CONFORMAL-ARC RADIOTHERAPY

submitted by
R. Paul King, MS
Chiel Medical Physicist

In March of 2005, Jeff Anderson Regional Cancer Center introduced a new modality called conformal-arc radiotherapy Conformal-arc is the bringing-together of two other methods of radiotherapy, one very new and the other not new at all.

Intensity modulated, dynamic, conformal, radiotherapy is quite new. Conformal radiotherapy involves using advanced technology and precise methods to "conform" the shape of a radiation dose to the shape of a tumor that it's meant to treat. When a radiation treatment becomes dynamic, the treating linear accelerator is made to move during treatment, so that the shape or orientation of the beam changes during the treatment. When intensity modulation is added to dynamic, conformal treatments, it gives us much more ability to conform the dose away from sensitive organs in addition to conforming it onto the tumor. Radiotherapy treatments which were unthinkable just a few years ago are suddenly possible and practical. Intensity modulated, dynamic, conformal radiotherapy is quite new.

In the 1960's, when today's methods hadn't even been dreamt of, arc-rotational radiation therapy was the new high-tech innovation of its day. Arc therapy was a good solution to the big problem of that time. From its very earliest days, radiation therapy had always been limited by beam energy. The energies just weren't high enough. Like trying to cook a thick steak over a Bic lighter, treating a deep-seated tumor with low energy radiation could produce a scorched surface with an underdone center. Rotational therapy worked like a rotisserie, getting the radiation down to the center without burning any part of the surface.

Arc therapy had some drawbacks. So, as high beam energies became available and then affordable, we didn't really need to rotate the beam any longer. Over the years; arc rotations, like the Volkswagen beetle, gradually went out of style.

But, it's now time for the rotating beam to make a comeback. This time in addition to rotating the beam around the patient, we also dynamically change the shape of the field as it rotates, keeping the dose focused on the tumor. The dynamic, conformal, modern part of this treatment conforms the dose tightly onto the tumor. The old-fashioned, rotating part spreads out the incidental dose to everything else; making sure no organ gets too much radiation. And, since beam energy is no longer a limitation, we can now do this with 25 Megavolt x-rays. That makes it even better.

The software technology needed to plan conformal arc treatments only just became available early this year. Sensing the value of this modality to patient care, Jeff Anderson Regional Cancer Center quickly put it into clinical service and now uses this method, for example, as a part of almost all teletherapy prostate treatments.

Jeff Anderson Regional Cancer Center is among the early centers in the United States to offer this modality. Most of the earliest interest in this technique came from Asia. But as more American institutions come to realize the value of conformal arc, they will follow this institution's example in adopting its routine, clinical use.