Brain Cancer Drug Therapy

OX2 Therapeutics touts method to 'turn off' protein that suppresses immune system.

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A newly formed biotech company spun off from University of Minnesota anti-cancer research says it is wrapping up a Series A funding round and readying initial clinical trials for a potentially game-changing product for fighting brain cancer with immunological drugs.

OX2 Therapeutics Inc (http://www.ox2therapeutics.com/)., co-founded by U of M Masonic Cancer Center researchers Michael Olin (https://www.pediatrics.umn.edu/bio/pediatrics-a-z/michael-olin) and Dr. Chris Moertel (https://www.cancer.umn.edu/bio/immunology-research-members/christopher-moertel), is working on a therapy based on the pair's discovery that a certain kind of protein associated with cancer blocks the effectiveness of vaccines now being developed to treat brain cancer tumors (known as glioblastomas), as well as other kinds of tumors.

They found that this protein, known as CD200, is a key tool used by cancer cells to escape detection by the body's immune system. The presence of CD200 suppresses the stimulating effect that anti-cancer vaccines are meant to have on the immune system, perhaps accounting for why there have been highly uneven results in the hundreds of ongoing clinical trials for different kinds of immunotherapy drugs.

OX2's solution is a CD200 inhibitor made from extremely small peptides. Studies in dogs have shown that when small doses are administered via injection after surgery to remove a brain tumor, it locks onto specific receptors on CD200, thus countering its ability to shield tumors from attack. The effect, the company says, is to "reverse or modulate immune suppression" in the patient.

The animal studies conducted by Olin, Moertel and U of M veterinary medicine colleague G. Elizabeth Pluhar (https://www.health.umn.edu/people/experts/g-elizabeth-liz-pluhar-dvm-phd) have shown that the use of the CD200 inhibitor "significantly increased leukocyte infiltration into the vaccine site, cytokine and chemokine production, and cytolytic activity" – all meaning that it greatly enhanced the effectiveness of anti-cancer drug treatments and prevented the return of tumors.

If those results can be replicated in human clinical trials, the product could have wide applications in the cancer immunotherapy market, perhaps boosting the effectiveness of anti-cancer drugs generally.

The first application being targeted by OX2 is brain cancer and glioblastomas. That's because of the founders' medical and research focus on pediatric cancer at the Masonic Cancer Center. Brain cancer is the second-most common form of cancer in children and the leading cause of cancer-related deaths in children.

Their work at the U has been supported by the Dahlberg Family Foundation, Bob and Corinne Ferris, Children's Cancer Research Fund (CCRF), CCRF's Dr. Daniel G. Carey Brain Tumor Research Fund, the American Brain Tumor Association, Randy Shaver Cancer Research and Community Fund, Humor to Fight the Tumor and Love Your Melon.

Last year, Olin and Moertel teamed up with California biotech entrepreneur Sumant Dhawan to spin off the patent-pending U of M biotech into a startup company; veteran Twin Cities health care exec Jeff Liter was tapped as CEO. OX2 revealed through a Form D filing (https://www.sec.gov/Archives/edgar/data/1704490/000120919117033212/xslFormDX01/primary_doc.xml) last year it was seeking to raise $3.1 million via a private placement of company stock in a Series A funding round.

Liter told *TCB* last week the financing is "reasonably completed. For the most part, we're done with it."

The commercialization strategy once the product is approved by the U.S. Food and Drug Administration, he added, is a partnership or a licensing deal with a major pharmaceutical company, rather than a build-out of an independent therapeutics company.

Olin added that OX2 has "multiple human versions" of the CD200 inhibitor that are "now working really well" in the animal studies.

"We have dogs that have now gone 640 days after being treated for high-grade brain tumors," he said. "These dogs are brought in by pet owners and were diagnosed with brain tumors -- we treat them just like we would our human patients, only with a canine-specific version of the drug. The response has just been phenomenal. The inhibitor has extended their lives significantly.

"We're excited about its potential in immunotherapy," he added. "We think it could be a real rock

star. Our goal is to have the first clinical trial underway by late this year or early next year."