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Kayt Sukel

Epidemiological studies have long shown a strong association between a diet high in red meat and an increased risk for cancer. New research suggests that an important molecule might be driving that link. Read more...

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Numerous studies have suggested that there is a strong link between the consumption of beef, lamb, and pork products and an increased risk for cancer and heart disease. In fact, the World Cancer Research Fund recommends that individuals limit their consumption of red meat to no more than 500 grams per week to reduce that risk. But although this association keeps turning up, researchers have not been able to adequately explain why red meat confers such risk. Now, a new study published by researchers at the University of California at San Diego (UCSD) suggests that one of the culprits may be a unique molecule called *N*-glycolylneuraminic acid (Neu5Gc).



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According to Ajit Varki, the co-director of UCSD's Glycobiology Research and Training Center, this particular molecule, a sugar, is the first known genetic difference between humans and chimpanzees. Chimps have it—but evolution selected it for removal from the human genome millions of years ago.

“We first became interested in Neu5Gc because of the difference between humans and chimpanzees. But I also have a background as an oncologist and knew that people had reported (using indirect methods) tiny traces of this molecule in cancer,” said Varki. “So we thought that cancers must be somehow making the molecule. It seemed to be the most logical answer.”

But subsequent studies showed that wasn't the case. So how was a molecule that was not made by the human body turning up in tumor cells?

“We lost the molecule at some point thanks to evolution. But then we started eating the molecule,” said Varki. “And since it’s only different by one oxygen atom, our bodies don’t see it as foreign. They take it up. But our immune systems do see it as foreign—and that should increase inflammation.”

To conclusively prove the link, Varki’s team created a mouse model that, like humans, lacked Neu5Gc. They then fed the animals Neu5GC and challenged them with anti-Neu5Gc antibodies. Those mice not only developed systemic inflammation as observed through increased cytokine response, they also showed a five-fold increase in baseline cancers. Varki argues that this suggests a direct link between Neu5Gc and the increased risks seen in the epidemiological studies. While the results are quite compelling, Neu5Gc does not offer a complete explanation of the link between red meat and cancer.

“Epidemiologists say that one burger can take 30 minutes off your life. Certainly, our results show why red meat might result in a higher risk for cancer and heart disease,” said Varki. “But we are not saying that eating red meat is a horrible thing. It can be a very beneficial food, especially if you are short on iron and certain vitamins. But it’s important to know that it could cause problems in the long run.”

Reference

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Peter Moon PhD
VCU Biomaterials Laboratory
VCU Dept of General Practice
pcmoon@vcu.edu