

New study explores the link between diet, blood sugar and cancer risk across species

Some animals' natural biological defenses could inspire new approaches to cancer prevention and treatment in humans

By Richard Harth, ASU News

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Researchers have long known that diet exerts a profound influence on health, including the risk of developing cancer. A new study, led by researchers at Arizona State University, explores the relationship between diet, blood sugar (specifically glucose) and cancer prevalence across a broad range of vertebrate species.

Surprisingly, the study found that birds, despite having significantly higher blood sugar levels and living longer than similarly sized mammals and reptiles, have lower cancer prevalence. It also revealed that primary carnivores — animals that mainly consume other vertebrates — are more prone to tumors than herbivores, particularly when domestication is considered.

The findings, published today in the journal Nature Communications, challenge existing assumptions and suggest that some species have evolved natural biological defenses against cancer. These defenses — such as metabolic adaptations and cellular protective mechanisms — could inspire new approaches to cancer prevention and treatment in humans.

“We knew that birds get less cancer than mammals, and they also have very high levels of glucose in their blood. That made us wonder if there was some connection,” study co-author Carlo Maley said.

Maley is a researcher with the Biodesign Center for Biocomputing, Security and Society, a professor with the School of Life Sciences and director of the Arizona Cancer Evolution Center.

He is joined by ASU colleagues, including corresponding author [Stefania Kapsetaki](#) and [Karen Sweazea](#), with ASU's [College of Health Solutions](#), the [Biodesign Center for Health Through Microbiomes](#) and the [Center for Evolution and Medicine](#).

Birds break the pattern

The study examined data from up to 273 vertebrate species, analyzing their diet, average plasma sugar levels and cancer prevalence. A key finding was that birds, despite their high blood sugar, have lower cancer rates than mammals and reptiles.

This was unexpected because in humans and many other animals, high blood sugar is often linked to increased cancer risk. However, the study found that the link between plasma sugar levels and cancer prevalence did not hold consistently across all vertebrates. Instead, the trend was driven by broad differences among major groups — birds, mammals and reptiles. When researchers examined each group separately, they found no clear relationship between plasma sugar levels and cancer rates within those groups.

This suggests that birds may have evolved unique biological mechanisms that protect them from cancer despite high blood sugar levels — mechanisms absent in mammals and reptiles. Understanding these adaptations could offer valuable insights into cancer resistance.

“Future studies investigating the evolutionary history and mechanisms linking diet, plasma glucose levels and cancer prevalence across vertebrates would provide further clues about the observed diversity among species and inform strategies for more effective cancer prevention and treatment across vertebrates,” Kapsetaki said.

The role of diet

The researchers also investigated whether diet influences plasma sugar levels and cancer prevalence. While previous studies suggested that carnivores have a higher cancer risk than herbivores, this study across nonhuman vertebrates examined diet categories in greater detail, considering factors like the proportion of fruit, plants, invertebrates and vertebrate meat in an animal's diet.

The study found no statistically significant link between diet and plasma sugar levels across nonhuman vertebrate species, suggesting that glucose regulation is likely influenced more by evolutionary and physiological adaptations than diet alone. While diet affects blood sugar levels in humans and some other species, it does not appear to be a universal rule across vertebrates.

One explanation is that different species have evolved distinct mechanisms to manage blood sugar, regardless of diet. For example, birds maintain high blood sugar despite diverse diets, ranging from nectar-rich to meat-based. Similarly, some carnivorous mammals have stable blood sugar levels despite protein-heavy diets, while certain herbivores show variability unrelated to their plant-based food intake.

“The lack of an overall connection between diet and blood sugar in the species examined in this study suggests that these animals are largely consuming foods designed for them as their diet was not manipulated for the study,” Sweazea said. “Even when our lab fed birds diets high in fat or sugar, which are known to increase blood sugar and cancer risk in humans, the birds show no changes in their blood sugar response. They are remarkably resilient animals.”

Although diet does not strongly influence blood sugar levels across species, it may still play a role in cancer risk. The study found that primary carnivores had a higher tumor prevalence than herbivores. One possible explanation is that harmful compounds accumulate in the food chain, making vertebrate meat consumption a potential risk for tumor development.

In addition, the researchers found that domesticated species tend to have a higher cancer prevalence, possibly due to reduced genetic diversity and weaker evolutionary pressures. This suggests that natural selection may help limit cancer in wild populations. However, while the study highlights patterns across species, it does not suggest that eating domesticated animals specifically increases cancer risk in humans.

Implications for human health

Although this study focused on nonhuman species, its findings may offer new insights into preventing cancer in people. Unlike birds — which seem to have evolved natural defenses against cancer despite high blood sugar levels — humans and other mammals do not show the same resistance.

The researchers propose that birds may have evolved unique cancer defenses, potentially related to their high metabolic rate, reliance on fat metabolism over glucose, and cellular adaptations that limit oxidative damage. Understanding these adaptations could provide valuable insights into how species evolve natural cancer defenses.

The latest in cancer research

The Biodesign Institute is taking a comprehensive approach to cancer research — from diagnosis and treatment to prevention — as well as a collaborative approach that unites clinicians and researchers of different expertise. [Visit the Biodesign Institute website](#) to learn more.

For now, the best advice for humans remains consistent with public health recommendations: Eat a balanced diet, avoid excessive processed and red meat, and manage blood sugar through a healthy lifestyle, including regular exercise. However, scientists will continue investigating whether nature's cancer-resistant species can offer new solutions in the fight against the disease.

This story originally appeared on [ASU News](#).

Main image



A new study analyzing diet, average plasma sugar levels and cancer prevalence in some 273 vertebrate species showed surprising results. The study found no significant link between diet and plasma sugar levels across nonhuman vertebrate species, suggesting that glucose regulation is likely influenced more by evolutionary and physiological adaptations than diet alone. Birds in particular did not suffer increased cancer rates compared with mammals and reptiles, despite having higher blood glucose levels, which are associated with increased cancer risk in other animals, including humans. Graphic by Jason Drees/ASU

Text image(s)



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No caption