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“An in vivo comparison of susceptibility of pancreatic and breast xenograft models to targeted osmotic lysis”

Many types of cancer produce more sodium channels than normal tissue. In targeted osmotic lysis (TOL), these sodium channels are stimulated while at the same time sodium pumps are blocked with a drug. By overloading the cancer cells with sodium, water follows the sodium into the cell, causing it to burst (lyse). Normal cells do not lyse because they have fewer sodium channels. Breast cancer is a disease in which malignant cancer cells form in the tissue of the breast. This is caused by an abnormality in the DNA structure. Breast cancer is most commonly found in woman in the United States. It is diagnosed in 12 percent of women, however, men can also get breast cancer. Pancreatic cancer has the highest mortality rate of all major cancers. The majority of patients are diagnosed at an advanced stage, for which the 5-year survival rate is 10%. Both breast cancer and pancreatic cancer overexpress voltage gated sodium channels. Our hypothesis is that TOL will be as effective in pancreatic cancer as it is in breast cancer. In our methods we injected the nude mice with the cancer. We use nude mice because the mutation that causes their hair loss also causes them to have a weak immune system. When the immune system malfunctions, it does not attack the non-mouse cells. Then we inject the drug Digoxin, the vehicle, and the TOL. We measured the growth of the tumors with calipers. We stimulated the sodium channels using a custom manufactured coaxial ring device that produces a pulsed electric field. Digoxin is the drug used along with stimulation in targeted osmotic lysis. It blocks sodium pumps. With this information we believed that PANC-1 pancreatic cancer cells would have a faster cancer cell decline than the MDA-MB-231 breast cancer cells. In our experiment, there was a difference in the post treatment 1, however there was no difference in post treatment 2. TOL treatment cause a decrease in tumor size for both breast cancer and pancreatic cancer. Thus TOL promises to be an effective treatment for pancreatic cancers.