

Eric Westman and William Yancy are medical doctors associated with Duke University School of Medicine in North Carolina , where they are associate professors.

They are prolific authors associated with ketogenic and high-fat, low-carbohydrate diets. They have both received funding from Robert C. Atkins Foundation which supports research into low-carbohydrate nutrition.

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One frequently referenced paper compares two calorie restricted diets. This paper claims that carbohydrate restriction " may be one of the most effective dietary treatments for diabetes". The study was over a 24 week (4.5 month) period. <sup>1</sup>

The *low-carbohydrate (ketogenic)* group were given "a lay-press diet book and additional handouts [and] a registered dietitian instructed participants to restrict intake of dietary carbohydrate to fewer than 20 grams per day, without explicitly restricting caloric intake. Allowed foods were unlimited amounts of animal foods and eggs; limited amounts of hard cheese, fresh cheese, salad vegetables (2 cupfuls per day), and non-starchy vegetables (1 cupful per day). Participants were encouraged to drink at least 6 glasses of permitted fluids daily."

The *low-glycemic (low-carbohydrate)* group were given "a lay-press diet book and additional handouts [and] a registered dietitian instructed participants to follow a low-glycemic index, reduced-calorie diet with approximately 55% of daily caloric intake from carbohydrate." The energy intake was calculated to be 500 kcalories less than the participant's calculated energy needs for the day.

Overall, the completion rate was not high. Completion rate was greater for the low-glycemic group. Only 55% of the participants were able to complete the low-carbohydrate, high-fat ketogenic diet compared with 63% on the low-glycemic diet. The low-glycemic index diet was 36% fat which is not a low-fat diet. The amount of fat was higher than the average US diet which is 33% fat by energy.

Criteria	Low-carb (Ketogenic)	Low-fat ("Medical")
BMI	38	38
Black	24%	52%
Fats (by energy)	59%	36%
Carbohydrates (by energy)	13%	44%
Completion rate	55%	63%
Insomnia	31%	19%
Constipation	53%	19%
Diarrhea	41%	37%
Headaches	53%	46%

The low-glycemic group had a much higher level of black participants who are afflicted by diabetes at a lower threshold than white people.

Participants of the ketogenic group were instructed to drink “bouillon dissolved in water 2-3 times a day during the first two weeks to reduce possible side effects.” This is to supply sodium and potassium to treat the side-effects of the ketogenic diet.

Adverse events were reported for both groups with a greater prevalence occurring in the ketogenic diet group. The paper stated that there was no significant difference between to two groups but the data supplied indicated otherwise.

Both the comparison and experimental diets are very unhealthy and the participants were miserable. They were very overweight and diabetic at the start of the trial and at the end of the trial.

Funding for this study was obtained from the Robert C. Atkins Foundation.

A paper, *Systematic review and meta-analysis of clinical trials of the effects of low carbohydrate diets on cardiovascular risk factors*, <sup>2</sup>, claims that:

LCD was shown to have favourable effects on body weight and major cardiovascular risk factors; however the effects on long-term health are

unknown.

At least one of the authors, William S. Yancy, has received funding from *Robert C. Atkins Foundation*, which is committed to “low-carbohydrate nutrition”.

This study investigated 17 clinical trials involving 1,141 obese patients. Some results are highlighted below.

Criteria	Units	< 6 months		6-11 months		12-23 months		> 23 months		All	
		n	Mean	n	Mean	n	Mean	n	Mean	n	Mean
[Reference range]											
BMI [<25]	kg/(m•m)	3	-2.13	4	-2.06	3	-1.46	1	-1.50	11	-2.09
Diastolic BP [<80]	mmHg	5	-4.23	8	-3.53	7	-2.51	2	-1.484	22	-3.10
Systolic BP [<120]	mmHg	5	-6.64	8	-5.19	7	-4.39	2	-1.67	22	-4.81
Fasting glucose [70-110]	mg/dL	3	-0.67	7	-2.03	4	-3.56	2	3.50	16	-1.05
Fasting glucose [3.9-6.1]	mmol/L	3	-0.04	7	-0.08	4	0.20	2	0.19	16	-0.06
LDL Cholesterol [65-135]	mg/dL	7	2.35	7	-0.30	6	-2.71	2	-3.27	22	-0.48
LDL Cholesterol [1.7-3.5]	mmol/L	7	0.06	7	-0.01	6	-0.07	2	-0.08	22	-0.01
Insulin [5-20]	µIU/mL	2	-3.09	4	-2.56	3	-1.81	2	-1.07	11	-2.24
Insulin [35-145]	pmol/L	2	-22	4	-18	3	-13	2	-8	11	16
Weight change (kg)		8	-6.82	9	-8.09	7	-6.33	4	-4.65	28	-7.04

An examination of the table provides no evidence of an improvement.

- The average systolic blood pressure dropped 5 points. If a person has high blood pressure, that is not going to improve their health outcomes.
- The average fasting plasma glucose was reduced by 1.05 mg/dL (0.06 mmol/L). Given that the reference range is 70-110 mg/dL (3.9-6.1 mmol/L), do the authors really believe that such an insignificant difference is relevant.

- Similarly, the LDL cholesterol was reduced the miniscule amount of 0.48 mg/dL (0.01 mmol/L).
- For a number of the criteria (blood pressure, weight, BMI, glucose, insulin, triglycerides), the the longer the study period, the amount of the improvement was less.

Low-carbohydrate diets are usually restricted in energy so weight loss is inevitable.

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A much bigger study <sup>3</sup> investigated 17 studies involving 272,216 subjects. This examined the impact of low-carbohydrate diets on all-cause mortality. Their conclusion was, compared with the standard western diet,

Low-carbohydrate diets were associated with a significantly higher risk of all-cause mortality and long-term harm.

## Footnotes

1. Westman, E. C. et al. (2008) The effect of a low-carbohydrate, ketogenic diet versus a low-glycemic index diet on glycemic control in type 2 diabetes mellitus. *Nutrition & Metabolism*. 5 (1), 36.
2. Santos, F. L. et al. (2012) Systematic review and meta-analysis of clinical trials of the effects of low carbohydrate diets on cardiovascular risk factors. *Obesity Reviews*. 13 (11), 1048-1066.
3. Noto, H. et al. (2013) Low-Carbohydrate Diets and All-Cause Mortality: A Systematic Review and Meta-Analysis of Observational Studies Lamberto Manzoli (ed.). *PLoS ONE*. 8 (1), e55030.