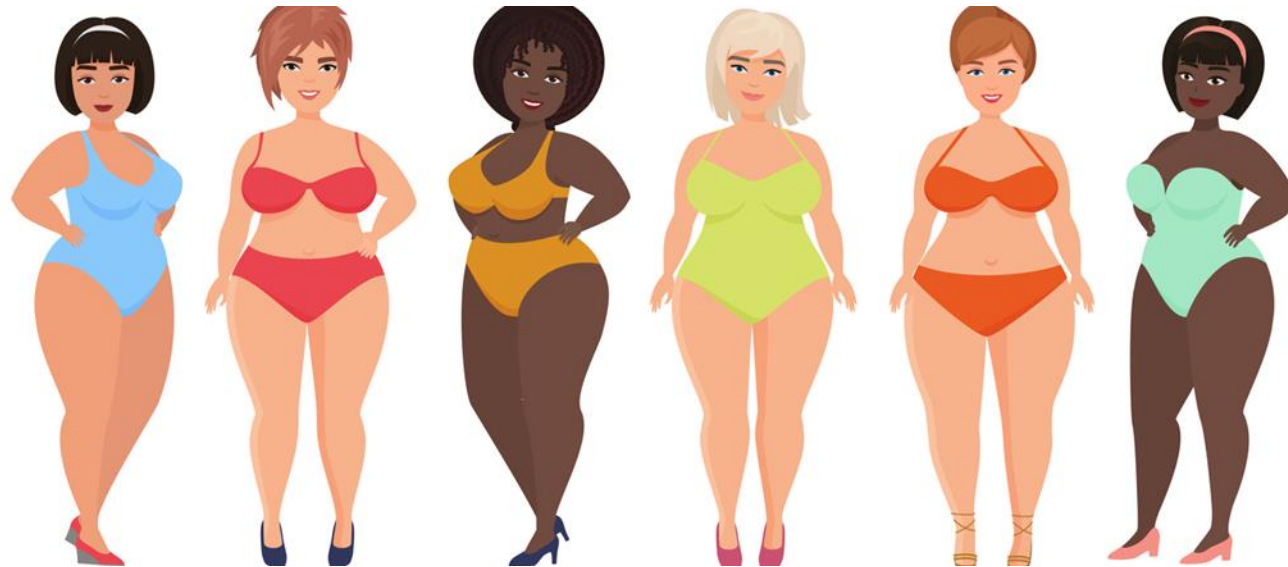
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Content

- European advise
 - A diet that prevents progression of disease
 - Weight reduction
- Dietary advice for healthy food habits
- Symptom relief
- Ketogenic diets
- Research



Case: Anna 45 years

BMI 42 kg/m²

Lipedema with pain since 13 years old, weight loss attempt since 25 years, arthritis in her knees, got bigger during pregnancies and losing weight got more difficult with time. She is now stage 3.

Weight history and weight loss attempts:

Conservative weight loss with weekly follow ups, losing 10 kg

Rehabilitation for a year, losing 20 kg

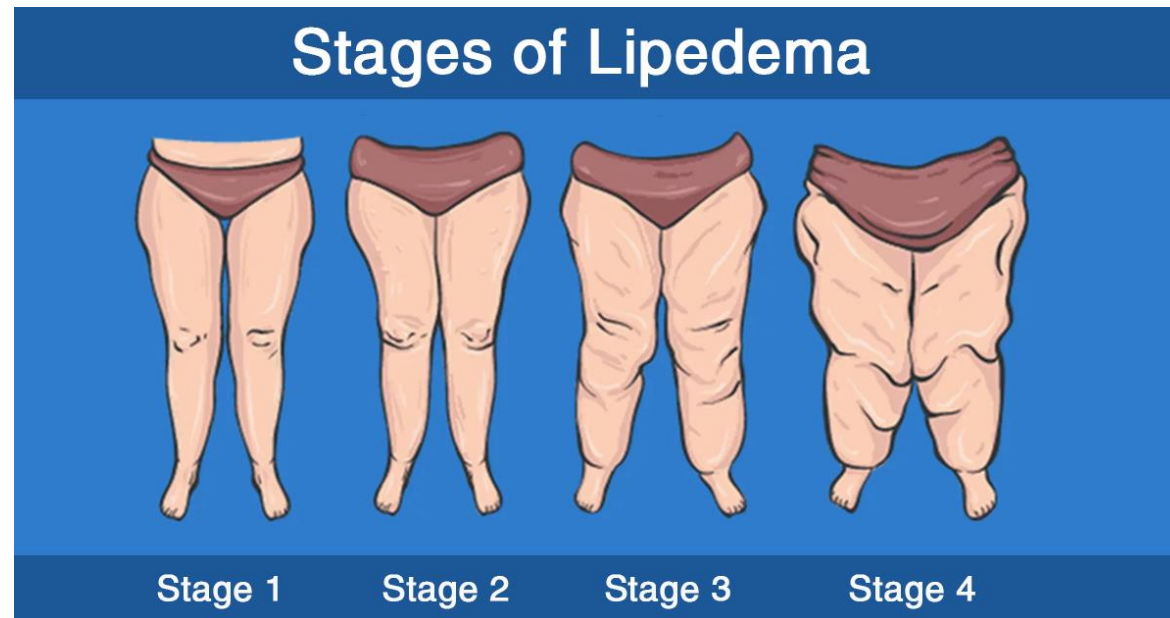
Physical activity:

- pool three times a week and in the gym three times a week.

- "I try to eat better and do things that make me feel confident and active."

-

- "My weight will always be a problem and I've come to terms with that. However, I am more than my size. I try to be kind and treat others with love and respect. I have other talents. I will not let this beat me. "



Online information

- RAD (rare adipose disorder) diet
- Limit fat and red meat, low glycemic foods, fruits and vegetables, limit salt and no dairy products
- Gluten free products
- Ketogenic diets
- Anti-inflammatory diet



Evidence is limited



Lipoedema – myths and facts, Part 5*

European Best Practice of Lipoedema – Summary of the European Lipoedema Forum consensus

Re overweight and obesity

- Overweight/obesity is an aggravating factor of Lipoedema
 - Majority of Lipoedema patients are obese (62–88 %)
 - Lipoedema patients usually suffer from their weight gain
 - Majority of patients try “diet and exercise” and experience yo-yo effect
 - Weight gain can impair Lipoedema
 - Obese Lipoedema patients often experience a lack of fitness and mobility
 - Conclusion: **Obesity/weight gain must be focused on**

The following measures to reduce hyperinsulinemia should be recommended:

- Sufficiently long intervals between **meals**. Recommended are four to six hours during daytime, and at least twelve hours during the night [90–92]
- Strict **avoidance of constant “grazing”** (many small meals spread throughout the day), especially eating sweets and other snacks that raise blood glucose levels.
- Reduction of foods containing **refined carbohydrates or sugar**. The fewer of refined carbs consumed the better [85, 93, 94].
- Preference for **“real food”** instead of processed foods.
- **Consumption of healthy fats** (olive oil, wild oily caught fish, pasture raised meat and milk products and avoidance of industrial trans-fats) [95–97].

For long term weight stabilisation **support and coaching** are mandatory during and after nutrition therapy in order to **prevent relapses** [98].

National and International guidelines



Why do we need dietary guidelines?

- Ensure the body's needs
- Promote public health and prevent disease



Nordic Nutrition Recommendations 2012

Integrating nutrition and physical activity




Kostråd for å fremme folkehelsen
og forebygge kroniske sykdommer

Metodologi og vitenskapelig kunnskapsgrunnlag

Nasjonalt råd for ernæring
2011

How to see the dietary guidelines in the light of lip- and lymphedema?

THE NORWEGIAN DIETARY GUIDELINES

1. Enjoy a varied diet with lots of vegetables, fruit and berries, whole-grain foods and fish, and limited amounts of processed meat, red meat, salt and sugar.
 2. Maintain a good balance between the amount of energy you obtain through food and drink and the amount of energy you expend through physical activity.
 3. Eat at least five portions of vegetables, fruit and berries every day.
 4. Eat whole grain foods every day.
 5. Eat fish two to three times a week. You can also use fish as a spread on bread.
 6. Choose lean meat and lean meat products. Limit the amount of processed meat and red meat.
 7. Include low-fat dairy foods in your daily diet.
 8. Choose edible oils, liquid margarine and soft margarine spreads instead of hard margarines and butter.
 9. Choose foods that are low in salt and limit the use of salt when preparing food and at the table.
 10. Avoid foods and drinks that are high in sugar.
 11. Choose water as a thirst-quencher.
 12. Be physically active for at least 30 minutes each day.
-  Look for the Keyhole when shopping for food.

