



# HYPERTENSION

## A LOW CARBOHYDRATE APPROACH

### REFERENCE HANDOUT

'The HF-DASH diet lowered blood pressure to the same extent as the DASH diet but also reduced plasma triglyceride and VLDL concentrations without significantly increasing LDL cholesterol.' - [Chiu et al. 2016](#)



### SYSTEMATIC REVIEWS AND META-ANALYSIS

Evans CE, Greenwood DC, Threapleton DE, Gale CP, Cleghorn CL, Burley VJ. Glycemic index, glycemic load, and blood pressure: a systematic review and meta-analysis of randomized controlled trials. *The American Journal of Clinical Nutrition*. 2017;105(5):1176-1190. [doi:10.3945/ajcn.116.143685](https://doi.org/10.3945/ajcn.116.143685)

Yu Z, Nan F, Wang LY, Jiang H, Chen W, Jiang Y. Effects of high-protein diet on glycemic control, insulin resistance and blood pressure in type 2 diabetes: a systematic review and meta-analysis of randomized controlled trials. *Clinical Nutrition*. Published online August 15, 2019. [doi:10.1016/j.clnu.2019.08.008](https://doi.org/10.1016/j.clnu.2019.08.008)

Rebholz CM, Friedman EE, Powers LJ, Arroyave WD, He J, Kelly TN. Dietary Protein Intake and Blood Pressure: A Meta-Analysis of Randomized Controlled Trials. *American Journal of Epidemiology*. 2012;176(suppl\_7):S27-S43. [doi:10.1093/aje/kws245](https://doi.org/10.1093/aje/kws245)



### TRIALS/STUDIES

Yancy WS, Westman EC, McDuffie JR, et al. A Randomized Trial of a Low-Carbohydrate Diet vs Orlistat Plus a Low-Fat Diet for Weight Loss. *Arch Intern Med*. 2010;170(2):136. [doi:10.1001/archinternmed.2009.492](https://doi.org/10.1001/archinternmed.2009.492)

Unwin DJ, Tobin SD, Murray SW, Delon C, Brady AJ. Substantial and Sustained Improvements in Blood Pressure, Weight and Lipid Profiles from a Carbohydrate Restricted Diet: An Observational Study of Insulin Resistant Patients in Primary Care. *International Journal of Environmental Research and Public Health*. 2019;16(15):2680. [doi:10.3390/ijerph16152680](https://doi.org/10.3390/ijerph16152680)

Pérez-Guisado J, Muñoz-Serrano A. A Pilot Study of the Spanish Ketogenic Mediterranean Diet: An Effective Therapy for the Metabolic Syndrome. *Journal of Medicinal Food*. 2011;14(7-8):681-687. [doi:10.1089/jmf.2010.0137](https://doi.org/10.1089/jmf.2010.0137)

Walker L, Smith N, Delon C. Weight loss, hypertension and mental well-being improvements during COVID-19 with a multicomponent health promotion programme on Zoom: a service evaluation in primary care. *BMJ Nutrition, Prevention & Health*. Published online February 13, 2021:bmjnph. [doi:10.1136/bmjnph-2020-000219](https://doi.org/10.1136/bmjnph-2020-000219) PDF

Kim D, Roberts C, McKenzie A, George MP. Nutritional ketosis to treat pulmonary hypertension associated with obesity and metabolic syndrome: a case report. *Pulm Circ*. 2021;11(1):2045894021991426. [doi:10.1177/2045894021991426](https://doi.org/10.1177/2045894021991426)

Ballard KD, Quann EE, Kupchak BR, et al. Dietary carbohydrate restriction improves insulin sensitivity, blood pressure, microvascular function, and cellular adhesion markers in individuals taking statins. *Nutr Res*. 2013;33(11):905-912. [doi:10.1016/j.nutres.2013.07.022](https://doi.org/10.1016/j.nutres.2013.07.022) ABSTRACT



## ASSOCIATION STUDIES

Scaranni P de O da S, Cardoso L de O, Chor D, et al. Ultra-processed foods, changes in blood pressure, and incidence of hypertension: results of Brazilian Longitudinal Study of Adult Health (ELSA-Brasil). *Public Health Nutrition*. Published online undefined/ed:1-22. [doi:10.1017/S136898002100094X](https://doi.org/10.1017/S136898002100094X)

He D, Sun N, Xiong S, Qiao Y, Ke C, Shen Y. Association between the proportions of carbohydrate and fat intake and hypertension risk: findings from the China Health and Nutrition Survey. *Journal of Hypertension*. 2021; Publish Ahead of Print. [doi:10.1097/HJH.0000000000002803](https://doi.org/10.1097/HJH.0000000000002803)



## FASTING

Maifeld A, Bartolomaeus H, Löber U, et al. Fasting alters the gut microbiome reducing blood pressure and body weight in metabolic syndrome patients. *Nature Communications*. 2021;12(1):1970. [doi:10.1038/s41467-021-22097-0](https://doi.org/10.1038/s41467-021-22097-0)

Grundler F, Mesnage R, Michalsen A, Wilhelmi de Toledo F. Blood Pressure Changes in 1610 Subjects With and Without Antihypertensive Medication During Long-Term Fasting. *J Am Heart Assoc*. 2020;9(23). [doi:10.1161/JAHA.120.018649](https://doi.org/10.1161/JAHA.120.018649)



## MECHANISMS

da Silva AA, do Carmo JM, Li X, Wang Z, Mouton AJ, Hall JE. Role of Hyperinsulinemia and Insulin Resistance in Hypertension: Metabolic Syndrome Revisited. *Can J Cardiol.* 2020;36(5):671-682. [doi:10.1016/j.cjca.2020.02.066](https://doi.org/10.1016/j.cjca.2020.02.066)

Yanai H, Tomono Y, Ito K, Furutani N, Yoshida H, Tada N. The underlying mechanisms for development of hypertension in the metabolic syndrome. *Nutrition Journal.* 2008;7(1):10. [doi:10.1186/1475-2891-7-10](https://doi.org/10.1186/1475-2891-7-10)



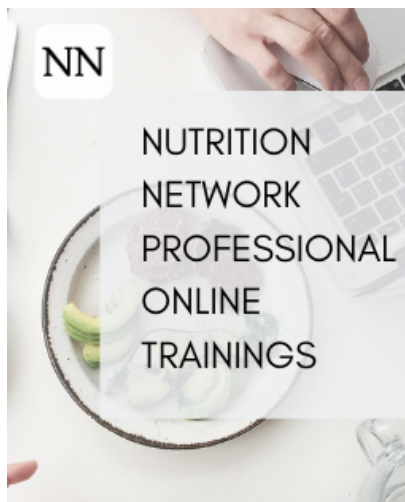
## GENERAL RESOURCES - IMPLEMENTATION & POSSIBLE MEDICATION REDUCTION

Clinical Guidelines. [Society of Metabolic Health Practitioners.](#) Hite et al.

Low-Carbohydrate Nutrition Approaches in Patients with Obesity, Prediabetes and Type 2 Diabetes - Low Carb Nutrition - Queen's Units. [Guidelines.](#)

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