The Youth Restoring Benefits Of NAD+

References

1. Busso N, Karababa M, Nobile M, et al. Pharmacological inhibition of nicotinamide phosphoribosyltransferase/visfatin enzymatic activity identifies a new inflammatory pathway linked to NAD. *PLoS One*. 2008 May 21;3(5):e2267.
2. Sauve AA. NAD+ and vitamin B3: from metabolism to therapies. *J Pharmacol Exp Ther.* 2008 Mar;324(3):883-93.
3. Belenky P, Racette FG, Bogan KL, McClure JM, Smith JS, Brenner C. Nicotinamide riboside promotes Sir2 silencing and extends lifespan via Nrk and Urh1/Pnp1/Meu1 pathways to NAD+. *Cell.* 2007 May 4;129(3):473-84.
4. Imai S, Armstrong CM, Kaeberlein M, Guarente L. Transcriptional silencing and longevity protein Sir2 is an NAD-dependent histone deacetylase. *Nature*. 2000 Feb 17;403(6771):795-800.
5. Gomes AP, Price NL, Ling AJ, et al. Declining NAD(+) induces a pseudohypoxic state disrupting nuclear-mitochondrial communication during aging. *Cell.* 2013 Dec 19;155(7):1624-38.
6. Available at: http://investors.chromadex.com/phoenix.zhtml?c=212121&p=irol-newsArticle&ID=1936672&highlight=. Accessed August 29, 2014.
7. Satoh MS, Poirier GG, Lindahl T. NAD(+)-dependent repair of damaged DNA by human cell extracts. *J Biol Chem*. 1993 Mar 15;268(8):5480-7.
8. Anderson RM, Bitterman KJ, Wood JG, et al. Manipulation of a nuclear NAD+ salvage pathway delays aging without altering steady-state NAD+ levels. *J Biol Chem*. 2002 May 24;277(21):18881-90.
9. Gong B, Pan Y, Vempati P, et al. Nicotinamide riboside restores cognition through an upregulation of proliferator-activated receptor-gamma coactivator 1alpha regulated beta-secretase 1 degradation and mitochondrial gene expression in Alzheimer’s mouse models. *Neurobiol Aging.* 2013 Jun;34(6):1581-8.
10. Imai SI, Guarente L. NAD and sirtuins in aging and disease. *Trends Cell Biol.* 2014 Aug;24(8):464-71.
11. Prolla TA, Denu JM. NAD+ deficiency in age-related mitochondrial dysfunction. *Cell Metab*. 2014 Feb 4;19(2):178-80.
12. Villalba JM, Alcaín FJ. Sirtuin activators and inhibitors. *Biofactors*. 2012 Sep-Oct;38(5):349-59.
13. Landry J, Sutton A, Tafrov ST, et al. The silencing protein SIR2 and its homologs are NAD-dependent protein deacetylases. *Proc Natl Acad Sci USA*. 2000 May 23;97(11):5807-11.
14. Price NL, Gomes AP, Ling AJ, et al. SIRT1 is required for AMPK activation and the beneficial effects of resveratrol on mitochondrial function. *Cell Metab*. 2012 May 2;15(5):675-90.
15. Higashida K, Kim SH, Jung SR, Asaka M, Holloszy JO, Han DH. Effects of resveratrol and SIRT1 on PGC-1α activity and mitochondrial biogenesis: a reevaluation. *PLoS Biol*. 2013 Jul;11(7):e1001603.
16. Canto C, Auwerx J. Targeting sirtuin 1 to improve metabolism: all you need is NAD(+)? *Pharmacol Rev*. 2012 Jan;64(1):166-87.
17. Hirschey MD, Shimazu T, Huang JY, Schwer B, Verdin E. SIRT3 regulates mitochondrial protein acetylation and intermediary metabolism. *Cold Spring Harb Symp Quant Biol.* 2011;76:267-77.
18. Chen Y, Fu LL, Wen X, et al. Sirtuin-3 (SIRT3), a therapeutic target with oncogenic and tumor-suppressive function in cancer. *Cell Death Dis*. 2014 Feb 6;5:e1047.
19. Scher MB, Vaquero A, Reinberg D. SirT3 is a nuclear NAD+-dependent histone deacetylase that translocates to the mitochondria upon cellular stress. *Genes Dev*. 2007 Apr 15;21(8):920-8.
20. Kotas ME, Gorecki MC, Gillum MP. Sirtuin-1 is a nutrient-dependent modulator of inflammation. *Adipocyte*. 2013 Apr 1;2(2):113-8.
21. Gallí M, Van Gool F, Leo O. Sirtuins and inflammation: Friends or foes? *Biochem Pharmacol*. 2011 Mar 1;81(5):569-76.