Kartla overvektiges matvaner – én gruppe skilte seg spesielt ut

Når på døgnet du spiser, kan ha mye å si for kaloriinntaket ditt.



Norsk Epidemiologi 2013; 23 (1): 61-74



61

e

Do Norwegians with diabetes have a healthier diet than the general population?

Anne-Marie Aas^{1,2}, Lars Johansson³, Kirsti Bjerkan^{1,4}, Nina Lorentsen⁵ and Ingrid Løvold Mostad^{6,7}

21 kl. 22:08

Conclusion: Compared with the recommendations, people with diabetes had a low intake of carbohydrates and a high intake of protein and fat, but they made more healthy choices regarding intake of selected food groups compared with the control groups.



BMI OVER 30: Deltagerne i denne studien hadde alle en kroppsmasseindeks over 30. Da er man i fare for å utvikle sykdommer som diabetes type 2, høyt blodtrykk, samt hjerte- og karsykdommer.

FOTO: AMANDA I. O. ANDERSEN

- Meal timing as a determinant of individual energy intake in people with obesity.
- People with diabetes have a lower intake of carbohydrates and higher intake of protein and fat, and make healthier choices

British Journal of Nutrition (2022), 128, 334–344

doi:10.1017/S0007114521002580

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Meal patterns associated with energy intake in people with obesity

Dietary factors that affect blood sugar increase

1. Meal patterns
2. The plate model
3. Amount of carbohydrates – the larger the meal, the higher the blood sugar rise
4. Type of carbohydrates
5. Preparation (cooked, raw, pureed, etc.)
6. Fat and protein content of the diet/food



Macronutrients

Carbohydrates



4 calories per gram

Proteins



4 calories per gram

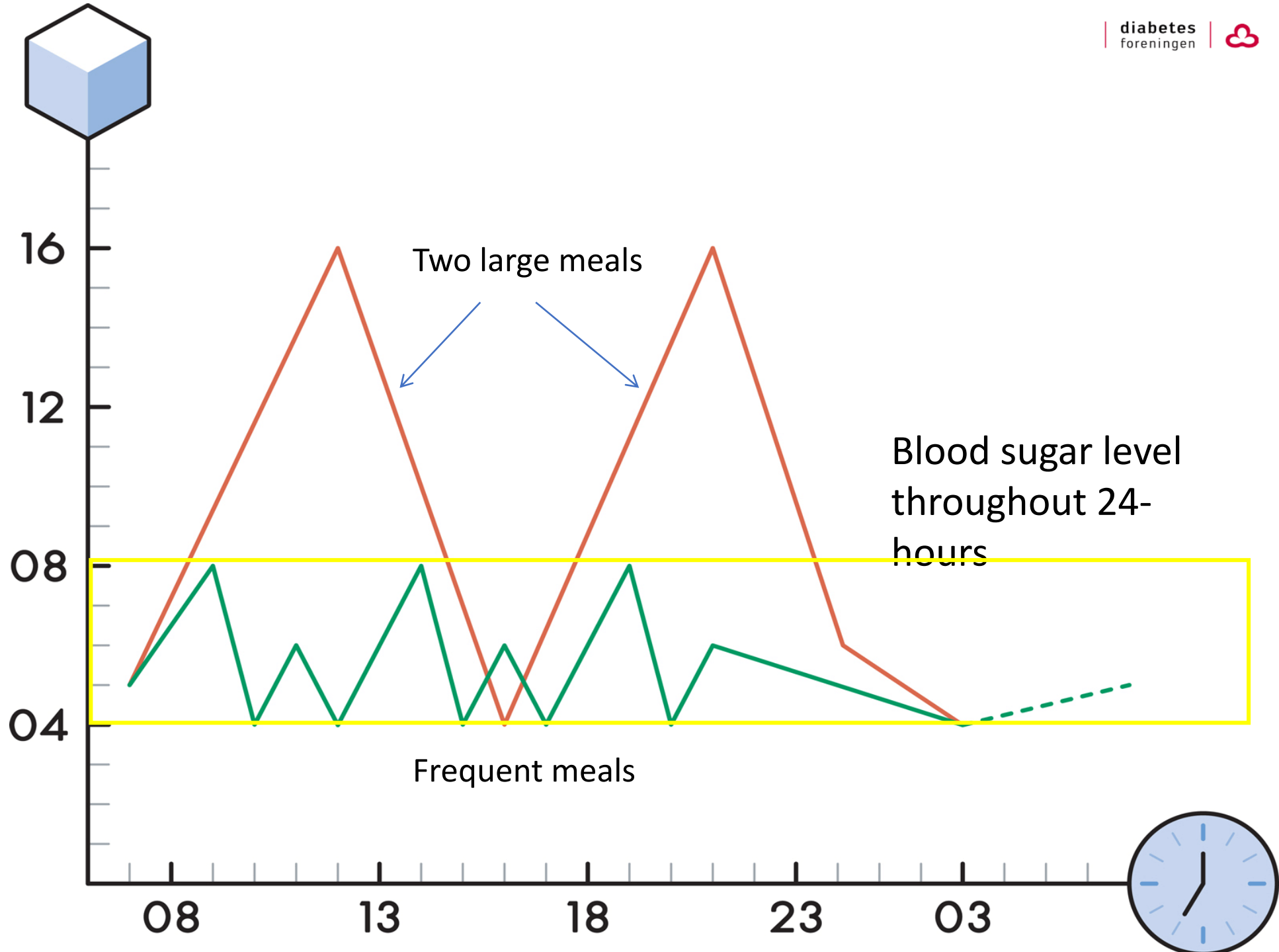
Fats



9 calories per gram



Alcohol: 7 calories per gram



➔ Bloodsugar

↑ Concentration

↓ Hunger

↑ Surplus of energy

↑ Humor

↑ Resting metabolic rate

↓ Fat storage

HEALTHY EATING PLATE

Use healthy oils (like olive and canola oil) for cooking, on salad, and at the table. Limit butter. Avoid trans fat.



The more veggies – and the greater the variety – the better. Potatoes and French fries don't count.



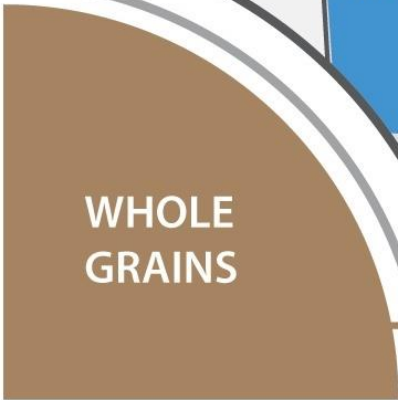
Eat plenty of fruits of all colors.



© Harvard University



Drink water, tea, or coffee (with little or no sugar). Limit milk/dairy (1-2 servings/day) and juice (1 small glass/day). Avoid sugary drinks.



Eat a variety of whole grains (like whole-wheat bread, whole-grain pasta, and brown rice). Limit refined grains (like white rice and white bread).



Choose fish, poultry, beans, and nuts; limit red meat and cheese; avoid bacon, cold cuts, and other processed meats.



Low carbohydrate bread: 1 slice 5g



1 crisp bread = 1,1g

Carbohydrates and carbohydrates



Bilder: Shdir/NDF, Fotograf Sveinung Bråthen

Dietary fiber

Why?

Good and long-lasting feeling of satiety

Prevents constipation

Can prevent/protect against lifestyle diseases (cholesterol)

Need: approx. 25-30 grams

Sources: Fruit, berries, potatoes and vegetables

Cereals, oatmeal, coarse flour and bran (wheat/oats)



Example

- 4 slices of extra whole grain bread, 11,8 g
- 2 whole grain crisp bread, 5 g
- 1 boiled potato, 0,9 g
- 1 raw carrot, 2,1 g
- 1 tomato, 1,5 g
- 2 broccoli florets, 1,4 g
- 2 raw cauliflower florets, 1,4 g
- ½ large pear, 4,5 g
- ½ orange 1,8 g
- → 29 g fiber

versus...

- 4 slices of semi-whole grain bread, 7,2 g
- 2 crisp bread 2 g
- 1 potato, 0,9 g
- ½ tomato, 0,7 g
- 6 slices of cucumber, 0,3 g
- 2 canned pear, 1 g
- 1,5 dl orange juice, 0,2 g
- → 12 g fiber

“hidden” sugar



5 a day?



