

## Bring on the Bitters

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Out of all the possible flavor choices with foods, such as sweet, sour, salty, and umami (deliciousness), which would you choose first? Bitter, though not as enjoyable, is also a flavor. In North America, bitter greens, such as kale and mustard, and herbs like gentian and wormwood, are usually the last possible flavor choice. What if you consider the benefits of choosing certain flavors over others? Bitters have a long history of strengthening our digestive system, supporting hormone balance and optimal pancreatic, liver, and gallbladder function.

On average, there are anywhere from 2,000 to 8,000 taste buds in the human body. Taste buds are made of tiny hairs that send messages to the brain about how things taste. Taste buds help the brain understand sweet, salty, sour, umami and bitter flavors. Exploring the bitter side of taste buds, a family of taste receptors, around 30 known as TAS2Rs, have been identified. Receptors are found in the mouth, throughout the gastrointestinal track and in the lungs. Bitters and the receptor sites seem to interact with specific phytochemicals in mammals and are finely tuned to differentiate an array of bitter substances. This may explain why we, as humans, are able to understand varying degrees of bitter flavors.

When a bitter substance is recognized by the TAS2Rs receptor sites in the body, a reaction happens between the nervous system and endocrine glands. Known as the "bitter reflex," the reflex activates the release of gastrin, stimulating digestive function. After the bitter receptor sites are activated, the nervous system jumps into action almost immediately by secreting enzymes in the mouth, reducing starches into smaller, more easily digested molecules. The stomach starts to activate the production of hydrochloric acid, which is a necessary to ensure the proper breakdown of proteins. This action creates a greater bioavailability to assimilate minerals such as calcium, magnesium and many others.

There are many studies linking a low-level of gastric output with several prolonged conditions including gallbladder disease, eczema, asthma and rosacea. Low acid levels may present in the stomach, which can lead to a reduction of mineral utilization and a disruption in the function of intestinal flora.

Bitter herbs and greens may be useful for people who experience gastrointestinal discomfort (bloating, gas, or constipation) because it increases the hydrochloric acid in the stomach. When acidity is high, viral and bacterial replication in the gut is greatly reduced, aiding in the functionality of the immune system. However, use caution as bitters may agitate patients with duodenal ulcers.

There are many additional benefits to the introduction of bitters in a patient's diet. The bitter receptors may also aid in metabolic function and support healthy functioning of the pancreas. Some practitioners will use bitters to assist in normalizing blood sugar levels, even in long-standing cases of poor upper digestive function. Bitters may also be valuable for patients sensitive to certain foods. When poorly or insufficiently broken down, food proteins may contribute to additional stress on the body's immune system associated with the digestive tract. It can be surmised that the

immune system's function may be improved by the use of bitters as a handful of studies show the bitter herb wormwood as being beneficial for supporting immune system response. Consider the intake of bitters for patients presenting a history poor immune system response and known food sensitivity.

Bitter greens are a powerhouse of nutrient dense foods. They contain vitamins A, C, K and some B vitamins, as well as minerals like calcium, magnesium and potassium. They are also good source of fiber. Bitter foods offer benefits for enhancing bile secretion, according to a study published in a 2011 International Journal of Food Sciences and Nutrition issue. Taste receptors for bitter substances trigger the pancreas to secrete digestive enzymes and the gall bladder to release bile. Bitter artichoke and cardoon can stimulate appetite, relieve nausea and improve liver function. This also increases bile secretions by up to 150%. In this way, bitters may positively impact the liver and gallbladder by increasing the production of bile. The production and excretion of bile caused by the gallbladder is necessary for the breakdown of fats in the body. This includes cholesterol and dietary fats, as well as the absorption of fat soluble nutrients vitamins A, D, E and K.

When buying bitter vegetable greens at your supermarket or farmers market, try buying as local and organic as possible. As with any vegetable, they will start to lose nutrient value the longer you wait to eat them after they have been cut. Try consuming vegetables within the first few days after purchase. Buy greens seasonally as some greens are better in the spring and others are better in the fall. For example, collards, kale, turnip greens and mustard greens are in season from October through early April. Swiss chard and beet greens grow from spring through fall. Dandelion greens are best in spring and summer.

Another way to enjoy the benefits of bitters is in your favorite beverage, aperitifs. Traditionally aperitifs were given to patrons in pre-dinner drinks to tonify the gastrointestinal system before the meal. Although there are many benefits in adding bitters to a patient's diet, be sure to use bitters with care. Bitters are contraindicated in patients with hyperacidity and/or patients with duodenal ulcers or those who are supertasters. Supertasters are patients who perceive the greatest oral burn from substances like capsaicin or alcohol. Exercise caution with such patients, for they may experience nausea or similar side effects.

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