22. Li X, Kazgan N. Mammalian sirtuins and energy metabolism. *Int J Biol Sci*. 2011 Feb; 7(5):575-87.
23. Chang HC, Guarente L. SIRT1 and other sirtuins in metabolism. *Trends Endocrinol Metab*. 2014 Mar;25(3):138-45.
24. Lu SP, Kato M, Lin SJ. Assimilation of endogenous nicotinamide riboside is essential for calorie restriction-mediated life span extension in Saccharomyces cerevisiae. *J Biol Chem.* 2009 Jun 19;284(25):17110-9.
25. Morris KC, Lin HW, Thompson JW, Perez-Pinzon MA. Pathways for ischemic cytoprotection: role of sirtuins in caloric restriction, resveratrol, and ischemic preconditioning. *J Cereb Blood Flow Metab*. 2011 Apr;31(4):1003-19.
26. Morselli E, Maiuri MC, Markaki M, et al. Caloric restriction and resveratrol promote longevity through the Sirtuin-1-dependent induction of autophagy. *Cell Death Dis*. 2010;1:e10.
27. Sebastián C , Satterstrom FK,Haigis MC, Mostoslavsky R. From sirtuin biology to human diseases: an update. *J Biol Chem*. 2012 Dec 14;287(51):42444-52.
28. Min SW, Sohn PD, Cho SH, Swanson RA, Gan L. Sirtuins in neurodegenerative diseases: an update on potential mechanisms. *Front Aging Neurosci*. 2013 Sep 25;5:53.

29. Oellerich MF, Potente M. FOXOs and sirtuins in vascular growth, maintenance, and aging. *Circ Res*. 2012 Apr 27;110(9):1238-51.
30. Haigis MC, Sinclair DA. Mammalian sirtuins: biological insights and disease relevance. *Annu Rev Pathol*. 2010;5:253-95.
31. Kemper JK, Choi SE, Kim DH. Sirtuin 1 deacetylase: a key regulator of hepatic lipid metabolism. *Vitam Horm.* 2013;91:385-404.
32. Tao R, Wei D, Gao H, Liu Y, DePinho RA, Dong XC. Hepatic FoxOs regulate lipid metabolism via modulation of expression of the nicotinamide phosphoribosyltransferase gene. *J Biol Chem.* 2011 Apr 22;286(16):14681-90.
33. Schug TT, Li X. Sirtuin 1 in lipid metabolism and obesity. *Ann Med.* 2011 May;43(3):198-211.
34. Ahn J, Lee H, Jung CH, Jeon TI, Ha TY. MicroRNA-146b promotes adipogenesis by suppressing the SIRT1-FOXO1 cascade. *EMBO Mol Med.* 2013 Oct;5(10):1602-12.
35. Pang W, Wang Y, Wei N, et al. Sirt1 inhibits akt2-mediated porcine adipogenesis potentially by direct protein-protein interaction. *PLoS One.* 2013;8(8):e71576.
36. Frojdo S, Durand C, Molin L, et al. Phosphoinositide 3-kinase as a novel functional target for the regulation of the insulin signaling pathway by SIRT1. *Mol Cell Endocrinol.* 2011 Mar 30;335(2):166-76.
37. Sasaki T, Kim HJ, Kobayashi M, et al. Induction of hypothalamic Sirt1 leads to cessation of feeding via agouti-related peptide. *Endocrinology.* 2010 Jun;151(6):2556-66.
38. Feige JN, Lagouge M, Canto C, et al. Specific SIRT1 activation mimics low energy levels and protects against diet-induced metabolic disorders by enhancing fat oxidation. *Cell Metab.* 2008 Nov;8(5):347-58.
39. Green MF, Hirschey MD. SIRT3 weighs heavily in the metabolic balance: a new role for SIRT3 in metabolic syndrome. *J Gerontol A Biol Sci Med Sci.* 2013 Feb;68(2):105-7.
40. Khan NA, Auranen M, Paetau I, et al. Effective treatment of mitochondrial myopathy by nicotinamide riboside, a vitamin B3. *EMBO Mol Med*. 2014 Apr 6;6(6):721-31.
41. Belenky P, Stebbins R, Bogan KL, Evans CR, Brenner C. Nrt1 and Tna1-independent export of NAD+ precursor vitamins promotes NAD+ homeostasis and allows engineering of vitamin production. *PLoS One*. 2011 May 11;6(5):e19710.
42. Kirkland JB . Niacin requirements for genomic stability. *Mutat Res*. 2012 May 1;733(1-2):14-20.
43. Canto C, Houtkooper RH, Pirinen E, et al. The NAD(+) precursor nicotinamide riboside enhances oxidative metabolism and protects against high-fat diet-induced obesity. *Cell Metab.* 2012 Jun 6;15(6):838-47.
