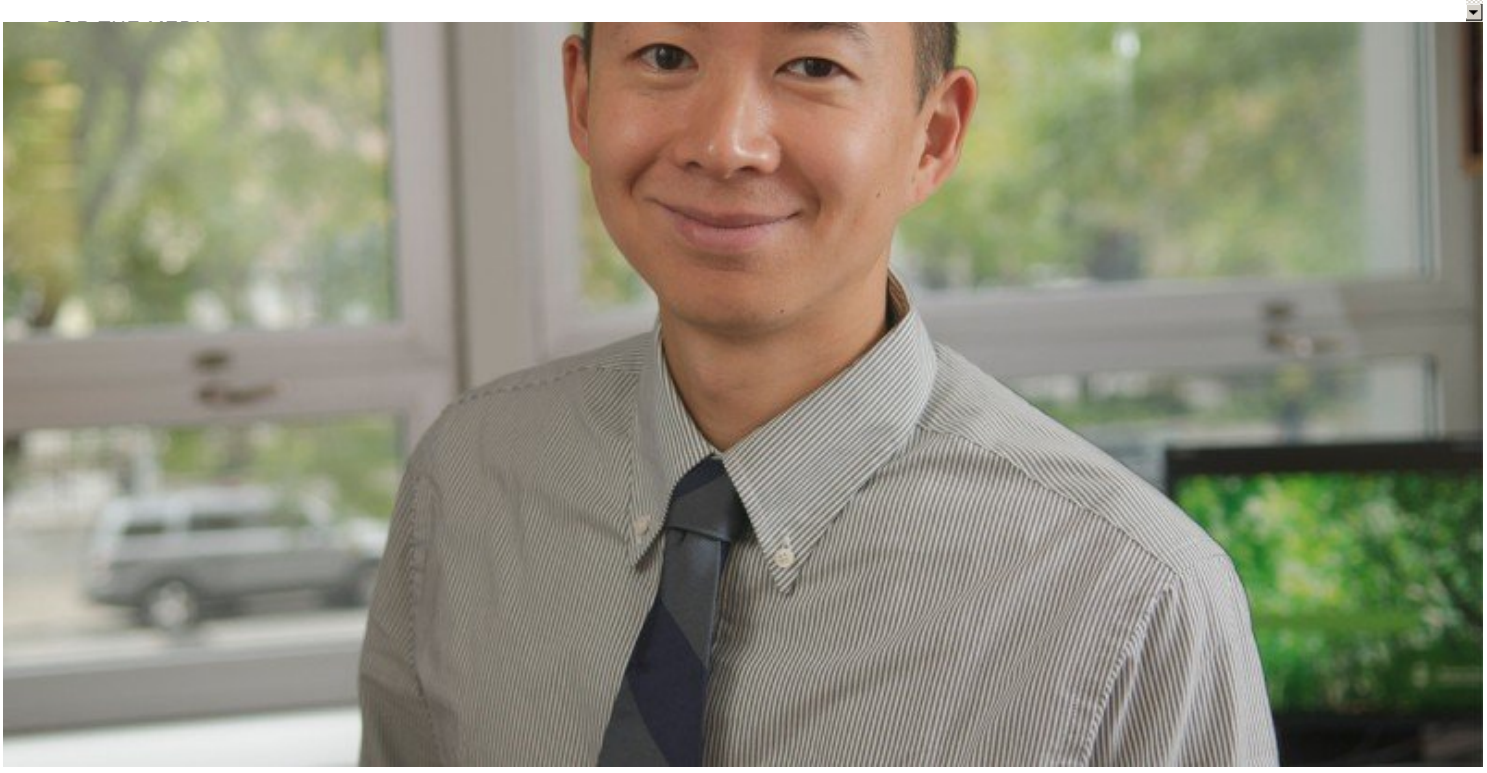
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Radiation oncologist Abraham Wu explains that CyberKnife is a brand name for one of several available stereotactic radiosurgery devices.

Summary

CyberKnife is a brand name. It refers to a stereotactic body radiation therapy device that delivers radiation using advanced imaging technology. MSK uses similar technology as part of an approach called MSK Precise™. This method destroys tumors with very intense doses of radiation in fewer sessions than standard radiation therapy.

Note: This article was updated in November 2018.

Advertisements for a radiation delivery system called CyberKnife® have prompted a large number of questions from patients inquiring whether it

employs a unique new technology.

CyberKnife is used in a type of radiation therapy called stereotactic radiosurgery (also known as stereotactic radiotherapy). This treatment destroys tumors with extremely precise, very intense doses of radiation while minimizing damage to healthy tissue, offering accuracy akin to the sharpness of a surgeon's scalpel.

Memorial Sloan Kettering radiation oncologist Abraham J. Wu employs stereotactic radiosurgery to treat lung and gastrointestinal cancers. He explains that CyberKnife is a brand name for one of several available stereotactic radiosurgery devices that deliver radiation with linear accelerators, or devices that form beams of fast-moving subatomic particles. The beams are precisely directed through the use of advanced imaging technologies combined with a sophisticated computer guidance system.

"There are a lot of different machines and a lot of different marketing terms thrown around, but they all achieve the same goal, which has two critical components," Dr. Wu says. "One is delivering a more intense dose of radiation in just a few sessions. This is called hypofractionated radiation therapy. The other is targeting the radiation very accurately by pinpointing the precise location of the tumor during treatment."

At MSK, radiation oncologists use linear accelerators made by a company called Varian. The Varian machine Dr. Wu most often uses — primarily to treat lung tumors — employs a system called TrueBeam™, which incorporates computed tomography (CT) imaging into the same device that delivers the radiation. This allows the radiation therapists to make sure patients remain in the proper position during radiation therapy and to adjust the radiation beams as needed.

MSK Precise: Larger Doses over a Shorter Period

MSK Precise incorporates the TrueBeam system to deliver hypofractionated radiation therapy. With this treatment approach, a radiation beam can be very precisely targeted to a tumor. The total radiation treatment can be split into fewer sessions, using larger doses given over a shorter period.

"Really, the big breakthrough in recent years has been the advent of CT imagers on the treatment machine itself — as we have with the TrueBeam — which allows us to ensure the accuracy of radiotherapy treatments with the highest precision," he says. "Interestingly, CyberKnife does not incorporate a CT imaging machine into the device — it uses a different system of image guidance."

In addition to using CT imaging, MSK Precise also employs MRI in the treatment of some cancers, particularly prostate cancer. When MRI is used to plan the treatment, CT scans are not needed. MSK is the only institution in the world to routinely use MRI for hypofractionated radiation therapy.

The main distinguishing feature of CyberKnife is that the linear accelerator is mounted on a robotic arm. While this offers more flexibility and freedom of movement in how the radiation beam is delivered, Dr. Wu says that "in practice this is rarely something that is going to make a difference in how precisely we treat someone. We can still deliver the radiation to a given target."

What is important, he explains, is the skill and experience of the radiation oncologists and medical physicists who define the radiation target.

"There are a lot of different technical solutions to achieve the kind of accuracy that you need to deliver very high doses of radiation — it's a variety of different means to the same end," Dr. Wu says. "We're convinced that our Varian machines enable us to perform stereotactic radiosurgery at the highest level."

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