# How Does Immunotherapy Work? | A Video Animation.

In this video about immunotherapy for bladder cancer treatment, Peter H. O'Donnell, MD, meets with Kevin, a bladder cancer patient and his wife. They discuss the Kevin's treatments to date, the results of his scans, and his immune therapy options as the next best treatment for his bladder cancer.


***Peter H. O'Donnell, M.D.**, is a translational researcher with advanced training in pharmacology and pharmacogenomics and a practicing oncologist specializing in the treatment of genitourinary malignancies, specifically bladder cancer. Dr. O'Donnell was also co-PI of the University of Chicago's The Cancer Genome Atlas (TCGA) effort for Bladder Cancer. He holds an appointment as Associate Director for Clinical Implementation in the University of Chicago Center for Personalized Therapeutics, is Chief Medical Officer of the University of Chicago Advanced Technology (Clinical Pharmacogenomics) Laboratory, and is a member of the University of Chicago Committee on Clinical Pharmacology and Pharmacogenomics. On a national scale, he serves as the Pharmacogenomics and Population Pharmacology Committee representative to the Genitourinary Oncology Committee within the Alliance for Clinical Trials in Oncology.*

*His research interests focus on pharmacogenomics and clinical implementation of pharmacogenomic findings. Dr. O'Donnell serves as principal investigator of three large clinical studies exploring the feasibility and benefit of incorporating broad germline pharmacogenomic testing into routine clinical practice for patients with any type of disease. He is also involved in a multi-institutional effort to identify germline genomic predictors of platinum chemotherapy response. He is similarly interested in developing novel therapies for urothelial cancer based on tumor genomic molecular profiling.*

Marcia: Hi Doctor.

Kevin: Hi. Good morning.

Dr. O'Donnell: How are you feeling today?

Marcia: I'm doing okay. I'm a little nervous about the scan so-

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Dr. O'Donnell: Of course, I know you had the scan this morning and we were doing that, remember, to see where the cancer is after you've now been through the chemotherapy. And, unfortunately, I'm sorry to tell you that the scan shows that the cancer is growing again.

Kevin: Doc, I thought this was gonna be the last round of chemo. I thought this was gonna do it for us.

Dr. O'Donnell: I know and I think the chemotherapy did help for a while. I want you to remember that in the initial part of the chemo therapy you were having pain and that pain went away. And we know the cancer was shrinking for a while. This often happens where the chemotherapy wears off or the cancer becomes resistant and we have to think about next steps. And so, I know this is difficult news to hear but I wanted you to hear that we have some really good treatments that I want to talk to you about next.

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There's two main types of treatment for bladder cancer. One is the chemotherapy, which you've had. And then the other is this newer class of drugs called immunotherapies. Have you ever heard of these?

Marcia: Yeah, a little bit, yeah.

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Dr. O'Donnell: Yeah, most people have heard about them from commercials or in newspapers. Right so they're being talked about for lots of different types of cancers now and bladder cancer is one of those. And these really came onto the scene in bladder cancer about a year and a half ago. And they've changed the whole landscape. They've made doctors really excited about the options for patients now and patients really are finding these to be beneficial in many cases.

Kevin: How does immune therapy work?

Dr. O'Donnell: I like to draw a picture when I explain that. Is it possible I could use your paper?

Marcia: Absolutely.

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Dr. O'Donnell: So, let me show you here. So, we have a cancer cell that's in your body, you have the cancer in your body. And then you have the immune cells okay? We all have our immune systems. So, the immune cells are floating around in our body, that's how we fight off colds or fight infection. It also turns out that the immune cells can see and detect and try to kill off cancer cells. When the immune system is working properly, it would actually recognize this as a cancer cell and try to kill and destroy it. The problem is cancers are smart and so they've developed this ability to put a protein out on the surface of the cancer cell. And that protein makes the cancer cell hide from the immune system. The immune fighting cell can't see the cancer cell when this protein is out on the surface.

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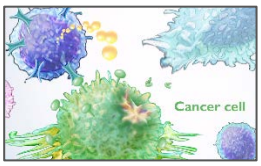


And so, what we do in that case is give you these new drugs called immune therapies. Immune therapies take away this signal here and allow the cancer cell to be recognized again by the immune system. They actually even do more than that, they will rev up and stimulate these immune cells to become active and fight and try to kill these cancer cells.

