Friday Favorites: Are Banana Smoothies Blocking Polyphenol Absorption? Banana vs. Mango Explained Transcript

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Recommended flavanols and food sources

[music] >> There are recommended daily intakes of essential nutrients like vitamins to prevent deficiencies, but recently the first dietary recommendation for a bioactive food compound was published. Bioactives are food compounds that are not necessary for basic human needs, but may have health benefits. For example, plant metabolites called flavonoids. Flavonoids are a type of polyphenol, of which the most commonly consumed are flavan-3-ols, also known as just flavanols.

A review of the literature suggested that the intake of 400 to 600 mg a day of flavanols would be beneficial for cardiometabolic protection, potentially helping to improve blood pressure, cholesterol, and blood sugars.

Note it specified that these are food guidelines, not supplement guidelines. Though really they're more like beverage guidelines as tea, green or black, would be by far the easiest way to reach those levels. Though there are also certainly some in a variety of berries and cocoa. However, there is an enzyme called polyphenol oxidase that can break down polyphenols like flavanols.

How polyphenol oxidase browns fruit

That's what causes certain fruits and vegetables to brown when you cut into them like bananas and potatoes. Why would a plant do that to itself? Apparently as a defense mechanism, part of the plant's own immune system.

When exposed to oxygen, polyphenol oxidase can oxidize polyphenols into breakdown products with antimicrobial activity. So when a banana gets bruised or you cut open an avocado, the polyphenol oxidase can start oxidizing polyphenols into defensive compounds that can clump together and form a brown compound called melanin. The same class of compounds that darkens the skin of a banana darkens our skin, too.

Okay, no problem. We can just not eat brown bananas. As that's visual evidence that many of the polyphenols have been lost. But, what if you mixed that banana, which you know is filled with a polyphenol oxidase enzyme, into a smoothie [clears throat] with polyphenol-rich foods like berries or cocoa? Might you end up with less nutrition? Big chocolate-funded researchers sought to find out. They put about a half a cup of cocoa's worth of cocoa flavanols into a smoothie containing banana compared to the same amount in a berry smoothie with no bananas. Here's a measure of how many of the chocolate flavanols made it into the bloodstream within hours of drinking the chocolaty berry smoothie compared to the same amount of cocoa blended into a banana smoothie.

Banana smoothies reduce cocoa flavanols

It's almost as if you hardly put any cocoa in there at all, presumably because the banana enzymes chopped up all the chocolate goodies. Let's not presume, though. They blended up the chocolaty banana smoothie again, banana, almond milk, and cocoa flavanols, and then just measured the amount of flavanols as the smoothie sat for an hour. Check it out. The cocoa flavanols plummeted. More than a 90% drop. A half-life of like 10 minutes.

So, every 10 minutes or so, the levels drop in half. How do they know for sure it was the polyphenol oxidase enzyme? Because when they added specific enzyme blockers, they blocked the effect.

Okay, no problem. If you're adding bananas to your smoothies, can you just chug it quickly before the enzyme does its job? And presumably, the enzyme would be deactivated when it hit the acid bath of the stomach, but let's not presume. You don't know [clears throat] until you put it to the test. I love that the researchers did all these extra steps. This time, they made study participants alternate sips between a straight banana almond milk smoothie and like chocolate milk, cocoa flavanols plus almond milk. So, there was no pre-mixing in the blender between the

banana enzyme and the flavanols, just mixing in the stomach. Here's how many cocoa flavanols make it into your bloodstream when sipping the chocolate milk alone.

Mixed in the stomach with banana and you get this, 37% less in your bloodstream, which shows that the banana enzyme can still do some polyphenol damage in the stomach. And yes, in simulated stomach acid conditions, the polyphenol oxidase enzyme is indeed down but not out. So, yeah, if you drink a smoothie with banana in it, it's better to not let it sit around, but even if you drink it immediately, you may still get less polyphenols in your system than if you would have skipped the banana.

Bananas still affect absorption in the stomach

But, banana makes smoothies so rich and creamy. Anything we [clears throat] can add to the smoothie to counter the banana enzyme's effects? That's exactly what I'll cover next. There is one food that has more polyphenol oxidase activity than a banana, and it's a vegetable that's not a potato. What vegetable turns brown that's not a white potato? A white mushroom. White button mushrooms are packed with that polyphenol munching enzyme, even more so than bananas. Uh now, for those of you thinking, "Don't worry, I don't expect to be putting mushrooms in my smoothies anytime soon." Some people add avocado to smoothies or or make a chocolate avocado pudding. Here's a question. What if you eat mushrooms with a meal packed with polyphenol-rich foods? Might they mix in your stomach and decrease the absorption of the anthocyanins in red cabbage or the berries in dessert, for instance? You could also imagine having some potatoes or eggplant in a meal. But, note this is for fresh produce, the enzyme is destroyed by cooking. And remember we should be cooking our white mushrooms anyway because of the agaritine, right? So, problem solved.

Who wants to cook their bananas though? What else can we put in a smoothie?

Other high-enzyme foods and smoothie ingredients

My favorite is mango, which you can buy frozen when it's not in season. Do we have to worry about it having polyphenol eating enzymes? Well, what happens when you cut open a mango? Does it go brown? No. So, it's probably fine. And indeed, when researchers measured polyphenol oxidase activity in a bunch of fruits and vegetables, mango had 500 times less than banana.

The apple doesn't surprise me since it goes brown so fast, but what's with the beet greens? Better to use something like kale for your green smoothies instead, where enzyme activity is undetectable.

This study raises so many interesting questions. Should you not add bananas to your oatmeal? I no longer add it to my cran-chocolate-pomegranate breakfast bowls since I don't want to lose any of the polyphenols. But what if you're not making something chocolatey? The study only tested the effects of the enzyme on cocoa flavanols. Like they didn't check [snorts] to see if mixing bananas with berries would affect the berry phytonutrients, but the presumption is that it would. And what does this mean for bottled smoothie drinks that you buy off the shelf in the store? Well, if they've been pasteurized, then it should be okay since the heat should destroy the enzyme.

That's why vegetables are blanched before they're frozen to destroy the enzymes.

Cooking, pasteurization, and ways to inhibit browning

Even just heating banana to 70° C, which is like the temperature of hot tea for 2 minutes in the presence of vitamin C and citric acid, which might come from lemon juice, would suppress the enzyme by 80%.

I'm not suggesting drinking hot smoothies, but rather that depending on the ingredients, pasteurized smoothie drinks may not share the same problem as fresh made smoothies. What about just the vitamin C and citric acid alone, like putting lemon juice in your smoothie?

Only cuts the enzyme activity down by 13%. Works wonders on a cut apple though, slashing enzyme activity nearly

in half, which explains why lemon juice can keep your fruit salad from turning brown.

Anything we can add to a banana smoothie to inhibit the enzyme? Sulfites used to be put on fresh fruits and vegetables until they were banned in 1986 following cases of sulfite induced asthma. They're still used in dried fruit though to prevent browning. What about natural agents?

Onion extracts can prevent the browning of pears, both fresh and cooked onion juice, but there's got to be a better option for your smoothie. Pineapple seems to help keep apples from browning and bananas too, but that was after soaking in pineapple juice for 3 days, so it's not clear if it would work right away. There was a study comparing lemon juice and white wine to prevent browning in pastry dough. You've heard of hard cider, hard seltzer. The lemon juice beat out the wine though, so better a lemon squeeze than drinking a hard smoothie.