# Drugs and celery: how genetic engineering can resolve a deadly interaction

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For centuries, celery has been consumed by people all over the world and is a popular ingredient in various cuisines. Recently, however, it has been found that celery, as well as lemons and grapefruits, interacts with pharmaceutical drugs.

Celery contains organic chemical compounds called furanocoumarins, which are toxic and can alter DNA, causing cells to die. The soluble fibre content of celery makes it easy to digest, and the abundance of antioxidants, minerals and vitamins makes the vegetable a highly nutritious addition to a person's diet.

However, furanocoumarins contained in celery inhibit the actions of enzymes that break down drugs. Almost 50% of all pharmaceuticals are broken down by a protein called cytochrome P450 3A4 (CYP3A4), which is in a family of proteins called CYP enzymes.

Oral drugs are normally absorbed in the intestine and stomach, where enzymes such as CYP3A4 are located, ready to break them down into soluble fragments that are released through processes such as sweating and urination. CYP enzymes located on the membranes of intestinal cells are inhibited by furanocoumarins in plants such as celery. This reduces their ability to break down target compounds, such as pharmaceutical drugs. The result of this is that the blood concentration of the drug becomes higher than it would have been without enzymatic disruption, leading to fatal consequences such as an unexpected overdose if treatment is not delivered in time.

Scientists are investigating the possibility of combining genes contained in celery with plants that have much lower levels of furanocoumarins. This will cause future generations of these plants to contain fewer compounds that facilitate these undesirable interactions.

Even though the list of medications that cannot be consumed with celery continues to grow, advances in genetic engineering may give people the ability to have the best of both worlds.