Fat recommendation ...from



...to



Ingvild Thun, klinisk ernæringsfysiolog

Calories and fat content



Salami

Energi 399
kcal

Protein 19,5 g

Fett 35 g



Favorittsalami

Energi 429 kcal

Protein 19 g

Fett 38 g

→ 2,7 g sukker



Spezial Salami

Energi 316 kcal

Protein 25 g

Fett 25 g



Go'og Mager

Energi 181 kcal

Protein 25 g

Fett 9 g

«Eat fish 2-3 times a week»



«Choose oils, margarine in liquid form and soft margarine, instead of hard margarine and butter»



Diet and lymphedema

- Weight control and anti-inflammatory and anti-edema diet are two additional necessary components of the holistic therapy in presence of primary or secondary limb lymphedema.
 - Food, diet, nutraceuticals and fasting on the basic processes at the root of the chronic progressive degeneration of tissue lymph stasis, i.e. weight excess, inflammation, edema, fibroadiposis.
 - More targeted and randomized studies are needed in order to assess and standardise the obvious, so far neglected, role of nutrition in lymphedema patients.
-
- Veins and Lymphatics 2019; volume 8:8220 [page 24] [Veins and Lymphatics 2019; 8:8220]
Lymphedema and nutrition: A review Attilio Cavezzi,

Obesity and lymphedema

1. impaired diaphragm function and increased intra-abdominal pressure with dysfunction of fluid cardiopetal aspiration/ drainage;
2. reduced/altered ambulation/ mobility with consequential musculo-vascular limb pump dysfunction and phlebolymphatic stasis;
3. concomitant metabolic syndrome with multiple factors inducing edema (cardiac/renal/liver insufficiency etc.);
4. fluid-retentive adipose tissue in excess;
5. hypertension and intake of edema-generating drugs (calcium-blockers, alpha-lytics, second-generation β -blockers etc.);
6. hormonal alterations such as hyperproduction of insulin and cortisol;
7. Skin infections/inflammation which compromise/generate fluid retention furthermore

Weight loss

- Positive effect on LYM volume reduction specifically in upper limb of up to 44%
- More could be expected in lower limb
- No differences in result between types of dietary interventions: Both low energy and low fat gave reduction in WL, BMI, skinfold and arm volume

Salt and Sodium reduction



- Excess sodium tends to retain water in the blood vessels, increases arterial pressure, imbalances microcirculatory homeodynamics and lymphatic function, which subsequently worsens edema.

- Avoid table salt
- Use sodium reduced salts
- Avoid salty snacks
- More home made foods
- Be aware of sodium and salt content in foods
- Read ingredients lists and be aware of spices with salt

Least amount of:

- Canned foods
- Instant soups/sauces/stews
- Processed foods
- Street/fast foods
- Mineral water with sodium
- Processed meat and fish products
- Soy sauce
- Table salt
- Stock

Antioxidants

- Protects against tissue damage and inflammation
- The most important antioxidants
- Vitamin E, beta-carotene, vitamin A, vitamin C, zinc and selenium.
- Eat plenty of fruit and vegetables, cereals and fatty fish
- At least 5 portions of fruit and vegetables/day, one portion for each meal



Dietary supplements

- The evidence for extra intake of supplements in lip- and lymphedema is very weak
- Usually recommended when food intake is limited
- The main thing is that supplements should not substitute foods
- Too much or too little of some nutrients could be harmful



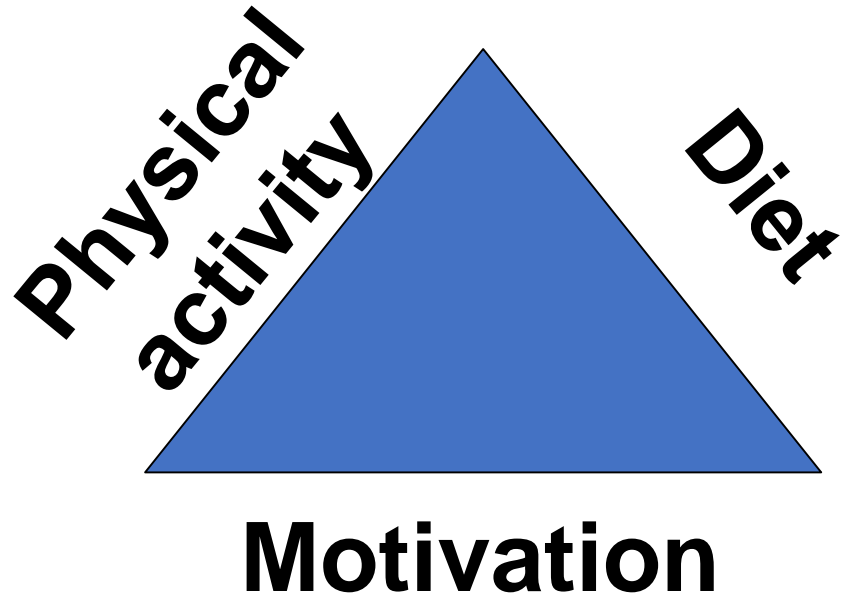
Dietary interventions and weight loss

Which diet to choose?

- Low fat?
- Low carb?
- Mediterranean?
- Meal replacements?
- 5:2 diet?
- High protein?
- Marginal differences between the effect of the different diets
- Weight loss is health-beneficial independent of dietary compositions
- The main factor is consistency

Lifestyle treatments

- Aim: Change in lifestyle
- Method: Specialized programs for long term follow-up



Conservative weight loss treatments

Different methods for energy restriction:

- Low-calorie diets (LCD)
- Very-low calorie/energy diets (s/VLEDs)
- Meal replacements
- Intermittent fasting
- Low carbohydrate high fat diet

