IS TYPE 2 DIABETES A REVERSIBLE DISEASE?

EXPERIENCE FROM A 12 WEEK PILOT STUDY

JULIA TULIPAN

www.JuliaTulipan.at

WHAT TO EXPECT

1. Current situation
2. What are the dietary guidelines?
3. What we know so far about the use of LC
4. Pilot Project „Take diabetes in your own hands“

DIABETES EPIDEMIC

In the WHO/European Region

over 50%
of people are
overweight or **obese**

over 20%
of people are
obese

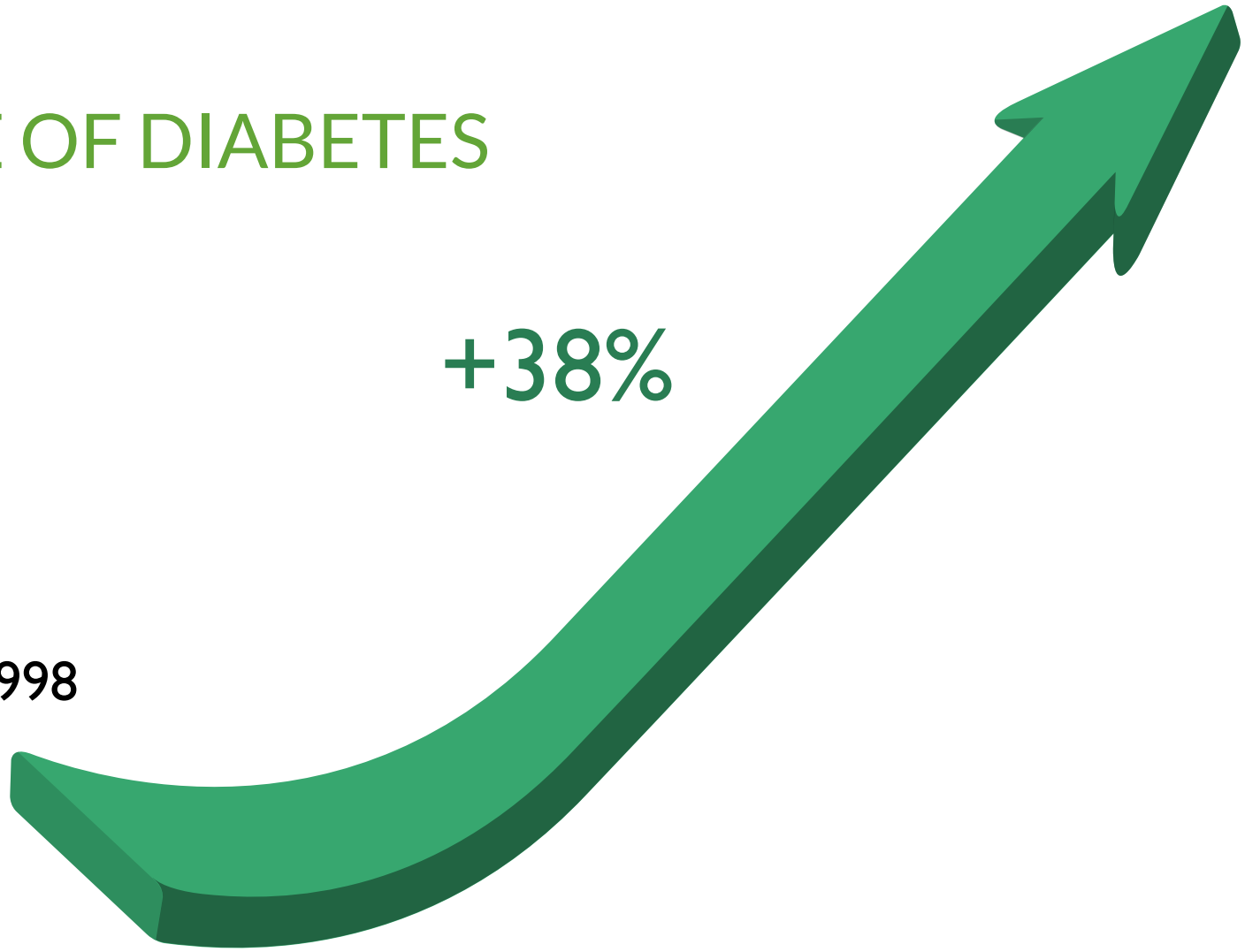
www.euro.who.int/obesity

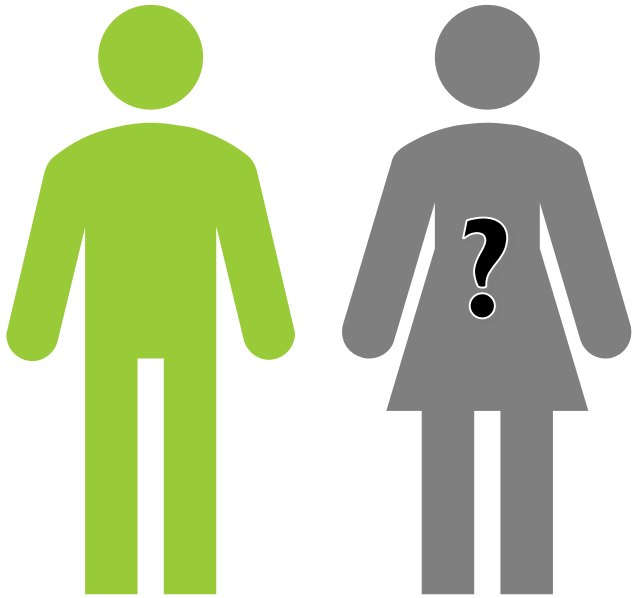
World Health Organization
REGIONAL OFFICE FOR Europe

422 Million adults have diabetes

The number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014

INCREASE OF DIABETES

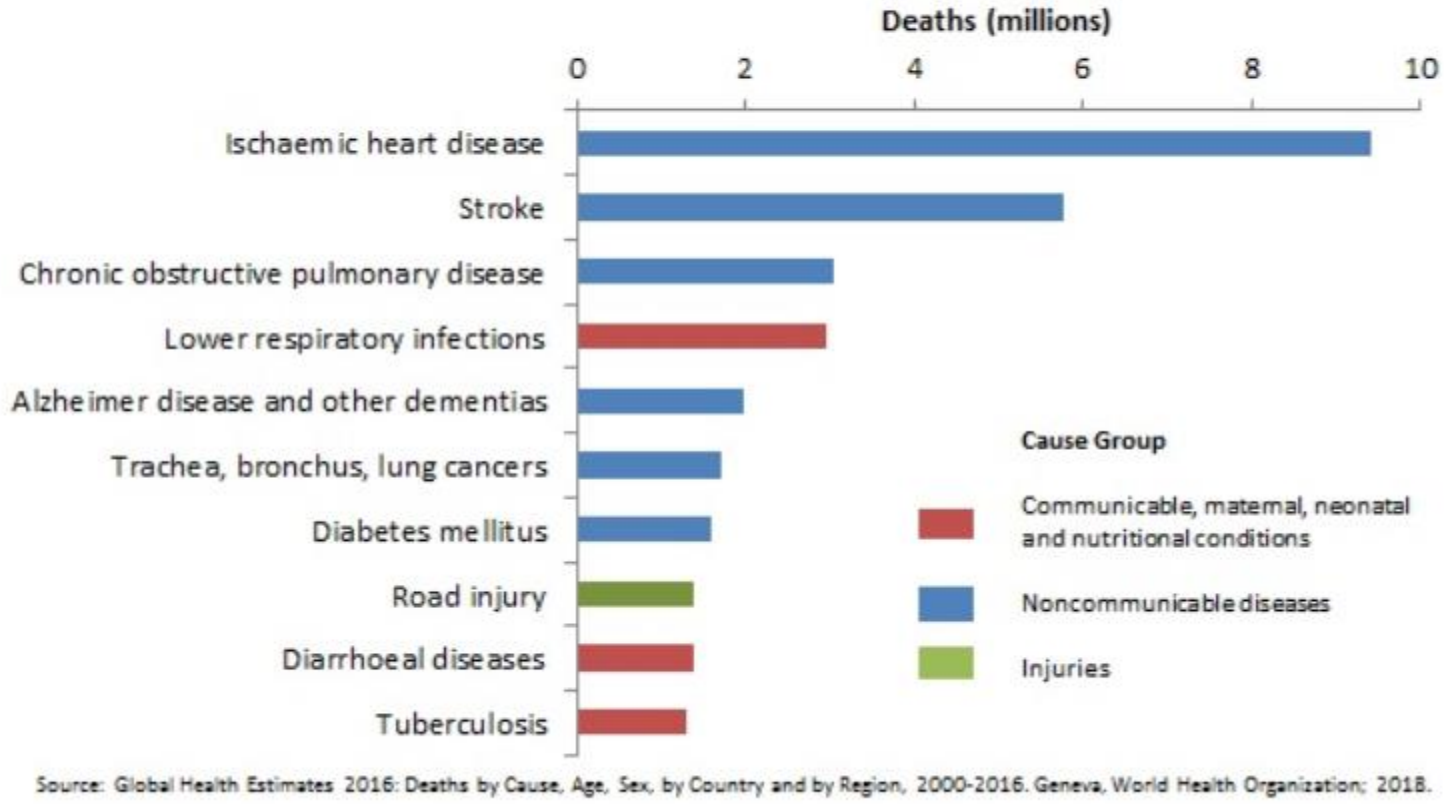




ONE IN TWO DOESN'T KNOW SHE HAS DIABETES

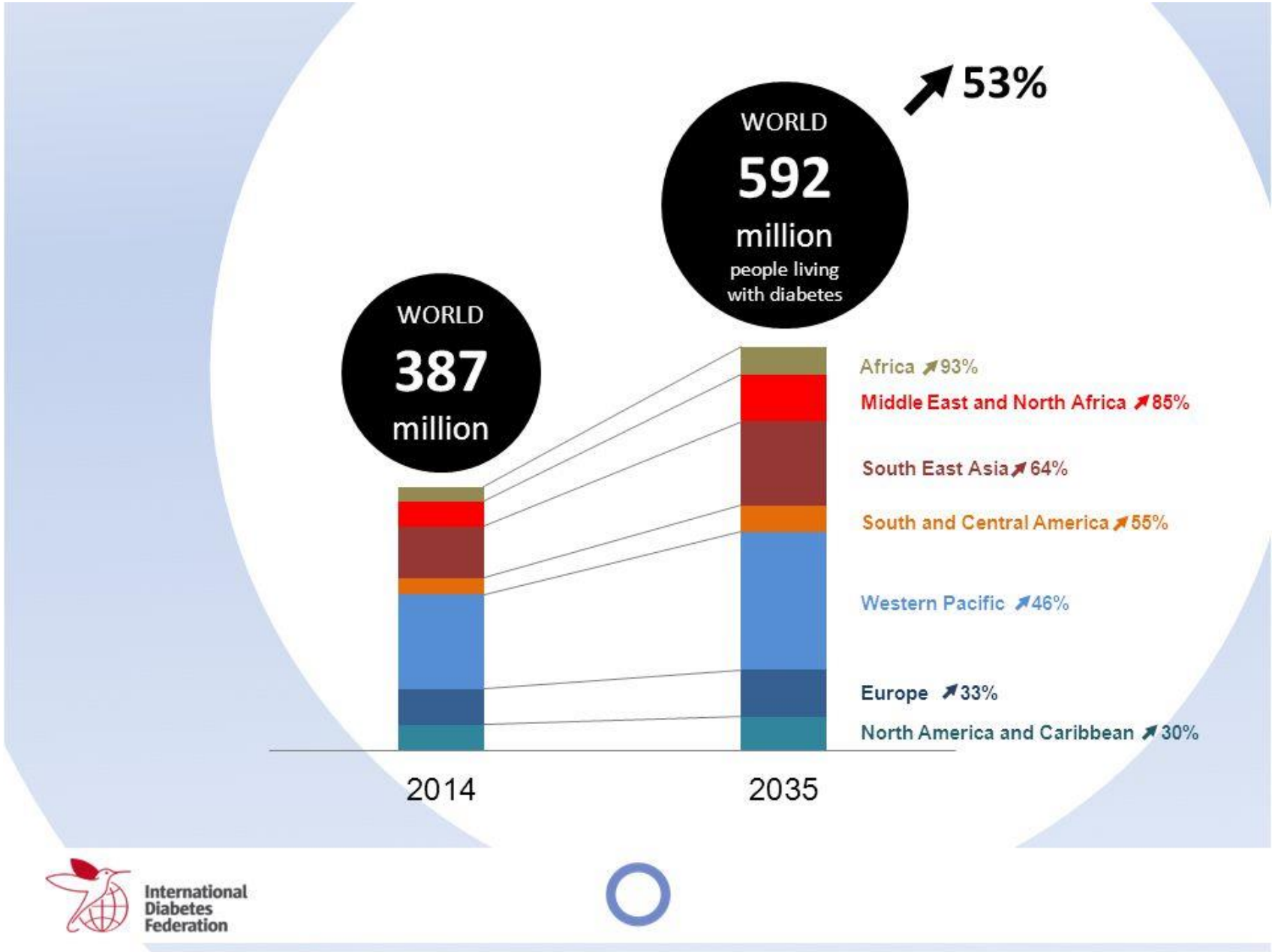
In Germany every 20 minutes, one person dies as a consequence of diabetes

Top 10 global causes of deaths, 2016



Source: Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2016. Geneva, World Health Organization; 2018.

