MedicalXpress

Radioactive scorpion venom for fighting cancer

June 27 2006

Health physicists are establishing safe procedures for a promising experimental brain-cancer therapy which uses a radioactive version of a protein found in scorpion venom. For many, this will conjure images of Spiderman's nemesis, the Scorpion. The purpose of this work is not science fiction, but rather to help to develop a promising new therapy for brain cancer. The venom of the yellow Israeli scorpion preferentially attaches to the cells of a type of essentially incurable brain cancers known as gliomas.

Responding to this urgent problem, scientists at the Transmolecular Corporation in Cambridge, Massachusetts created a radioactive version of this scorpion venom. Called TM-601, it contains an artificial version of the venom protein, attached to a radioactive substance called iodine-131 (I-131). When it enters the bloodstream, the compound attaches to the glioma cells, then the I-131 releases radiation that kills the cell.

This compound has enabled an experimental treatment for high-grade gliomas, found in 17,000 people in the US every year and usually causing death in the first year of diagnosis. Patients would simply be injected with the compound in an outpatient procedure, without needing chemotherapy or traditional radiotherapy. The first, early human trials of the venom therapy showed promising signs for treating the tumor and prolonging survival rates for patients.

At the Health Physics Society meeting this week in Providence, Rhode

Island, Alan M. Jackson of the Henry Ford Health System in Detroit will report that he and his colleagues recently established safe procedures for the therapy, currently in the second sequence of phase-II human trials, which involve higher doses of radiation than the earliest trials.

"The health physicist has the duty to ensure to ensure that these therapies are conducted both legally and safely," Jackson says. "Obviously, a key objective is to bring these patients home and to ensure that their loved ones and the environment are properly protected."

In the trials, one group of patients received the therapy three times over three weeks, while the other group received the therapy 6 times over 6 weeks. Each group received the same dose of radioactive iodine per week, 40 millicuries (mCi). According to Jackson, this is not tremendously high compared to a thyroid cancer treatment, in which patients receive up to 200 mCi in a single treatment.

As Jackson discovered, the TM-601 that does not bind to cells in the body is rapidly excreted in the urine. "Other tissues will receive some dose," he says, "but the vast majority of the dose is delivered to the cancer cells." To prevent the radioactive compound from being absorbed by the thyroid, which has a voracious appetite for iodine, the patients were given large amounts of non-radioactive iodine prior to the therapy to block the thyroid uptake of I-131.

When the patient returns home several hours after the procedure, there are radiation doses to any family members at home due to the presence of radiation in the patient's body. Such radiation exposures to family members, Jackson found, are low and comparable to those from a family member receiving standard thyroid cancer therapy.

Jackson is encouraged by the safety of this procedure and its potential to help patients with brain gliomas. A recent study of the earlier phase II

trials showed that patients receiving up to 40 mCi of weekly dose did not show evidence of any adverse reactions attributable to the radiation. The second-sequence phase II trial at Henry Ford involves 3 patients, with a total of 54 patients across the US currently in investigational trials for the therapy.

Source: Health Physics Society