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Onion: a cancer fighter?

Exploring the onion as cancer fighter and food preserver

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ONIONS that many people love on burgers and in salads are being studied at a new level as a potential disrupter and killer of cancer cells.

With research showing favourable results, the use of onions may soon go beyond the supermarket to being used in nutraceuticals and as a healthy alternative to artificial food preservatives.

Onions are being studied as a potential disrupter and killer of cancer cells. (Photo: AFP)

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A compound known as flavonoids is instrumental in providing colour to fruits and vegetables, and a specific variety of flavonoid — quercetin — is particularly rich in onions. Out of 28 vegetables and nine fruits, onions lead in quercetin content.

Earlier studies have determined quercetin has been highly effective as an antioxidant in neutralising cancer cells and restoring a healthy cellular environment. But until now, in-depth research on quercetin levels in Canadian onions has been lacking.

According to a news release from the University of Guelph in Canada, a research team, under the direction of Dr Suresh Neethirajan, is working to unlock the onion's beneficial characteristics.

Dr Neethirajan is the scientist who recently co-developed a portable mechanism to rapidly detect peanut allergens in foods, as well as a handheld device for the early detection of disease in livestock that can be used by farmers.

COUNTRY RICH IN ONIONS

Canada's onion-growing capacity, according to the release, is extensive and the crop has a definite presence on the global market. The nation reportedly has an annual onion production of 210,000 tons with a market value of $74 million.

As the demand for antioxidants continues to grow in the food and nutraceutical industries, with forecasts reaching US$2.7 billion by 2018, onion growers stand to have a valuable cash crop.

But Neethirajan said that until now the information needed for Canadian farmers to invest in a particular type of onion crop has been missing.

“There are many onion varieties and farmers need to know which is the best to invest in a crop. From our research, the Ruby Ring variety shows the most promise in providing high levels of quercetin,” he said.

But quercetin levels are only half the equation of harnessing this important ingredient, the release stated.

The other issue is the method of extraction that has commonly used solvents that can leave a toxic residue in foods, which is then ingested.

Neethirajan and his team have determined a way for onions to release their healthy component by using superheated (above boiling) water in a pressurised container. This method allows quercetin to be extracted in a pure form without contamination or residue and makes it viable for the nutraceutical, food and cosmetic industries to implement as a healthy natural food source.

A QUEST FOR THE HEALTHIEST ONION

The research team extracted quercetin from five varieties of onions commonly grown in Ontario — Stanley, Safrane, Fortress, LaSalle, and Ruby Ring — using pressurised low- polarity water, and then subjecting the extractions to a barrage of assays to determine the level of antioxidant properties of each onion type. The study found that the Stanley variety — a yellow onion — had the highest quercetin content, even though Ruby Ring was determined to have more health benefits.

Neethirajan explained some of the difference might have had to do with the research technique that was used for peeling the onions. Flavonoids are in greater concentration near the skin that was removed in the scientific process, including other possible factors such as cultivation and storage techniques, as well as the weather.

In this research, the Ruby Ring onion’s ability of its quercetin molecules to attract and neutralise free radicals proved the best. The release stated that free radicals in the human system can lead to cancerous cells that could develop into tumours, or increase the risk of diabetes or heart disease if left unheeded. The flavonoid has also been used in the manufacture of anti-AIDS drugs for its ability to inhibit a viral protein.

However, in another research test on onions, Neethirajan found the Stanley variety showed a remarkable effect of killing specific cells related to colon cancer, although all five varieties displayed an ability to attack the unwanted cells.

“There was a 3.5 - four-fold increase in the number of cells undergoing apoptosis [cell death],” he said, “[but] the Stanley variety showed a slightly higher number of apoptotic cells compared to the other extracts.”

All varieties also reportedly demonstrated a five-fold decrease in colon cancer cell multiplication. Although Neethirajan admits it’s difficult to explain the discrepancy of onion varieties, the potential of keeping cancer cell populations from increasing and by destroying them is encouraging.

“A hallmark of cancer cells is their ability to avoid apoptosis. By triggering apoptosis in abnormally dividing cells, cancer cells and metastasis can be put in check,” he said.

QUERCETIN’S POWERFUL ALLY

Ruby Ring onions also have a high anthocyanin, or phenol content that is a prime contributor to the red or purple colours in a number of fruits and vegetables. As it is another health-promoting component, anthocyanin possibly enriches the free radical scavenging properties of quercetin molecules to rank this variety of onion a “supervegetable”.

“Determining the purest method of extracting the onion’s health-promoting components is extremely important in developing biocompatible, biodegradable and eco-friendly antioxidant onion-based food products in the future,” Neethirajan said.

ONIONS FOR KEEPING FOOD FRESH

The future looks bright for specific onions, and Neethirajan predicts there could also be a strong demand for a residue-free powder or film-forming solutions of the onion’s antioxidant components. These could then be used as a natural and readily available food preservative that would help prevent oxidation.

Although flavour may have a definite impact on some foods, the release stated it could also enhance products such as certain baked goods. However, he said flavonoids have a rapid dispersion rate and therefore could possibly be used in everything from fruit juices to alcoholic drinks, as well as an important component in creams and lotions.