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Common transplant drug inhibits breast cancer growth, study shows

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Tacrolimus, a drug that is commonly used to prevent organ transplantation rejection, inhibits breast cancer growth in pre-clinical studies. The finding from UNC scientists was reported in the May 26th *PLoS ONE.*

Nancy Klauber-DeMore, MD, associate professor of surgery, said, " We now have a rationale for performing human clinical trials to determine if Tacrolimus reduces breast cancer growth in humans. Since Tacrolimus is already an FDA-approved drug, the safety and toxicity profile is known, which means that Tacrolimus could potentially go directly into a later stage clinical trial."

Klauber-DeMore is a member of UNC Lineberger Comprehensive Cancer Center and co-founder and Chief Scientific Officer of Enci Therapeutics, Inc., a UNC spin-off biotech company.

Tacrolimus is used to prevent rejection (when a person's immune system attacks of a transplanted organ by the immune system of a person receiving the organ) in people who have received kidney, liver, or heart transplants. Tacrolimus is in a class of medications called immunosuppressants. It works by decreasing the activity of the immune system to prevent it from attacking the transplanted organ. Tacrolimus does this by binding to and inactivating a protein called calcineurin in immune cells.

Although preventing organ transplant rejection and inhibiting cancer

growth may seem unrelated, the team realized that activating calcineurin is a common pathway that stimulates both the immune system and the growth of new blood vessels to tumors. Blocking blood vessel growth to tumors is a therapeutic strategy to inhibit tumor growth.

Klauber-DeMore's group had previously discovered that a protein called SFRP2 stimulates blood vessel growth and is expressed in human breast cancers. While investigating the mechanism through which SFRP2 stimulates blood vessel growth, they found that SFRP2 activates calcineurin in blood vessel cells. Based on this mechanism, Klauber-DeMore thought that Tacrolimus might also bind to and inactivate calcineurin in blood vessel cells, thereby blocking new blood vessel growth to tumors. The team tested this theory in a pre-clinical breast tumor model and found that orally administered Tacrolimus inhibited breast tumor growth rate by over 70 percent.

Klauber-DeMore said, "This data is encouraging, but we don't know yet whether Tacrolimus will inhibit breast cancer growth in humans. However, this pre-clinical study provides a reasoning for the next step, which will be to perform a clinical trial using Tacrolimus in patients with breast cancer."

Provided by University of North Carolina School of Medicine