

Highly Treatable Cancers That Affect Young People Require Special Considerations

Certain lymphomas, a type of blood cancer, can affect adolescents and young adults. Proton therapy and fertility issues may be relevant.

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Hodgkin lymphoma and primary mediastinal B-cell lymphoma are two aggressive blood cancers that affect young people between their late teens and mid-30s, a group often referred to as Adolescents and Young Adults (AYA).

These lymphomas often grow in the lymph nodes in the chest region, and patients usually see their doctor with symptoms such as enlarged lymph nodes or shortness of breath. There are no screening tests for these cancers at this time.

Symptoms usually subside after time or treatment with antibiotics in otherwise healthy, young patients, but if not, physicians will look further into the cause. Luckily, these types of lymphoma are rare and considered curable. Hematologic (blood) diseases such as lymphoma can often be cured even at stage 4.

The first line of treatment is always a cocktail of systemic drugs, including chemotherapy and other therapies that target proteins that control how cancer cells grow, divide, and spread. This multiagent treatment usually destroys most of the disease. Sometimes, radiation is recommended as a follow-up treatment.

For stage 1 and 2 Hodgkin lymphoma, multiple randomized trials have shown that without a course of radiation, the cure rate is 5%–10% lower, even after systemic drugs have resulted in a complete metabolic response — meaning no signs of lymphoma are visible on a PET-CT scan. Five to 10 of every 100 of these patients will have a recurrence without radiation.

In the past, Hodgkin lymphomas were treated only with radiation, which meant delivering a high dose of radiation to large parts of the chest and nearby lymph nodes in order to kill all microscopic disease. Though an effective treatment for the disease, the level of radiation carried a higher risk of long-term negative side effects such as ischemic heart disease, valvular heart disease and secondary cancers such as breast cancer.

Today, patients undergo systemic treatment first, which allows radiation oncologists to target the area most likely to experience a recurrence: the initial site of disease. Treating patients with chemotherapy first allows providers to reduce the size of the area being treated with radiation and to use lower doses (compared to radiation as the sole treatment). This can help reduce the risk of side effects.

Proton therapy, a more precise way to deliver radiation, can help reduce the risk even further. Because protons are heavy, radioactive particles rather than waves, and have the property of losing energy slowly until a sudden peak, they can be controlled to release most of their dose at the site of the tumor, without depositing more radiation beyond it. This reduces toxicity (and side effects) to healthy organs.

Fertility

Fertility preservation is one of the most serious concerns for AYAs — young adult patients with cancer. Many patients are not aware that chemotherapy and radiation can affect fertility.

Collaboration between a patient's providers early on — before starting treatment — can improve fertility outcomes in the future, but options become more limited after treatment has started.

However, proton therapy can be precisely manipulated to avoid delivering radiation to reproductive and hormone-producing organs in both male and female patients to minimize infertility.

Some cancers tend to affect young people more. Common AYA cancers include:

- In 15- to 19-year-olds: thyroid cancer, Hodgkin lymphoma, brain and central nervous system tumors, and non-Hodgkin lymphoma
- In 20- to 29-year-olds: thyroid cancer, testicular cancer, melanoma, and Hodgkin lymphoma
- In 30- to 39-year-olds: breast cancer, thyroid cancer, melanoma, and colon and rectum cancer

“My most challenging consultations with patients are for lymphoma,” said [Yolanda Tseng, MD](#), who treats lymphomas and central nervous system tumors at Fred Hutch Cancer Center – Proton Therapy. “The extent and location of the cancer determines when I recommend protons or photons, among other things. Each patient has a different toxicity risk based on their initial extent of disease, age, sex, family history and prior medical history. If the tumor overlaps with the heart or if the patient is a young woman, we often consider proton therapy to minimize dose to heart, lungs and breast tissue. This translates into fewer side effects.”

The International Lymphoma Radiation Oncology Group (ILROG) has [guidelines](#) on lymphoma patients most likely to benefit from proton therapy. These include (1) patients with mediastinal disease (cancer in the area between the lungs) that overlaps with the heart; (2) young female patients for whom proton therapy can reduce breast dose and risk for secondary breast cancer; and (3) heavily pretreated (with systemic drugs) patients who are at higher risk for radiation-related toxicity to the bone marrow, heart and lungs.

Tseng recently co-authored a [study](#) that identified a fourth group that could benefit from proton therapy: patients with concurrent mediastinal and axillary disease (cancer in the armpit area). The study used pencil beam scanning to deliver radiation to more extensive areas while limiting the dose to the lungs, heart and breast tissue compared to modern photon techniques.

Because doctors consider Hodgkin and mediastinal B-cell lymphoma to be curable, age, sex and extent of disease play important roles in determining the course of treatment. In such cases, physicians put heavier emphasis on reducing potential side effects, especially future cancer risk, because patients are expected to live for many years and physicians want to preserve their quality of life.

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