Personalized Cancer Care: A Look at Targeted Treatments

The outlook for cancer treatment options is a promising one. Researchers and physicians are discovering new ways to identify the best care for patients through targeted treatments. With the large number of cancer types, a treatment plan that works well for one person may not be the best plan for another. Through collaboration, rapidly evolving technology, and research in genetics and the molecular profiling of tumors, researchers and physicians have made astounding strides in the development of personalized cancer care.

1 What is personalized cancer care?

Cancer is not one disease. It's hundreds of different diseases. Today, compared to five years ago, we know so much more about what makes these cancers work. This has allowed doctors to increasingly use new drugs, which target individual aspects of the tumor cells to create custom plans for each patient. **Personalized cancer care** is a way of approaching an individual's treatment plan by looking at the genetic makeup and the biology of the patient's tumor to identify the best treatment plan for the individual.

2 How does it differ from prior cancer care?

In the last 10-15 years with the cloning of the human genome, we've gained a better understanding of how each person's tumor is unique and how each individual is unique. Years ago there were really only three options for treatment: chemotherapy, radiation, and surgery. These could occasionally cure certain types of cancer in people but the side effects were not small. Today as more targeted medicines are developed, doctors are matching patients much more specifically to types of treatments. By really going after what makes the cancer different than the person, researchers are seeing less side effects and better effectiveness for patients.

3 What targeted cancer treatments are currently available? Are most FDA approved?

Targeted cancer treatments are available for many different types of cancers and the number of drugs the FDA is approving now is happening at record-breaking speed. In the past, we've had drugs that treated general characteristics of the tumor cell. For instance, it was known that tumor cells grow fast and they divide fast. So agents were used that would non-specifically go after the dividing process of the cancer cell. Targeted treatments, on the other hand, are now aimed at a specific target in the tumor's cell. These specific targets are associated with the cancer process. One example would be Imatinib (Gleevec). This molecule specifically targets cells with The Philadelphia Chromosome. In one form of leukemia, chronic myelogenous leukemia (CML), The Philadelphia Chromosome produces an abnormal cell signaling protein that doesn't turn off. Imatinib fits right into a pocket of this signaling protien and blocks it. **Targeted treatments take advantage of the characteristics that make the cancer cells different from healthy cells.** The process of developing these targeted treatments is difficult. However, this is being done at record-breaking speed. Once these treatments have been developed and have made it through clinical trial, the FDA can then approve them.

Recording: bit.ly/CancerCareRecording

4 Which cancer type is making the biggest strides in terms of targeted therapy?

It's interestingly spread out through most types of human cancers. The leukemias and other types of blood cancers have had a number of targeted drugs developed. This could show that the country is finally getting the return on investment of 50 years of research. It could also show that the FDA is working closely with the academic world, as well as with the private sector to make sure that effective drugs are getting developed and getting developed quickly. Another theme developing is that the same targeted therapy drug can work with several different types of cancer. This means that targets extend over a number of different cancers. For example, brain, cervix and colorectal cancer are all being treated with the FDA-approved drug Bevacizumab.

In the past, because of the difficulty of developing drugs and the cost of the process, rare tumor types, such as giant cell tumor of the bone, were unfortunately often overlooked for clinical trial. Now, because development is moving incredibly fast, agents and targeted therapies are being found that are effective at treating extremely rare tumor types.

This, in part, has been made easier by technology's ability to link communities of people and find patterns to lead to new drug development. Large strides are being made in cancer development. Cervical cancer, which has been historically difficult to treat, now has an FDA-approved targeted therapy. In addition, Ipilimumab was developed to treat melanoma. This type of drug targets the immune system to fight the cancer for us. This type of immunotherapy is extremely new and extraordinarily exciting for everyone in the field. Those drugs are the first generation of those different types of targeted therapies. An entire disease has been turned around with these types of therapies and immunotherapy and has completely revolutionized doctors' approaches to that disease.