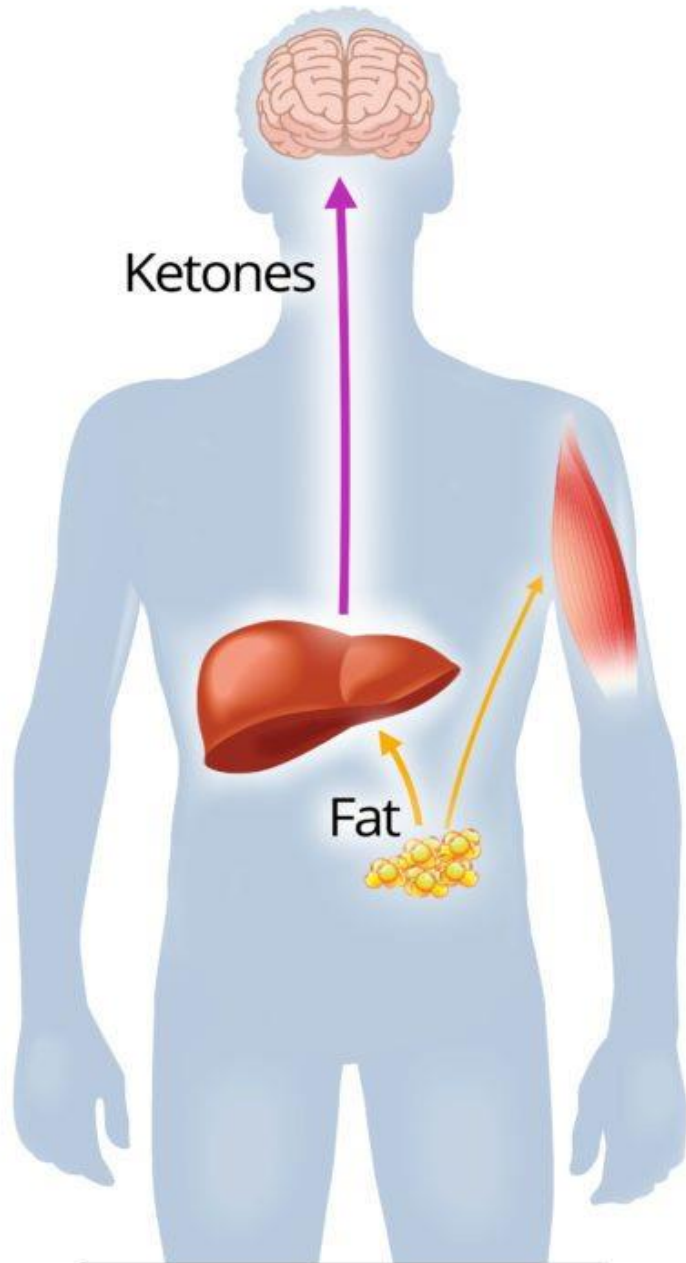


Williams and Fruhbeck, 2009

Very low-energy diets (VLEDs)- ketogenic

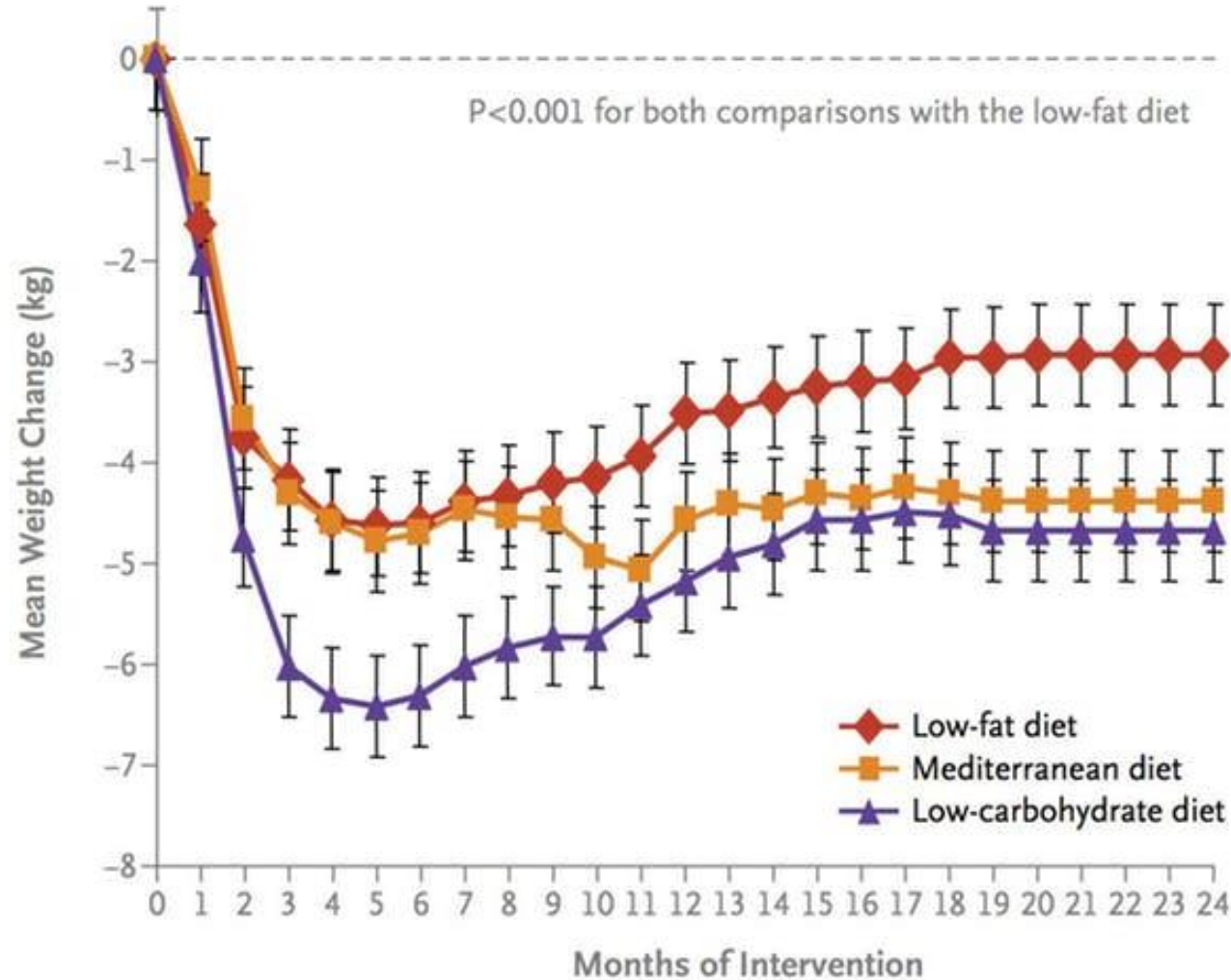
- 400-800 kcal/day
- Commercial diets are optimized in regards to recommended amounts of minerals, vitamins, electrolytes and fatty acids
- They should give 0.8-1.5 g protein/kg ideal weight
- Induces a weight loss of 1.5-2.5 kg/week
- It is recommended alongside tight follow-ups by clinical nutritionist/ dietitian or physician over time

Ketogenic diets



- < 50 g Carbohydrates per day
- Induce ketoses
 1. Low levels of carbohydrates cause the liver to produce ketone bodies from fat stores
 2. Ketones can be measured in urine and blood

Weight Loss with a Low-Carbohydrate, Mediterranean, or Low-Fat Diet



July 17, 2008

N Engl J Med 2008; 359:229-241

DOI: 10.1056/NEJMoa0708681

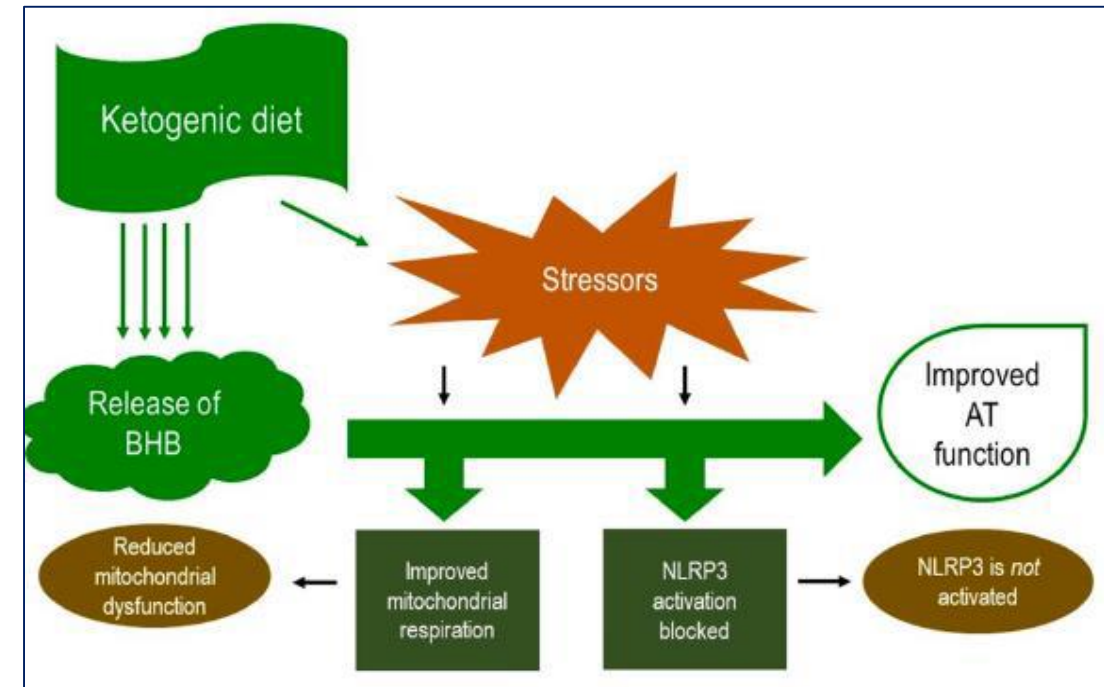
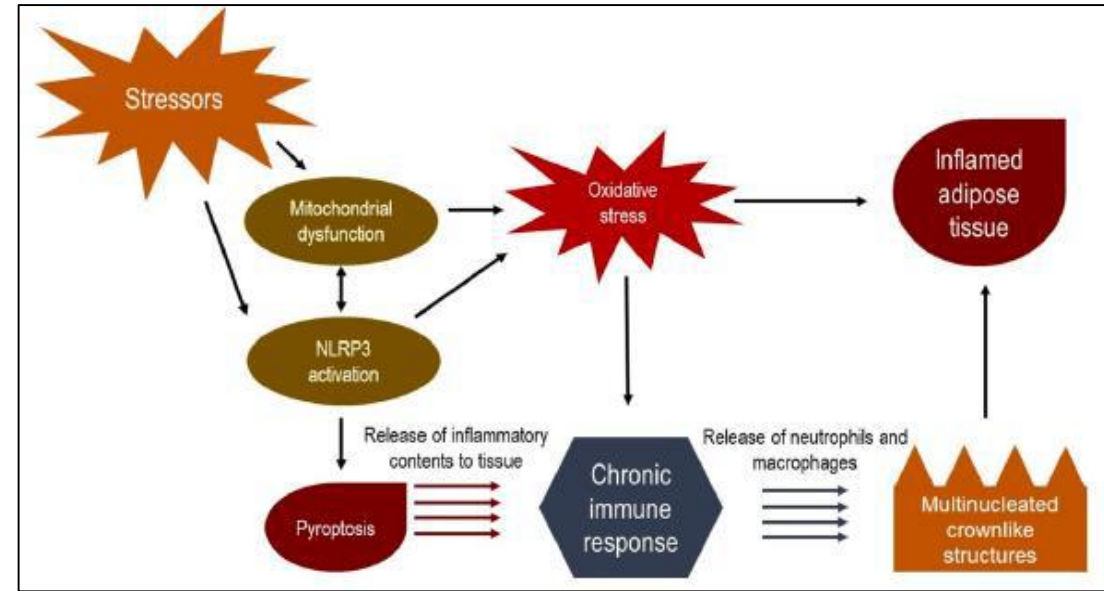
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Hypotheses for the effect of ketogenic diets


