

Mucus Nature Nerd Talk 7/28/23 - References

Erin Miller BSc, Andrea McBeth ND

Mucus In Human Health

- [Bergstrom, K. S. B., & Xia, L. \(2013\). **Mucin-type O-glycans and their roles in intestinal homeostasis.** *Glycobiology*, 23\(9\), 1026–1037.](#)
- [Luis, A. S., & Hansson, G. C. \(2023\). **Intestinal mucus and their glycans: A habitat for thriving microbiota.** *Cell Host & Microbe*, 31\(7\), 1087–1100.](#)
- [Desai, M. S., Seekatz, A. M., Koropatkin, N. M., Kamada, N., Hickey, C. A., Wolter, M., Pudlo, N. A., ... & Martens, E. C. \(2016\). **A Dietary Fiber-Deprived Gut Microbiota Degrades the Colonic Mucus Barrier and Enhances Pathogen Susceptibility.** *Cell*, 167\(5\), 1339–1353.e21.](#)
- [McDonald, D., Hyde, E., Debelius, J. W., Morton, J. T., Gonzalez, A., Ackermann, G., Aksenov, A. A., ... Knight, R. \(2018\). **American Gut: an Open Platform for Citizen Science Microbiome Research.** *mSystems*, 3\(3\), e00031-18. <https://doi.org/10.1128/mSystems.00031-18>](#)
- [Sonnenburg, E. D., Smits, S. A., Tikhonov, M., Higginbottom, S. K., Wingreen, N. S., & Sonnenburg, J. L. \(2016\). **Diet-induced extinctions in the gut microbiota compound over generations.** *Nature*, 529\(7585\), 212–215.](#)
- [Chassaing, B., Koren, O., Goodrich, J. K., Poole, A. C., Srinivasan, S., Ley, R. E., & Gewirtz, A. T. \(2015\). **Dietary emulsifiers impact the mouse gut microbiota promoting colitis and metabolic syndrome.** *Nature*, 519\(7541\), 92–96.](#)
- [Bohórquez, D. V., Shahid, R. A., Erdmann, A., Kreger, A. M., Wang, Y., Calakos, N., Wang, F., & Liddle, R. A. \(2015\). **Neuroepithelial circuit formed by innervation of sensory enteroendocrine cells.** *The Journal of Clinical Investigation*, 125\(2\), 782–786.](#)
- [Herath, M., Hosie, S., Bornstein, J. C., Franks, A. E., & Hill-Yardin, E. L. \(2020\). **The Role of the Gastrointestinal Mucus System in Intestinal Homeostasis: Implications for Neurological Disorders.** *Frontiers in Cellular and Infection Microbiology*, 10, 248.](#)
- [Song, C., Chai, Z., Chen, S., Zhang, H., Zhang, X., & Zhou, Y. \(2023\). **Intestinal mucus components and secretion mechanisms: what we do and do not know.** *Experimental & Molecular Medicine*, 55\(4\), 681–691.](#)

Structure and Functionality

- [Wagner, C. E., Wheeler, K. M., & Ribbeck, K. \(2018\). **Mucins and Their Role in Shaping the Functions of Mucus Barriers.** *Annual review of cell and developmental biology*, 34, 189–215. <https://doi.org/10.1146/annurev-cellbio-100617-062818>](#)
- [Sheng, Y. H., & Hasnain, S. Z. \(2022\). **Mucus and Mucins: The Underappreciated Host Defence System.** *Frontiers in cellular and infection microbiology*, 12, 856962. <https://doi.org/10.3389/fcimb.2022.856962>](#)
- [Bansil, R., & Turner, B. S. \(2006\). **Mucin structure, aggregation, physiological functions and biomedical applications.** *Current opinion in colloid & interface science*, 11\(2-3\), 164-170.](#)
- [Scientific American - **Mucus: The Body's Unsung Hero**](#)

Evolutionary Origins

- [Bakshani, C. R., Morales-Garcia, A. L., Althaus, M., Wilcox, M. D., Pearson, J. P., Bythell, J. C., & Burgess, J. G. \(2018\). **Evolutionary conservation of the antimicrobial function of mucus: a first defence against infection.** *NPJ biofilms and microbiomes*, 4, 14. <https://doi.org/10.1038/s41522-018-0057-2>](#)
- [Lang, T., Klasson, S., Larsson, E., Johansson, M. E., Hansson, G. C., & Samuelsson, T. \(2016\). **Searching the Evolutionary Origin of Epithelial Mucus Protein Components-Mucins and FCGBP.** *Molecular biology and evolution*, 33\(8\), 1921–1936. <https://doi.org/10.1093/molbev/msw066>](#)

- [Pajic, P., Shen, S., Qu, J., May, A. J., Knox, S., Ruhl, S., & Gokcumen, O. \(2022\). A mechanism of gene evolution generating mucin function. Science advances, 8\(34\), eabm8757.](#)

