Where the sun doesn't shine? Skin UV exposure reflected in poop

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Credit: CC0 Public Domain

The sun can indeed shine out of your backside, suggests research. Not because you're self-absorbed, but because you've absorbed gut-altering UV radiation.

This is the first study to show that skin exposure to UVB light alters the gut microbiome in humans. Published in *Frontiers in Microbiology*, the

analysis suggests that vitamin D mediates the change—which could help explain the protective effect of UVB light in inflammatory diseases like MS and IBD.

Ratifying rodent studies

Sun exposure, vitamin D levels and the mix of bacteria in our gut are each associated with risk of inflammatory conditions like MS and IBD. Scientists hypothesize that a causal chain links the three.

Exposure to UVB in sunlight is well-known to drive vitamin D production in the skin, and recent studies suggest that vitamin D alters the human gut microbiome. However, that UVB therefore causes gut microbiome changes, via vitamin D production, has so far been shown only in rodents.

In a new clinical pilot study, researchers tested the effect of skin UVB exposure on the human gut microbiome.

Healthy female volunteers (n=21) were given three one-minute sessions of full-body UVB exposure in a single week. Before and after treatment, stool samples were taken for analysis of gut bacteria—as well blood samples for vitamin D levels.

Rich as feces

Skin UVB exposure significantly increased gut microbial diversity, but only in subjects who were not taking vitamin D supplements during the (winter) study (n=12).

"Prior to UVB exposure, these women had a less diverse and balanced gut microbiome than those taking regular vitamin D supplements,"

reports Prof. Bruce Vallance, who led the University of British Columbia study. "UVB exposure boosted the richness and evenness of their microbiome to levels indistinguishable from the supplemented group, whose microbiome was not significantly changed."

The largest effect was an increase in the relative abundance of *Lachnospiraceae* bacteria after the UVB light exposures.

"Previous studies have linked *Lachnospiraceae* abundance to host vitamin D status," adds Vallance. "We too found a correlation with blood vitamin D levels, which increased following UVB exposure."

This indicates that vitamin D at least partly mediates UVB-induced gut microbiome changes.

The results also showed some agreement with mouse studies using UVB, such as an increase in *Firmicutes* and decrease in *Bacteroidetes* in the gut following exposure.

Getting to the bottom of UVB's protective effect

"In this study we show exciting new data that UVB light is able to modulate the composition of the gut microbiome in humans, putatively through the synthesis of vitamin D," Vallance sums up.

The study is not designed to show the exact mechanism by which the microbiome changes occur, but both UVB and vitamin D are known to influence the immune system.

"It is likely that exposure to UVB light somehow alters the immune system in the skin initially, then more systemically, which in turn affects how favorable the intestinal environment is for the different bacteria," suggests Vallance.

"The results of this study have implications for people who are undergoing UVB phototherapy, and identifies a novel skin-gut axis that may contribute to the protective role of UVB light exposure in inflammatory diseases like MS and IBD."

More information: *Frontiers in Microbiology*, DOI: 10.3389/fmicb.2019.02410 , www.frontiersin.org/articles/1 … micb.2019.02410/full

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