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Marcia: I mean this sounds really great but are there any side effects to this immune therapy?

Dr. O'Donnell: Great question. So, you know any medicine can have possible side effects but one of the good things about immune therapy is that the side effects are nothing like chemotherapy. So, what you went through with that, this is completely different. In fact, most patients tell me "Doc, are you sure you're giving me something with the immune therapy?" Because they feel so well during the treatments. Now if you were to have a side effect, the more common ones are some people will get a rash on the skin or some itching. And some people have a little bit of tiredness with the therapies. But even again, most patients feel pretty good on the treatments. There are some rare side effects that are more serious. These happen in less than one out of every ten patients, so less than 10% of all patients will have one of these more severe side effects.

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I want you to be aware of them though because they can happen. These are directly related to what you asked me about how the drugs work, how the immune therapies work is that sometimes they can rev up the immune system too much. And the immune system can start to attack your own body. I don't know if you've heard of auto-immune diseases, right? So, where your immune system is attacking your own body, that's like what happens here with these immune therapy drugs in these rare cases where your immune system gets too revved up. So, examples of that would be if your immune system starts attacking your intestines, you could have diarrhea. If your immune system would attack your liver, your liver doesn't work well. If your immune system would attack your lungs you might have trouble breathing. I even had one moment where the immune system attacked her muscles and she couldn't raise her arm above her shoulder.

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Now the good news about any of those side effects is that usually they're reversible meaning you would stop the immune therapy and then we would start a treatment called steroids. And the steroids calm down the immune system and usually things are getting better within even a couple of days.

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Marcia: So why did he have to go through chemotherapy with all those side effects he had to deal with if there's this other option?

Dr. O'Donnell: Great question. So, for bladder cancer there's two main types of treatment that we use. One is the chemotherapy that you went through. And then the other is this immune therapy. Patients like you who could tolerate the chemotherapy, that is the approved first treatment. So, we give chemotherapy to patients first because it really has the highest chance of working and it's been a tried and true treatment for decades. And then if the chemotherapy stops working like we're talking about today, then we go to the immune therapy.

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Kevin: Doc, you explain it really well. But what are the odds it's gonna work for me? That's what I wanna know.

Dr. O'Donnell: Do you like talking about numbers? Is it okay to talk about numbers?

Kevin: Yeah.

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Dr. O'Donnell: Okay. So about 20% of patients who we give these immune therapy drugs to, they will shrink the tumor. Another 20% of patients it'll kind of freeze the tumor into not growing but also not shrinking. So, when I think about it, I say "No almost half of patients will have some benefit from these immune therapy drugs." And so, to me it's clear that we would use this next. I'm recommending this to you. It is the standard of care treatment for people that have been through chemotherapy and have bladder cancer that has spread like you do. This is the exact treatment that we would use next. And it really offers a lot of hope.

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I actually wanna make a point about what you asked me about the chance of this working. And you know the reason these drugs have changed the whole landscape for bladder cancer is because if you are in that group of patients that has a response, that has their tumor shrink with these types of treatment then oftentimes we see the tumor not grow for long periods of time, perhaps even years and years. And we didn't used to be able to say that about bladder cancer. So that's really the ray of hope that I want you to walk away from here today, is if these drugs do work for you, it's possible that it will work for a very long time.

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Marcia: That sounds great. Wait so how ... Is it a pill that he's taking every day or how does that work?

Dr. O'Donnell: Great question. So, this is an IV infusion that you would get, usually once every three weeks. So, you would come into the medical center, you'd get it as an outpatient treatment. So, you'd usually be at the medical center for a couple hours. And then you'd go home that same day and then come back three weeks later for the next infusion.

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Marcia: Oh, that sounds great.

Kevin: This treatment seems like it's worth a try.

Marcia: I know right sounds very promising. Thank you so much. Yeah, I know we had a ton of questions but really thank you so much for your explanations.

Dr. O'Donnell: You're welcome.

Kevin: Let's go ahead.

Dr. O'Donnell: I think it's great, I think it's the right thing. So, the next step would be my nurse will come in and she'll talk to you about what it's actually like on the treatment day and she'll pick a start day with you.

Marcia: Great. Great thank you so much.

Kevin: Thanks doctor.

Marcia: Bye bye.

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