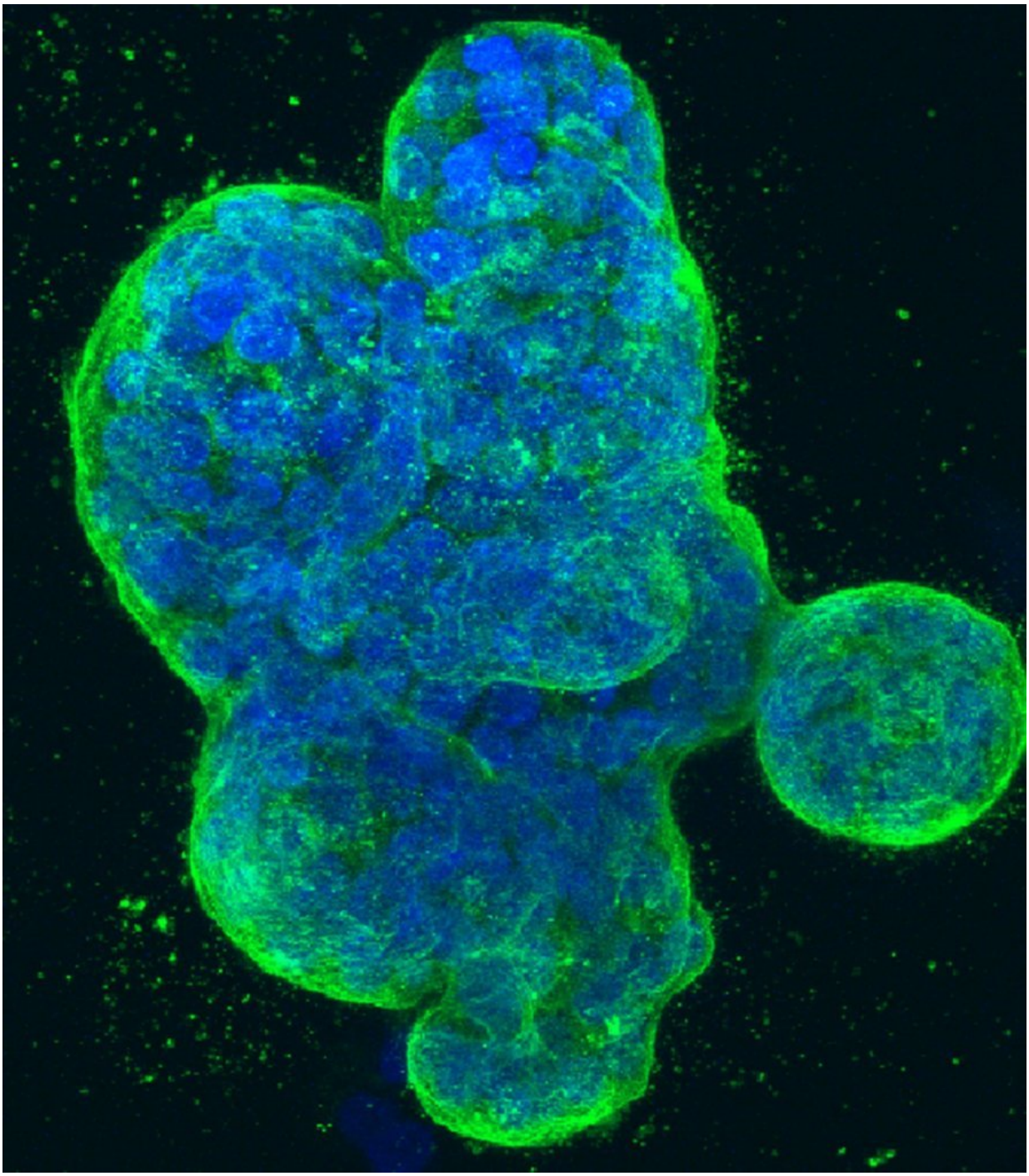
Researchers identify ways breast cancer avoids immune system detection

December 18 2018, by Kathleen Haughney



Three-dimensional culture of human breast cancer cells, with DNA stained blue and a protein in the cell surface membrane stained green. Image created in 2014 by Tom Misteli, Ph.D., and Karen Meaburn, Ph.D. at the NIH IRP.

Recent breakthroughs in immunotherapy are making a huge difference in treating some forms of cancer, especially metastatic cancer. But breast cancer has proven a tricky foe for this new therapy, and an interdisciplinary team of FSU researchers is now a little bit closer to figuring out why.

Associate Professor of Statistics Jinfeng Zhang, Professor of Chemistry and Biochemistry Qing-Xiang "Amy" Sang, and graduate students Mayassa Burjas Bou Dargham and Yuhang Liu analyzed data from more than 1,000 breast cancer patients and found that breast cancer behaves differently than other cancers that are currently treated with immunotherapy.

"We've been trying to understand why breast cancer patients do not respond well to the current immunotherapy and cannot benefit from this major breakthrough," Sang said.

Their work is published in the journal *PLOS ONE*.

Immunotherapy is a course of treatment where drugs unleash the body's own immune system to fight cancer. When cancer invades the body, the immune system often fails to recognize it as abnormal. Immunotherapy drugs inactivate the mechanisms cancer cells have that allow them to hide from the immune system. And then, the immune system attacks the cancer.

However, while immunotherapy has been an effective treatment for some forms of cancer such as melanoma, breakthroughs for breast cancer patients have proven more elusive.

Researchers said the problem lies in the many different mechanisms breast cancer uses to hide from the immune system.

The team broke the data down into different groups and identified seven clusters of breast cancer patients based on the immune evasion mechanisms that breast cancer uses to avoid detection. Some of the types even used a combination of ways to hide from the immune system.

Knowing more about breast cancer tumors and how they work will give oncologists more tools to treat patients, whether it is with yet-to-be developed immunotherapy drugs or the traditional combination of chemotherapy and radiation, researchers said. It may also help researchers design clinical trials for potential drugs.

"Cancer treatment isn't as personalized as it should be," Burjas Bou Dargham said. "We've been trying to understand what's really going on with these tumors and how they operate. That way doctors can ultimately better treat their patients."

Zhang, with the help of Liu, analyzed reams of data from the National Institutes of Health's Cancer Genome Atlas to see where patterns existed among cancer patients. He and Sang have previously collaborated on other research related to genetic biomarkers in cancer that could help dictate what type of chemotherapy might be most effective for a patient.

"There's so much data available to understand problems in cancer," Zhang said. "Immunotherapy is a big breakthrough, but still we don't understand why some patients respond and others don't."

The team plans to follow up on this work by delving into data about an aggressive subtype of breast cancer called triple-negative breast cancer.

More information: Mayassa J. Bou-Dargham et al. Subgrouping breast cancer patients based on immune evasion mechanisms unravels a high involvement of transforming growth factor-beta and decoy receptor 3, *PLOS ONE* (2018). DOI: 10.1371/journal.pone.0207799

Provided by Florida State University