- Weight loss and fat mass loss
- Pain reduction
- Improvement in quality of life
- Change in metabolism and hormone function
- Reduction in edema and body water
- Reduction inflammation
- Reduction and prevention of fibroses

Keith et al. 2021: Ketogenic diet as a potential intervention for lipedema



Article

Potential Effects of a Modified Mediterranean Diet on Body Composition in Lipoedema

Laura Di Renzo ^{1,*}[†], Giulia Cinelli ^{2,3}[†], Lorenzo Romano ², Samanta Zomparelli ², Gemma Lou De Santis ²,
Petronilla Nocerino ¹, Giulia Bigioni ⁴, Lorenzo Arsini ⁴, Giuseppe Cennamo ⁵, Alberto Pujia ⁶,
Gaetano Chiricolo ⁶ and Antonino De Lorenzo ¹

Low carbohydrate and high fat diets

Kirkpatrick et al. (2019) J of Clin Lipidology 13, 689

Table 1 Diet classification based on amount of TDE and grams per day from CHO^{20,22-24}

Diet description	Ketogenic	Calories/d	CHO % TDE	Protein % TDE	Fat % TDE
VLCHF/KD	Yes	>1000	<10* (<20–50 g/d)	~10% TDE (1.2–1.5 g/kg)	70–80% TDE
Low-CHO	No	>1000	10–25† (38–97 g/d)	10–30% TDE	25–45% TDE
Moderate-CHO	No	>1000	26–44† (98–168 g/d)	10–30% TDE	25–35% TDE
High-CHO	No	>1000	45–65† (169–244 g/d)	10–30% TDE	25–35% TDE
Very-high-CHO	No	>1000	>65† (>244 g/d)	10–30% TDE	25–35% TDE
VLCaD‡	Varies	<800	Varies	Varies	Varies
Classic KD	Yes	Varies	3	7	90

CHO, carbohydrate; VLCHF/KD, very-low-CHO, high-fat ketogenic diet; VLCaD, very-low-calorie diet; PSMF, protein sparing modified fast; TDE, total daily energy.

*Typically the amount of CHO required to induce ketosis in most people.²²

†Based on 1500 calories/d, an energy intake considered hypocaloric for most individuals.

‡VLCaDs vary in macronutrient composition—some may be ketogenic if CHO content is low enough; others may not be if CHO content is >50 g/d. The PSMF is a subset of VLCaDs and is typically higher in protein to spare LBM with a macronutrient composition of <20 to 50 g CHO/d, 1.2 to 1.5 g/kg protein/d, and <10 to 15% TDE fat.

Side effects

Results from a prospective multicentre study: VLCD 800 kcal for 12 weeks with 1 year follow-up in 8.296 participants

Hairloss: 0.6%

Constipation: 0.3%

Galle stones: 0.2%

Cholecystectomy: 0.1%

Reported side effects of an LCHF diet is constipation, headache, bad breath, muscle cramps, general weakness, gastro-oesophageal reflux, hypoglykemia, hyperlipedemia, nephrothiasis and diarrhea.

Yancy et al. Electronic

Wibisons et al. J Pediatr. 2015;166(4):1030-6.e1

Is Lipedema Resistant to All Diets?

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

Dr.med. Gabriele Faerber (Center for Vascular Medicine, Hamburg, Germany)
 Leslyn Keith, OTD, CLT-LANA (The Lipedema Project, Boston, USA)

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. Up to 85-88% of patients with lipedema may have a comorbidity of obesity. Obesity can exacerbate lipedema symptoms and is associated with further health complications.



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 a protein-optimized Ketogenic Diet

- Components of a Successful Prescription for Weight Reduction
- Combination of nutrition, physical activity and behavior change
 - Targeted/prevention of blood glucose and insulin peaks
 - Observe breaks in between eating
 - Fat loss without muscle loss
- These criteria are all met using a protein-optimized ketogenic diet.

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).

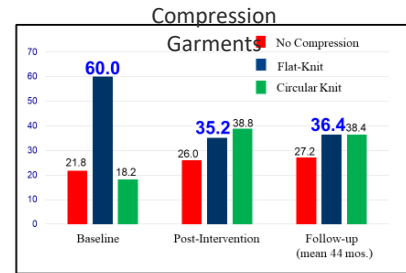
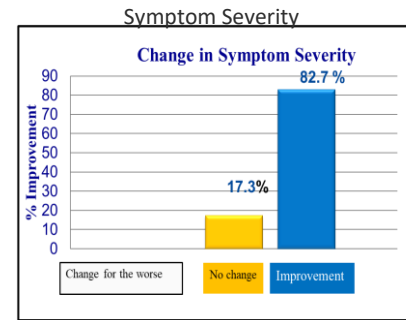
The intervention in both investigations was a protein-optimized ketogenic diet. Total carbohydrate intake is restricted to less than 50g/day. Protein intake is optimized by encouraging daily intake of 1.2-1.5g of protein per kg of normal weight. Fat intake is moderate with healthy fatty acids encouraged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

The second study also used sonolipolysis (ultrasonic cavitation) and manual lymph drainage (physical treatments)



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 (ie. no benefit with physical treatments).

Results



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.

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O R I G I N A L
Research

Leslyn Keith, OTD, OTR/L, CLT-LANA, Carol Rowsemitt,
PhD, RN, FNP-C, and Lorie G. Richards, PhD, OTR/L, FAHA

Lifestyle Modification Group for Lymphedema and Obesity Results in Significant Health Outcomes

Table 2.

Results for All Outcome Measures Over Testing Sessions.


Keith et al. (2020) Am J of Lifestyle Medicine

Outcome Measure	Baseline ^a	First Posttest	Second Posttest	<i>F</i> (4, 36)	<i>P</i>
	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)		
Weight (kg)	107.72 (26.69)	103.29 (27.81)	102.54 (28.59)	11.17	<.001
Waist (cm)	113.25 (19.94)	108.7 (18.65)	109.5 (19.34)	3.16	.025
Body fat (%)	40.81 (3.83)	39.79 (3.93)	39.58 (4.25)	1.9	.133
BMI	38.38 (7.02)	36.76 (7.32)	36.27 (7.53)	11.92	<.001
Limb volume (mL)	9690.03 (4339.56)	9205.76 (4113.77)	8991.14 (3986.61)	9.4	<.001
LLIS	50.44 (14.63)	37.9 (8.6)	38 (18.38)	5.26	.002
OWLQOL	41.51 (22.48)	63.43 (22.03)	65.49 (21.52)	6.12	<.001
WRSM	36.97 (18.01)	21.17 (11.81)	23.83 (17.58)	9.99	<.001
COPM-P	3.85 (1.6)	6.12 (1.86)	6.07 (1.97)	9.78	<.001
COPM-S	2.75 (1.71)	5.07 (2.25)	5.41 (2.55)	9.01	<.001

Abbreviations: *M*, mean; BMI, body mass index; LLIS, Lymphedema Life Impact Scale; OWLQOL, Obesity and Weight Loss Quality of Life; WRSM, Weight-Related Symptom Measure; COPM-P, Canadian Occupational Performance Measure–Performance Score; COPM-S, Canadian Occupational Performance Measure–Satisfaction Score.

^aMean of 3 baseline measures.

Effect of a ketogenic diet on pain and quality of life in patients with lipedema: The LIPODIET pilot study

Vilde Sørli¹ | Ann Kristin De Soysa² | Åsne Ask Hyldmo³ | Kjetil Retterstøl¹ |
Catia Martins^{3,4} | Siren Nymo^{3,4,5} 

Assess if an eucaloric LCHF-diet had effect on:

1. Pain and quality of life in participants with lipedema.
2. Change in body composition in participants with lipedema.

Hypotheses: An LCHF-diet may induce a reduction in pain and improvement in quality of life, independent of weight loss in people with lipedema.

