

## Some health benefits of berries may not make it past your mouth

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Research has suggested that compounds that give colorful fruits their rich hues, especially berries, promote health and might even prevent cancer. But for the first time, scientists have exposed extracts from numerous berries high in those pigments to human saliva to see just what kinds of health-promoting substances are likely to survive and be produced in the mouth.

It's too early to name the best berry for [health promotion](#) based on this initial work. But the researchers have discovered that two families of pigments that provide berries with their colors, called anthocyanins, are more susceptible to degradation in the mouth than are the other four classes of these pigments.

The Ohio State University study also showed that bacteria living in the mouth are responsible for most of the breakdown of these compounds that occurs in saliva. Researchers are investigating whether it's the berry pigments themselves, or instead the products of their degradation, that actually promote health.

Scientists say that these early findings will contribute to the further development of confectionaries, gums and other delivery devices for the prevention and possibly the treatment of conditions such as [periodontal disease](#) and oral cancers.

The researchers exposed extracts of anthocyanin pigments from [blueberries](#), chokeberries, black raspberries, red grapes and strawberries

to the saliva collected from 14 people. Black raspberries, in particular, have been shown in numerous previous studies to have chemopreventive effects on tumors in the mouth, esophagus and colon, mostly in animal studies. Their high anthocyanin content has been linked to those benefits.

"All fruits are unique because their [chemical composition](#), or fingerprint, varies," said Mark Failla, professor of [human nutrition](#) at Ohio State and interim chair of the Department of Human Sciences. "There are many different edible berries. Some might be better for providing health-promoting effects within the [oral cavity](#), whereas others may be more beneficial for colonic health. We simply do not know at this time.

"Increased intake of fruits and vegetables is associated with decreased risk of some chronic diseases. An understanding of the metabolism of these compounds, and the relative activities of the compounds in the consumed fruit and their metabolic products, is needed to make scientifically sound dietary recommendations and to develop effective delivery vehicles for the mouth," Failla said.

The research is published in a recent issue of the journal *Food Chemistry*.

Failla and colleagues asked 14 healthy individuals between the ages of 21 and 55 years to collect saliva in the morning before they had eaten breakfast or brushed their teeth. Research participants later collected additional saliva samples before and after they had rinsed their mouths with an antibacterial liquid.

The five fruits selected for study allowed the scientists to test the six distinct families of the anthocyanin pigments. Researchers purified the anthocyanins from each berry type and added the extracts to saliva.

The extent of the pigment degradation in saliva was primarily a function of the chemical structure of a given anthocyanin, said Failla, also an investigator in Ohio State's Comprehensive Cancer Center and Food Innovation Center.

Two families of anthocyanins consistently degraded when exposed to saliva: delphinidin and petunidin. Four other families were more stable: cyanidin, pelargonidin, peonidin and malvidin.

"Our observations suggest that the bacteria within one's oral cavity are a primary mediator of pigment metabolism. The bacteria are converting compounds that are present in the foods into metabolites," Failla said. "One area of great interest is whether the health-promoting benefits associated with eating anthocyanin-rich fruits like berries are provided by the pigment itself, the natural combinations of the pigments in the fruit, or the metabolites produced by bacteria in the mouth and other regions of the gastrointestinal tract."

There is context for this study that further complicates the understanding of anthocyanins' benefits. Multiple studies have led to the conclusion that anthocyanins themselves are very poorly absorbed by the body.

"If anthocyanins are the actual health-promoting compound, you would want to design food products, confectionaries and gels containing mixtures of anthocyanins that are stable in the mouth. If, on the other hand, the metabolites produced by the metabolism of anthocyanins are the actual health-promoting compounds, there will be greater interest in fruits that contain anthocyanins that are less stable in the oral cavity," Failla said. "We lack such insights at this time."

The extent to which the anthocyanins were degraded varied among the 14 people whose saliva was used in the study. However, two families of anthocyanins consistently degraded the most in all volunteers. Failla said

the observed variation among individuals is likely related to differences in the microbial community that resides in each person's mouth.

This research group is continuing the work, examining which bacteria are most involved in the metabolism of anthocyanins and testing the stability of the pigments in berry juices in the mouths of human volunteers rather than in test tubes containing their saliva.

Provided by The Ohio State University

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