A trio of faculty members in the Idaho State University College of Pharmacy has received a $128,820 National Institutes of Health (NIH) grant to conduct research to more effectively fight breast cancer.

The ISU researchers — Dr. Nandita G. Das, Dr. Sudip K. Das and Dr. Cindy M. Wilson — are examining how to administer the drug tamoxifen more effectively, by using the human body’s lymphatic system.

Tamoxifen is one of the oldest, most widely prescribed and successful therapies known for the treatment of estrogen receptor positive breast cancers. It is also FDA approved for the prevention of breast cancer in high-risk patients. Using the body’s lymphatic system could improve the drug’s cancer-fighting abilities.

Lymphatic vessels are present alongside blood vessels and serve as an important agent in the body’s defense mechanism because they filter out organisms that cause disease, produce certain white blood cells and generate antibodies," said Dr. Nandita Das, assistant professor and principal investigator of the two-year research project. "They also drain off excess fluids and protein so that tissues in our bodies do not swell.

"Unfortunately," she added, "the lymphatic system also serves as the medium for metastasis, which is the invasion of cancer from an isolated location through the rest of the body."

According to Das, "lymph flows very slowly compared with blood due to the lack of a pumping mechanism. If we could localize anticancer drugs within lymph vessels and lymph nodes, the drug would stay in place for long periods of time, allowing for greater chances of interacting with and killing cancer cells which are floating around in the lymph – thus potentially preventing metastasis."

There is a rich network of lymph vessels and lymph nodes in and around the human breast, so localization of the drug within the lymphatic system could also offer tumor targeting with the drug.

"The goal of targeted drug delivery is to preferentially concentrate a large proportion of the drug dose in the vicinity of the target tissue, for example, a tumor, while sparing the rest of the body from the drug as much as
possible. This could greatly reduce side effects and toxicities related to drugs," Das said.

"One highlight of the project is the possibility of achieving drug targeting by simple oral dosing, which would be very convenient for patients," said Dr. Sudip Das, associate professor of pharmaceutics and a co-investigator on the project. "Our unique drug delivery approach, which is called self-emulsifying microemulsion systems and uses specialized FDA approved ingredients, will allow the drug to be channeled toward the lymphatic system in preference to direct absorption into the blood vessels from the gastrointestinal tract."

Wilson, associate professor and third investigator on the project, agreed.

"I am excited about the prospect of applying basic physiology techniques to evaluate drug targeting as part of this project," Wilson said. "This research also highlights the value of effective collaboration between investigators with varying expertise in generating federal grant funding and allows me to gain experience in a new field while contributing expertise from my own background."

ISU pharmacy dean Dr. Joseph Steiner also concurred with the benefits of the research.

"A diagnosis of cancer is devastating to patients and their families," Steiner said. "Medications are required to fight the disease, and we could change the way patients anticipate the usually distressing side effects of chemotherapy if the treatment drugs could be targeted to tumors and concurrently prevent metastasis. This could greatly improve the chances of survival. I am pleased that colleagues in our college are involved in this cutting-edge research and are able to win coveted federal funding for their investigations."