Carefully mixed radiation cocktail reduces breast cancer treatment's collateral damage to skin

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A carefully determined mixture of electron and x-ray beams precisely treated breast tumors while significantly reducing collateral skin damage in 78 patients, researchers will report on August 1 at the annual meeting of the American Association of Physicists in Medicine in Orlando.

The key to choosing the right mixture of beams, as well as their individual properties, was a sophisticated computer approach developed by medical physicists Jinsheng Li, Ph.D. and Chang-Ming Ma, Ph.D. of Fox Chase Cancer Center in Philadelphia.

In treating shallow tumors such as those that occur in the breast, physicians have been turning to mixed-beam radiation therapy (MBRT), which employs separate beams of electrons and photons (x-rays). The two types of radiation complement one another, as electrons generally travel to shallow depths while the x-rays can penetrate to deeper parts of the tumor as needed.

However, each beam interacts in complex ways with its environment, making their exact path to the tumor region hard to predict. Nonetheless, physicists can calculate the probability for a given beam to follow a desired trajectory.

Therefore, Li and Ma use computers to simulate billions of trips of each beam to the unique landscape of each tumor. Gathering the statistics

from these billions of trials, they determine the best beam properties and mixtures.

The computer simulations helped oncologists send accurately targeted doses for 78 breast cancer patients receiving "hypofractionated" treatments, in which the patients received fewer, but more potent, doses of radiation. The beams delivered all the radiation within a small margin of the tumor's edge, dramatically reducing radiation damage to surrounding healthy tissue. The researchers expect their approach to provide benefits for reducing collateral damage in the treatment of shallow tumors in the breast, chest wall, and head-and-neck region.

Source: American Institute of Physics

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