WHO 2018



International Diabetes Federation

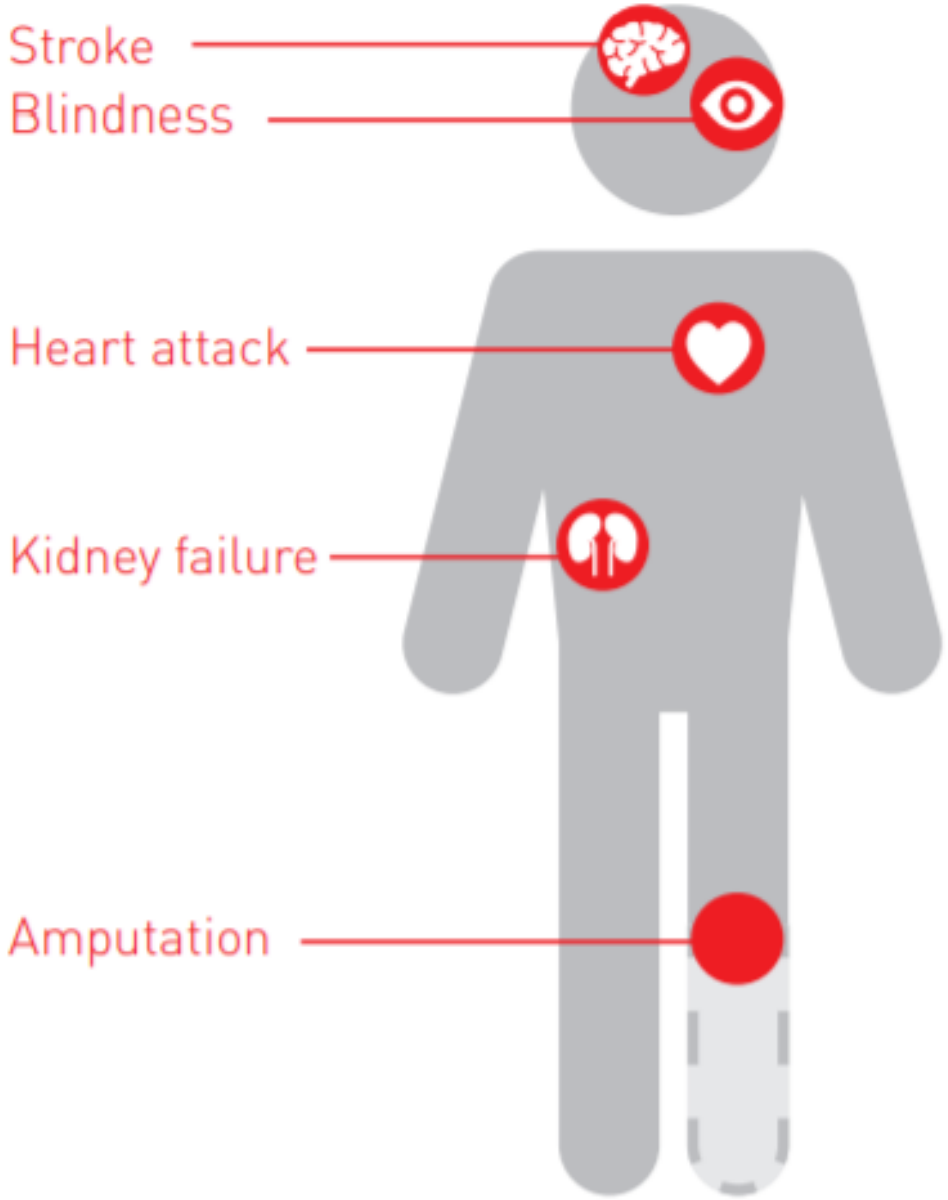
CURRENT THERAPY STRATEGIES

DOWNWARD PROGRESSION

„As commonly known, diabetes is a chronic and progressive disease"

– German Diabetes Association

Metformin → Metformin + 1 medication → Metformin + 2 medications → Metformin + medication + insulin



- 80,1 % high blood pressure
- 24,1 % diabetic retinopathy
- 23 % neuropathy
- 12,1 % peripheral artery occlusive disease
- 11,1 % heart attack
- 9,7 % diabetic nephropathy
- 7,4 % stroke
- 4,9 % diabetic foot syndrome
- 1,7 % amputation
- 0,6 % loss of sight

DiabetesDE: Deutscher Gesundheitsbericht Diabetes 2010. (PDF) auf diabetesde.org (PDF; 1,5 MB) Kirchheim Verlag, 2009.

DIETARY GUIDELINES „WHAT IS A HEALTHY DIET“?

AUSTRIAN SOCIETY FOR NUTRITION

Balanced Diet ?!

- *Adequate energy intake = low calories*
- *Smaller meals; 5-6 meals a day*
- *Adequate carbohydrate intake = 50% carbs, whole grains, legumes*
- *Reduced fat intake = avoid butter and animal fats*
- *Prefer vegetables oils = olive oil, safflower oil, rape seed, …*

2.200 kCal
54g protein (10%)
75g fat (30%)
323g carbs (60%)

= 108 sugar cubes per day

= 5 ½ milk chocolate bars

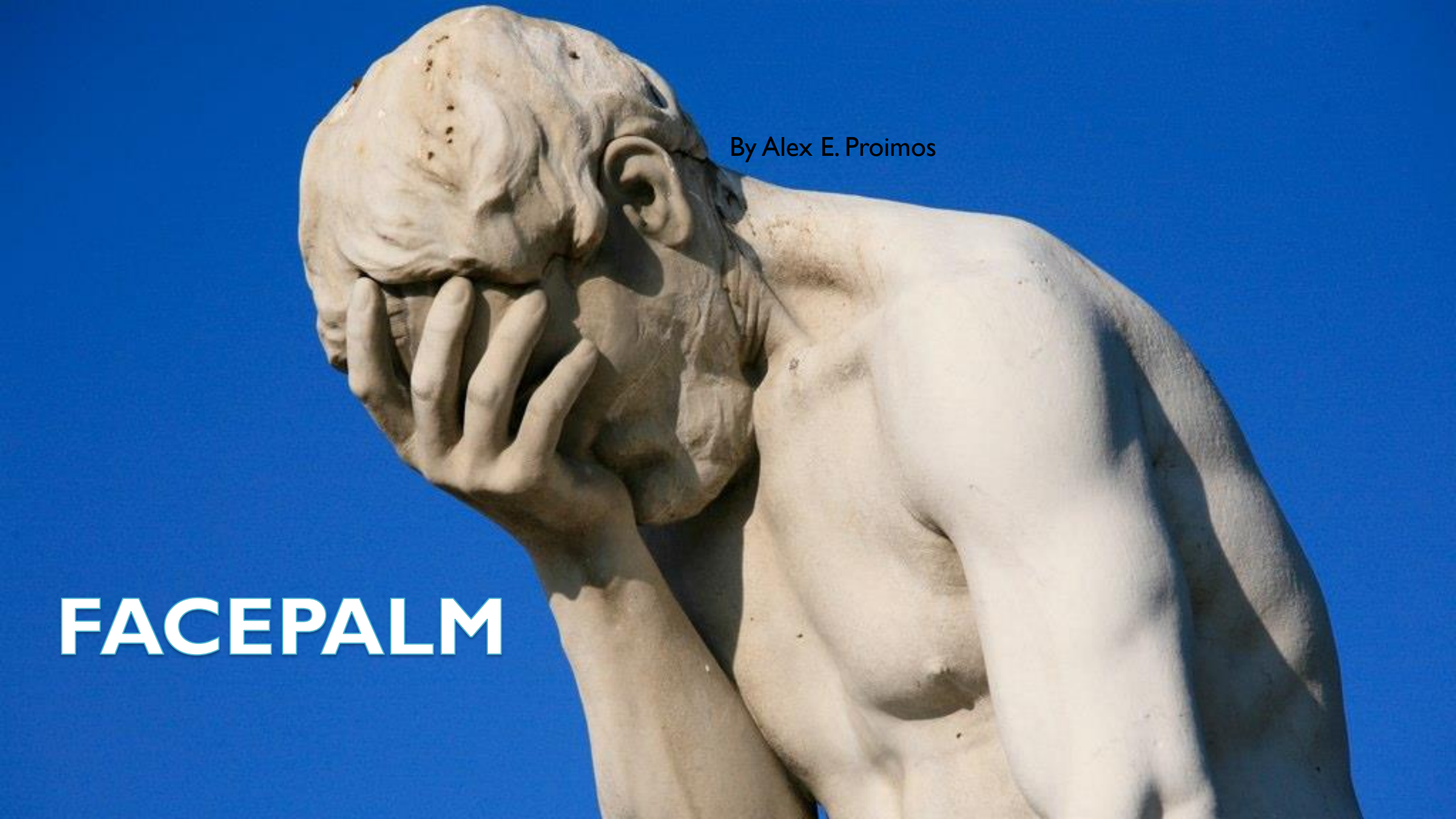
Courtesy of Daniela Pfeifer

1.600 kCal
41g protein (10%)
54g fat (30%)
235g carbs (60%)

= 78 sugar cubes per day

= 4 milk chocolate bars

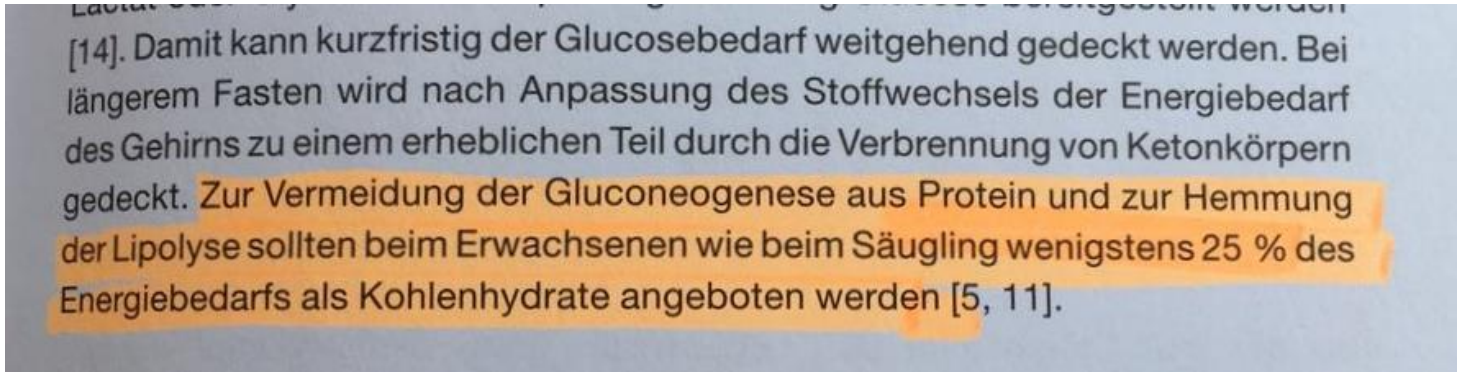
Courtesy of Daniela Pfeifer


By Alex E. Proimos
FACEPALM

SAD BUT TRUE

from - "Referenzwerte für die Nährstoffzufuhr" page 61

Deutsche Gesellschaft für Ernährung, 2000


[14]. Damit kann kurzfristig der Glucosebedarf weitgehend gedeckt werden. Bei längerem Fasten wird nach Anpassung des Stoffwechsels der Energiebedarf des Gehirns zu einem erheblichen Teil durch die Verbrennung von Ketonkörpern gedeckt. Zur Vermeidung der Gluconeogenese aus Protein und zur Hemmung der Lipolyse sollten beim Erwachsenen wie beim Säugling wenigstens 25 % des Energiebedarfs als Kohlenhydrate angeboten werden [5, 11].

„To **inhibit** gluconeogenesis from protein and to **inhibit lipolysis** adults are adviced to eat at least 25% of their daily caloric needs from carbohydrates"

LOW-CALORIE & LOW-FAT NOT SUSTAINABLE

- Chronic hunger is very stressful
- Reduction of REE (Resting Energy Expenditure)
- Malnutrition (nutrient deficiencies)
- Loss of muscle mass

Fothergill, Erin, et al. "Persistent metabolic adaptation 6 years after "The Biggest Loser" competition." Obesity (2016)


Eat less and exercise more is not sustainable!

WHAT DO WE KNOW ABOUT CHRONIC ENERGY RESTRICTION?