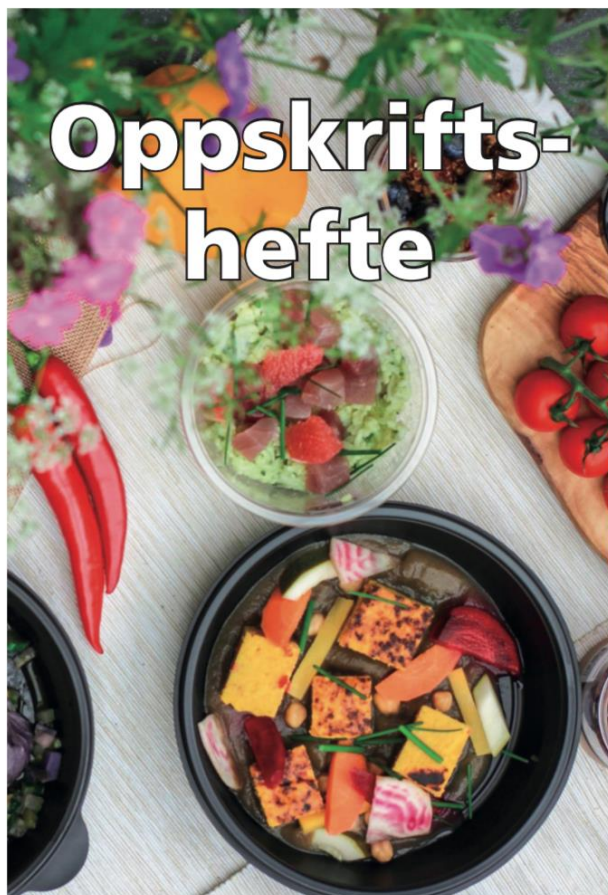


Norwegian University of
Science and Technology



DIETARY INTERVENTION

Recipes



Dietary plans

Monday

Breakfast: 3 slices whole grain bread (gluten free) or 5 whole grain crispbread, tiny layer of butter, 1 egg, tomato, cucumber and salad and 1.5 dl of skimmed milk

Lunch: “Pasta salad”; a lot of leaf salad, tomato, cucumber, pepper, green, cheese, 150 g tuna/ham/ chicken, 1 egg (60 g chick peas or beans) 2 Tbs dressing and 1 slice whole grain bread.

Dinner: 1 serving Chili con carne, free amount of salad

Supper: 1.5 dl yoghurt, 1,5 dl unsweetened muesli or oatmeal, ½ banana, 2 Tbs berries or jam without sugar and 10 almonds

Snack: 1 fruit or 25 g unsalted nuts

PAIN & QUALITY OF LIFE

LYMQOL BEN - Skåring System Lymfødem Livskvalitet skjema

Skåring for de individuelle responsene er angitt under. Der hvor det ikke er angitt en skår er besvart eller angitt som "ikke aktuelt", IA, skåres dette som 0.
Poengsum for hvert domene er utregnet ved å summere de individuelle skårene og dele totalt antall besvarte spørsmål.
Dersom mindre enn 50% av spørsmålene er besvart pr. domene, kan ikke dette utregnes.
De fire domene og deres tilsvarende spørsmål er:
Funksjon: 1 (a-f), 2, 3.
Utseende: 4, 5, 6, 7, 8, 9, 10.
Symptomer: 11, 12, 13, 14, 15.
Følelser: 16, 17, 18, 19, 20, 21.
Generell livskvalitet: spørsmål 22. Skåres som denne verdien pasienten har anført mellom

Funksjon Q1-3

1a) gåing

Ikke i det hele tatt	Noe	En del	Mye
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4

1b)

1c) å greie å stå over tid.

1d) din evne til å reise deg opp fra en stol.

1e) ditt yrke.

1f) din evne til å gjøre husarbeid.

Ikke i det hele tatt	Noe	En del	Mye
1	2	3	4

2: Påvirker hevelsen dine fritidsaktiviteter /ditt sosiale liv?

Vennligst gi eksempler på dette.....

3: I hvilken grad er du avhengig av hjelp fra andre grunnet ditt lymfødem?

Ikke i det hele tatt	Noe	En del	Mye
1	2	3	4

SUM Funksjon Q1-3

Utseende Q 4-10

Ikke i det hele tatt	Noe	En del	Mye	Ikke aktuelt
0	1	2	3	4
0	1	2	3	4
0	1	2	3	4
0	1	2	3	4
0	1	2	3	4
0	1	2	3	4
0	1	2	3	4
0	1	2	3	4
0	1	2	3	4
0	1	2	3	4

1. Function
2. Body image
3. Symptoms
4. Feelings
5. Total score
6. General life quality

20: Har du følt deg irriteret?

21: Har du følt deg deprimeret?

Ikke i det hele tatt	Noe	En del	Mye	Ikke aktuelt
1	2	3	4	0

Generell livskvalitet:

22: Totalt sett hvordan vil du gradere din nåværende livskvalitet?

Vennligst kryss av på følgende skalaen:

0 1 2 3 4 5 6 7 8 9 10
dårlig utmerket

Sum totalt sett livskvalitet:

Tusen takk for at du tok deg tid til å fylle ut dette skjema.

Har du kommentarer eller spørsmål angående dette, vennligst diskuter dette med

Spørsmålene 16 til 21 har blitt benyttet med tillatelse fra ECRILC.
Dette spørsmålene er kun en del av QLQ-C30 Spørreskjema.

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All rights reserved. This document can be used or reproduced freely provided that this copyright statement is left intact, that the source is acknowledged, that the user registers and that no changes are made without permission of the author. Application for permission and for registration should be forwarded in writing to Dr Vaughan Keeley, Consultant in Palliative Medicine, Nightingale Macmillan Unit, 117A London Road, Derby DE1 2GS.

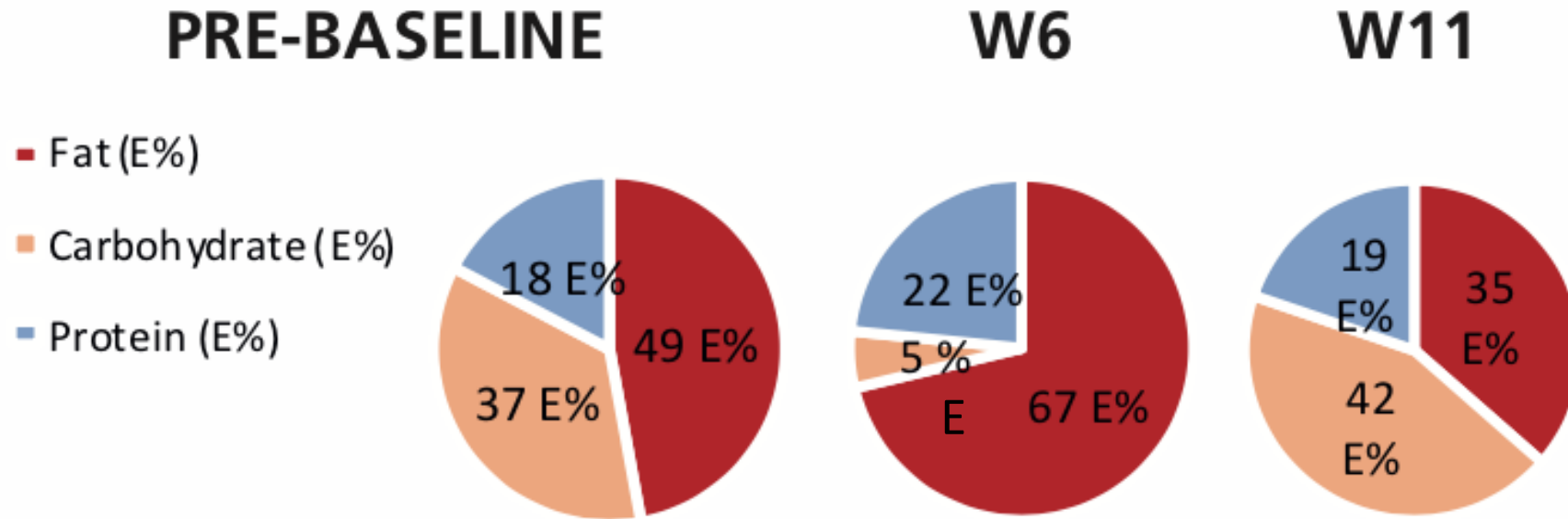
PARTICIPANTS



	N=9	Minimum	Maximum	Mean \pm SD
Age (years)		34.0	63.0	46.9 \pm 9.0
BW (kg)		82.7	129.4	102.6 \pm 12.6
BMI (kg/m²)		32.0	45.3	36.7 \pm 4.5

