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A research group on medical physics studies dosimetry in radiotherapy through Monte Carlo techniques

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The mathematical tool, quite used in Medical Physics, takes its name from the city of Montecarlo, well-known for its bingo halls and games of chance.

It allows to carry out calculations taking into account all the physical magnitudes that come into play when the particle beam making up the radiation acts on the patient. Leticia Rojas Calderón´s doctoral thesis "Dosimetría Monte Carlo en geometría simples con interfaces: aplicaciones en radioterapia" (Dosimetry Monte Carlo in simple geometries with interfaces: applications in radiotherapy) studies –under the supervision of the Professor of the University of Granada (Universidad de Granada, [http://www.ugr.es]) Antonio M. Lallena Rojo– aspects related to dosimetry of different treatments with radiotherapy through simulations carried out with Monte Carlo.

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“We intend to detect the implications of the interfaces and the different materials surrounding the tumor in the dosimetry of the troubles in question”, Lallena points out. In many cases, calculations are carried out without considering the interfaces. However, in the human body there are different materials that influence the final dose placed on the tumors.

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They have centred on three kinds of troubles which have in common the presence of interfaces. Thus, the so-called craniopharyngiomas have been studied with a concentric-sphere model to take into account the different materials. Such tumors appearing inside the head are usually treated injecting gel-shaped radionuclides, causing their reduction or disappearance. The habitual practice is

carrying out the dosimetry by analytical calculations, considering that all the region of interest is the same material, tender tissue or water.

"Gamma Knife"

The second subject tackled is synovial membrane inflammation in knees, with the appearance of additional tissue causing pain to the patient. Such affection can also be treated with gel-shaped radionuclides. Finally, Monte Carlo tool has been applied in the analysis of the "Gamma Knife" instrument, used in treatment of brain radiosurgery.

In this case, radiation is emitted from outside and the brain interface has been considered to observe how affects the final dose applied to the treated lesion. The patient´s head is modelled like a water sphere with a surface simulating the brain.

With these works of the Department of Modern Physics of the UGR [http://www.ugr.es], “we intend to get to know as exactly as possible the real dose reaching the area that receives the treatment and, on the other hand, to improve dosimetric calculations”. This reserach work is the previous step, basic and necessary, to carry out later research works to establish the appropriate doses for the treatments. In this line, the Department has three more doctoral theses under way as well as keeps a collaboration with the group of Radiobiology of the Faculty of Medicine to observe tumor growth and the optimum treatments against them.

Antonio Marín Ruiz | Quelle: alphagalileo

Weitere Informationen: prensa.ugr.es/prensa/research/index.php

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