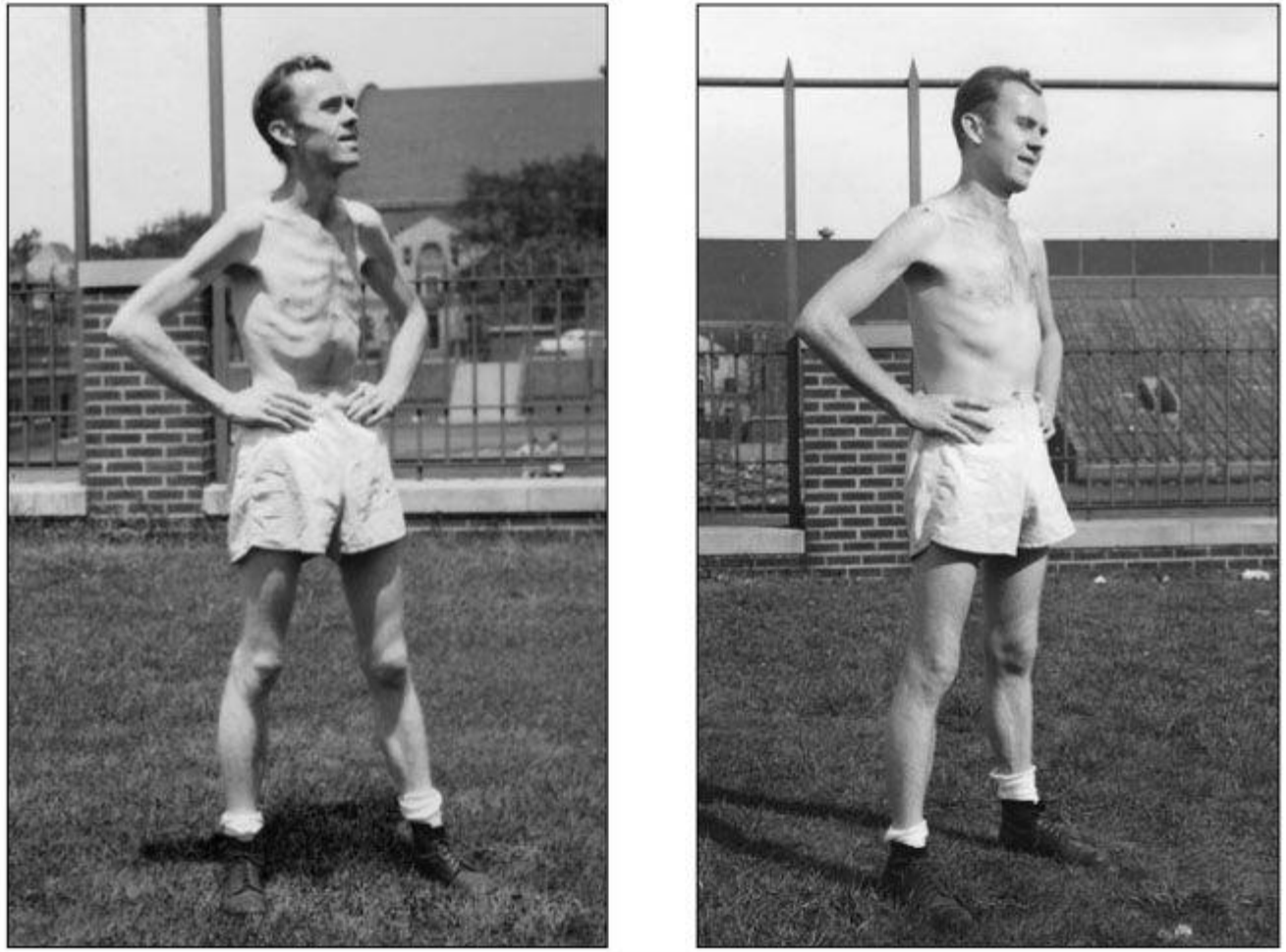
THE MINNESOTA STARVATION EXPERIMENT

November 1944 - December 1945

36 young men

4 phases:

Control phase (12 weeks) – starvation phase (24 weeks) – restricted rehabilitation (12 weeks) - unrestricted rehabilitation (8 weeks)

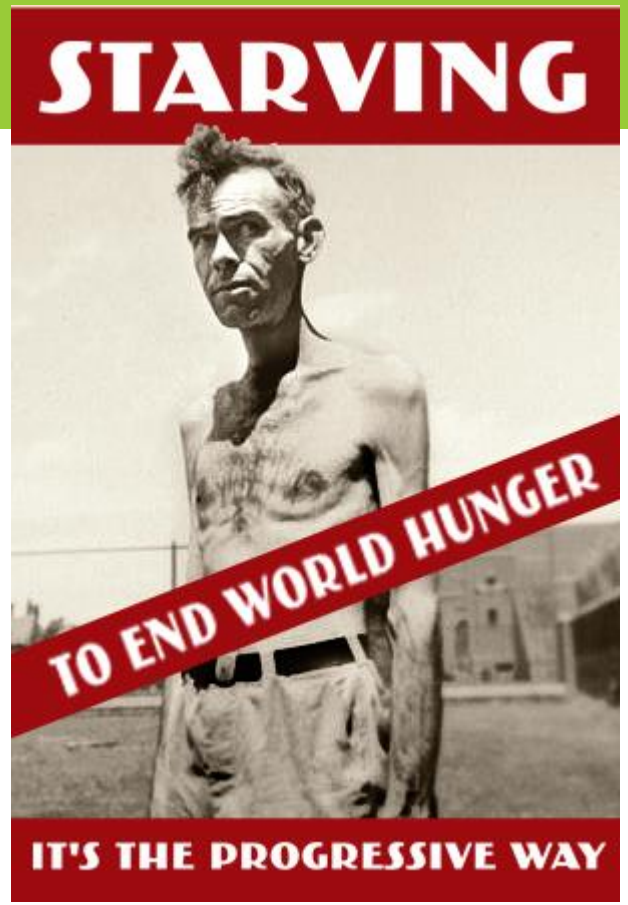


Dan Miller during the twenty-fourth week of starvation, and during the recovery period. Miller's 24.5 percent weight loss was typical. *Courtesy of Henry Scholberg*

Keys, A., Brožek, J., Henschel, A., Mickelsen, O., & Taylor, H. L., *The Biology of Human Starvation* (2 volumes), University of Minnesota Press, 1950.

RESULTS

- Increase of psychological disorders like depression.
- Self-mutilation
- Obsessive interest in food. Even after weight was regained
- Reduced concentration and focus
- Decrease of BMR (base-metabolic-rate)
- Reduction of body temperature



Does this sound familiar?

Anyone who has ever dieted and tried to master the demands of daily life with 1000 kcal per day will have had similar experiences.

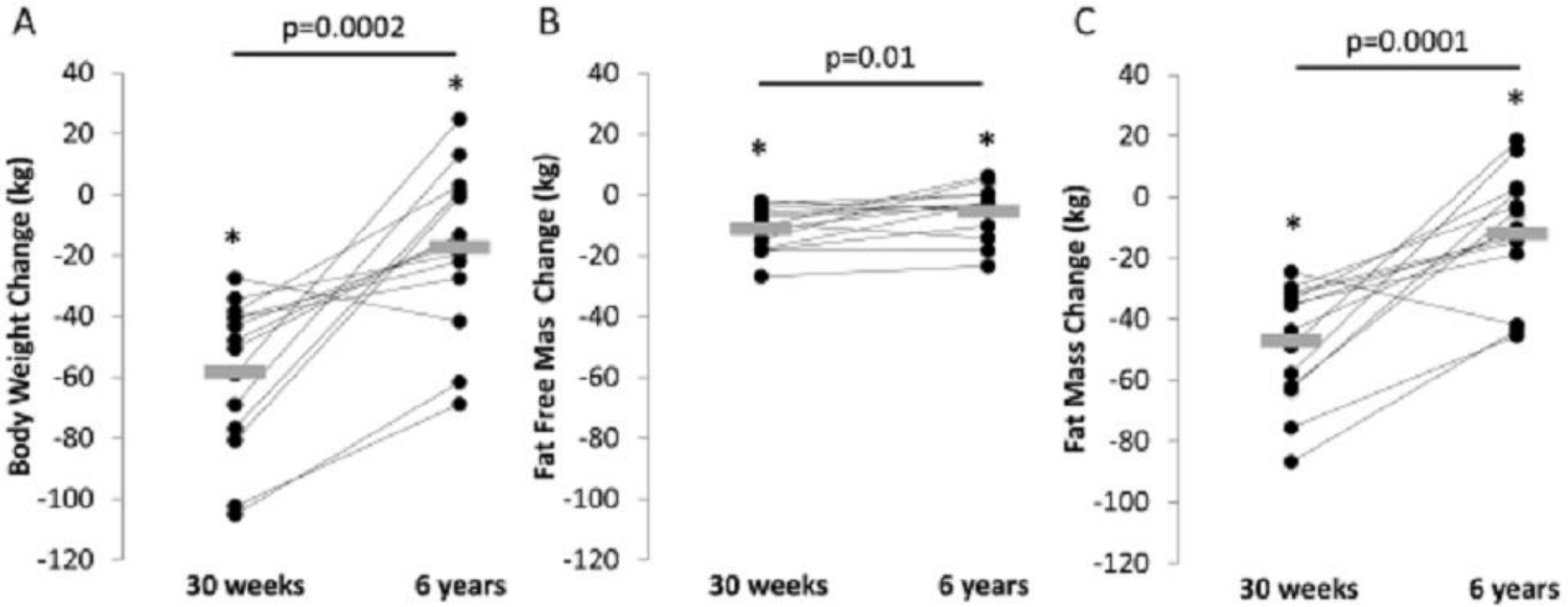
THE BIGGEST LOSER STUDY

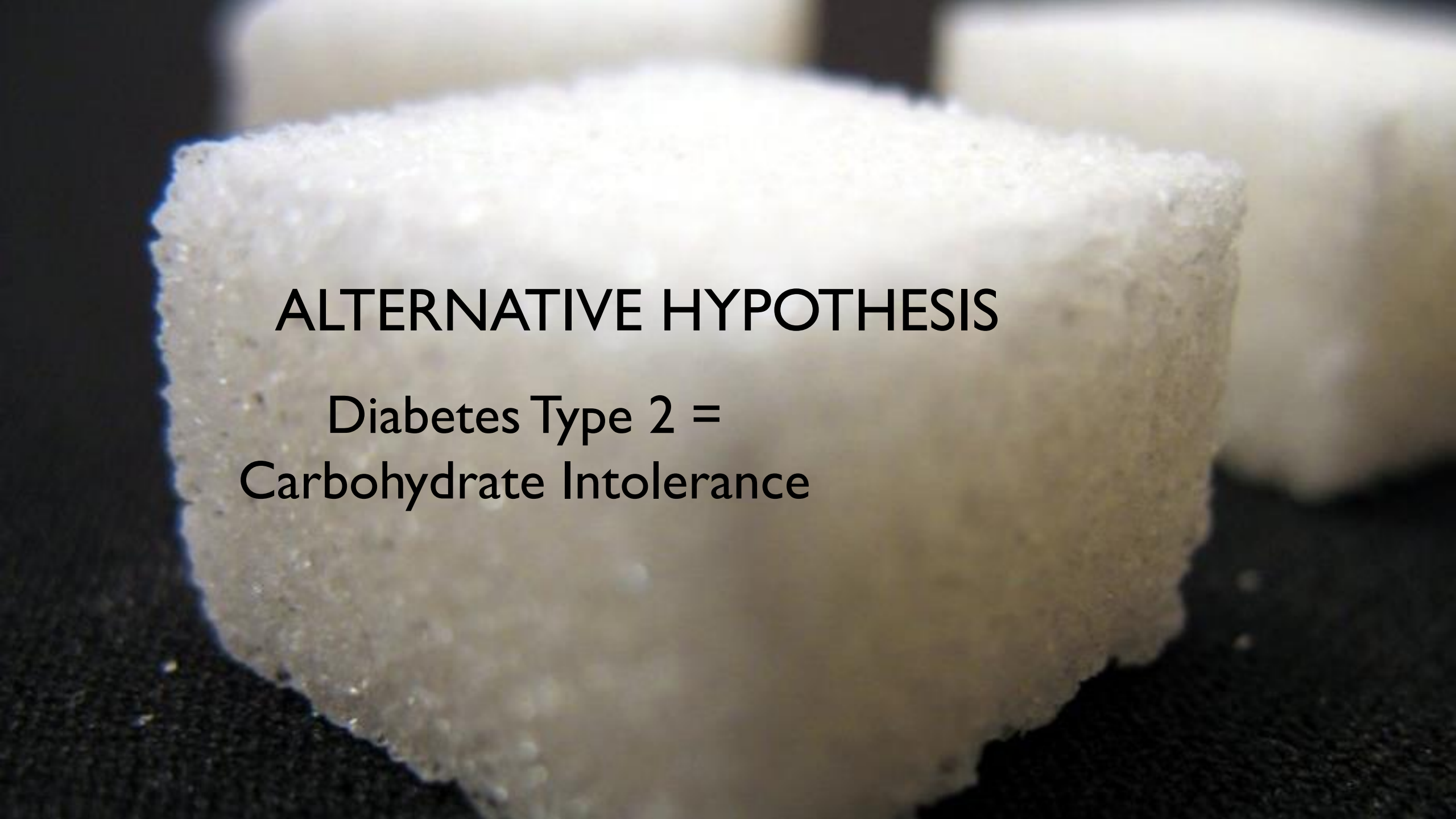
- 14 BL participants – 6 followed over 6 years
- 13 regained their weight; same weight or more than before BL challenge
- REE und TEE significantly decreased; no recovery after 6 years; 700 kcal LOWER THAN BEFORE

Entertaining but very questionable!

