Food Synergy: Not Missing The Forest For The Trees

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Is good science getting in the way of good nutrition? In the past, good nutrition science has been viewed as finding out how each nutrient works by itself to bring about good health. To do this, we refine our experiments so that we can answer questions about specific effects of specific nutrients. Unfortunately, sometimes this can be like studying the leaves on a tree while missing the whole forest.

Take the essential element copper, for example. If I want to find out how copper lessens oxidative damage in body cells, known as oxidative stress, I would feed volunteers diets having similar compositions except that one would contain ample copper and one would not. Then I'd look for biochemical changes that indicate oxidative stress. Hopefully, the only variable between the diets is the amount of copper. So if I see an effect, I can say that it is caused by too little copper in the diet. I might then suggest that we recommend a certain minimal amount of copper in our diets.

This seems like a logical approach, but does it give the full picture? To paraphrase an old adage: No nutrient is an island; different nutrients can have overlapping and complimentary actions. For example, copper is not the only nutrient that helps guards against oxidative stress. Others include zinc, manganese, selenium, vitamin E, Vitamin A, ß-carotene, and vitamin C. Each of these nutrients then may substitute for one of the others when it is in low supply. If there had been an excess of one of the other nutrients in the experiment above, we might not have seen an effect of low copper, and we might have incorrectly suspected that copper was not involved in oxidative stress. It is becoming increasingly clear that we cannot adequately study a single nutrient in isolation. We also have to consider others that might be involved.

Often you see ads suggesting that you should increase your dietary intake of zinc or calcium to prevent this or that disease. This advice should be taken with caution because nutrients interact -- too much zinc in the diet can reduce the absorption of copper. If your copper intake is already low, then you might experience signs of copper deficiency. Calcium acts in conjunction with phosphorus and magnesium, and too much calcium might affect the body's use of these nutrients. Too much calcium might also decrease the absorption of other nutrients.

There is a fine balance between too much and too little. Nutrient interactions can have positive as well as have negative effects. For example, most studies indicating that cadmium is a toxic food component have used diets containing high amounts of cadmium, without regard for other mineral nutrients. Researchers concluded that any amount of this mineral is not good for you. However, recently my laboratory showed that rats were 20 times less likely to absorb cadmium into their blood if the diet contained adequate amounts of the other essential minerals, such as zinc, iron, or calcium. We backed this observation with studies that used human volunteers who consumed a specific food with a natural amount of cadmium for a period of one year. Because the diet also contained adequate amounts of zinc and iron, the individuals showed no signs of cadmium overload. In other words, if you consume a diet adequate in the essential minerals, you reduce your chances of absorbing certain toxic minerals.

Back to my point. Good nutrition is not based on the action of single nutrients in isolation. Different nutrients from different foods all act together to protect us from disease and to promote good health. This is called food synergy. The best approach to good nutrition that provides "food synergy" is to consume a well-balanced diet--one that has a mixture of different types of food.