44. Belenky PA, Moga TG, Brenner C. Saccharomyces cerevisiae YOR071C encodes the high affinity nicotinamide riboside transporter Nrt1. *J Biol Chem.* 2008 Mar 28;283(13):8075-9.
45. Waterhouse NJ. The cellular energy crisis: mitochondria and cell death. *Med Sci Sports Exerc*. 2003 Jan;35(1):105-10.
46. Palmeira CM, Rolo AP. Mitochondrial membrane potential (ΔΨ) fluctuations associated with the metabolic states of mitochondria. *Methods Mol Biol*. 2012;810:89-101.
47. Smith CP, Thorsness PE. The molecular basis for relative physiological functionality of the ADP/ATP carrier isoforms in Saccharomyces cerevisiae. *Genetics*. 2008 Jul;179(3):1285-99.
48. Mouchiroud L, Houtkooper RH, Moullan, et al. The NAD(+)/Sirtuin pathway modulates longevity through activation of mitochondrial UPR and FOXO signaling. *Cell* . 2013 Jul 18;154(2):430-41.
49. Bogan KL, Evans C, Belenky P, et al. Identification of Isn1 and Sdt1 as glucose- and vitamin-regulated nicotinamide mononucleotide and nicotinic acid mononucleotide [corrected] 5'-nucleotidases responsible for production of nicotinamide riboside and nicotinic acid riboside. *J Biol Chem.* 2009 Dec 11;284(50):34861-9.
50. Tosato M, Zamboni V, Ferrini A, Cesari M. The aging process and potential interventions to extend life expectancy. *Clin Interv Aging*. 2007;2(3):401-12.
51. Larson EB, Yaffe K, Langa KM. New insights into the dementia epidemic. *N Engl J Med*. 2013 Dec 12;369(24):2275-7.
52. Brookmeyer R, Johnson E, Ziegler-Graham K, Arrighi HM. Forecasting the global burden of Alzheimer's disease. *Alzheimers Dement*. 2007 Jul;3(3):186-91.
53. Sasaki Y, Araki T, Milbrandt J. Stimulation of nicotinamide adenine dinucleotide biosynthetic pathways delays axonal degeneration after axotomy. *J Neurosci.* 2006 Aug 16;26(33):8484-91.
54. Tempel W, Rabeh WM, Bogan KL, et al. Nicotinamide riboside kinase structures reveal new pathways to NAD+. *PLoS Biol.* 2007 Oct 2;5(10):e263.
55. Wolfe GI, Baker NS, Amato A, et al. Chronic cryptogenic sensory polyneuropathy: clinical and laboratory characteristics. *Arch Neurol*. 1999 May;56(5):540-7.
56. Van Asseldonk JT, Van den Berg LH, Kalmijn S, et al. Axon loss is an important determinant of weakness in multifocal motor neuropathy. *J Neurol Neurosurg Psychiatry*. 2006 Jun;77(6):743-7.
57. Hanada T, Weitzer S, Mair B, et al. CLP1 links tRNA metabolism to progressive motor-neuron loss. *Nature*. 2013 Mar 28;495(7442):474-80.
58. Yang T, Chan NY, Sauve AA. Syntheses of nicotinamide riboside and derivatives: effective agents for increasing nicotinamide adenine dinucleotide concentrations in mammalian cells. *J Med Chem.* 2007 Dec 27;50(26):6458-61.

59. North BJ, Verdin E. Sirtuins: Sir2-related NAD-dependent protein deacetylases. *Genome Biol*. 2004;5(5):224.
60. Feige JN, Auwerx J. Transcriptional targets of sirtuins in the coordination of mammalian physiology. *Curr Opin Cell Biol*. 2008 Jun;20(3):303-9.
61. Jin L, Wei W, Jiang Y, et al. Crystal structures of human SIRT3 displaying substrate-induced conformational changes. *J Biol Chem*. 2009 Sep 4;284(36):24394-405.
62. Hirschey MD, Shimazu T, Capra JA, Pollard KS, Verdin E. SIRT1 and SIRT3 deacetylate homologous substrates: AceCS1,2 and HMGCS1,2. *Aging (Albany NY).* 2011 Jun;3(6):635-42.
63. Belenky P, Christensen KC, Gazzaniga F, Pletnev AA, Brenner C. Nicotinamide riboside and nicotinic acid riboside salvage in fungi and mammals. Quantitative basis for Urh1 and purine nucleoside phosphorylase function in NAD+ metabolism. *J Biol Chem*. 2009 Jan 2;284(1):158-64.
64. Mouchiroud L, Molin L, Kasturi P, et al. Pyruvate imbalance mediates metabolic reprogramming and mimics lifespan extension by dietary restriction in *Caenorhabditis elegans*. *Aging Cell*. 2011 Feb;10(1):39-54.