Fothergill, Erin, et al. "Persistent metabolic adaptation 6 years after "The Biggest Loser" competition." *Obesity* (2016).

BIGGEST LOSER





ALTERNATIVE HYPOTHESIS

Diabetes Type 2 =
Carbohydrate Intolerance

THE EXTRACTION OF INSULIN

1922 – Canadian Frederick Banting extracted insulin from pigs

1923 – Nobel Price for Physiology and Medicine

Until then:

→ Type-1 Diabetes was a deadly disease

→ **Type-2 Diabetes was treated with nutritional therapy**

Cheeses

1. Chester
2. Edam
3. Roquefort
4. Swiss

TABLE III

The following foods, owing to their great nutritive qualities, are especially valuable.

1. Butter
2. Olive Oil
3. Cream
4. Devonshire Cream

Cream Cheeses

1. Gervais
2. Neufchâtel
3. Stilton
4. Cheddar
5. Brie
6. Camembert
7. Pot-cheese
8. Philadelphia Cream Cheese

Meat and Poultry

1. Bacon
2. Ham
3. Pork
4. Tongue
5. Beef
6. Mutton
7. Goose
8. Duck

Fish and Eggs

„Diabetic Cookery“1918

TABLE IV

Foods Strictly Forbidden

1. Sugars
2. All Farinaceous Foods and Starches
3. Pies
4. Puddings
5. Flour
6. Bread
7. Biscuits
8. Rice (by permission only)
9. Sago
10. Arrowroot
11. Barley
12. Oatmeal (by permission only)
13. Tapioca
14. Macaroni
15. Beets (on doctor's order)
16. Large Onions
17. All Sweet and Dried Fruits
18. Honey
19. Levulose
20. All Sweet Wines
21. Liqueurs
22. Cordials
23. Syrups
24. Beer
25. Ale
26. Stout
27. Porter
28. Chocolate
29. Condensed Milk

TABLE V

Drinks Permitted

Sweetened with Saccharin only

1. Natural and Carbonated Waters
2. Lemonade
3. Tea
4. Coffee
5. Van Houten's Cocoa
6. Cracked Cocoa or Cocoa Nibs
7. Sweet and Sour Cream
8. Clabber
9. Cognac
10. Rum
11. Whiskey
12. Moselle and Rhine Wines
13. Bordeaux, Burgundy, and other sugarless wines

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„Diabetic Cookery“ aus 1918

WHAT DO WE KNOW ABOUT LOW CARB AND DIABETES SO FAR ?

Nutrition 28 (2012) 1016–1021

Contents lists available at ScienceDirect

Nutrition

journal homepage: www.nutritionjrnl.com

Applied nutritional investigation

Effect of low-calorie versus low-carbohydrate ketogenic diet in type 2 diabetes

Talib A. Hussain M.B., Ch.B., R.C.G.P. [a], Thazhumpal C. Mathew M.Sc., Ph.D., F.R.C.Path. [b], Ali A. Dashti M.Sc., Ph.D. [b], Sami Asfar M.B., Ch.B., M.D., F.R.C.S., F.A.C.S. [c], Naji Al-Zaid B.Sc., Ph.D. [d], Hussein M. Dashti M.D., Ph.D., F.I.C.S., F.A.C.S. [c,*]

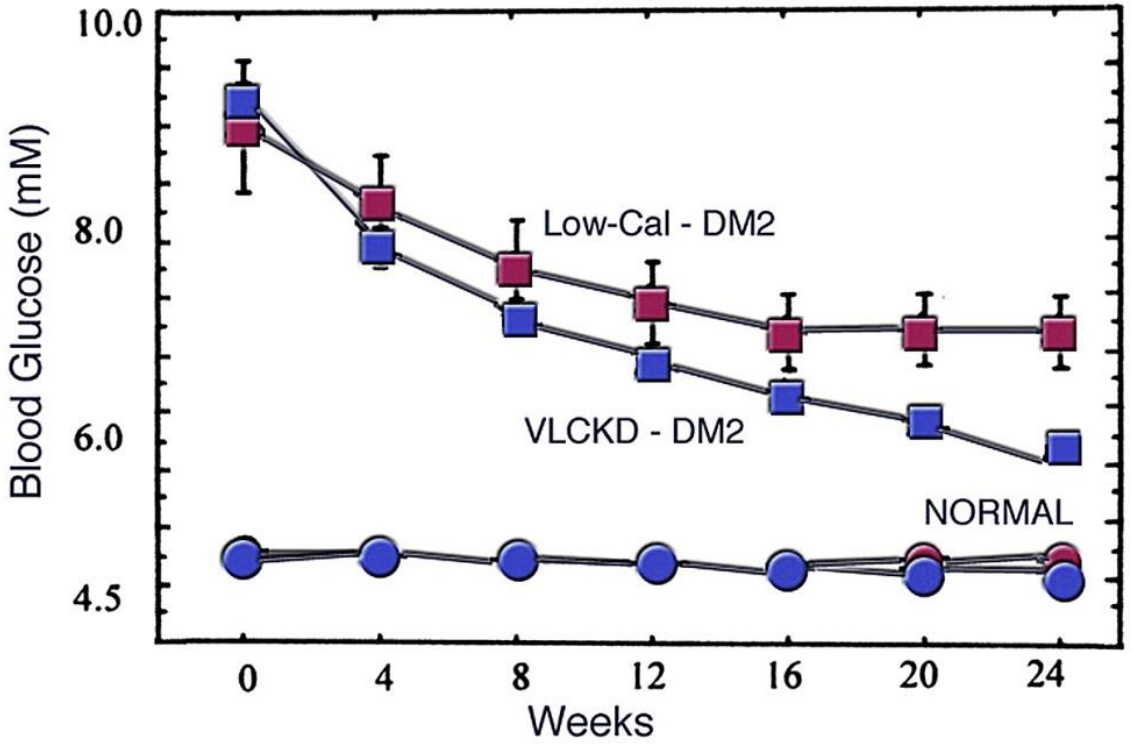
[a] Al Shaab Family Medicine Medical Center, Ministry of Health, Kuwait
[b] Department of MLS, Faculty of Allied Health Sciences, Health Sciences Center, Kuwait University, Kuwait
[c] Department of Surgery, Faculty of Medicine, Health Sciences Center, Kuwait University, Kuwait
[d] Department of Physiology, Faculty of Medicine, Health Sciences Center, Kuwait University, Kuwait

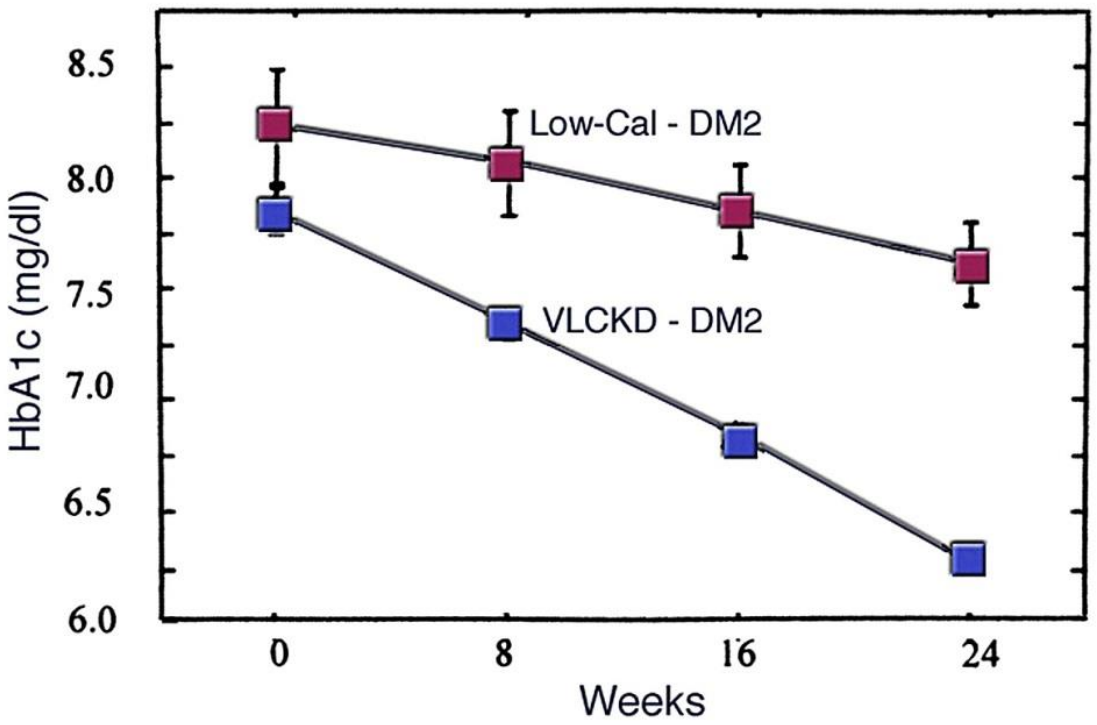
Conclusion: This study shows the beneficial effects of a ketogenic diet over the conventional LCD in obese diabetic subjects. The ketogenic diet appears to improve glycemic control – Nutrition, 2012

body mass index, changes in waist circumference, blood glucose level, changes in hemoglobin and glycosylated hemoglobin, total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, triglycerides, uric acid, urea and creatinine were determined before and at 4, 8, 12, 16, 20, and 24 wk after the administration of the LCD or LCKD. The initial dose of some antidiabetic medications was decreased to half and some were discontinued at the beginning of the dietary program in the LCKD group. Dietary counseling and further medication adjustment were done on a biweekly basis.

Results: The LCD and LCKD had beneficial effects on all the parameters examined. Interestingly, these changes were more significant in subjects who were on the LCKD as compared with those on the LCD. Changes in the level of creatinine were not statistically significant.

Conclusion: This study shows the beneficial effects of a ketogenic diet over the conventional LCD in obese diabetic subjects. The ketogenic diet appears to improve glycemic control. Therefore, diabetic patients on a ketogenic diet should be under strict medical supervision because the LCKD can significantly lower blood glucose levels.





"Dietary carbohydrate restriction has the greatest effect on decreasing blood glucose levels"

Nutrition DOI: (10.1016/j.nut.2014.06.011)

CONGRESS OF „THE EUROPEAN ASSOCIATION FOR THE STUDY OF DIABETES (EASD)“ 2016

Effects of a Paleolithic diet and exercise on liver fat, muscle fat and insulin sensitivity.

