

[MUSIC PLAYING]

EUGENE KWON, We have real data, we have real visuals that can guide us through very rational treatments.

MD:

VAL LOWE, MD: The goal of having a test available to find cancer should be that you help people, and it's not just that you want to be seeing exciting things. Although to me as an imager, it's very exciting to see something that nobody else can see. We want to be able to make sure that what we're doing has a real impact in people's lives. And in this sense, it's huge. I mean people can be treated within a few days of known areas of recurrence, where in other situations or in other places in the world they would have had no response that would have been successful.

SPEAKER 1: PET scanning with Choline C-11 enables doctors to detect a recurrence of prostate cancer months or years before conventional imaging.

VAL LOWE, MD: C-11 choline is an analog, or if you will, a similar compound to choline. I mean, it's essentially identical in molecular structure.

EUGENE KWON, For some reason, some parts of the body use a lot of choline. For instance the liver, the bowels, the kidneys, the **MD:** spleen, the pancreas.

VAL LOWE, MD: It's just that one of the carbon atoms is radioactive. So the actual function of the C-11 choline is identical to what the molecule choline is in everybody's body.

EUGENE KWON, For some strange reason, prostate cancer also sucks up a lot of this choline out of the bloodstream, and it is **MD:** instantaneous. And choline is a much better and more specific and accurate marker for finding the prostate cancer distribution in the body. So in other words, unlike virtually all other cancers, prostate cancer seems to have a very high affinity for the choline and the choline PET scanner therefore becomes a very good scanner and a specific scanner. So it not only gives you a location, but it also gives you a readout on the biological potential of that cancer.

How angry is the cancer? And how much of a threat does it post to the patient? And those are two pieces of information that have not been readily available.

VAL LOWE, MD: We use a very small amount of that tagged with this radioactive substance, inject it all into the body, and then we track it to see where it goes. In doing that, it allows us to take a picture of the body and see where our tracking molecule is going and then be able to identify where cancer is in the body.

EUGENE KWON, What's interesting is that prostate cancer cells tend to spread to sites other than the liver, other than the bowels, **MD:** other than the kidneys. So what we are doing with our scanner is actually looking for areas that are accumulating that choline very rapidly in places that you normally would not see it, somewhere between the eyebrows and the mid-thighs, and usually that's a signature that that's prostate cancer that's spread to that site.

SPEAKER 1: Prostate cancer uses choline as a building block. So when a minute amount of choline C-11 is injected into a patient, it is quickly taken up by the cancer causing it to glow during a PET scan.

VAL LOWE, MD: -is you have to have a medical cyclotron. It's essentially a particle accelerator, much like you would have in Los Alamos or other places in the world where they talk about accelerating atomic particles. You have to have one of those on site and make the C-11 atom on site because of that short half-life. You can't ship it in from someplace else because by the time you got it to your facility, there'd be nothing left.

So a choline molecule has five carbons. One of those carbon atoms has to be our C-11 carbon atom. So we have to take that one atom and build a molecule, which is called C-11 choline. And we have to do that right next to our cyclotron in a little robotic synthesis box that does it kind of through a computer process. And then out the end comes our C-11 choline.

SPEAKER 1: Because the radioactivity is the property that allows the PET scanner to see the cancer, choline C-11 must be used shortly after it's made. It cannot be stored and shipped. It must be manufactured right where it is used.

EUGENE KWON, MD: And me, personally, I think that the C-11 PET is just a stepping stone. And it's a useful stepping stone, though, because it's a huge stepping stone in the sense that we didn't even know what was going on prior to having this imaging. Now we have this imaging and it's informing us a lot more about the biology of the cancer. How it responds to treatment, heterogeneity, homogeneity, completeness, incompleteness.

It's giving us a huge wealth of information; however, it's not going to be the final scanner. It's a game-changer. It's going to cause a huge amount of activity in this arena.

It's going to drive the concept that we shouldn't be impressed any longer with simple static pictures of cancer. To me, I've always been everything changes every day. And even if you reach this level, it can change again and reach this level. That is life. That's the evolution that we have to embrace because everything can always get better as long as we push it forward.

SPEAKER 1: Mayo Clinic is adding a fourth PET scanning suite and second cyclotron. And it has increased production from twice weekly to twice daily three times a week.

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