

## Professor receives NIH grant for breast cancer research

Dr. Maggie Louie, associate professor in the Department of Natural Sciences and Mathematics, has received a third grant from the National Institutes of Health (NIH) in support of her ongoing research focused on the role environmental contaminants play in breast cancer and new studies examining how oxidative stress impacts the development and progression of breast cancer cells.

Dr. Louie has been studying how environmental contaminants promote cancer progression since joining Dominican's faculty in 2005 in the [School of Health and Natural Sciences](#). Louie involves both her undergraduate and graduate students in her research. She and her team have received more than \$1 million in grants from the NIH to fund their work.

Earlier research, including previous work from the Louie lab, has shown that breast cancer cells become increasingly aggressive the longer they are exposed to small concentrations of [cadmium](#), a common environmental contaminant that enters the body through consumption of contaminated food, water, or inhalation of cigarette smoke.

Now Dr. Louie is investigating further to understand how long-term exposure to low levels of cadmium can trigger oxidative stress, a process that leads to cellular damage. These damaged cells develop a tolerance to cadmium-stimulated oxidative stress. However, this could increase the risk of the cancer progressing undetected in the short term while increasing the long-term metastatic potential of breast cancer cells.

Dr. Shona Mookerjee from the Buck Institute for Research on Aging is the grant's co-investigator.

"We believe that chronic exposure to cadmium is inducing low levels of oxidative stress that may lead to adaptive tolerance and alter estrogen receptor signaling in breast cancer cells," Louie said.

"Oxidative stress is associated with cellular changes leading to cancer development and progression," Louie added. "However, direct evidence of increased oxidative damage has not been evaluated in breast cancer cells exposed to cadmium, either in acute doses or environmentally relevant doses over prolonged periods of time."

Research by the Louie lab has found that acute cadmium exposure in vitro leads to a depletion of glutathione – a protein that protects the body. This depletion is what leaves the cell vulnerable to oxidative stress. |

The researchers used DNA microarrays to measure expression levels of genes. They discovered numerous gene signatures that were turned on and off when exposed to cadmium. These were similar to the gene signals turned on and off for oxidative stress.

"Unfortunately, cadmium is all around us. Low levels of cadmium is in our food, our water, our makeup, and our air," Louie said. "If we can't get rid of cadmium exposure, maybe we can understand how to prevent cells from going into this adaptive tolerance."

The Louie Lab has published several studies showing cancer cells become increasingly aggressive the longer they are exposed to cadmium, even at low levels. Her studies focused on investigating the biochemical process involved with the cancer's ability to metastasize led to the discovery of several key players in this process.

[Louie](#) holds a doctorate in biochemistry and molecular biology from the University of California at Davis, where she also did postdoctoral research on cancer biology. She chose to teach rather than pursue a research position in industry, because she enjoys working directly with students.

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