Mucus in Nature

- [The Atlantic - No One Is Prepared for Hagfish Slime](#)
- [Infinite Spider - Mucus: Nature's Slip n' Slide](#)
- [Grutter, A. S., Rumney, J. G., Sinclair-Taylor, T., Waldie, P., & Franklin, C. E. \(2011\). Fish mucous cocoons: the 'mosquito nets' of the sea. Biology letters, 7\(2\), 292–294. <https://doi.org/10.1098/rsbl.2010.0916>](#)
- [Lai, J. H., del Alamo, J. C., Rodríguez-Rodríguez, J., & Lasheras, J. C. \(2010\). The mechanics of the adhesive locomotion of terrestrial gastropods. The Journal of experimental biology, 213\(Pt 22\), 3920–3933. <https://doi.org/10.1242/jeb.046706>](#)
- [Dybka-Stępień, K., Otlewska, A., Gózdź, P., & Piotrowska, M. \(2021\). The Renaissance of Plant Mucilage in Health Promotion and Industrial Applications: A Review. Nutrients, 13\(10\), 3354. <https://doi.org/10.3390/nu13103354>](#)
- [Caesar-Tonthat, T. C. \(2002\). Soil binding properties of mucilage produced by a basidiomycete fungus in a model system. Mycological Research, 106\(8\), 930-937.](#)
- [Wild, C. et al.\(2004\) Coral mucus functions as an energy carrier and particle trap in the reef ecosystem. Nature 428, 66–70. doi: 10.1038/nature02344](#)

Mucus and Microbiomes

- [MIT News - Fighting Bacteria with Mucus](#)
- [MIT News - Molecules found in mucus can thwart fungal infection](#)
- [Hansson G. C. \(2020\). Mucins and the Microbiome. Annual review of biochemistry, 89, 769–793. <https://doi.org/10.1146/annurev-biochem-011520-105053>](#)
- [Werlang, C., Cárcarmo-Oyarce, G., & Ribbeck, K. \(2019\). Engineering mucus to study and influence the microbiome. Nature Reviews Materials, 4\(2\), 134-145.](#)

Applications

- [MIT News - Synthetic mucin can mimic the real thing](#)
- [Drug Discovery News - Mining mucus for drug inspiration](#)
- [NIH News - Surgical Adhesive Inspired by Slug Slime](#)
- [Detwiler, R. E., & Kramer, J. R. \(2022\). Preparation and applications of artificial mucins in biomedicine. Current opinion in solid state & materials science, 26\(6\), 101031. <https://doi.org/10.1016/j.cossms.2022.101031>](#)
- [Patwa, A., Thiéry, A., Lombard, F., Lilley, M. K., Boisset, C., Bramard, J. F., Bottero, J. Y., & Barthélémy, P. \(2015\). Accumulation of nanoparticles in "jellyfish" mucus: a bio-inspired route to decontamination of nano-waste. Scientific reports, 5, 11387. <https://doi.org/10.1038/srep11387>](#)
- [Kramer, J. R., Onoa, B., Bustamante, C., & Bertozzi, C. R. \(2015\). Chemically tunable mucin chimeras assembled on living cells. PNAS, 112\(41\), 12574–12579. <https://doi.org/10.1073/pnas.1516127112>](#)
- [Yan, H., Melin, M., Jiang, K., Trossbach, M., Badadamath, B., Langer, K., ... & Crouzier, T. \(2021\). Immune-Modulating Mucin Hydrogel Microdroplets for the Encapsulation of Cell and Microtissue. Advanced Functional Materials, 31\(42\), 2105967.](#)
- [Donahue, R., Sahoo, J. K., Rudolph, S., Chen, Y., & Kaplan, D. L. \(2023\). Mucosa-Mimetic Materials for the Study of Intestinal Homeostasis and Disease. Advanced healthcare materials, e2300301.](#)
- [Kretschmer, M., Ceña-Diez, R., Butnarusu, C., Silveira, V., Dobryden, I., Visentin, S., ... & Yan, H. \(2022\). Synthetic Mucin Gels with Self-Healing Properties Augment Lubricity and Inhibit HIV-1 and HSV-2 Transmission. Advanced Science, 9\(32\), 2203898.](#)
- [Vinod, A., Reddy Bhimavarapu, Y. V., Hananovitz, M., Stern, Y., Gulec, S., Jena, A. K., ... & Tadmor, R. \(2022\). Mucus-Inspired Tribology, a Sticky Yet Flowing Hydrogel. ACS Applied Polymer Materials, 4\(11\), 8527-8535.](#)
- [Han, J., Lee, J., Kim, S., Lee, A., Park, H. G., & Kim, Y. S. \(2023\). Mucus-inspired organogel as an efficient absorbent and retention agent for volatile organic compounds. Nanoscale, 15\(1\), 101-108.](#)
- [Yang, S., & Duncan, G. \(2023\). Synthetic Mucus Biomaterials for Antimicrobial Peptide Delivery. bioRxiv : the preprint server for biology, 2023.03.07.531025. <https://doi.org/10.1101/2023.03.07.531025>](#)

Other Resources

- [Asknature.org - Mucus Biological Strategies](#)