

Urolithin – Postbiotikum und Schlüsselmetabolit für Immunsystem, Mitochondrien und Longevity

Mikrobiomabhängige Biotransformation, klinische Evidenz und Konsequenzen für die Labordiagnostik

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Literatur

- [1] García-Villalba R, Giménez-Bastida JA, Cortés-Martín A, et al. Urolithins: A Comprehensive Update on Their Metabolism, Bioactivity, and Associated Gut Microbiota. *Mol Nutr Food Res.* 2022;66(21):e2101019. doi:10.1002/mnfr.202101019.
- [2] Ryu D, Mouchiroud L, Andreux PA, et al. Urolithin A induces mitophagy and prolongs lifespan in *C. elegans* and increases muscle function in rodents. *Nat Med.* 2016;22(8):879-888. doi:10.1038/nm.4132.
- [3] Andreux PA, Blanco-Bose W, Ryu D, et al. The mitophagy activator urolithin A is safe and induces a molecular signature of improved mitochondrial and cellular health in humans. *Nat Metab.* 2019;1:595-603. doi:10.1038/s42255-019-0073-4.
- [4] Liu S, D'Amico D, Shankland E, et al. Effect of Urolithin A Supplementation on Muscle Endurance and Mitochondrial Health in Older Adults: A Randomized Clinical Trial. *JAMA Netw Open.* 2022;5(1):e2144279. doi:10.1001/jamanetworkopen.2021.44279.
- [5] Singh A, D'Amico D, Andreux PA, et al. Urolithin A improves muscle strength, exercise performance, and biomarkers of mitochondrial health in a randomized trial in middle-aged adults. *Cell Rep Med.* 2022;3(5):100633. doi:10.1016/j.xcrm.2022.100633.
- [6] Denk D, Singh A, Kasler HG, et al. Effect of the mitophagy inducer urolithin A on age-related immune decline: a randomized, placebo-controlled trial. *Nat Aging.* 2025;5:2309-2322. doi:10.1038/s43587-025-00996-x.
- [7] Denk D, Petrocelli V, Conche C, et al. Expansion of T memory stem cells with superior anti-tumor immunity by Urolithin A-induced mitophagy. *Immunity.* 2022;55(11):2059-2073.e8. doi:10.1016/j.immuni.2022.09.014.
- [8] Ghosh S, Vanwinkle ZM, Bodduluri SR, et al. Urolithin A activates aryl hydrocarbon receptor-NLRP6-mediated pathways in intestinal epithelial cells to modulate mucosal immunity and strengthen gut barrier integrity. *Nat Commun.* 2026;17:5411. doi:10.1038/s41467-026-73760-3.
- [9] Selma MV, Beltrán D, García-Villalba R, Espín JC, Tomás-Barberán FA. *Gordonibacter urolithinifaciens* sp. nov., a urolithin-producing bacterium isolated from the human gut. *Int J Syst Evol Microbiol.* 2014;64(Pt 7):2346-2352. doi:10.1099/ijs.0.055095-0.
- [10] Selma MV, Beltrán D, García-Villalba R, Espín JC, Tomás-Barberán FA. Description of urolithin production capacity from ellagic acid of two human intestinal *Gordonibacter* species. *Food Funct.* 2014;5(8):1779-1784. doi:10.1039/C4FO00092G.
- [11] Beltrán D, Romo-Vaquero M, Espín JC, Tomás-Barberán FA, Selma MV. *Ellagibacter isourolithinifaciens* gen. nov., sp. nov., a new member of the family Eggerthellaceae, isolated from human gut. *Int J Syst Evol Microbiol.* 2018;68(5):1707-1712. doi:10.1099/ijsem.0.002735.
- [12] Iglesias-Aguirre CE, García-Villalba R, Beltrán D, et al. Gut Bacteria Involved in Ellagic Acid Metabolism To Yield Human Urolithin Metabotypes Revealed. *J Agric Food Chem.* 2023;71(9):4029-4035. doi:10.1021/acs.jafc.2c08889.
- [13] Pidgeon R, Mitchell S, Shamash M, et al. Diet-derived urolithin A is produced by a dehydroxylase encoded by human gut *Enterocloster* species. *Nat Commun.* 2025;16:999. doi:10.1038/s41467-025-56266-2.
- [14] Pidgeon R, Giurleo A, Dridi L, et al. The presence and induction of regioselective dehydroxylases dictate urolithin metabolism by *Enterocloster* species. *npj Biofilms Microbiomes.* 2025;11:220. doi:10.1038/s41522-025-00849-w.
- [15] Cortés-Martín A, García-Villalba R, González-Sarriás A, et al. The gut microbiota urolithin metabotypes revisited: the human metabolism of ellagic acid is mainly determined by aging. *Food Funct.* 2018;9(8):4100-4106. doi:10.1039/C8FO00956B.
- [16] Romo-Vaquero M, Cortés-Martín A, Loria-Kohen V, et al. Deciphering the Human Gut Microbiome of Urolithin Metabotypes: Association with Enterotypes and Potential Cardiometabolic Health Implications. *Mol Nutr Food Res.* 2019;63(4):e1800958. doi:10.1002/mnfr.201800958.
- [17] Xian W, Yang S, Deng Y, et al. Distribution of Urolithins Metabotypes in Healthy Chinese Youth: Difference in Gut Microbiota and Predicted Metabolic Pathways. *J Agric Food Chem.* 2021;69(44):13055-13065. doi:10.1021/acs.jafc.1c04849.

