



Effects of Ketogenic Diet and Intermittent Fasting on Health and Lifespan

Carla Almendariz

Abstract

The frequency, amount and type of food intake play an important role in the organism health and are determinants for lifespan. A variety of dietary regimens have been designed and applied in order to improve the health span (length of time an individual is able to maintain good health) [1] and to decrease the probability of developing pathologies such as cancer, neurodegenerative and cardiovascular diseases [2]. Two of the most popular diet plans are the ketogenic diet (KD) and intermittent fasting (IF) and both regimes have been demonstrated to improve health in animal models and humans [3,4]. However, how do they achieve the benefits that they claim?

KD emerged more than 100 years ago and currently is receiving special attention as a potential treatment for healthy aging by promoting a shift from glucose utilization towards fatty acid metabolism [5]. Parallel to this, IF has been related with health enhancement, not only because the weight loss, but due to the activation of different cellular responses that improve glucose homeostasis and reduce inflammation and stress [4]. The cellular and molecular mechanisms by which KD and IF improve health and mitigate diseases are associated with metabolic pathways that activate the defense against oxidative and metabolic stress, autophagy (cell self-eating) to repair or remove damaged molecules [6,7] and activation of other pro-longevity mechanisms [8,9]. The role that diet has in modulating the mechanisms of health and lifespan are much more significant and prominent than previously thought; therefore, it is time to add to our understanding the mechanisms of action of these dietary regimes to have a better knowledge of the potential of the benefits of KD and IF.

References

- [1] Fontana, L., & Partridge, L. (2015). Promoting Health and Longevity through Diet : From Model Organisms to Humans. *Cell*, 161(1), 106–118. <https://doi.org/10.1016/j.cell.2015.02.020>
- [2] de Cabo, R., & Mattson, M. P. (2019). Effects of Intermittent Fasting on Health, Aging, and Disease. *The New England Journal of Medicine*, 381(26), 2541–2551. <https://doi.org/10.1056/NEJMra1905136>
- [3] Bando, H., Ebe, K., & Bando, M. (2018). Biology of Human Aging and Recent Nutrition Therapy. *Molecular Biology*, 7(1), 1–4. <https://doi.org/10.4172/2168-9547.1000203>
- [4] Golbidi, S., Daiber, A., Korac, B., Li, H., & Essop, M. F. (2017). Health Benefits of Fasting and Caloric Restriction. *Current Diabetes Reports*, 17(123), 1–11. <https://doi.org/10.1007/s11892-017-0951-7>
- [5] Roberts, M. N., Wallace, M. A., Tomilov, A. A., Zhou, Z., Marcotte, G. R., Tran, D., Perez, G., Gutierrez-Casado, E., Koike, S., Knotts, T. A., Imai, D. M., Griffey, S. M., Kim, K., Hagopian, K., McMackin, M. Z., Haj, F. G., Baar, K., Cortopassi, G. A., Ramsey, J. J., & Lopez-Dominguez, J. A. (2017). A Ketogenic Diet Extends Longevity and Healthspan in Adult Mice Short Article A Ketogenic Diet Extends Longevity and Healthspan in Adult Mice. *Cell Metabolism*, 26(3), 539-546.e5. <https://doi.org/10.1016/j.cmet.2017.08.005>
- [6] Mattson, M. P., Longo, V. D., & Harvie, M. (2017). Impact of intermittent fasting on health and disease processes. *Ageing Research Reviews*, 39, 46–58. <https://doi.org/10.1016/j.arr.2016.10.005>
- [7] Gustafsson, Å. B., & Mentzer, R. M. (2013). Chapter 9 - Autophagy: An Endogenous Survival Mechanism and Cardioprotective Response to Ischemic Stress. In R. A. Gottlieb (Ed.), *Autophagy in Health and Disease* (pp. 141–157). Academic Press. <https://doi.org/https://doi.org/10.1016/B978-0-12-385101-7.00009-7>
- [8] Newman, J. C., Covarrubias, A. J., Zhao, M., Yu, X., Gut, P., Ng, C., ... Verdin, E. (2018). Ketogenic diet reduces mid-life mortality and improves memory in aging mice John. *Cell Metabolism*, 26(3), 547–557. <https://doi.org/10.1016/j.cmet.2017.08.004>. Ketogenic
- [9] Catterson, J. H., Khericha, M., Dyson, M. C., Rajasingam, A., & Ahmad, M. (2018). Short-Term , Intermittent Fasting Induces Long-Lasting Gut Health and TOR-Independent Lifespan Extension. *Current Biology*, 28(11), 1714–1724. <https://doi.org/10.1016/j.cub.2018.04.015>

Monday February 10, 2020

12:30 pm

Room 2E25, Agriculture Building

Everyone Welcome