Menopause: the potential role of therapeutic carbohydrate restriction

Nutrition Network

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Introduction

As oestrogen/progesterone are insulin-sensitising hormones, a reduction in these hormones can increase insulin resistance, which may contribute to the metabolic dysregulation and symptoms of menopause. This section/handout includes studies that support potential benefits of a TCR approach to help manage areas of common concern during menopause, primarily as a means of reducing glycaemic variability and insulin resistance.

Insulin resistance, weight gain and cardiovascular disease

Therapeutic carbohydrate reduction is one way to combat insulin resistance, weight gain, and inflammation – risk factors for CVD. Insulin resistance also contributes to platelet dysfunction and clotting risk.

1. Mozaffarian D, Rimm EB, Herrington DM. Dietary fats, carbohydrate, and progression of coronary atherosclerosis in postmenopausal women. *Am J Clin Nutr*. 2004;80(5):1175-1184. doi:10.1093/ajcn/80.5.1175
2. Blomquist C, Chorell E, Ryberg M, et al. Decreased lipogenesis-promoting factors in adipose tissue in postmenopausal women with overweight on a Paleolithic-type diet. *Eur J Nutr*. 2018;57(8):2877-2886. doi:10.1007/s00394-017-1558-0
3. McPhee JC, Zinn C, Smith M. Exploring the acceptability of, and adherence to a carbohydrate-restricted diet as self-reported by women aged 40-55 years. J Holistic Performance Nutrition™. doi: 10.26712/230120181 PDF
4. Tavakoli, A. *et al.* (2025) 'The effects of intermittent fasting on antioxidant and inflammatory markers and liver enzymes in postmenopausal, overweight and obese women with rheumatoid arthritis: a randomized controlled trial',

Scientific Reports, 15(1), p. 2357. Available at: https://doi.org/10.1038/s41598-025-86734-0.

Glycaemic variability, insulin resistance and hot flashes

Hot flashes may be associated with glycaemic variability, visceral adiposity, and insulin resistance.

In addition to reducing hyperinsulinaemia, a TCR approach reduces glycaemic variability – keeping blood sugars more stable – and can successfully reduce abdominal adiposity.

1. Dormire S, Howharn C. The Effect of Dietary Intake on Hot Flashes in Menopausal Women. J Obstet Gynecol Neonatal Nurs. 2007;36(3):255-262. doi:10.1111/j.1552-6909.2007.00142.x

Sleep

Sleep has a bidirectional effect on metabolic health. Poor sleep patterns, such as shift work, can increase insulin resistance and increase the risk of developing metabolic syndrome. An increase in insulin resistance via other mechanisms, like changes in hormones, can reduce melatonin (inverse relationship) and affect sleep.

1. Franklin, K.A. *et al.* (2022) 'Effects of a palaeolithic diet on obstructive sleep apnoea occurring in females who are overweight after menopause—a randomised controlled trial', *International Journal of Obesity*, pp. 1–7. Available at: https://doi.org/10.1038/s41366-022-01182-4.
2. Siegmann MJ, Athinarayanan SJ, Hallberg SJ, et al. Improvement in patient-reported sleep in type 2 diabetes and prediabetes participants receiving a continuous care intervention with nutritional ketosis. *Sleep Medicine*. 2019;55:92-99. doi:10.1016/j.sleep.2018.12.014

Brain glucose hypometabolism and cognitive decline

'The peri-menopausal transition is a tipping point for female brain ageing. From the metabolic perspective, the process begins with decline in glucose metabolism and increase in insulin resistance, followed by a compensatory mechanism to use fatty acids and ketone bodies as an auxiliary fuel source' Wang et al.(2020). Reducing levels of oestrogen are implicated in this process.
TCR reduces brain insulin resistance and inflammation and may increase cerebral blood flow and BDNF. If carbohydrate intake is sufficiently reduced, ketone bodies can provide an alternative fuel source for the brain, further supporting cognitive function.

1. Yang H, Shan W, Zhu F, Wu J, Wang Q. Ketone Bodies in Neurological Diseases: Focus on Neuroprotection and Underlying Mechanisms. *Front Neurol*. 2019;10. doi:10.3389/fneur.2019.00585
2. Mujica-Parodi, L.R. *et al.* (2020) 'Diet modulates brain network stability, a biomarker for brain aging, in young adults', *Proceedings of the National Academy of Sciences*, 117(11), pp. 6170–6177. Available at: https://doi.org/10.1073/pnas.1913042117.

Insulin resistance and bone turnover

Diet quality affects bone markers and metabolic syndrome is associated with reduced bone mineral density. TCR addresses insulin resistance and provides nutrient density. In addition, a recent study examined the effect of carbohydrate intake on BMD via a Mendelian randomisation analysis and concluded that high carbohydrate intake may adversely affect BMD via specific metabolic pathways.

1. Hu T, Yao L, Bazzano L. Effects of a 12-month Low-Carbohydrate Diet vs. a Low-Fat Diet on Bone Mineral Density: A Randomized Controlled Trial. *The FASEB Journal*. 2016;30(S1):678.12-678.12. doi:10.1096/fasebj.30.1_supplement.678.12

Breast Cancer and Insulin Resistance

Multiple factors contribute to increased risk of breast cancer - the presence of insulin resistance/metabolic syndrome is known to impact risk and prognosis. Emerging data suggests a ketogenic diet may be supportive as an adjunct to the standard of care in cancer treatment.

1. Buga, A. *et al.* (2024) 'Feasibility and metabolic outcomes of a well-formulated ketogenic diet as an adjuvant therapeutic intervention for women with stage IV metastatic breast cancer: The Keto-CARE trial', *PLOS ONE*, 19(1), p. e0296523. Available at: https://doi.org/10.1371/journal.pone.0296523.
2. Bahrami, A. *et al.* (2024) 'Fasting mimicking diet during neo-adjuvant chemotherapy in breast cancer patients: a randomized controlled trial study', *Frontiers in Nutrition*, 11, p. 1483707. Available at: https://doi.org/10.3389/fnut.2024.1483707.

Individual responses to dietary composition can vary, so appropriate medical monitoring is advised. Patients who are taking medication should consult with their doctor, as the following guidelines (Society of Metabolic Health Practitioners) may need to be considered.