- [18] González-Sarriás A, García-Villalba R, Romo-Vaquero M, et al. Clustering according to urolithin metabotype explains the interindividual variability in the improvement of cardiovascular risk biomarkers in overweight-obese individuals consuming pomegranate: a randomized clinical trial. *Mol Nutr Food Res.* 2017;61(5):1600830. doi:10.1002/mnfr.201600830.
- [19] Xia M, Hua Z, Zhao Y, et al. Improvement of Urolithin A Yield by In Vitro Cofermentation of *Streptococcus thermophilus* FUA329 with Human Gut Microbiota from Different Urolithin Metabotypes. *J Agric Food Chem.* 2024;72(6):3008-3016. doi:10.1021/acs.jafc.3c09734.
- [20] Singh A, D'Amico D, Andreux PA, et al. Direct supplementation with Urolithin A overcomes limitations of dietary exposure and gut microbiome variability in healthy adults to achieve consistent levels across the population. *Eur J Clin Nutr.* 2022;76(2):297-308. doi:10.1038/s41430-021-00950-1.
- [21] Núñez-Sánchez MA, García-Villalba R, Monedero-Saiz T, et al. Targeted metabolic profiling of pomegranate polyphenols and urolithins in plasma, urine and colon tissues from colorectal cancer patients. *Mol Nutr Food Res.* 2014;58(6):1199-1211. doi:10.1002/mnfr.201300931.
- [22] García-Villalba R, Espín JC, Tomás-Barberán FA. Chromatographic and spectroscopic characterization of urolithins for their determination in biological samples after the intake of foods containing ellagitannins and ellagic acid. *J Chromatogr A.* 2016;1428:162-175. doi:10.1016/j.chroma.2015.08.044.
- [23] Korczak, M., Roszkowski, P., Granica, S. et al. Conjugates of urolithin A with NSAIDs, their stability, cytotoxicity, and anti-inflammatory potential. *Sci Rep* 12, 11676 (2022). doi.org/10.1038/s41598-022-15870-8
- [24] Shen PX, Li X, Deng SY, Zhao L, Zhang YY, Deng X, Han B, Yu J, Li Y, Wang ZZ, Zhang Y. Urolithin A ameliorates experimental autoimmune encephalomyelitis by targeting aryl hydrocarbon receptor. *EBioMedicine.* 2021 Feb;64:103227. doi: 10.1016/j.ebiom.2021.103227