

Gene therapy not just counseling for your denim obsession

Imagine a world where one size does not fit all, wait that's the world we live in now. So why is the treatment you get under the "one size fits all" umbrella, we are all different, right? This is the focus of our research a personalized approach for treatment of ovarian cancer. Ovarian cancer is the deadliest gynecological (women's reproductive) disease, it is known as the "silent killer" due to late diagnosis of the cancer. By the time the cancer is diagnosed it has already spread to other organs and makes treatment very difficult. Cancer is an exceptionally multifaceted disease where the internal machinery of the cell malfunctions, and depending on what breaks determines how aggressive the cancer is. This break down inside of normal cells is what leads to a cancer cell and causes very quick growth of the cancer and the eventual death of millions. We have identified one of the malfunctioning components inside ovarian cancers mechanical driving compartment, a broken gas pedal that is pressed all the way to the floorboard, and is causing it to grow and survive, this broken pedal is called DJ-1. So if we can repair the cells gas pedal then we can slow it down and make it easier to catch and treat.

We have a dual treatment approach 1) Treat the cancer with a compound that glow's when light is shined on it, so the surgeon can visualize the really small tumors that they would not normally see during surgery. Not only does the compound make the cancer glow but if light is continually shined on it it starts to produce a toxic molecule inside the cells to help kill the cancer cell. 2) Gene therapy, fix the broken pedal, DJ-1 is over abundant inside the cell and we have found a way to lower that amount, making the toxic molecule produced from the light compound more effective. We have done this by making small particles called nanoparticles and inside the nanoparticle we have put a small molecule to fix the issue. The small molecule inside the nanoparticle is siRNA and is what is used to fix this imbalance and sensitize the cells to treatment.

Our ideology would be after a patient gets diagnosed with ovarian cancer that has increased amounts of DJ-1, that the physician injects our DJ-1 nanoparticle 24 hrs prior to surgery making the light therapy more efficient. This would allow time for the nanoparticles to accumulate inside the ovarian cancer. Then the patient goes in for surgery to remove as much cancer as possible, but before surgery the light compound is injected. Then the patient goes into surgery and using special glasses the surgeon removes all the glowing cancer, and before he sews the patient up he would continue to shine light on where the cancer was found killing any left behind cancer cells. This would decrease the amount of chemotherapy the patient would need and thereby increase patient quality of life and lower 5 year death rates after cancer treatment. It's a win-win for everybody.

It is our hope that one day our ovarian cancer treatment will see use in a clinical setting. Cancer is intelligent and we as cancer researchers have to stay two steps ahead, utilizing all the current technology in order to better understand and treat this disease. We are molecular mechanics.

Publication

[ROS-induced nanotherapeutic approach for ovarian cancer treatment based on the combinatorial effect of photodynamic therapy and DJ-1 gene suppression.](#)

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