Preventing radiation in cancer therapies to damage healthy organs

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When a person receives radiation cancer treatment, he or she is exposed to ionizing radiation; to prevent damaging healthy tissue, Dr. Guerda

Massillon, researcher at the National University of Mexico (UNAM), studied the properties of various materials called dosimeters that measure radiation doses.

The physicist says that ionizing radiation is used in the diagnosis and treatment of cancer.

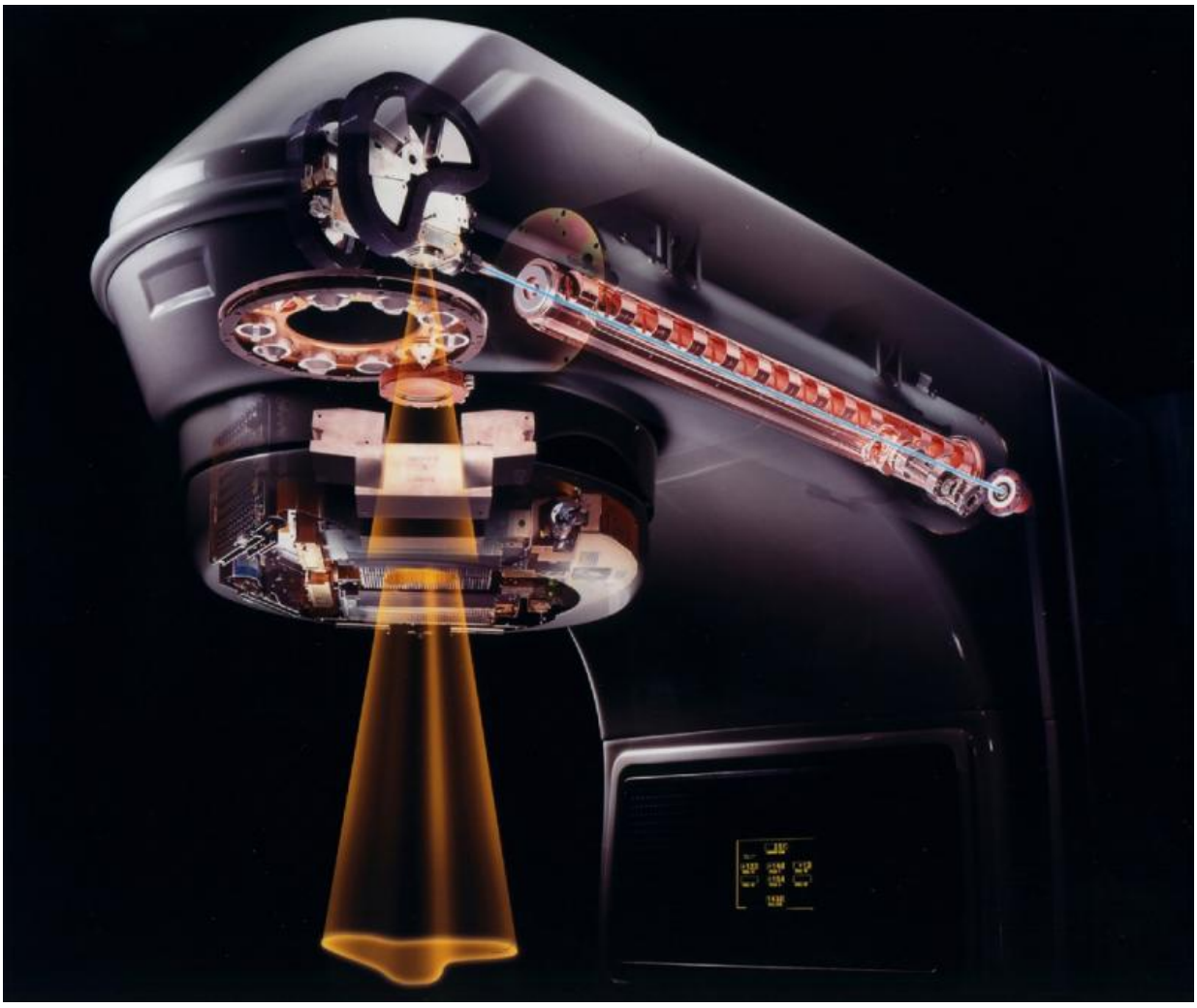
"In extreme cases, if the dose is too high, radiation can modify the cellular structure and generate alteration in the cells of organs found near the tumor. This causes them to lose their functions," said Massillon, who was honored for her research with the IUPAP Young Scientist Prize 2015 awarded by the International Union of Pure and Applied Physics.

The intent of the study is to analyze the interaction of ionizing radiation with matter and measure how much energy the patient receives. The doctor explained that there are two types of radiation: ionizing and non-ionizing.

Non-ionizing radiation is used in lasers, light beams and waves that are used to make ultrasound or magnetic resonance imaging. They have a longer wavelength, so the power is low and does not change the structure of matter.

By contrast, ionizing radiation from X-ray technology, CT scanners or gamma-ray mammograms have enough power to change matter, because the wavelength is low and of high energy.

For example, techniques with X-ray equipment are used for the early detection of breast cancer. To avoid affecting the patient, it is necessary to record and measure the radiation dose administered, which is achieved with the use of thermoluminescent dosimeters.



These small crystals are materials capable of conserving energy when exposed to radiation, which on heating show the amount of energy deposited in the form of light.

The doctor said that to prove mammography equipment the thermoluminescent dosimeter is placed in front of the machine (replacing the patient) and the necessary shots are taken. Later, the

relationship between the light emitted by the crystal and the deposited energy is analyzed, so that the precise dose the patient receives is known.

Another example is radiotherapy, used in the treatment of different cancers. In the case of prostate cancer, usually a radioactive seed is inserted into the patient and is delivered directly to the tumor.

"Around the prostate are other healthy organs that are very sensitive. If the spatial distribution is known, most of the dose will stay in the cancerous area and the surrounding tissue is barely affected."

To reach this level, it is necessary to know how a dosimeter will respond to different types of radiation and the optimal conditions for usage.

Guerda Massillon, originally from Haiti, was also selected as one of the Research Fellows by the Royal Society of London to develop her research project.

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