Anti-cancer traits found in Australian faba beans

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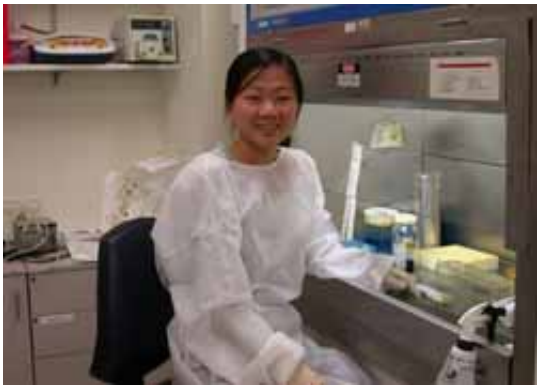

(Medical Xpress)—Anti-cancer properties have been found in extracts from Australian-grown faba beans, along with effects that may have implications for treating hypertension and maintaining healthy weight.

As part of a study into the health benefits of faba beans, commonly known as broad beans, PhD student from Charles Sturt University (CSU), Ms Siem Siah applied phenolic compounds from Nura and Rossa faba beans to five different cancer cell lines in laboratory experiments at Wagga Wagga.

In all cases the rate of cancer cell death was accelerated.

Ms Siah said, "We know that anti-oxidant properties are potentially linked to anti-cancer properties, so we were trying to look for the connections."

Ms Siah's PhD principal supervisor Dr Chris Blanchard from CSU's School of Biomedical Sciences said the research team, from CSU, NSW Department of Primary Industries (DPI) and CSIRO, was astonished by the findings from experiments on anti-cancer and enzyme-inhibiting properties.

"We were absolutely blown away by the results," Dr Blanchard said.

The findings have been published in the leading international peer-reviewed publication, British Journal of Nutrition.

Favourable outcomes

The Grains Research and Development Corporation funded the research. NSW DPI chemist Dr Jennifer Wood co-supervised Ms Siah's PhD with Dr Blanchard. Dr Izabela Konczak from CSIRO Food and Sciences oversaw the experiments. The preliminary experiments on antioxidant properties were carried out at CSU and the cell culture assays were carried out at CSIRO.

In plants, phenolic compounds are chemicals largely responsible for colour, metabolism and defensive mechanisms. Because they play a strong protective role against insects, they are often found in seed coats and hulls.

Ms Siah grew cultures of four cancer cell lines – bladder, stomach, liver and colon cancers – in flasks, then applied the phenolic compounds to them directly and waited 24 hours to measure the proliferation of cells.

The rate of cancer cell multiplication was greatly reduced once the faba bean extracts were applied.

For a fifth type of cancer cell, acute promyelocytic leukemia, Ms Siah applied a method called flow cytometry.

Dr Wood said the experiment yielded an insight into the mechanism that inhibited the cancer cell multiplication.

"Normal healthy cells are programmed to multiply, grow and die (cell death is called apoptosis)," Dr Wood said. "Cancer cells evade the process of apoptosis, continue to proliferate and become tumours.

"This work showed faba bean phenolics induced normal cell death in the cancer cells. Conversely, the extracts had no effect on the proliferation of normal human colon cells tested, a very favourable outcome."

Human health applications?

Additional experiments on the interaction with important human enzymes showed that phenolic extracts from faba beans inhibited angiotensin converting enzyme (ACE), a common target of pharmaceutical medication for hypertension.

These compounds also inhibited the action of the digestive enzymes alpha-glucosidase and lipase, which could mean slower digestion (and therefore a longer feeling of satiety), and lower sugar and fat absorption by the digestive system.

Dr Blanchard said several avenues could be pursued to build on these findings and look for therapeutic human health applications, if funding becomes available.

"One is to generate large amounts of these extracts and undertake feeding trials to see if we can directly use extracts as a natural product to improve health outcomes.

"Or you could drill down further and find out what compounds are involved in these activities, synthesise them and have them approved for pharmaceutical use.

"Or we could do further testing in human trials, incorporating faba beans in diets to demonstrate exactly what happens when we consume them over a long period," Dr Blanchard said.

More information: Siah, S. In vitro investigations of the potential health benefits of Australian-grown faba beans (Vicia faba L.): chemopreventative capacity and inhibitory effects on the angiotensin-converting enzyme, α-glucosidase and lipase is published in the *British Journal of Nutrition* (2012), 108, S123–S134.
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