Stem cells have an innate attraction to tumor cells. If genetically engineered to produce proteins with anti-tumor activity, they could serve as tumor-killing assassins.

At UCSF, a team of scientists led by Mitchel S. Berger, MD, chair of the Department of Neurological Surgery, is exploring this strategy in the fight against glioblastoma — the most common and lethal brain tumor.

Under a $19 million grant from the California Institute for Regenerative Medicine (CIRM), the work involves an even bigger team, one that extends outside of UCSF to four other California institutions. The goal is to be ready for a clinical trial in four years.

“We needed to assemble a team of investigators having all the necessary skill sets to accomplish this very ambitious and very timeline-driven project,” says UCSF Professor David James, PhD, coordinator of the CIRM project.

Progress has been quick, James says. Researchers started in early 2010 by looking at 12 possible options involving different combinations of three potential stem cell hosts, two therapeutic genes and two routes of delivery. They hope to identify the single most efficacious therapeutic stem cell host and route of delivery approach. In nine months,
they’ve narrowed the possibilities to four options.

Currently, the research team continues to investigate fetal neural stem cells and mesenchymal stem cells, derived from bone marrow, as candidate host cells, and have concluded that administration of therapeutic stem cells directly into the tumor is the approach to be used in a clinical trial.

The remaining candidate host cells are now being tested for their ability to produce and deliver two therapeutic gene products: one called TRAIL, or tumor necrosis factor-related apoptosis-inducing ligand, and the other an enzyme called cytosine deaminase (CD), which converts an inactive substance known as a prodrug into a drug with anti-tumor activity.

Researchers expect to pick one of the two cellular finalists in the next three months, and then determine the most effective therapeutic gene during the second year of this research project.

?The major objective of the early research is to go from 12 possibilities to just one: the best cellular vehicle, the best route of administration and the best drug,? James says.

Once they have accomplished that, they’ll devote their efforts to developing a stem cell therapy for which they could seek Food and Drug Administration approval for use in patients with brain tumors.

?For medical research, that is moving quickly,? James says, ?which is undoubtedly what the advocates for the use of stem cells in medicine are expecting.?  

Source URL: https://stemcell.ucsf.edu/team-ambitious-project