Tea for the Teeth

Naturally Occurring Tannins Seem to Prevent Decay

By Margie Patlak
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An apple a day may keep the dentist away. So might a cup of tea or coffee, a bar of chocolate, a glass of beer, a bowl of rhubarb or other foods and beverages loaded with plant compounds called tannins.

Used to prevent infection for centuries, tannins have only recently been recognized as potential tooth protectors, with qualities that may make the compounds more effective than fluoride in fighting tooth decay. The Japanese are already selling a toothpaste that contains tannins, and therapeutic mouthwashes rich in the compounds might be around the corner.

Since tannins are prevalent in many edible plants, one might be able to avoid the dentist's drill by using a nutritional approach that goes far beyond shunning candies and cakes.

"We might be able to prevent cavities by eating certain foods or drinking various beverages," says Dr. Laurence E. Wolinsky, associate professor of oral biology at the University of California at Los Angeles (UCLA) School of Dentistry.

In Wolinsky's study, tannins hindered bacteria from sticking to tooth enamel in an artificial setting created to simulate the environment in the mouth. Other studies show a diet high in tannins prevents tooth decay in hamsters and reveal that heavy tea drinkers have an exceptionally low rate of dental problems. Tannins may also be a tooth-saver for chocolate-lovers since research suggests that tannins and perhaps other ingredients in sweetened chocolate can offset the cavity-promoting effects of the sugar it contains.

"One of the key goals to preventing dental problems is to reduce the amount of plaque on teeth," says Wolinsky. "Tannins seem to do just that."

Plaque, he explains, is an acidic bacterial glue that coats teeth and eats away at their enamel, triggering decay. "Tannins can aggressively bind to the bacteria before they have a chance to form plaque," Wolinsky says. Fluoride, in contrast, mainly just buttresses tooth defenses against bacterial attack by strengthening enamel.

Wolinsky and Elizabeth Sote accidentally uncovered the dental benefits of tannins while studying "Nigerian chewing sticks." These sticks are actually the wood and bark of several plants found in Nigeria. The people who engage in the traditional habit of chomping on the sticks to relieve stress are rewarded with an exceptionally low rate of tooth decay.

The California scientists discovered that tannins in the sticks most likely ward off cavities in the Nigerians' teeth. They mixed extracts of the chewing sticks with a culture of a bacterium that is the primary cause of plaque. They then added the mixture to saliva-coated beads of tooth enamel. Within an hour, extracts from four types of chewing sticks had reduced the number of bacteria sticking to the beads by as much as 85 percent, compared with a control solution without the extracts.

The stick extracts also hampered the more tenacious grasp bacteria can have on teeth after exposure to sugar. When the investigators added sugar to the bacteria-extract mixtures, two of the chewing-stick extracts reduced the amount of bacteria sticking to a glass rod by nearly 90 percent.

"The bacteria were settling to the bottom of the test tube in huge clumps and weren't forming the typical film you normally see on glass," Wolinsky says. When he analyzed the extracts of the chewing sticks to see what chemicals they contained, tannins turned up as the primary active ingredients. The investigators then repeated the experiments replacing the extracts with commercially available tannins. The results were nearly identical.

"The chemical structure of a tannin allows it to bind to large numbers of bacteria," Wolinsky says. "For this reason we believe tannins will probably prevent tooth decay in the mouth."

The findings of Swedish scientists lend support to that hypothesis. When these researchers added cocoa extracts to the diet of hamsters, the animals' level of tooth decay dropped by nearly 60 percent. When they analyzed the cocoa extracts for chemical content, tannins once again were the primary active ingredients along with another, unidentified substance.

But further studies on cocoa by Dr. Johannes van Houte, senior staff member at the Forsyth Dental Center in Boston, indicate that other compounds in addition to the tannins in cocoa prevent tooth decay, and do so differently than Wolinsky suggested.

"We found that cocoa does not prevent plaque production in rats, but instead seems to prevent the breakdown of tooth enamel, subsequently preventing tooth decay," says van Houte. Investigators do not know how exactly this breakdown is prevented. Tannins, as well as other compounds in cocoa, might thwart the disintegration of calcium and phosphate—main components of teeth. When the enamel breaks down, these components dissolve into solution, which leads eventually to tooth decay.

When chocolate is manufactured, the lengthy heating process concentrates the tannins in cocoa. These tannins may enable a "chocoholic" to eat large quantities of chocolate without doing penance in a dentist's chair. Researchers at the Forsyth Dental Center found no difference in the plaque production of volunteers who ate sweetened milk chocolate three times a day and those who ate no chocolate at all. Such a finding is surprising, since the sugar found in chocolate would normally promote plaque production.

"The fact that the sugar in the chocolate did not prompt greater plaque deposits suggests there is something in it that hinders plaque formation," says Dr. Paul F. DePaola, head of the department of clinical trials at Forsyth. "This plaque-inhibiting substance may be a tannin."

Although these findings point to tannins' possible role as fighters of tooth decay, "the general public shouldn't rinse their mouths out with synthetic tannins, because they are probably toxic in high concentrations, and have to be used correctly," Wolinsky says. But he does foresee therapeutic rinses that contain tannins for people who are heavy plaque producers if future clinical findings uphold his laboratory results. ■

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