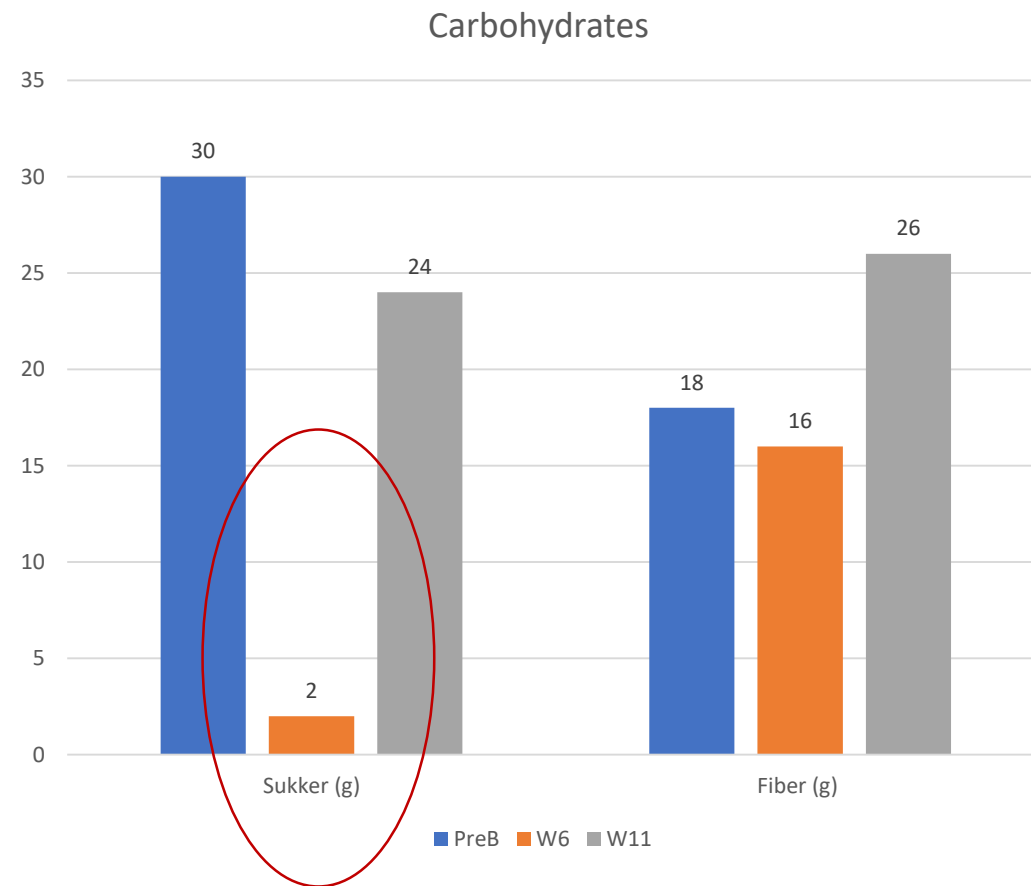
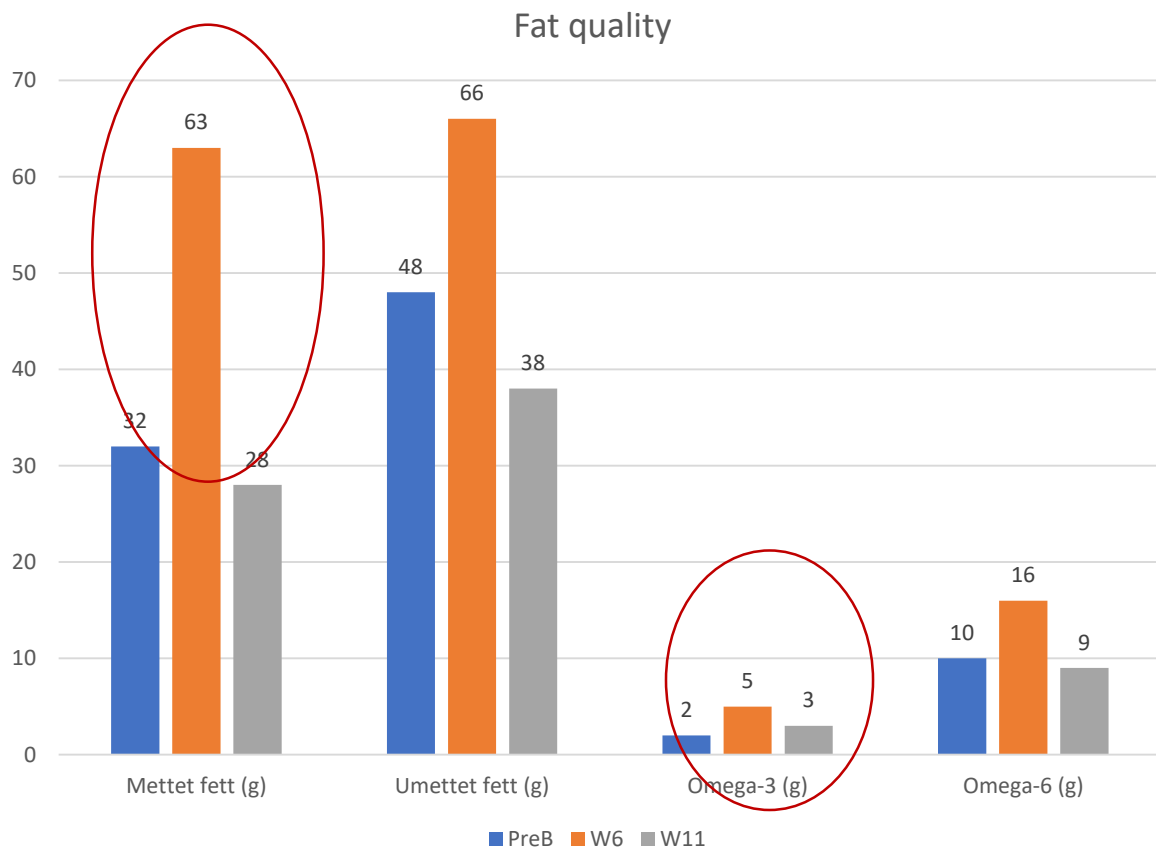
The data is presented as mean \pm SD. (BW: body weight, BMI: body mass index, SD; Standard deviation)

MACRONUTRIENT COMPOSITIONS



All were ketotic on the ketostix during LCHF

- Sign. Increase in intake of saturated fat between pre-baseline and W6
- Sign. increase in intake of Omega-3 fatty acids between pre-B and W6
- Sign. reduction in intake of sugar between pre-B and W6



PAIN



	Baseline	W7	W13	P-value MedianΔ (B to W7)	P-value MedianΔ (B to W13)	P-value MedianΔ (W7 to W13)
VAS (cm)	4.9 (2.85,6.3)	1.70 (0.45, 3.90)	3.60 (3.00, 6.40)	<0.05 Δ-3.2	0.905 Δ-1.3	0.093 Δ1.9

Results presented as median and quartiles. N=9 at baseline and W7, N= 8 at W13. (B; baseline, W: week, VAS: visual analogue scale)

Significant reduction in mean VAS-score (P<0.05) between baseline and week 7

QUALITY OF LIFE



- **Body image/appearance***
Significant reduction on Likert's scale between baseline (3.1) and W7 (2.9) (P<0.05, z = -2.1).



- **Symptoms***
Significant reduction on Likert's scale between baseline (2.6) and W7 (2.0)



Generell livskvalitet:

22: Totalt sett hvordan vil du gradere din nåværende livskvalitet?

Vennligst kryss av på følgende skalaen:

