



Controlling Weight with Probiotics



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Without a doubt one of the greatest health problems plaguing Americans to date is obesity.

The CDC reports that currently 42.4% of adults in the US are obese with a body mass index (BMI) between 30-40. Among these individuals, 9.2% were reported as having severe obesity with a BMI greater than 40. (1) In addition to proper nutrition and physical activity, scientists are looking into the role the microbiome plays in fat storage.

In particular, *Akkermansia muciniphila* has gained traction in these studies due to its ability to degrade mucin and modulate gut inflammation. (2)

Evidence of the benefits of *A. muciniphila* were observed in 2015 by Caesar et al. This group looked at fat intake and microbial composition by splitting mice into two control groups: those who consumed fats (lipids) in the form of lard and those who consumed fats in the form of fish oil. After eleven weeks, the control

groups were pyro sequenced for gut microbial composition and compared. Final analysis showed the control group fed a fish oil diet had a much higher concentration of *A. muciniphila* as well as other beneficial probiotic bacteria. To further rule out additional factors, the cecum from each control group was transplanted into a fresh group of mice and fed lard for three weeks. The control group containing the cecum from the fish oil mice had less weight gain compared to those in the lard control group. Moreover, 16S rRNA gene sequencing of the cecum from the fish oil fed mice was found to be high in *A. muciniphila*. (3)

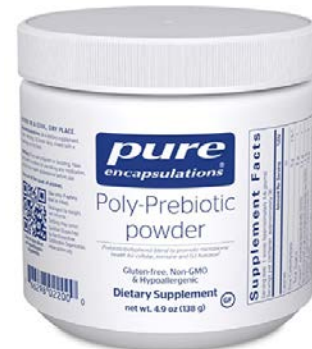


Figure 2: There are commercial products currently available that include *Akkermansia* in their formulations.

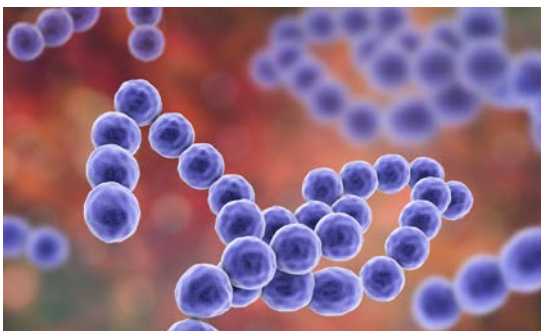


Figure 1: *Akkermansia muciniphila*

In 2017, further analysis by Ottman et al. found there might be more to the mystery of *A. muciniphila*. In their study, they observed the immunomodulatory effects of *A. muciniphila* compared to that of other well-known probiotic organisms, *Lactobacillus plantarum WCFS1* and *Faecalibacterium prausnitzii A2-165*. In order to compare the organisms, they analyzed a comparison of TNF-alpha (pro-inflammatory)/IL-10 (anti-inflammatory) cytokine induction ratio. Mice containing *A. muciniphila* had a much lower cytokine ratio, indicating a much greater anti-inflammatory response which is ideal for probiotic use. (4)

Akkermansia muciniphila has other effects on the body. It is a mucin-degrading bacterium commonly found in human gut. *Mucins* are glycoprotein components of the mucous that coats the surfaces of cells lining the respiratory, digestive, and urogenital tracts. Increased mucin production occurs in many cancers (pancreas, lung, breast, ovary, colon and other tissues). Mucins are also over-expressed in lung diseases such as asthma, bronchitis, chronic obstructive pulmonary disease (COPD) or cystic fibrosis. (5)

To reduce the growing cases in obesity, current studies in mice suggest that a reduction in overall body fat composition is

achievable by probiotic supplementation of *A. muciniphila*.

If future studies continue to support this claim, people may have another option to consider in regards to body recomposition.

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References:

- (1) <https://www.cdc.gov/nc/hs/products/databriefs/db360.htm>
- (2) <https://supplementpolice.com/akkermansia-muciniphila/>
- (3) [https://www.cell.com/cell-metabolism/fulltext/S1550-4131\(15\)00389-7?returnURL=http%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS1550413115003897%3Fshowall%3Dtrue](https://www.cell.com/cell-metabolism/fulltext/S1550-4131(15)00389-7?returnURL=http%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS1550413115003897%3Fshowall%3Dtrue)
- (4) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5332112/#pone.0173004.ref017>
- (5) <https://blog.healthmatters.io/2018/07/04/what-is-akkermansia-muciniphila/>