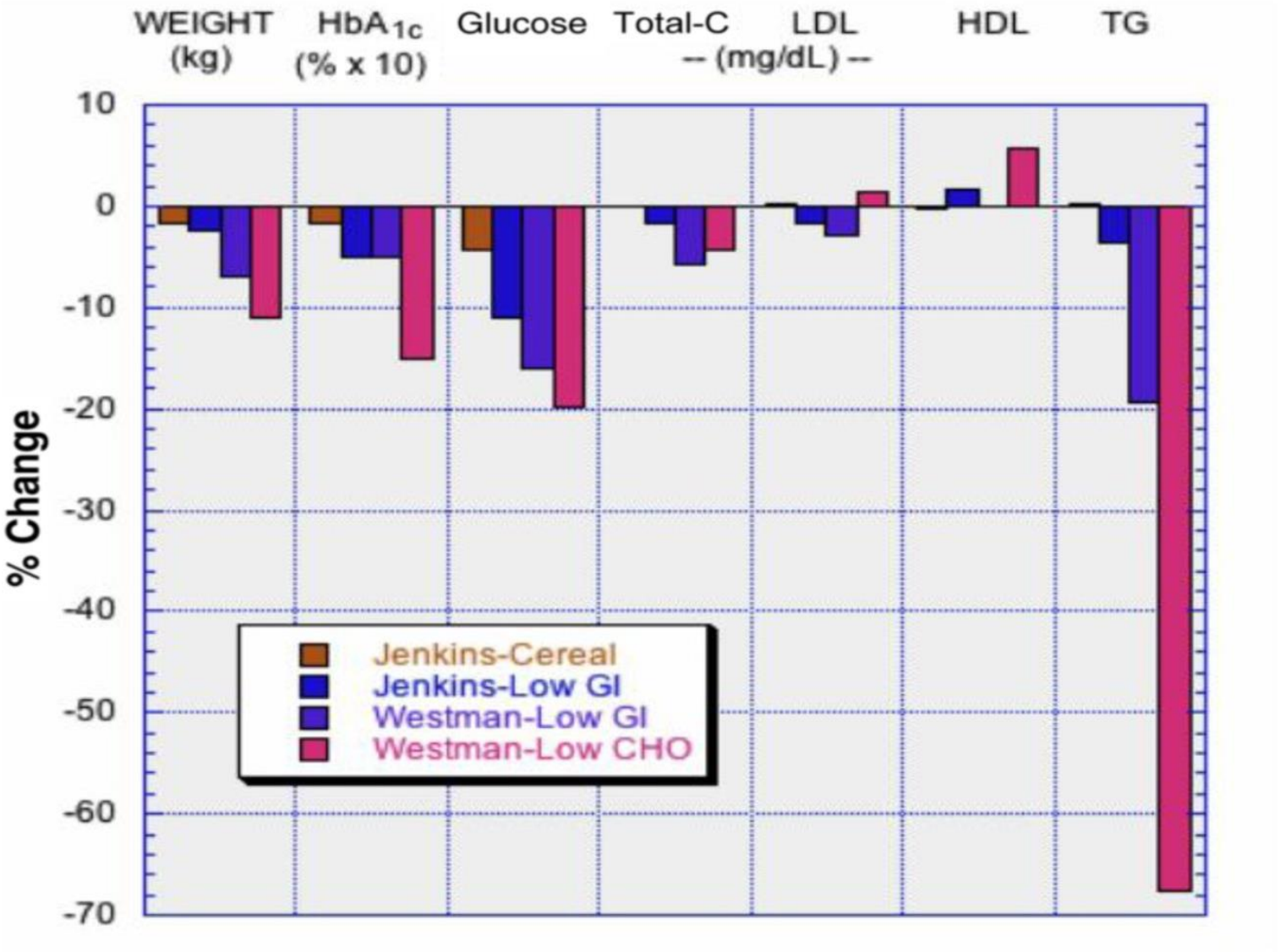
Otten, Julia, Umeå University, Faculty of Medicine, Department of Public Health and Clinical Medicine, Medicin.

Conclusion

IN INDIVIDUALS WITH TYPE 2 DIABETES, A PALEOLITHIC DIET FOR 12 WEEKS IMPROVED WEIGHT, INSULIN SENSITIVITY, HBA1C, TRIGLYCERIDES AND BLOOD PRESSURE.

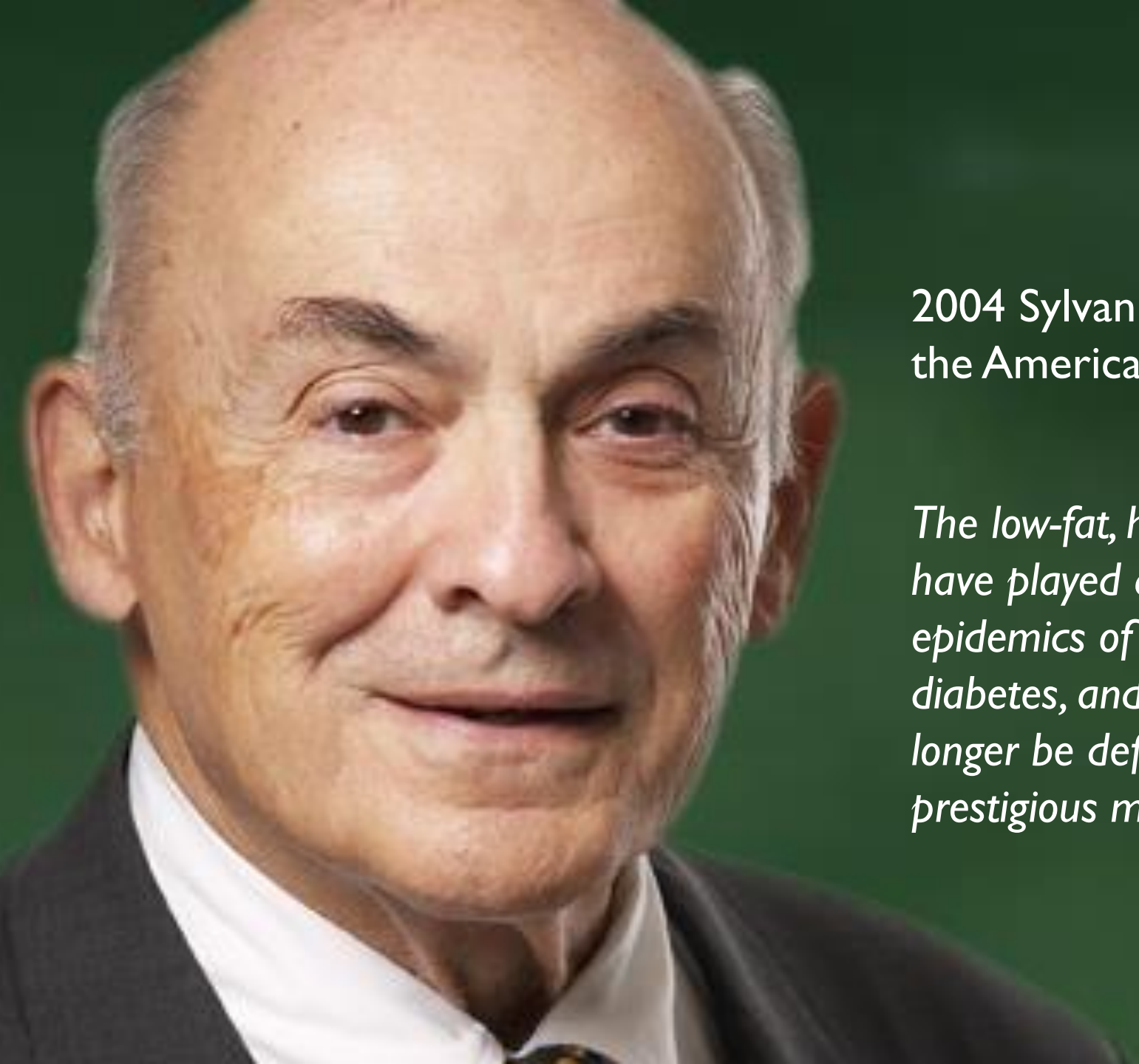
Evidence

Feinman, Richard David, et al. **"Dietary Carbohydrate restriction as the first approach in diabetes management."** Critical review and evidence base." *Nutrition* (2014).



Conclusion

Dietary carbohydrate restriction is the **most effective method** (other than starvation) of **reducing serum TGs** and increasing high-density lipoprotein



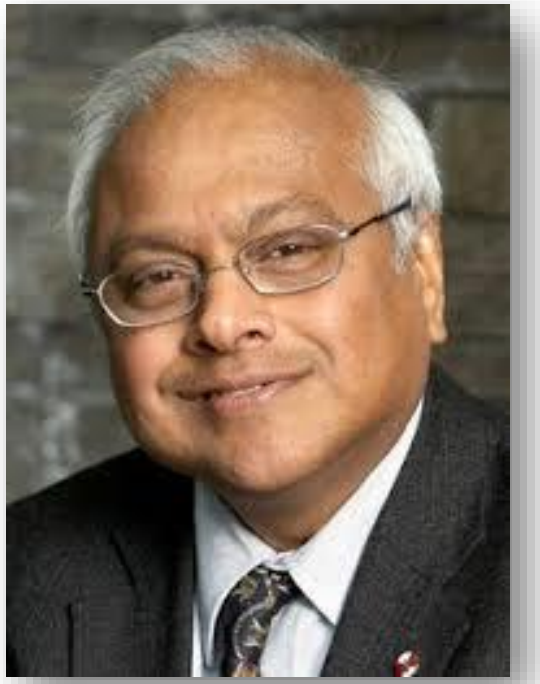
2004 Sylvan Lee Weinberg, former president of the American College of Cardiology:

The low-fat, high-carbohydrate diet … may well have played an unintended role in the current epidemics of obesity, lipid abnormalities, type 2 diabetes, and metabolic syndromes. This diet can no longer be defended by appeal to the authority of prestigious medical organizations.

Weinberg, Sylvan Lee. "The diet–heart hypothesis: a critique." Journal of the American College of Cardiology 43.5 (2004): 731-733.

„Fat protects the heart and current dietary guidelines have no scientific basis“

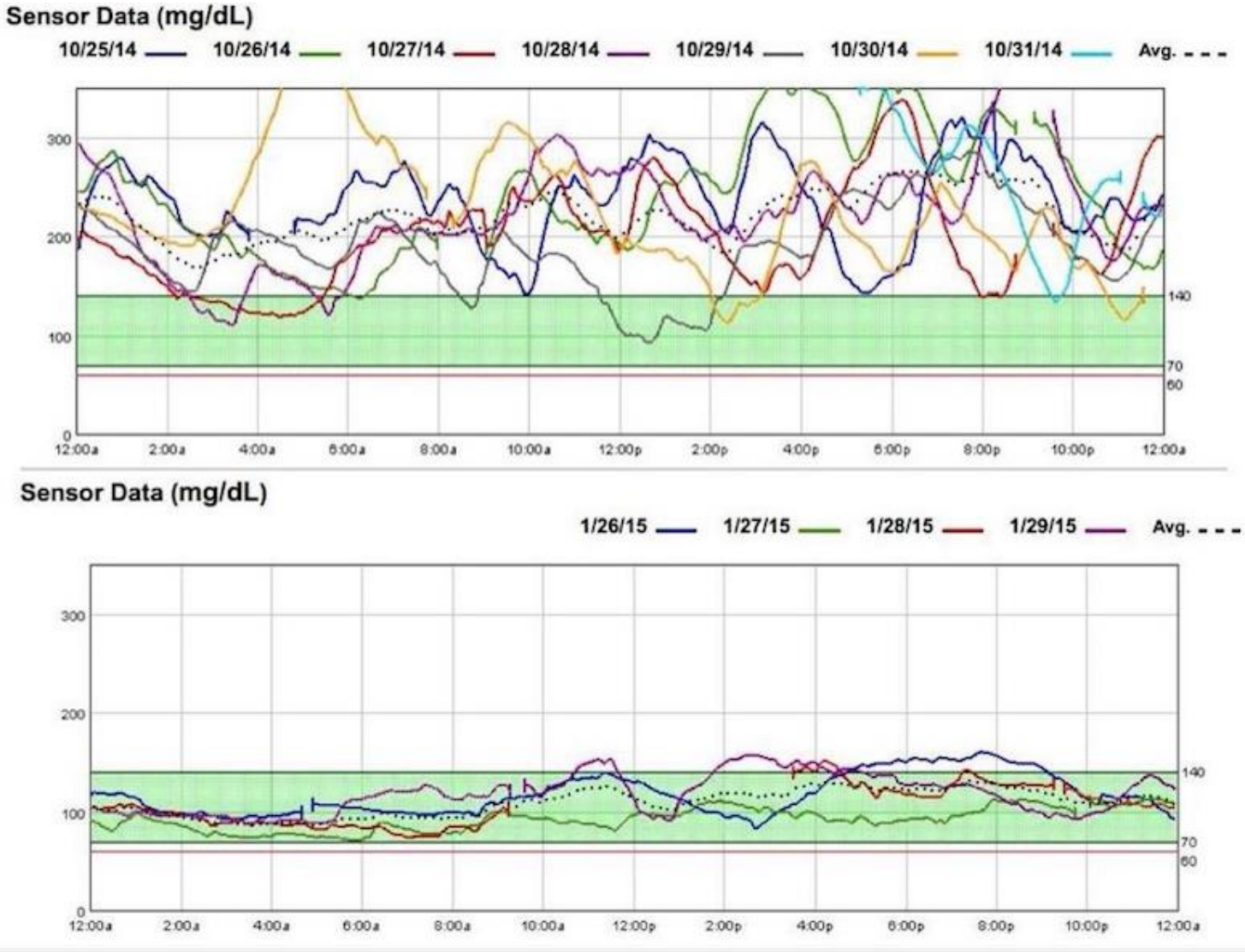
Yusuf Salim – Former President of the World Heart Federation - 2017



„ The current recommendations of the DGE on macro and nutrient distribution for the nutrition of the population are outdated and should be revised - especially as they are not supported by scientific data.

Prof. Dr. Matthias Blüher
President of the German Adiposity Society(DAG)

www.aerzteblatt.de – 23rd January 2017


Sensor Data (mg/dL)
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LATEST EVIDENCE

1 year diet intervention – 262 patients

- 94% stopped insulin therapy
- 13.8 kg weight loss
- T2D medication down from 56.9% to 29.7%
- HOMA-IR -55%
- hsCRP -39%

Hallberg, Sarah J., et al. "Effectiveness and safety of a novel care model for the management of type 2 diabetes at 1 year: an open-label, non-randomized, controlled study." *Diabetes Therapy* 9.2 (2018): 583-612.

