

An Apple a Day

The Myths, Misconceptions and Truths
About the Foods We Eat

Joseph Schwarcz

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Extract

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AN APPLE A DAY

IS THERE A BETTER SUBJECT WITH WHICH TO BEGIN A DISCUSSION OF the relationship between food and health than apples? After all, doesn't "an apple a day keep the doctor away"? In actual fact, there are no single foods that have magical health properties. There are good diets and there are bad diets. It is certainly possible to have a good diet and never eat apples, just as it is possible to gorge on apples and have a horrible diet. What really matters in terms of nutrition is the net effect produced by all of the chemicals that wend their way into our bodies from the food we eat. Yes, chemicals. I can practically see those eyebrows being raised. It may seem unusual to see the word "chemical" without an adjective like "poisonous," in front of it. Actually, without appropriate context, "toxic chemical" is a meaningless term.

Take salicylic acid as an example. It occurs naturally in a variety of fruits and plants, including apples. It is also formed in our body when Aspirin is metabolized. Indeed, salicylic acid is responsible for the physiological effects of Aspirin, which include reducing the risk of blood clot formation. That's why Aspirin is used to treat a heart attack, and why it is commonly taken in small doses to prevent one. But in an overdose, salicylic acid can kill. Before

childproof packaging was introduced, Aspirin poisoning was a common cause of death in children. So how do we react if a test detects salicylic acid in our blood? Panic because of the presence of a “toxic chemical,” or relief because of possible protection against heart disease? Of course, without the proper context there can be no appropriate reaction. To decide whether to laugh or cry, we need to know what blood levels of salicylic acid have been linked to risk and what levels to protection from disease. The mere presence of the chemical says nothing. As Paracelsus insightfully and wisely noted some 500 years ago, “Only the dose makes the poison. And to this we can add, “And only the dose makes the cure.”

So let's not get paranoid about chemicals in our food. Everything in the world is made of chemicals, and if you restricted yourself to a diet free of chemicals, you would be dining in a vacuum! With that in mind, let's investigate the chemicals in an apple. So tell me, would you like some nail polish remover in your diet? Or rubbing alcohol? Then have an apple. Yes, all apples contain acetone and isopropanol. And if these don't sound toxic enough, you can throw in some cyanide. It's there too, added by nature, not by humans. Should you then be worried about eating apples? Of course not. The amounts of these chemicals are too small to be of any consequence. Apples, as already mentioned, contain over 300 naturally occurring compounds, and whatever effect the fruit has on our health is a reflection of all of these. Researchers are particularly excited about one class of compounds, the polyphenols. Why? Because they have powerful antioxidant properties.

Chances are that if you haven't heard rhyme and verse about antioxidants in recent years, you've been spending too much time in the butcher shop. These highly publicized substances are found in fruits and vegetables and can neutralize free radicals, those rogue molecular fragments produced whenever we inhale oxygen. We

can't live without oxygen, of course, but there is a cost to be paid for living with it: illness and eventual death! About 2 to 3 percent of the oxygen consumed by our cells is converted into free radicals that are so reactive, they can rip other molecules apart. When the victims are proteins, fats, nucleic acids or other essential biomolecules, the result can be heart disease, cancer or dementia. Even plain old aging has been linked to cumulative free-radical damage.

Since antioxidants can mop up excess free radicals, they obviously merit serious scientific investigation. One of the difficulties, though, is the large variety of antioxidants that are present in plant products. Vitamins C and E, along with carotenoids, have received a great deal of attention, but most of the antioxidant activity of fruits and vegetables can be attributed to polyphenols. The term "polyphenol" actually refers to several related families of molecules that include the flavonoids, anthocyanins, chalcones and hydroxycinnamates. To complicate things further, each family in turn comprises many compounds that are linked by some common feature of their molecular structure. As one might expect, because these antioxidants have different molecular structures, they also have different degrees of antioxidant activity. Obviously, knowledge about the distribution of polyphenols in our diet, coupled with knowledge about which ones have the most activity, would be very useful.

But before we start jumping on the polyphenol bandwagon, we need to ask a pertinent question: What evidence do we have that polyphenols in the diet can contribute to good health? Demonstrating that these chemicals can neutralize free radicals in a test tube is one thing, showing that they can prevent cancer or heart disease is quite another. The first major study to suggest such a possible benefit appeared in *The Lancet* in 1993. Dutch researchers measured the amount of flavonoids in various foods,

and by means of a dietary questionnaire assessed the flavonoid intake of 805 men ages 65 to 84 who were then followed for five years. Even when adjustments were made for smoking, body weight, cholesterol levels, blood pressure, physical activity, and vitamin and fibre intake, the polyphenol content of the diet was inversely associated with death from heart disease. The major sources of polyphenols in this study were tea, onions and apples. A single apple a day made a difference.

There is evidence for the anticancer effects of polyphenols as well. Researchers at Cornell University found that treating colon or liver cancer cells in the laboratory with apple extract inhibited their proliferation, with extracts from the skin performing even better than extracts from the flesh. The same Cornell team also showed that apples may play a role in reducing the risk of breast cancer. Rats exposed to a substance known to trigger breast cancer were fed apple extract in amounts equivalent to a human eating one, three or six apples a day. Lo and behold, the chance of developing the disease was reduced by 17, 39 and 44 percent respectively. Even when cancer set in, maintaining the apple diet blocked the spread of the disease, and after six months reduced the number of tumours by 25 percent. Impressive results for just one apple a day. These researchers did not stop at investigating cancer. When they exposed rat brain cells to a specific polyphenol, quercetin, they found that the cells resisted oxidative damage more, implying a potential reduction in the risk of developing Alzheimer's and other such brain diseases. Indeed, a group at the University of South Florida has found a greatly reduced risk of Alzheimer's disease in seniors who drank fruit or vegetable juices at least three times a week compared with those who drank these less than once a week.

Other studies have found that quercetin reduces the growth of

human prostate cancer cells in the lab and that its presence in the diet is inversely associated with the risk of lung cancer. This is not that surprising, given that quercetin has very potent antioxidant activity. And it is found in apples, along, of course, with many other polyphenols. But before we start attributing magical properties to apples, let's realize that there are foods with higher antioxidant potential. Red kidney beans, blueberries and cranberries all have greater antioxidant capacity per serving. And oregano has 40 times the antioxidant activity of apples. What matters, though, is the total intake of polyphenols. Let's face it, eating apples every day is easy. Kidney beans are more challenging.

But the real key to antioxidant intake is variety. The more different fruits and vegetables consumed, the greater the chance that we equip ourselves with the complex array of antioxidants that may be needed for good health. Studies indicate we should be aiming for a daily polyphenol intake of around one gram. Apples, depending on the variety, can contribute anywhere from 100 to 300 milligrams. Eating a couple a day is certainly a good idea. And if someone tries to scare you by pointing out that apples contain embalming fluid, you can respond that whatever the detriments of the traces of the naturally occurring formaldehyde may be, they are more than countered by the benefits of the polyphenols. Eat those apples, and make the undertaker wait longer with his embalming fluid.