0	1	2	3	4	5	6	7	8	9	10
dårlig										utmerket

1. Function
2. Body image
3. Symptoms
4. Feelings
5. Total score
6. General life quality

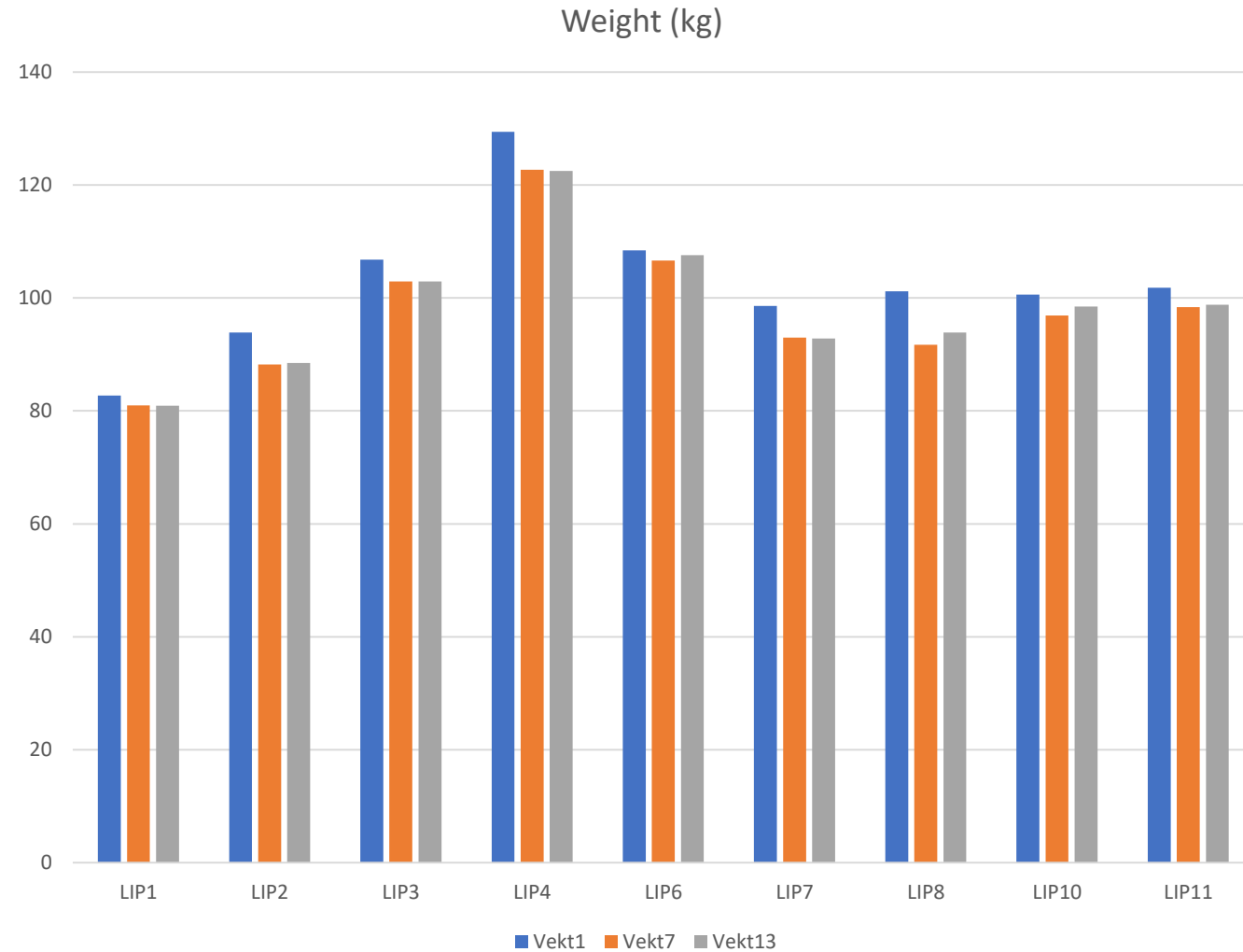
*Likert's scale, 1-4:
not at all = 1,
a little = 2,
quite a bit = 3,
a lot = 4.

BODY COMPOSITION



Weight loss

- Significant weight loss between baseline and week 7 (4.3 ± SD: 2.5 kg, P<0.001)
- No significant change in weight between week 7 and 13



CONCLUSION

- An LCHF diet was associated with reduction in reported pain and weight loss. Weight loss was maintained in the NNR period, concurrent with pain increase.
- This indicates that a ketogenic diet may reduce pain for patient with lipedema, regardless of weight loss.
- More research with larger sample size is needed to draw conclusions on whether an LCHF diet can be a possible treatment option for patients with lipoedema.

The effect of a low energy ketogenic diet on pain and quality of life in females with lipedema – A randomized controlled trial

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1. Background

Lipedema is an underdiagnosed subcutaneous adipose tissue (SAT) disorder (1, 2), characterized by an excessive SAT accumulation in the lower extremities (1), followed by pain and tenderness to palpation (3). This may result in immobility and reduced quality of life (QoL) (4). Recent research suggests that ketogenic diets may relieve pain and improve QoL in patients with lipedema (4).

Figure 1. Types of lipedema. (4)

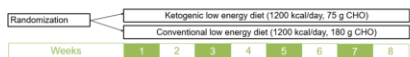


2. Aim

The aim of this study was to investigate the impact of a ketogenic diet on pain and QoL in females with lipedema.

3. Methods

Adult females with lipedema and obesity were randomized to isocaloric diets (1200 kcal/day) either ketogenic, or control, for 8 weeks.



Pain was measured using brief pain inventory (BPI) and QoL by RAND-36, impact of weight on quality of life-lite (IWQOL-lite) and lymphoedema quality of life (LYMQOL), before and after the intervention.

4. Results

- A total of 29 females diagnosed with lipedema (BMI 38 ± 8 kg/m², age 47 ± 11 years) were included in the study (Table 1).
- Dietary macronutrient composition at week 8 can be seen in Fig. 2.
- Greater weight loss (WL) in the KETO compared to CONV group.
- In the KETO group, there was a significant reduction in strongest pain, average pain, and pain now (Figure 3).
- Greater reduction in pain now in the KETO group (Figure 3).
- No correlation between changes in average pain and %WL ($r=0.211$, $P=0.511$) in the KETO group, or overall ($r=0.349$, $P=0.081$). However, there was a correlation between average pain and %WL for the CONV group ($r=0.699$, $P=0.012$).
- Both the keto and control groups improved their total QoL, physical function from IWQOL-lite and vitality from RAND-36, but only the KETO group improved self-esteem from IWQOL-lite (Figure 4).
- WL and changes in average pain were correlated with improved general health from RAND-36 only in the KETO group ($r=-0.620$, $P=0.042$ and $r=0.629$, $P=0.038$, respectively), and WL was correlated with improved physical function from RAND-36 in both KETO and CONV group ($r=0.657$, $P=0.039$ and $r=-0.662$, $P=0.028$, respectively).

5. Conclusion

A ketogenic diet is associated with reduction in pain and improvement in QoL in females with lipedema. However, further studies with larger sample size are needed, as well as research exploring underlying biological mechanisms.

The Norwegian LIPODIET Study

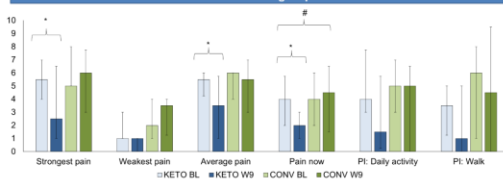
- Pain and quality of life
- Body weight and composition
- Inflammatory markers

TABLE 1. General characteristics of all participants

	BL		W9	
	KETO (n=13)	CONV (n=16)	KETO (n=12)	CONV (n=12)
Age, years	49 ± 10	45 ± 12		
Weight, kg	106 ± 14	109 ± 18	96 ± 14 [*]	102 ± 20 ^A
FM, %	49 ± 4	50 ± 5	46 ± 5	49 ± 4
Calf circumference, cm	47 ± 5	49 ± 4	45 ± 5	48 ± 4
Thigh circumference, cm	69 ± 10	68 ± 9	64 ± 9	64 ± 7

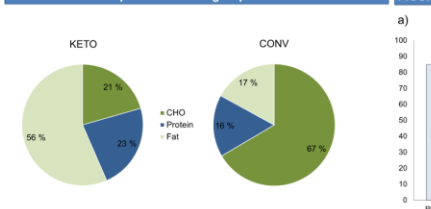
Data presented as mean ± SD. FM: fat mass, WL: Weight loss. KETO: Ketogenic diet, CONV: Conventional diet. BL: Baseline, W9: Week 9. ^{*} $P < 0.05$, Significant difference from baseline to week 9. ^A $P < 0.05$, Significant different change between groups.

FIGURE 3. Pain at baseline and week 9 in both groups



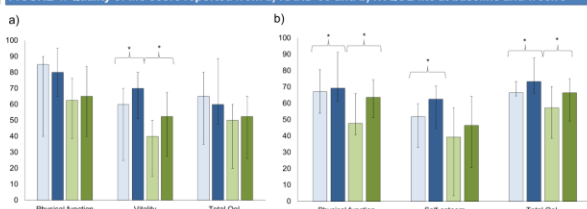
Data presented as median and 25 and 75 percentiles. KETO: ketogenic diet, CONV: conventional diet. BL: Baseline, W9: Week 9. PI: Pain inference. ^{*} $P < 0.05$ from Baseline to week 9. [#] $P < 0.05$, significant different change between groups.

FIGURE 2. Diet composition in both groups at week 8



Percentage of macronutrient distribution in both groups at week 8. CHO: Carbohydrates, KETO: ketogenic group, CONV: conventional diet.

FIGURE 4. Quality of life score reported from a) RAND-36 and b) IWQOL-lite at baseline and week 9



Data presented as median and 25 and 75 percentiles. KETO: ketogenic diet, CONV: conventional diet. BL: Baseline, W9: Week 9. ^{*} $P < 0.05$ from Baseline to week 9. [#] $P < 0.05$, significant different change between groups.

Looking for the future



- Research strategy is focused on partnering with the Lipedema research and patient community to identify and overcome specific barriers to advancement in Lipedema care.
- What is the optimal level of carbohydrate for treatment of lip- and lymphedema?
- What is the mechanisms behind the effect of a ketogenic diet?
- What is the effect of ketone bodies in lip- and lymphedema?
- One shoe do not fit all, therefore we need more treatment options
- Follow-up and multidisciplinary teams and combined modality can be central



How can patients with lip- and lymphedema get dietary counseling?

- Advanced dietary guidance for ketogenic diets can be given by authorized clinical nutritionists
- In Norway they usually works in hospitals and has to be referred by a physician

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