CHANGE IS HAPPENING

American Diabetes Association. Diabetes Care

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Original Research

Management of Hyperglycemia in Type 2 Diabetes, 2018. A Consensus Report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD)

Melanie J. Davies, David A. D'Alessio, Judith Fradkin, Walter N. Kernan, Chantal Mathieu, Geltrude Mingrone, Peter Rossing, Apostolos Tsapas, Deborah J. Wexler and John B. Buse

Diabetes Care 2018 Sep; dci180033.
https://doi.org/10.2337/dci18-0033

Check for updates

Previous Next

Article Figures & Tables Suppl Material Info & Metrics PDF

The American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) - 2018

Recognizes LC as a treatment option for diabetes

DIABETES – TAKE MATTERS IN YOUR OWN HAND

12-WEEK PILOT PROJECT

MAY – JULY 2017

HYPOTHESIS AND AIM OF THE STUDY

Objections

- LCHF is hard to implement
- people find it hard to stick to
- coaching is time intensive

Aim

1) LCHF is easy to implement with
2) very little support needed
3) easy to stick to and a diverse way of eating
4) LCHF effects disease progression in a positive way

THE TEAM

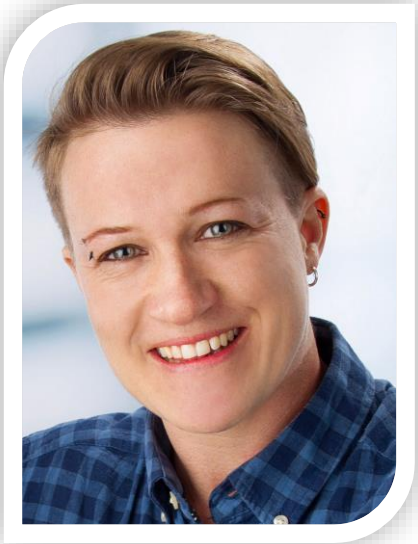
Innsbruck und Vienna

Daniela Peifer
Nutritionist

www.danielapfeifer.at

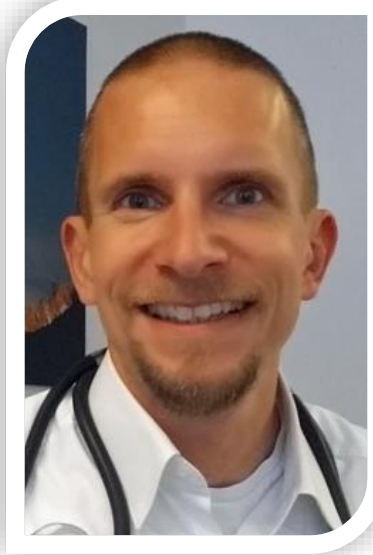
Dr. Roland Fuschlberger
Internal Medicine

www.infumed.at



Julia Tulipan
Biology/ Nutrition Coach

www.juliatulipan.at



Dr. Peter Schödl
Sports Medicine

www.hoch-form.at

Inclusion Criteria

- Diabetes Type 1/ Type 2 or pre-diabetes
- Willingness to participate in group meetings
- Willingness to follow a dietary program for 12 weeks
- 2 blood tests
- No pre-existing severe illnesses (e.g. CVD, kidney disease, dialysis,…)
- ---

RESTRICTIONS & PARTICIPANTS

- No additional costs – standard parameter, standard of care check-ups
- 4 male, 19 female
- 23 Participants
- 3 Dropouts

WHAT WE DID

12 weeks duration	Supervised by a physician	initial LCHF workshop	4 group meetings
Blood 2x	„Goodie-Bag“ with product samples	1 x booklet with LCHF background info	Recipies for 30 days

Kick-Off

18.04. 2017

LCHF basics workshop,
recipies,
goodie bag,

25.04. 2017

Focus topic „Fats“,
Q&A

22.05. 2017

Focus topic
„Protein“,
Q&A

12.06. 2017

Focus topic
„Cholesterol“,
Q&A

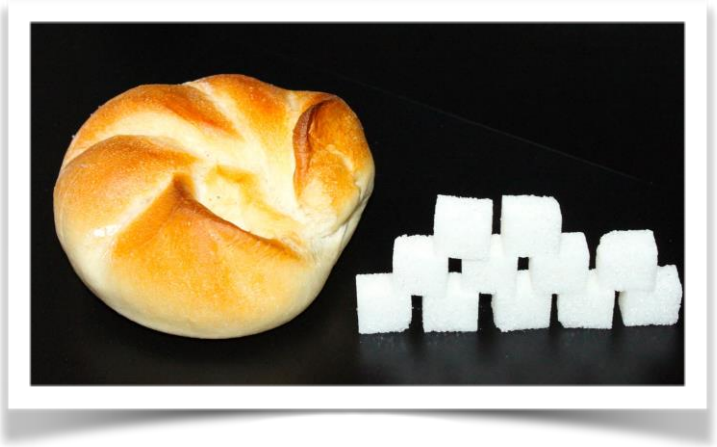
11.07. 2017

Last meeting,
reflexion,
feedback,
2nd blood draw

CARB CONTENT

Courtesy of Daniela Pfeifer

CARB CONTENT



Courtesy of Daniela Pfeifer

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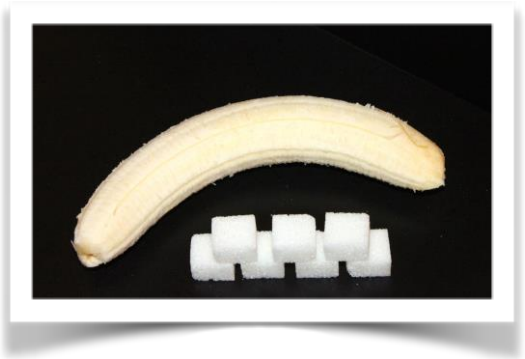

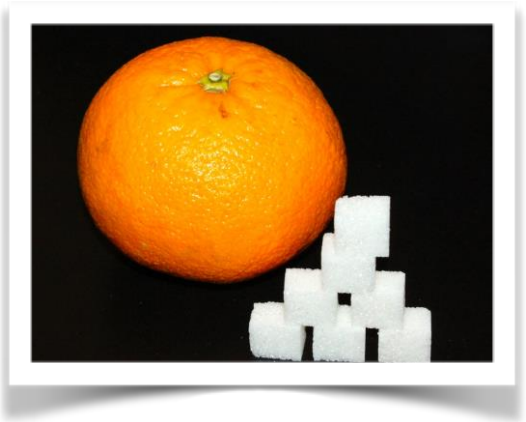

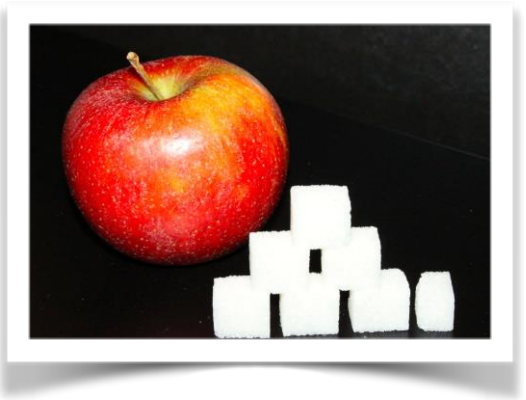

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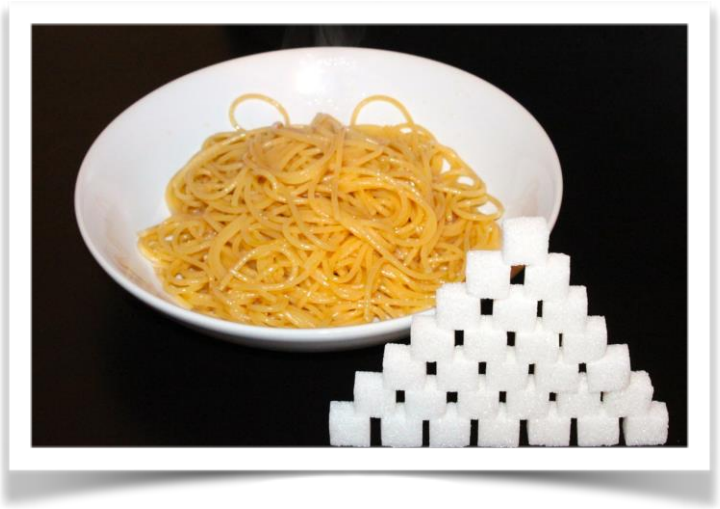
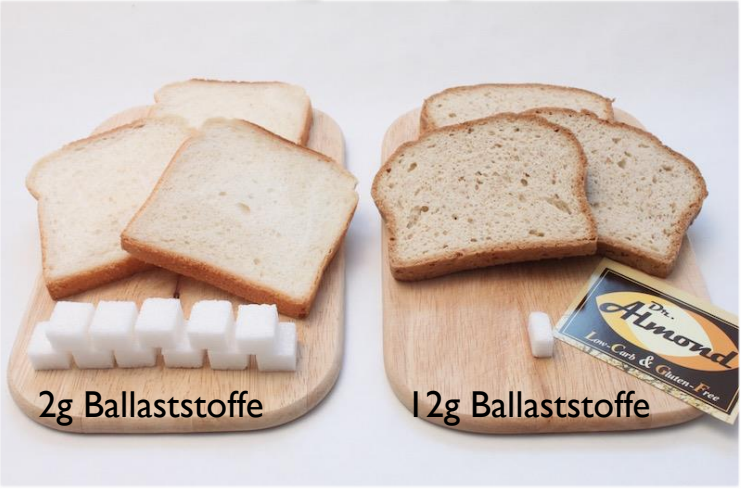
Courtesy of Daniela Pfeifer

Courtesy of Daniela Pfeifer



150g Pasta

THERE ARE ALTERNATIVES



dr-almond.com

Courtesy of Daniela Pfeifer

LOW CARB NUTRITION

Courtesy of Daniela Pfeifer

LOW CARB ALTERNATIVES

- Bread (made from nut flours)
- Sugar substitutes erythritol and/ or stevia
- Cakes, cookies and desserts

