

What is the basic science behind radiation therapy?

For many years, radiation therapy has been an indispensable part of treating many types of cancer including ACC. High energy X-rays and Gamma rays, consisting of small particles called photons, have been used for attacking the tumor. These minute, sub-atomic particles remove electrons out of tumor cell atoms and destroy larger molecules within the cells by destroying smaller chemical compounds. Radiation beams also damage the genetic code contained in the DNA of the cells, thereby interrupting the construction plans for essential proteins that are necessary for cell growth. In addition to this type of cellular damage, cells cannot replicate anymore, so consequently they die.

However, the challenge in delivering radiation therapy to a tumor is that the energy is only partly transferred to the tumor and causes some level of damage to healthy tissue. This problem has been partly solved by a variety of modern techniques and advancements in types of beam shaping and more controlled delivery. The more advanced systems utilize a variety of X-ray, CT and MRI imaging, adjustable apertures, sophisticated computer technology, LED lights and complex mechanics as part of the treatment planning and delivery. The general terms used to describe this more pinpoint radiation delivery systems include phrases like IMRT (Intensity Modified Radiation Therapy), 3-D conformal and SBRT (Stereotactic Body Radiation Therapy). Besides these improved delivery systems, there is a growing awareness of three of the more unique types of radiation beam therapies for treating ACC which include neutron and proton therapies in the US, and carbon ion therapy in Germany. Use of all these targeting methods and unique types of radiation in treating ACC considerably improves the treatment results over that of conventional photon radiotherapy.