5 How do you use targeted treatments to effectively personalize cancer care?

There are many factors to consider. The general theme is the practicing clinician has to be aware of the way the patient is presenting, the stage of the disease, the standard options available, the molecular genotype of the tumor, and if the patient could match for a targeted therapy. Part of the clinician's responsibility is to know these factors. The good news is that these targeted therapies are available and therefore so is the ability to mix and match therapeutic approaches with the goal of optimizing response and minimizing toxicity. Technology is moving so fast. Patients have gone to see their doctors with extensive molecular analyses of their tumors. More often than not, however, the patient doesn't understand it and it can cause confusion. The clinician's job is to help interpret what is the molecular noise versus what is the meaningful target that can either put the patient on a clinical trial or identify them for standard care. There's a huge interest in doing DNA tests on tumors. The answer to cancer for roughly 20% of those people may be hidden in those genes, and understanding the gene code itself can be life-saving. However, that's the minority of cases still. What we know today may not necessarily be accurate six months from now. A couple of years ago there were no targeted treatments for ovarian cancer. Now there are several. There are aspects like that in many kinds of cancers. It's complicated. That's why it is the role of the physician to be the expert in advising patients and looking at the patient as an individual.

6 I hear a lot about new tests on tumor DNA. Should I have those?

The situation of the patient makes a big difference here. The tools used today might be different a few years from now. Not only will the technology change, but the tumor might change as well. An expensive molecular analyses might not be relevant in 5 or 10 years. The question should be asked if a molecular analysis will change the course of treatment. Will it send patients to clinical trial or not? If it does, then it may be considered. Along this topic, there has also been a shift toward molecular tumor boards. **Molecular tumor boards** involve bringing a number of experts into a room and looking at a patient's results and determining as a team what they think is best for the patient and which one of the identified targets could be treated with an FDA-approved targeted therapy or a clinical trial. It is also important for patients to advocate for themselves and ask their doctors, "Might there be a clinical trial for me?" **"As long as patients keep that in mind for part of their treatment planning I think that also offers the chance to help patients get in on the newest treatment options." - Dr. Demetri**

7 What are the limitations of targeted cancer treatment?

We need to recognize that, although targeted therapy has been a boon for cancer treatment, it's not necessarily a cure-all. Tumor cells are clever. Tumor cells can develop resistance to targeted therapies. The tumor can disappear. It can re-mutate. There are a variety of responses from the cancer cell to survive even with the targeted therapy. Cancer is a complex disease. For instance, a mutation in one cancer is very effectively treated by targeted therapy, yet the same mutation in another cancer, because it's in a different context, will not have the same response. So we have to understand the entire cell and the entire pathway to predict the cancer's response. Finally, targeted treatments are not without side effects. The advantage of targeted therapy is to find a subset of patients who will benefit, a subset of tumors to respond. Therefore, those other patients won't be subjected to the toxicity. That doesn't mean they don't have toxicity. They're not the standard ones seen with chemotherapy such as nausea, vomiting, or bone marrow suppression. However, there are effects like skin rash and high blood pressure. Physicians need to make sure patients are aware of it.

One more item to note is that many types of cancer can be treated with standard treatments, such as chemo and radiation. The goal of targeted therapy is not to completely defer from these standard therapies just because targeted therapy is the new talked-about thing. It's really about taking the whole person into account, and that's where the details really do matter.

8 Where can I go to find out more information?

American Cancer Society www.cancer.org, the **National Cancer Institute** www.cancer.gov, and **American Society of Clinical Oncology** www.asco.org are reputable sites for accurate information on cancer statistics. Other reliable sources of information are professional nonprofit organizations within the specific cancer type. For instance, **Ovarian Cancer National Alliance** is an organization within ovarian cancer and a good source for information. Additionally, www.cancer.net has subgroup-specific disease information.

Expert Panel Members


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