Courtesy of Daniela Pfeifer

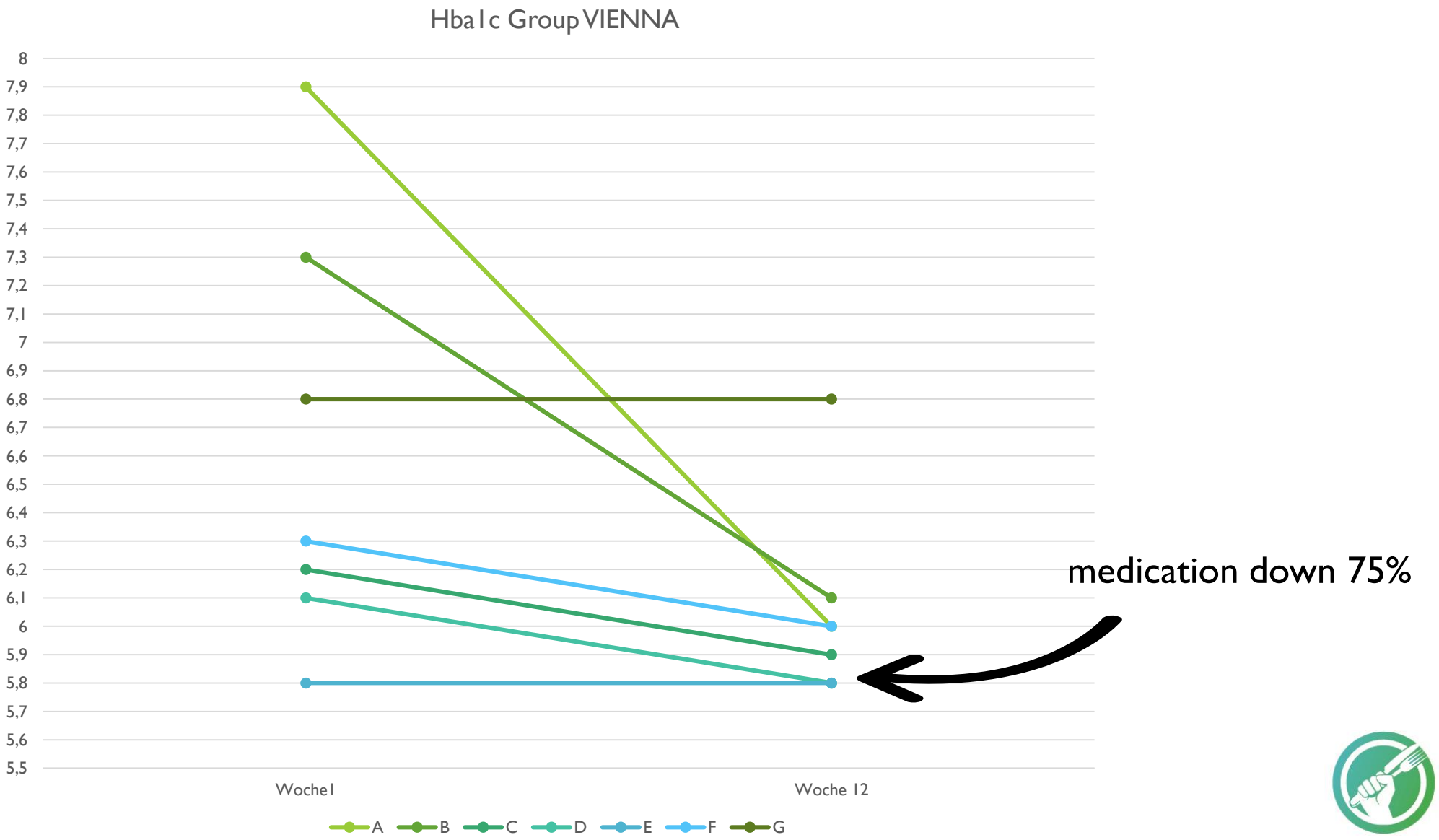
Fett
v-KH

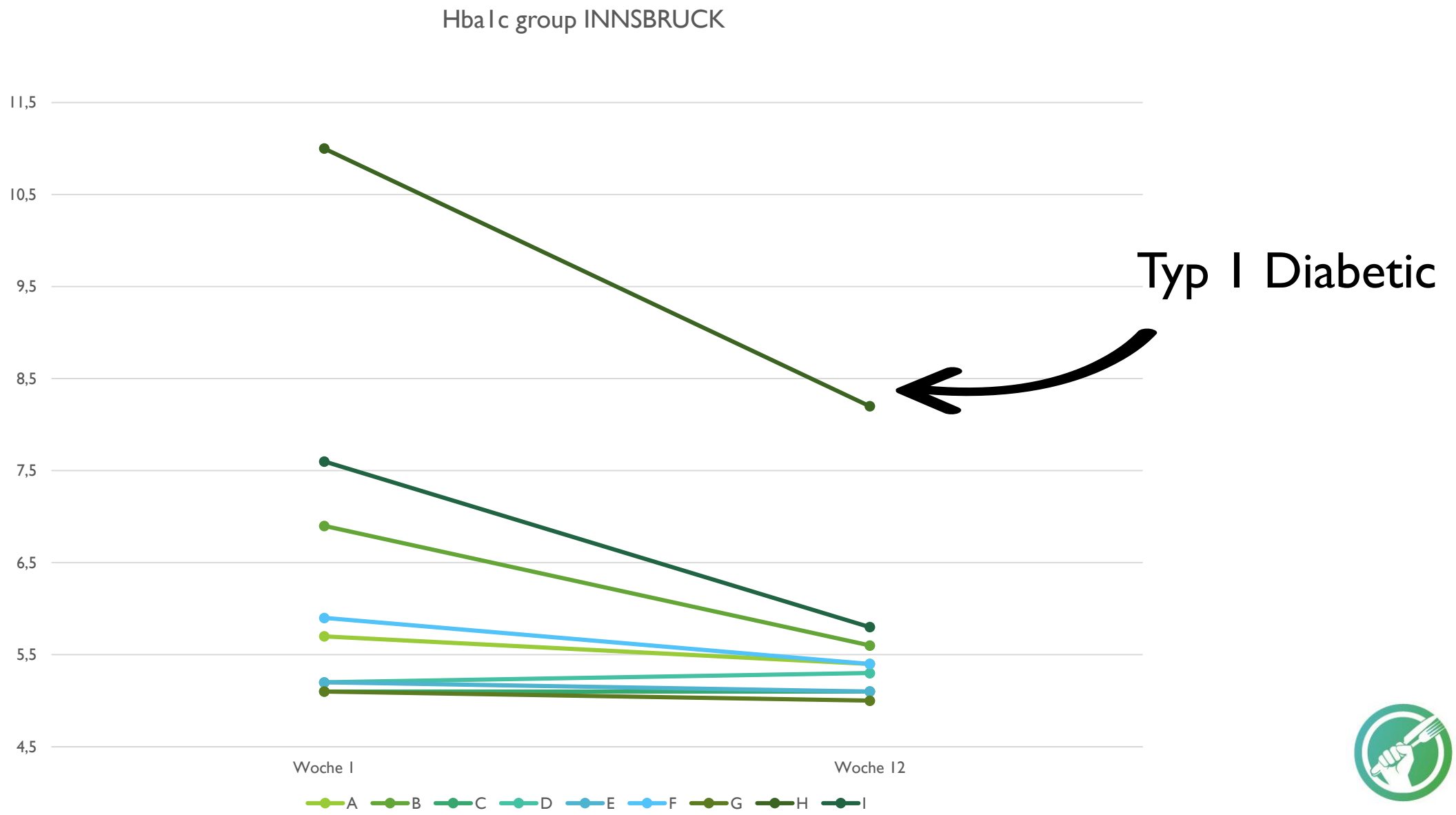
„classic“ Sachertorte:
4.955 kCal total; 27g KH/Stück

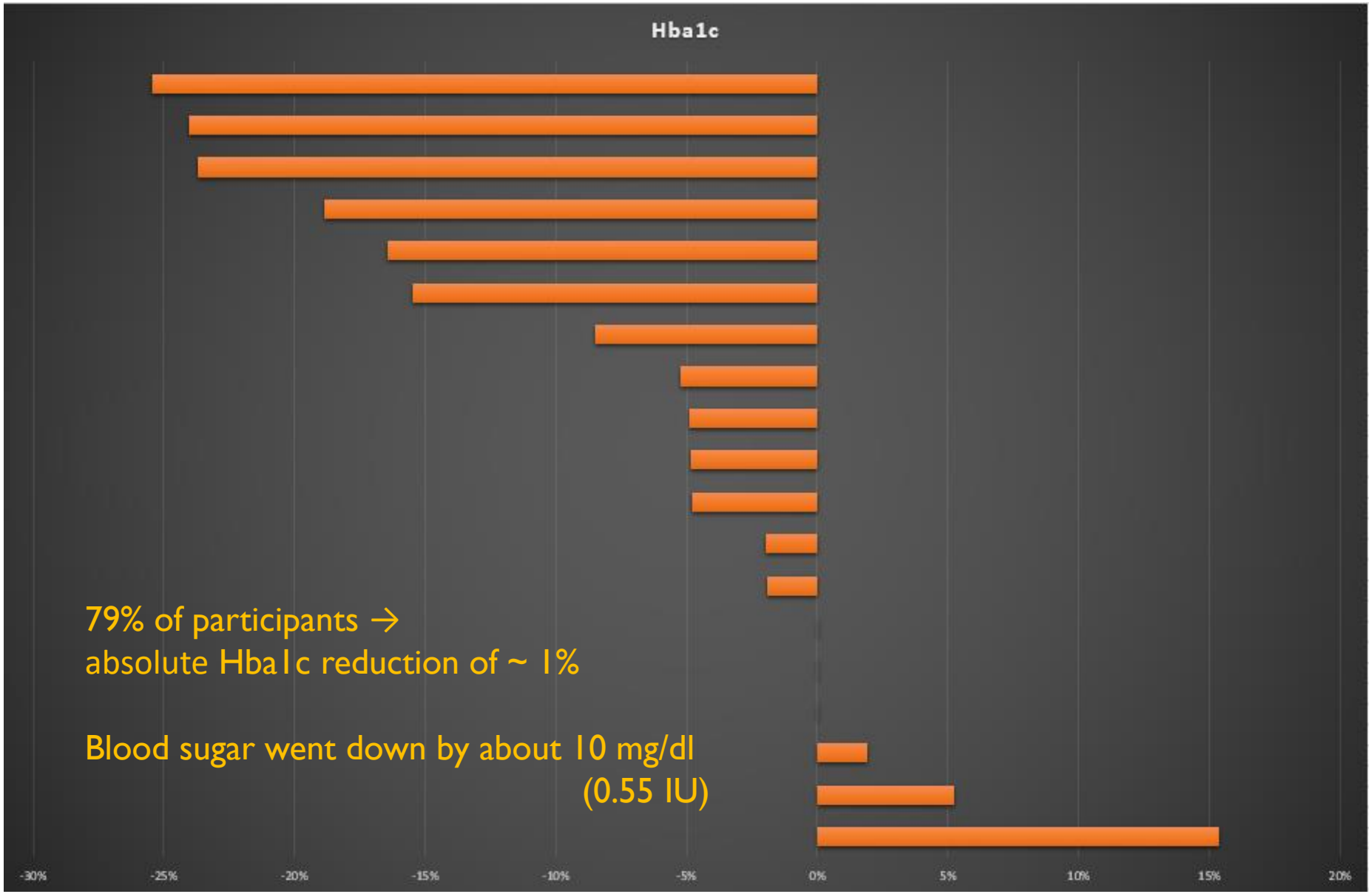
Sachertorte LowCarb:
4.100 kCal total; 7g KH/Stück

Courtesy of Daniela Pfeifer

RESULTS

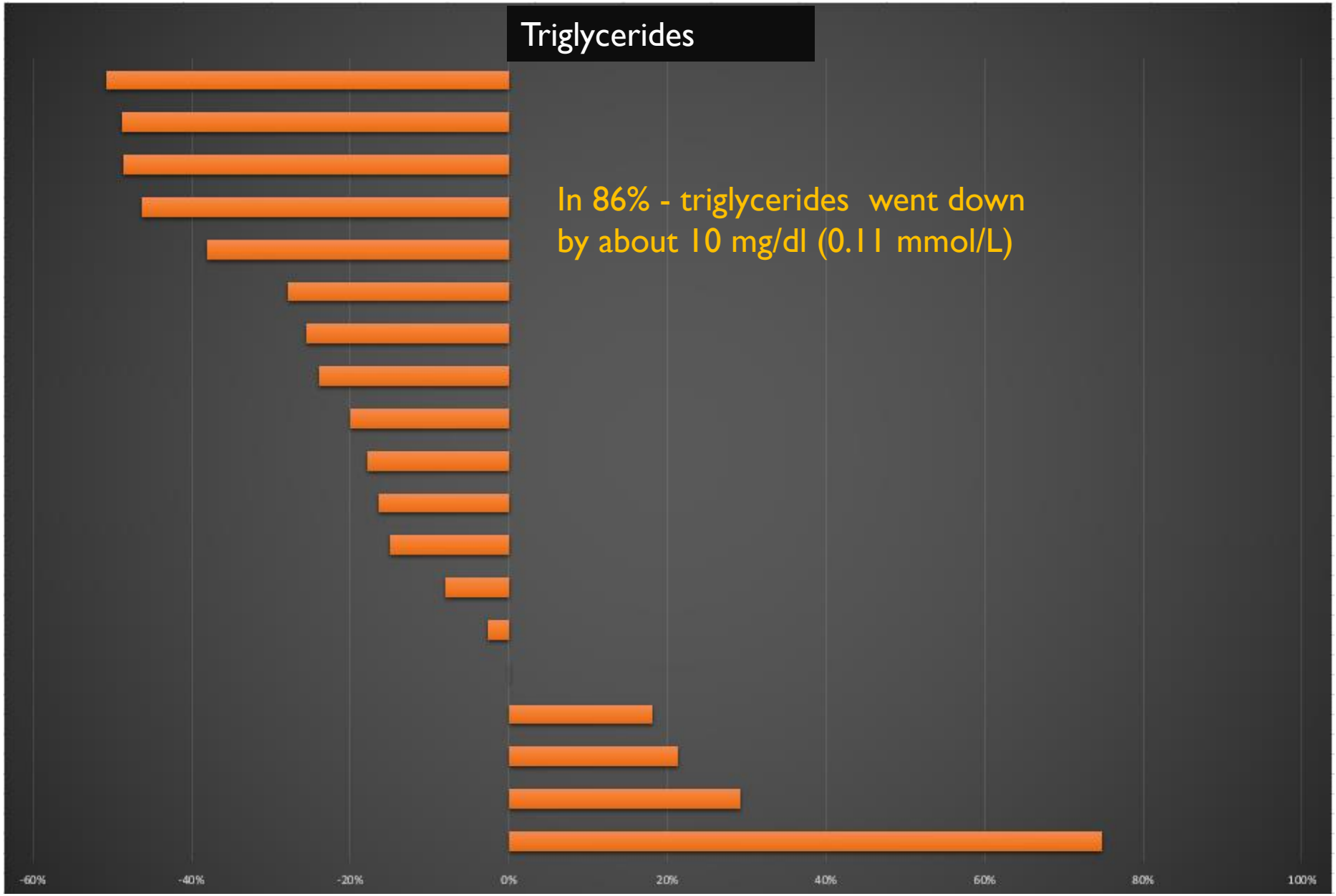

Hba1c Group VIENNA
8
7,9
7,8
7,7
7,6
7,5
7,4
7,3
7,2
7,1
7
6,9
6,8
6,7
6,6
6,5
6,4
6,3
6,2
6,1
6
5,9
5,8
5,7
5,6
5,5
Woche1
Woche 12
A
B
C
D
E
F
G
medication down 75%

