



How Targeted Therapies Treat Cancer

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Hi, my name is Kurtis Davies and I'm the lead assay development scientist in the Colorado Molecular Correlates Laboratory and instructor in the Department of Pathology at the University of Colorado Anschutz Medical Campus.

In this video, I'm going to discuss targeted therapies and how they are used to treat certain types of cancer. So one of the biggest, if not the biggest, revolution in cancer care over the past several years is the development of drugs that specifically target the proteins that have been aberrantly turned on by driver mutations in the cancer cells. And, to review, these driver mutations lead to overactive proteins that are going to lead to unregulated and unchecked growth of cancer cells.

Basically, these targeted therapies are drugs and they're essentially molecules that directly bind to the proteins that have been activated by the mutations. By binding to these proteins they prevent the ability of that protein to activate the growth and division of the cancer cell. So, what's going on is you're effectively stopping the cancer cell from growing by physically stopping the protein that's driving this growth from performing whatever function it was doing to lead to this unregulated growth.

So the really nice thing about targeted therapies is that they are directly targeting the thing that is specifically making the cancer cell grow. This is in contrast to conventional chemotherapies that basically target all dividing cells – so including the ones that are supposed to be growing and dividing normally in your body – and this is why chemotherapies have such bad side effects. Because they are stopping growth of even non-cancerous cells. And that's why you have really bad side effects in your gut and why your hair falls out, etc., when you're treated with these conventional chemotherapies.

However, the trick with targeted therapies is that they are only going to work in people that have this specific mutation that is going to activate the protein that is the target of the drug. So this specific targeting of certain proteins has been termed personalized medicine, or precision medicine, so-called because the therapy is tailored to the genetic makeup of an individual's tumor. And this is really why genetic testing of tumor samples, in particular for lung cancer, is so important. It allows the doctor to directly determine which gene mutations in the DNA, and correspondingly which altered proteins, are responsible for causing the

uncontrolled growth of the cancer cells. So, specifically in lung cancer we now have many drugs that target many of these activated proteins.

In order to be treated by one of these new targeted therapies, your tumor sample must be tested to see whether it contains certain mutations in certain genes that will lead to alterations in the proteins that are the target of these targeted therapies. If you don't have the mutation, then being treated with the corresponding targeted therapy will not work, because the target of that therapy is not active in your tumor.

So, to sum this up, if you are diagnosed with advanced lung cancer, in particular non-small cell lung cancer, it is very, very important to have your tumor cells tested for these mutations because if your tumor is positive for a specific mutations, you can be treated with these new targeted therapies that tend to work much better than conventional chemotherapies, and they tend to have far more tolerable side effects.