

## Bioavailability Part 1 of 4

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### ☀ **Six Degrees (or so) of Separation**

Bioavailability gained significance in the functional food and dietary supplement sectors about a decade ago. Borrowed from the discipline of pharmacology, it refers to the amount of an active substance which actually makes its way to a specific part of the body following oral consumption. Injected drugs are widely assumed to be 100% absorbed, or 'bioavailable'. Pharmacologists have long known the same is not true of orally-ingested drugs. The medicinal ingredient extricates itself from the excipients (non-medicinal ingredients), navigates its way through the GI tract, interacts with either friendly or antagonistic nutrients along the way, and is finally absorbed into the blood stream in the small intestine and metabolized by the liver, at a fraction of the amount originally ingested.

### ☀ **A View of Our Own**

Nutrients follow the same path, ending at the small intestine, the site of nutrient absorption. Simply defined in food and nutrition terms:

"Bioavailability means how much of a particular nutrient within a food is usefully absorbed."

### ☀ **Long Known as Nutrient Absorption**

Bioavailability is not listed in the index of modern nutrition text books, although nutrient absorption is core to nutrition courses. Teachings have long illustrated that while wheat is a source of iron, the phytate content of wheat inhibits absorption of iron, and other minerals as well, such as calcium. Phytic acid binds to a variety of minerals to form phytate, an insoluble salt which is excreted from the body. On the upside, Vitamin D promotes calcium absorption. The non-haem form of iron in spinach renders it less absorptive than the haem form in red meat. But spruce up that spinach salad with orange slices, and the Vitamin C in the oranges will convert the non-haem iron in spinach to its haem form.

### ☀ **Meeting at the Crossroad**

Acquiring insight from the field of pharmacology evolved with the advent of functional foods in the early '90's. In addition, researchers began to intensely investigate the capability of foods and nutrients to alter physiological processes, as do drugs. Prior to the mid-'90's, the notion that an isolated component of oatmeal, beta glucan, could – when ingested in adequate daily portions and within proper dietary conditions – inhibit the synthesis of serum cholesterol, was inconceivable. Yet, today, this is a known fact. Advances in each of the disciplines of food science and human nutrition often intersect at the crossroad of bioavailability.

### ☀ **The Role of Nutrient Retention**

Vitamins are either fat-soluble or water soluble. Vegetables containing fat-soluble vitamins A, E & K offer greater bioavailability of these nutrients when prepared in a fat-based, lightly-oiled, stir-fry than in a water-based, steamed, side dish. On the other hand, water-soluble vitamins C in broccoli, and B in pasta are diminished in cooking water or leached with excessive boiling. Nutrient retention and bioavailability are also applied to newly discovered phyto-nutrients. Lycopene, an antioxidant in tomatoes shown to control the growth of prostate tumors, is lipophilic, meaning fat-loving. Bioavailability is greater in tomatoes processed with some oil, as in a tomato sauce, than in a raw tomatoe, or perhaps a lycopene supplement. This takes us to the long-standing 'supplement vs. food' debate, the topic of the next Food Fax. As they say in advertising 'watch this space'. **FF**

### ☀ **Some Web sites**

<http://news.bbc.co.uk/2/hi/health/4777607.stm>

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