

Plant-Based Nutrition and Meal Timing in Cardiometabolic Disease

The randomized trials most likely to come up in clinic, each with its PubMed identifier so you can reach the source in one step.

HOW TO READ THIS

Every reference is from Dr. Kahleová's own bibliography and carries its PMID. Findings are given by *direction of effect only* — effect sizes and methods belong with the paper, not a summary sheet.

Observational studies and meta-analyses are labeled.

1 · Meal timing and meal frequency

1. Kahleova H, Belinova L, Malinska H, et al. Eating two larger meals a day (breakfast and lunch) is more effective than six smaller meals in a reduced-energy regimen for patients with type 2 diabetes: a randomised crossover study. *Diabetologia*. 2014;57:1552–60. PMID: 24838678
Energy-matched crossover. Two meals produced greater reductions in body weight and hepatic fat, and greater improvement in insulin sensitivity, than six meals on identical intake — the trial the patient handout is built on.
2. Kahleova H, Lloren JI, Mashchak A, Hill M, Fraser GE. Meal frequency and timing are associated with changes in body mass index in Adventist Health Study 2. *J Nutr*. 2017;147:1722–28. PMID: 28701389
Prospective cohort (observational). Fewer eating occasions, a larger breakfast and a longer overnight interval were each associated with a more favorable change in BMI.
3. Belinova L, Kahleova H, Malinska H, et al. The effect of meal frequency in a reduced-energy regimen on the gastrointestinal and appetite hormones in patients with type 2 diabetes: a randomised crossover study. *PLoS One*. 2017;12:e0174820. PMID: 28369078
Companion mechanistic analysis to the 2014 trial: appetite and gut-hormone responses under two- versus six-meal regimens.
4. Semnani-Azad Z, Khan TA, Chiavaroli L, et al. (incl. Kahleová H). Intermittent fasting strategies and their effects on body weight and other cardiometabolic risk factors: systematic review and network meta-analysis of randomised clinical trials. *BMJ*. 2025;389:e082007. PMID: 40533200
Network meta-analysis — the reference for when a patient asks which fasting protocol is “best.”

2 · Glycemic control and insulin requirement

5. Kahleova H, Matoulek M, Malinska H, et al. Vegetarian diet improves insulin resistance and oxidative stress markers more than conventional diet in subjects with type 2 diabetes. *Diabet Med*. 2011;28:549–59. PMID: 21480966
Calorie-matched against a conventional diabetic diet. Greater improvement in insulin sensitivity, and more participants able to reduce diabetes medication.
6. Kahleova H, Tura A, Hill M, Holubkov R, Barnard ND. A plant-based dietary intervention improves beta-cell function and insulin resistance in overweight adults: a 16-week randomized clinical trial. *Nutrients*. 2018;10. PMID: 29425120
Beta-cell function improved alongside insulin sensitivity — relevant when a patient assumes decline is one-directional.
7. Kahleova H, Znayenko-Miller T, Smith K, et al. Effect of a dietary intervention on insulin requirements and glycemic control in type 1 diabetes: a 12-week randomized clinical trial. *Clin Diabetes*. 2024;42:419–27. PMID: 39015168
Type 1 diabetes. Total daily insulin requirement fell and insulin sensitivity rose — the trial behind the dose-titration warning on the protocol sheet.
8. Kahleova H, Maracine C, Znayenko-Miller T, et al. Can a vegan diet help people with type 1 diabetes save on insulin? A secondary analysis of a 12-week randomized clinical trial. *BMC Nutr*. 2025;11:188. PMID: 41088465
The insulin reduction above, in cost terms — often more persuasive to a patient than an HbA_{1c} figure.

3 · Body weight and cardiometabolic risk

9. Kahleova H, Petersen KF, Shulman GI, et al. Effect of a low-fat vegan diet on body weight, insulin sensitivity, postprandial metabolism, and intramyocellular and hepatocellular lipid levels in overweight adults: a randomized clinical trial. *JAMA Netw Open*. 2020;3:e2025454. PMID: 33252690
Ectopic fat measured directly by ¹H-MRS. Body weight, insulin sensitivity and both intramyocellular and hepatocellular lipid moved favorably.
10. Barnard ND, Alwarith J, Rembert E, et al. (incl. Kahleova H). A Mediterranean diet and low-fat vegan diet to improve body weight and cardiometabolic risk factors: a randomized, cross-over trial. *J Am Nutr Assoc*. 2022;41:127–39. PMID: 33544066
Head-to-head crossover against the diet most patients have already heard of. The two patterns did not perform identically across outcomes — worth reading before recommending either by default.
11. Uusitupa M, Khan TA, Viguiouk E, et al. (incl. Kahleova H). Prevention of type 2 diabetes by lifestyle changes: a systematic review and meta-analysis. *Nutrients*. 2019;11. PMID: 31683759
Meta-analysis. The population-level case for lifestyle intervention in people at high risk of type 2 diabetes.
12. Kahleova H, Levin S, Barnard N. Cardio-metabolic benefits of plant-based diets. *Nutrients*. 2017;9. PMID: 28792455
Narrative review — a reasonable single starting point.
13. Jardine MA, Kahleova H, Levin SM, Ali Z, Trapp CB, Barnard ND. Perspective: plant-based eating pattern for type 2 diabetes prevention and treatment: efficacy, mechanisms, and practical considerations. *Adv Nutr*. 2021;12:2045–55. PMID: 34113961
The most practice-oriented review of the set, including implementation.

4 · Mechanism: why a plant-based meal behaves differently

14. Kahleova H, Tura A, Klementova M, et al. A plant-based meal stimulates incretin and insulin secretion more than an energy- and macronutrient-matched standard meal in type 2 diabetes: a randomized crossover study. *Nutrients*. 2019;11. PMID: 30813546
Matched for energy and macronutrients — so the difference is not simply calories or carbohydrate load.
15. Klementova M, Thieme L, Haluzik M, et al. (incl. Kahleova H). A plant-based meal increases gastrointestinal hormones and satiety more than an energy- and macronutrient-matched processed-meat meal in T2D, obese, and healthy men: a three-group randomized crossover study. *Nutrients*. 2019;11. PMID: 30642053
A satiety mechanism to offer patients who expect to feel deprived.

5 · The three objections you will actually hear

16. **“Where’s the protein?”** Kahleova H, Fleeman R, Hlozkova A, Holubkov R, Barnard ND. A plant-based diet in overweight individuals in a 16-week randomized clinical trial: metabolic benefits of plant protein. *Nutr Diabetes*. 2018;8:58. PMID: 30405108
17. **“It’s too expensive.”** Kahleova H, Sutton M, Maracine C, et al. Vegan diet and food costs among adults with overweight: a secondary analysis of a randomized clinical trial. *JAMA Netw Open*. 2023;6:e2332106. PMID: 37669055
Total food costs fell, not rose.
18. **“My symptoms aren’t metabolic.”** Barnard ND, Kahleova H, Holtz DN, et al. A dietary intervention for vasomotor symptoms of menopause: a randomized, controlled trial. *Menopause*. 2023;30:80–87. PMID: 36253903
Frequency and severity of vasomotor symptoms improved — useful in women who have declined or cannot take hormone therapy.



The full bibliography — over 100 peer-reviewed papers

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