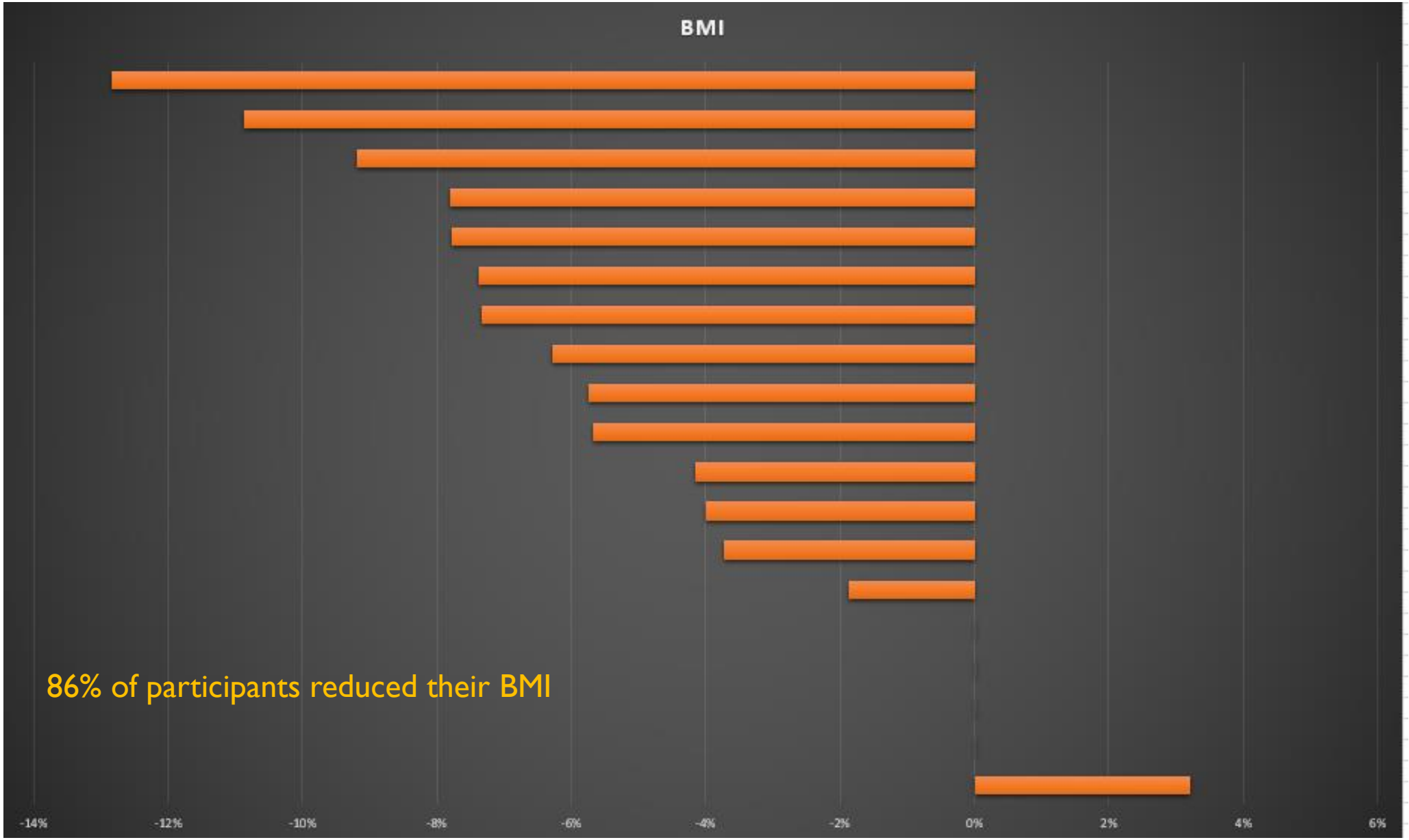

Hba1c group INNSBRUCK
11,5
10,5
9,5
8,5
7,5
6,5
5,5
4,5
Woche 1
Woche 12
A
B
C
D
E
F
G
H
I
Typ 1 Diabetic



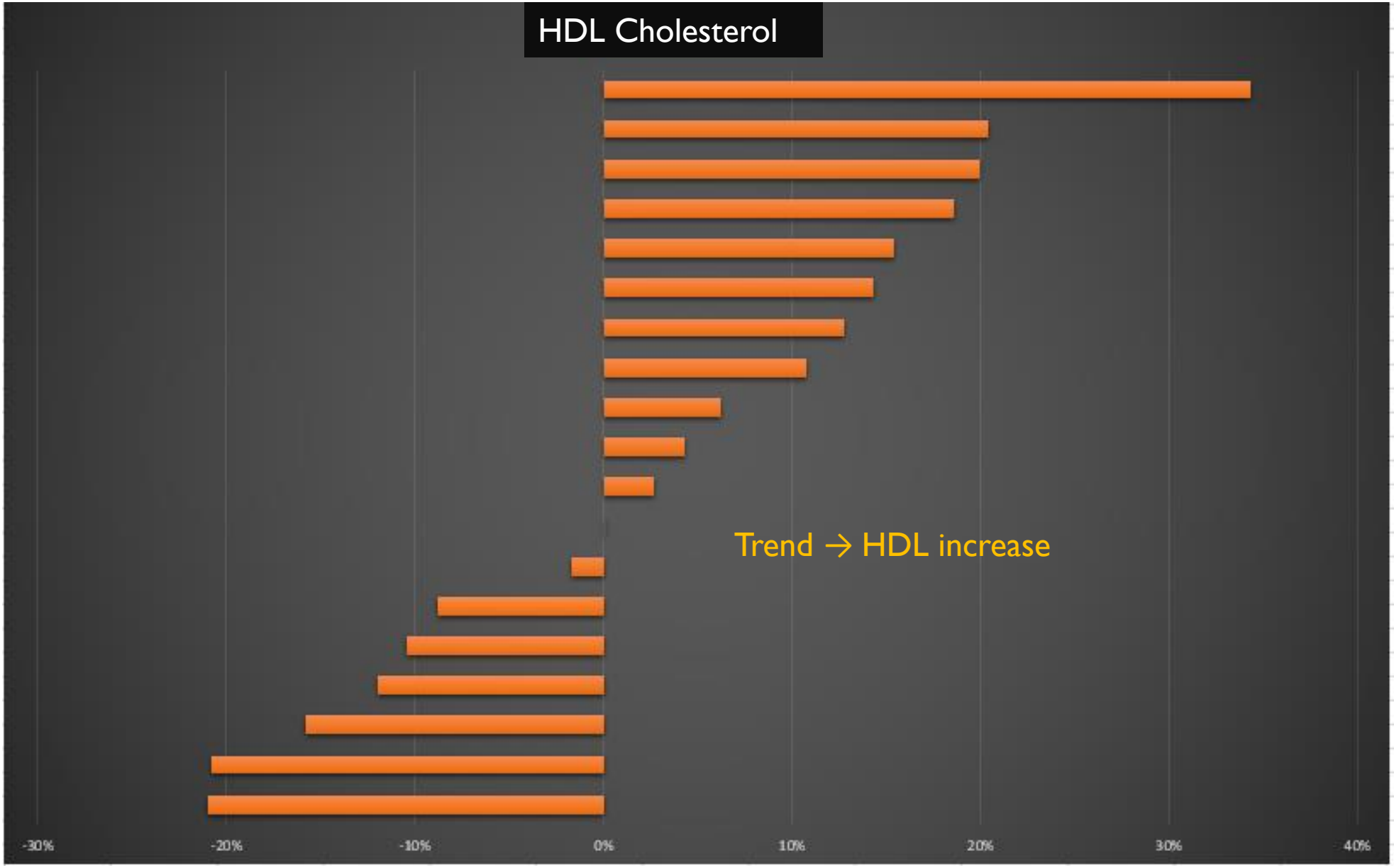
79% of participants →
absolute Hba1c reduction of ~ 1%

Blood sugar went down by about 10 mg/dl
(0.55 IU)


Triglycerides
In 86% - triglycerides went down by about 10 mg/dl (0.11 mmol/L)
-60%
-40%
-20%
0%
20%
40%
60%
80%
100%



86% of participants reduced their BMI


HDL Cholesterol
Trend → HDL increase
-30%
-20%
-10%
0%
10%
20%
30%
40%

FEEDBACK

- „Never had so much energy before“
- „This is the first summer I did not have problems with allergies“
- Reversal of NAFLD in 2 people
- „This is the best thing that has ever happend to me"

MEDICAL SUPERVISION WAS IMPORTANT FOR THE PARTICIPANTS TO DISCUSS MEDICATION;

GROUP MEETINGS; GIVE SUPPORT; BASIC KNOWLEDGE AND FAT IS OK;

RECIPES AND FOOD ALTERNATIVES

LCHF IS A FEASIBLE AND SUSTAINABLE STRATEGY FOR THE MANAGEMENT OF DIABETES.

LCHF IS EASY TO IMPLEMENT

VERY LITTLE SUPPORT IS NECESSARY FOR AN EFFECTIVE INTERVENTION

PARTICIPANTS DESCRIBE THE DIET AS SATIATING AND TASTY

What's next?

- partnering with 2 physicians from two of the biggest hospitals in Vienna
- building a diabetes program based on our learnings
- make it scalable and increase the number of patients

Prim. Assoc. Prof. PD. Marcus Säemann
Nephrology
Wilhelminenspital Vienna

Michael Leutner M.D.
Medical University of Vienna
General Hospital Vienna
Internal Medicine

THANK YOU!

MAG. JULIA TULIPAN

WWW.JULIATULIPAN.AT

Questions?

Samaha, Frederick F., et al. "**A low-carbohydrate as compared with a low-fat diet in severe obesity**." *New England Journal of Medicine* 348.21 (2003): 2074-2081.

Conclusion: Taken together, our findings demonstrate that severely obese subjects with a high prevalence of diabetes and the metabolic syndrome lost more weight during six months on a carbohydrate-restricted diet than on a calorie- and fat-restricted diet. The carbohydrate-restricted diet led to greater improvements in insulin sensitivity that were independent of weight loss and a greater reduction in triglyceride levels

Bazzano, Lydia A., et al. **"Effects of low-carbohydrate and low-fat diets: a randomized trial."** *Annals of internal medicine* 161.5 (2014): 309-318.

Conclusion: The low-carbohydrate diet was more effective for weight loss and cardiovascular risk factor reduction than the low-fat diet. Restricting carbohydrate may be an option for persons seeking to lose weight and reduce cardiovascular risk factors.

Haimoto, Hajime, et al. **"Three-graded stratification of carbohydrate restriction by level of baseline hemoglobin A1c for type 2 diabetes patients with a moderate low-carbohydrate diet."** *Nutrition & metabolism* 11.1 (2014): 33.

Conclusion: Also, the greater the reduction in carbohydrate intake (g/day), the greater the decrease in HbA1c levels ($P < 0.001$), but DeltaHbA1c was not significantly influenced by changes in other macronutrient intakes (g/day).

Feinman, Richard D, et al. **„Dietary carbohydrate restriction as the first approach in diabetes management: Critical review and evidence base".** Nutrition. 2014 Jul 16. pii: S0899-9007(14)00332-3.

Conlusion: Dietary carbohydrate restriction reliably reduces high blood glucose, does not require weight loss (although is still best for weight loss), and leads to the reduction or elimination of medication. It has never shown side effects comparable with those seen in many drugs.

Accurso, Anthony, et al. **"Dietary carbohydrate restriction in type 2 diabetes mellitus and metabolic syndrome: time for a critical appraisal."** *Nutrition & metabolism* 5.1 (2008): 9.

Conclusion: The rationale is that carbohydrate restriction improves glycemic control and reduces insulin fluctuations which are primary targets. Experiments are summarized showing that carbohydrate-restricted diets are at least as effective for weight loss as low-fat diets and that substitution of fat for carbohydrate is generally beneficial for risk of cardiovascular disease. These beneficial effects of carbohydrate restriction do not require weight loss. Finally, the point is reiterated that carbohydrate restriction improves all of the features of metabolic syndrome.

Fothergill, Erin, et al. ***"Persistent metabolic adaptation 6 years after "The Biggest Loser" competition."*** *Obesity (2016)*

Conclusions: Metabolic adaptation persists over time and is likely a proportional, but incomplete, response to contemporaneous efforts to reduce body weight.

Hallberg, Sarah J., et al. "Effectiveness and safety of a novel care model for the management of type 2 diabetes at 1 year: an open-label, non-randomized, controlled study." *Diabetes Therapy* 9.2 (2018): 583-612.