NAD+ (nicotinamide adenine dinucleotide) supplementation has been implicated in various metabolic processes, including those related to weight loss and sugar cravings. Here are five ways in which NAD+ supplementation may support weight loss and diminish sugar cravings, along with citations to relevant journal articles:

1. **Enhanced Mitochondrial Function**: NAD+ is a critical coenzyme involved in mitochondrial function, including energy production through oxidative phosphorylation. By promoting efficient energy metabolism, NAD+ supplementation may support weight loss by increasing basal metabolic rate and reducing fat storage. Additionally, improved mitochondrial function may decrease sugar cravings by providing cells with adequate energy, reducing the need for frequent glucose consumption.

Citation: Khan NA, Auranen M, Paetau I, et al. Effective treatment of mitochondrial myopathy by nicotinamide riboside, a vitamin B3. EMBO Mol Med. 2014;6(6):721-731. doi:10.1002/emmm.201403943.

1. **Regulation of Sirtuins**: NAD+ serves as a substrate for sirtuins, a class of proteins involved in various cellular processes, including metabolism and aging. Activation of sirtuins by NAD+ supplementation has been linked to improved insulin sensitivity, enhanced fat oxidation, and decreased appetite, thereby contributing to weight loss and reduced sugar cravings.

Citation: Cantó C, Gerhart-Hines Z, Feige JN, et al. AMPK regulates energy expenditure by modulating NAD+ metabolism and SIRT1 activity. Nature. 2009;458(7241):1056-1060. doi:10.1038/nature07813.

1. **Increased NAD+ Levels in Hypothalamus**: NAD+ levels in the hypothalamus play a crucial role in regulating energy balance and appetite. NAD+ supplementation may directly affect hypothalamic function, leading to improved leptin sensitivity, reduced food intake, and decreased cravings for sugar-rich foods.

Citation: Yoshino J, Mills KF, Yoon MJ, Imai S. Nicotinamide mononucleotide, a key NAD(+) intermediate, treats the pathophysiology of diet- and age-induced diabetes in mice. Cell Metab. 2011;14(4):528-536. doi:10.1016/j.cmet.2011.08.014.

1. **Inhibition of Adipogenesis**: NAD+ has been shown to inhibit adipogenesis, the process by which precursor cells differentiate into fat cells. By suppressing adipocyte formation and promoting fat breakdown, NAD+ supplementation may contribute to weight loss and reduced accumulation of adipose tissue, potentially decreasing sugar cravings associated with adiposity.

Citation: Garten A, Schuster S, Penke M, Gorski T, de Giorgis T, Kiess W. Physiological and pathophysiological roles of NAMPT and NAD metabolism. Nat Rev Endocrinol. 2015;11(9):535-546. doi:10.1038/nrendo.2015.117.

1. **Improvement in Circadian Rhythms**: NAD+ levels exhibit circadian oscillations and influence the activity of circadian clock genes. Dysregulation of circadian rhythms has been linked to obesity and metabolic disorders. NAD+ supplementation may help restore proper circadian function, leading to improved metabolic health, reduced weight gain, and decreased cravings for sugary foods.

Citation: Peek CB, Affinati AH, Ramsey KM, et al. Circadian clock NAD+ cycle drives mitochondrial oxidative metabolism in mice. Science. 2013;342(6158):1243417. doi:10.1126/science.1243417.