Non-Hodgkin Lymphoma: Targeted Therapy

What is targeted therapy?

Targeted therapy uses medicines that attack certain parts of cancer cells. These medicines target proteins or cell functions that help cancer cells stay alive, grow, and divide. They're different from chemotherapy (chemo) medicines. And they may work when chemo does not. Targeted therapy focuses on cancer cells. They mostly leave healthy cells alone. So the side effects are different and often less severe than chemo side effects.

When is targeted therapy used for non-Hodgkin lymphoma?

Targeted medicines can be used to treat some types of non-Hodgkin lymphoma. They tend to be used after other treatments have been tried. But some targeted therapies are used earlier. Targeted therapy is often given along with chemotherapy.

Your lymphoma cells will be tested to look for changes in the cells that can be matched with a medicine that targets those changes.

Which targeted therapy medicines are used to treat non-Hodgkin lymphoma?

The targeted medicines used to treat non-Hodgkin lymphoma include:

- Kinase inhibitors
- Proteasome inhibitors
- HDAC (histone deacetylase) inhibitors
- EZH2 inhibitors
- Nuclear export inhibitors

Kinase inhibitors

Kinases are proteins in cells that help send signals to the control center inside the cell. Some kinases help lymphoma cells grow or stay alive. Medicines that block kinases are called kinase inhibitors. They can help slow or stop the growth of some types of non-Hodgkin lymphoma cells. They are grouped by the specific kinase they work on:

- **BTK inhibitors.** These medicines block the BTK protein, which helps lymphoma cells grow and stay alive. They tend to be used after at least one other treatment has been tried. They are taken daily as a pill. Side effects can include headache, easy bruising, infection, changes in bowel movements, and heart rhythm problems.
- **PI3K inhibitors.** These medicines work on a group of kinases known as PI3K. PI3K kinases send signals that affect cell growth. These medicines are taken as pills or given as infusions into a vein through an IV. They're most often used when other lymphoma treatments stop working. Common side effects include fever, feeling tired, nausea, diarrhea, cough, belly pain, rash, and low blood cell counts.

Proteasome inhibitors

Proteasomes act like tiny garbage disposal units inside cells. They get rid of proteins the cell doesn't need. This helps control cell growth. Proteasome inhibitors stop proteasomes so they don't destroy proteins. As the proteins build up inside the lymphoma cells, they die.

Bortezomib is a proteasome inhibitor that can be used to treat some types of lymphoma. It tends to be used if other treatments don't work. It can be given through an IV (intravenous line) into a vein or as a shot under the skin (subcutaneous injection). Side effects include nausea, appetite loss, and low blood cell counts. It can also cause nerve damage. This can lead to numbness, tingling, or pain in the hands and feet.

HDAC inhibitors

HDAC (histone deacetylase) inhibitors work on histones. These are proteins that affect the genes in cells that control cell growth. HDAC inhibitors can be used to treat some types of T-cell lymphomas, including skin lymphomas.

Examples of these medicines are romidepsin and belinostat. Both are given through an IV into your blood. Side effects can include nausea, vomiting, shortness of breath, feeling tired, and low blood cell counts.

EZH2 inhibitors

EZH2 is a protein that can help some cancer cells grow. Some people with follicular lymphoma (FL) have an EZH2 gene mutation in their cancer cells. A medicine called tazemetostat targets this mutation to kill the FL cells. It may be tried if other treatments don't work. Sometimes it is even used to treat FL cells that don't have the EZH2 mutation when there aren't other good treatment options left. It is taken as a pill.

Common side effects include feeling tired, low blood cell counts, bone and muscle pain, and nausea.

Nuclear export inhibitors

The nucleus is the "brain" of the cell. It controls the proteins that keep a cell alive. A protein called XPO1 helps move proteins from the nucleus to other parts of the cell to keep it working and alive. Selinexor is a medicine called a nuclear export inhibitor. It blocks the XPO1 protein so other proteins cannot be moved out of the nucleus. It might be used to treat certain B-cell lymphomas that are no longer responding to any other treatments.

This medicine is taken as a pill. Common side effects include low blood cell counts, which can cause easy bleeding, tiredness, and shortness of breath. It can also cause nausea, diarrhea, weight loss, and low sodium levels in your blood.

Working with your healthcare provider

Talk with your healthcare providers about what you should expect targeted therapy to be like and what side effects you should watch for. Be sure you know when to call them. For instance, if your blood counts drop, it can make you more likely to get infections. You may be told to check your temperature and stay away from people who are sick. You may need to call if you have a fever or chills. Make sure you know what number to call with problems or questions. Ask how to get help after hours and on weekends and holidays.