

Southwestern Ontario: Targeting cancer cells with copper

Scientific discovery rarely travels in a straight line from hypothesis to conclusion. Just ask Athir Zarir, 1st place winner in the Southwestern Ontario regional Sanofi Aventis BioTalent Challenge, who set out to investigate the cancer-fighting properties of traditional herbal remedy and ended up with a study showing how to kill cancer cells.

The herb that caught the attention of 17-year-old Athir, a Grade 11 student at Westminster Secondary School in London, is milk thistle, used in Europe for centuries to treat chronic liver diseases. “Recently, there had been some research suggesting that the milk thistle extract called silymarin could be effective in fighting cancer,” said Athira.

She took the idea to her mentor, Dr. Ed Lui, of the Department of Physiology and Pharmacology at the University of Western Ontario, who showed her research he was doing on oxidant stress in cancer cells. “The hypothesis we arrived at is that a cancer cell already has a lot of oxidant stress,” said Athir, “and if you can find a way to introduce a pro-oxidant, this will react with the existing free radicals in the cell to create more and more free radicals, which can kill the cell much more quickly.”

Athir used copper as a pro-oxidant and formed a complex by bonding it to a compound found in the milk thistle extract. She then tested the effect of this complex on melanoma (skin cancer) cells.

“The hypothesized relationship proved to be correct ... the complex only affected melanoma cells high in oxidant stress,” she said. “The results of this experiment indicated that the use of phenol-bound copper to successfully target cancer cells without affecting normal cells can be directly attributed to the high levels of oxidant stress present in most cancer cells.”