Cancers of the Hematologic and Lymphatic Systems

Leukemia includes a number of cancers that originate in the bone marrow. Lymphocytes (or the precursor blasts) develop abnormally and multiply, preventing the function of the surrounding healthy cells. The cancerous cells can then spread throughout the body via the bloodstream. There are four main forms of leukemia: acute and chronic lymphocytic leukemia (ALL, CLL) and acute and chronic myelogenous leukemia (AML, CML). Acute versus chronic denotes the rate of progression.1

Lymphomas are a group of cancers that originate within the lymphatic system. Lymphocytes develop abnormally and multiply, decreasing the normal immune function of the system. Like the bloodstream, the lymphatic system provides a means for the cancer to metastasize to other tissues. Lymphomas are broadly divided into Hodgkin (HL) and non-Hodgkin lymphomas (NHL) and can be further diagnosed based on the specific cells involved and rate of the disease's progression.1-6

Assessing the Patient with Leukemia or Lymphoma

A thorough history and examination are essential to assessing and treating any patient, but especially in those with leukemia or lymphoma. The patient may be undiagnosed and in need of a physical therapist’s evaluation to determine a systemic origin to a dysfunction rather than a musculoskeletal one. In this case, the physical therapist would be a key component in referring the patient back to the primary caregiver or oncologist for further medical evaluation.7

Risk Factors to Review1-5

- Age: ALL is seen in children ages 2-4 and in adults aged >50 years. CLL, AML and CML typical develop only in older adults, as do most lymphomas8
- Genetic: First-degree relatives with leukemia or lymphoma increase the risk of developing these cancers
- Health: Individuals with compromised immune systems due to organ transplant or disease (HIV, Hepatitis C, etc.) are at higher risk for leukemia or lymphoma
- Environmental
**Signs and Symptoms**

Leukemia and Lymphoma Have Many of the Same Signs and Symptoms:

- Fever or chills
- Persistent fatigue/weakness
- Loss of appetite and/or weight
- Excessive night sweats
- Enlarged lymph nodes
- Unusual bleeding/echymosis
- Petechiae
- Bone pain or tenderness
- Itching
- Frequent infection

When assessing the patient with a current cancer diagnosis, it is important to know what interventions are being utilized in the treatment of leukemia and lymphoma and the associated side effects of the interventions. A thorough examination and evaluation will determine key areas in which physical therapy can help to improve the patient's quality of life.

**Medical Treatment**

Treatment plans will differ for each patient based upon the type and stage of disease and the patient's wishes. Below is a list of the most common interventions currently utilized.

- Surgery
- Radiation therapy
- Chemotherapy
- Drug therapy
- Bone marrow transplant
- Immunotherapy
- Stem cell transplantation

**Medical Treatment Side Effects**

- Persistent fatigue
- Progressive weakness
- Decreased sensation & balance secondary to chemotherapy induced peripheral neuropathy
- Skin changes
- Nausea
- Lymphedema
- Soft tissue adhesions
- Osteopenia, osteoporosis
- Increased risk of infection (bone marrow transplant)
# Physical Therapist Assessment Tools

## Strength Assessment
**Manual Muscle Testing (MMT)**
- Testing performed by physical therapist to determine strength of individual or groups of muscles
- Inter-rater reliability 82% to 97%; Test-retest reliability 96% to 98% 18
- Construct validity found 18

**Dynamometer**
- Handheld device used to measure grip strength
- Test-retest reliability $r=0.9864$ 19
- Concurrent validity $r>0.98$ 19

## Pain Assessment
**Visual Analog Scale (VAS)**
- Self-administered tool. Patient marks pain level on a 100-mm line that incorporates the range of "no pain" to "the worst pain imaginable." 20
- Test-retest reliability 0.71-0.99 20

## Sensory Assessment
**Semmes-Weinstein monofilaments**
- Tools used to determine light touch sensation in hands and feet 2° chemotherapy-induced polyneuropathy (CIPN)
- Test-retest reliability: no significant error found using t-test analysis 21
- Predictive validity: Sensitivity=1.0, Specificity=0.4 21

## Balance Assessment
**Berg Balance Scale (BBS)**
- 14-item test used to score balance impairment
- Internal consistency 0.96 in clients with varying diagnoses 20
- Test-retest reliability 0.92 for older adults 20

**Tinetti Assessment Tool**
- Mobility assessment for balance and walking ability and safety in performing tasks
- Inter-rater reliability 85% +/- 10% 22
- Correlated with Berg balance scale $r=0.91$ 22

## Quality of Life Assessment
**FACT Questionnaires (Functional Assessment of Cancer Therapy)**
- **FACT-G (FACT-General)** 23
  - 27-item, self-administered questionnaire
  - Domains: Emotional, functional, physical, and social/family well-being
  - Valid tool for measuring the above domains 24
- **FACT-Leukemia (FACT-Leu)** 23
  - Basic FACT-G +17 items specific to leukemia patients
  - Test-retest correlation 0.82 to 0.92
- **FACT-Lymphoma (FACT-Lymphoma)** 23
  - Basic FACT-G +15 items specific to lymphoma patients
  - Test-retest correlation 0.82 to 0.92
- **FACIT-F (FACIT-Fatigue)**
  - Basic FACT-G + 13 items
  - Test-retest reliability: 0.87 25
  - Coefficient alpha: 0.93-0.95 25
  - Validity: significant positive relationship with other fatigue measures 26
Treating the Patient with Leukemia or Lymphoma

Physical Therapists (PT) focus on the impairments, functional limitations, and disabilities that may occur as a result of having leukemia or lymphoma or undergoing the treatment for these diseases. PTs educate patients on how physical therapy can help during the course of their treatment. For example, in the past, patients have been advised to combat fatigue with rest, but research recommends that continued physical activity is an essential part of reducing cancer-related fatigue and other side effects.

**Physical Therapy Interventions for Impairments, Functional Limitations, and Disabilities**

- Pain: Soft tissue mobilization, stretching, joint mobilization, posture education, modalities
- Soft tissue dysfunction: Soft tissue mobilization, stretching, strengthening, modalities
- Decreased bone mineral density: progressive exercise program
- Strength loss: Progressive strengthening program
- Sensation loss: Education on safety awareness
- Lymphedema: Lymph drainage massage, compression garments
- Decreased balance: Challenges to visual, vestibular, and somatosensory systems, gait training
- Fatigue: Exercise, relaxation and energy conservation techniques (deep breathing, visual imagery, education)
- Decreased quality of life: Exercise, energy conservation techniques, education

**Resources**

- Lymphoma Foundation of America - [www.lymphomahelp.org](http://www.lymphomahelp.org)
- Lymphoma Foundation of Canada - [www.lymphoma.ca](http://www.lymphoma.ca)
- National Cancer Institute (National Institutes of Health) - [www.cancer.gov](http://www.cancer.gov)
- American Cancer Society - [www.cancer.org](http://www.cancer.org)
- Mayo Clinic - [www.mayoclinic.com](http://www.mayoclinic.com)
- American Physical Therapy Association - [www.choosept.com](http://www.choosept.com)
- APTA Oncology - [www.oncologypt.org](http://www.oncologypt.org)
References


Disclaimer: This ‘Leukemia/Lymphoma Fact Sheet’ is a public service from APTA Oncology. It is not intended to be a comprehensive overview of this subject.