John R. Marsh Cancer Center
Annual Cancer Registry Report for 2007

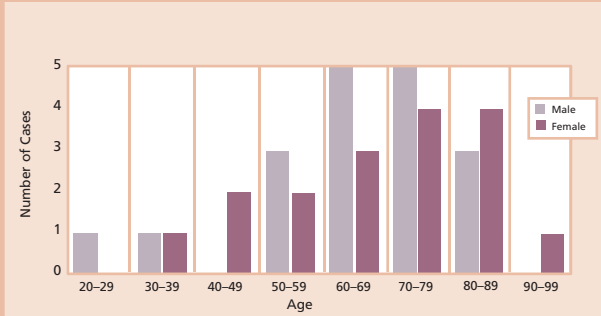
Non-Hodgkin's Lymphoma Prognosis and Treatment

by Frederick H. Kass III, MD

Non-Hodgkin's lymphomas (NHL) are a group of diseases (more than twenty individual histologic subtypes) which result from the malignant transformation and proliferation of lymphocytes. These diseases, which occur primarily in middle-aged and elderly patients, have more than doubled in incidence during the past thirty years. This appears to be due to an aging population and probably environmental factors.

Non-Hodgkin's lymphomas are divided into three histologic groups: low, intermediate, and high grade. These categories are useful in understanding the natural history and prognosis of specific subtypes of NHL and predicting the need for and the response to treatment (chemotherapy and/or radiation therapy). Chemotherapy includes cytotoxic agents, steroids, and monoclonal antibodies. The latter agents that have been developed to react with specific surface antigens on the malignant lymphocytes and have been of major benefit in managing NHLs.

Figure 1. 2007 Prevalence of Lymphoma at Washington County Hospital

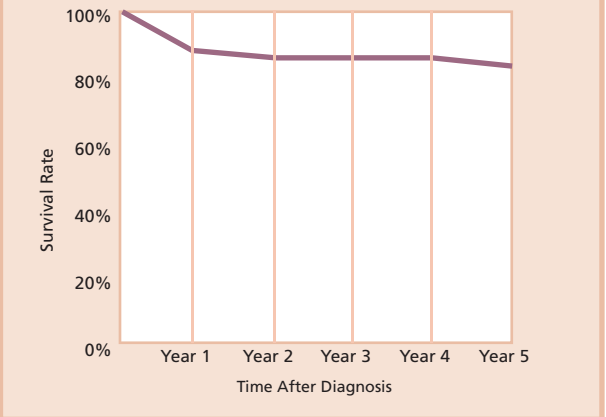


In 2007, thirty-five new cases were diagnosed, the majority of patients being over fifty years of age with an equal number of males and females (Figure 1). Most of cases were low-grade (nineteen cases, of which seven were follicular lymphomas). Sixteen cases were intermediate-grade non-Hodgkin's lymphoma (thirteen were diffuse large cell lymphomas). There were no cases of high-grade NHL. The distribution (grade and histologic subtypes of NHL) is similar to that seen nationally.

The prognosis and survival of patients with non-Hodgkin's lymphoma are very good. This reflects the long natural history of low-grade disease (medical survival greater than five years) and the usual durable remission of diffuse large cell lymphoma to combination chemotherapy and radiation therapy. The five year survival of patients diagnosed in 2000–2001 is excellent —greater than 85%. (Figure 2)

The evaluation and management of patients with non-Hodgkin's lymphoma is dependent on close cooperation between surgery, pathology, diagnostic radiology, radiation oncology, and medical oncology. All of these specialties are imperative for the optimum care of patients with non-Hodgkin's lymphoma.

Figure 2. Lymphoma Adjusted Five-Year Survival Rate at Washington County Hospital 2001–2005



Primary Site Distribution of Cancer Cases at Washington County Hospital for 2007

	Total Cases	Analytic	Non-Analytic	Male	Female
All sites	1,036	967	69	518	518
Oral Cavity					
Lip	0	0	0	0	0
Tongue	5	5	0	5	0
Oropharynx	1	1	0	1	0
Hypopharynx	0	0	0	0	0
Other	10	9	1	6	4
Digestive System					
Esophagus	11	10	1	9	2
Stomach	2	2	0	0	2
Colon	68	68	0	35	33
Rectum	23	22	1	14	9
Anus/anal canal	6	6	0	1	5
Liver	2	2	0	1	1
Pancreas	15	14	1	9	6
Other	6	6	0	2	4
Respiratory system					
Nasal/sinus	0	0	0	0	0
Larynx	8	8	0	5	3
Lung/bronchus	129	128	1	80	49
Other	3	3	0	3	0
Blood & bone marrow					
Leukemia	13	13	0	4	9
Multiple myeloma	8	8	0	4	4
Other	6	5	1	2	4
Connect/soft tissue	11	11	0	8	3
Skin					
Melanoma	40	35	5	20	20
Other	3	2	1	2	1
Breast	180	174	6	1	179
Female genital					
Cervix uteri	15	14	1	0	15
Corpus uteri	43	43	0	0	43
Ovary	9	9	0	0	9
Vulva	2	2	0	0	2
Other	2	2	0	0	2

Primary Site Distribution of Cancer Cases at Washington County Hospital for 2007 continued

	Total Cases	Analytic	Non-Analytic	Male	Female
Male genital					
Prostate	204	176	28	204	0
Testis	5	5	0	5	0
Other	0	0	0	0	0
Urinary system					
Bladder	45	28	17	32	13
Kidney/renal	16	16	0	9	7
Other	1	1	0	0	1
Brain & CNS					
Meninges (malignant)	1	1	0	1	0
Brain (malignant)	13	13	0	7	6
Meminges (benign)	13	12	1	6	7
Endocrine					
Thyroid	49	49	0	12	37
Other	0	0	0	0	0
Lymphatic system					
Hodgkin's disease	2	2	0	1	1
Lymphoma	38	34	4	19	19
Unknown primary	28	28	0	10	18

Number of cases excluded: 1
This report excludes CA in-situ cervix cases, squamous and basal cell skin cases, and intraepithelial neoplasia cases.

2007 National Cancer Rates vs. Washington County, Md., Cancer Rates by Gender for Top Five Sites

Site	Female WCHS	National	Site	Male WCHS	National
Breast	35%	26%	Prostate	35%	25%
Lung/bronchus	9%	14%	Lung/bronchus	15%	15%
Colorectal	8%	10%	Colorectal	9%	10%
Corpus uteri	8%	6%	Bladder	6%	7%
Melanoma	4%	4%	Melanoma	4%	5%

New Directions in Radiation Therapy

by Dan Cornell, MD

Approximately 100 years ago radiation therapy was first used to treat tumors. At that time, the use of radiation therapy was limited to radioactive sources that were actually placed within or close to tumors that could be easily visualized. In time, the concept of tumor visualization and providing a high dose in a small area would prove to be the cornerstone of management for future radiation therapy techniques. With the shift of radiation therapy to external beam radiation, radioactive sources for the use of tumor control took a back seat to modern linear accelerators that could provide nearly the same dose in a more convenient external approach. Over the ensuing years, better techniques became available to evaluate the position and extent of tumors so that radiation therapy planning could be made more efficient. A prime example of this is the advent of the CT and MRI scanners which allowed for precise visualization of the tumor in relation to other structures.

Another great step forward occured with PET scanning which allows clearer visualization of soft tissue masses but also the metabolic activity of these masses. Since tumors have a high metabolic rate they can be easily seen on a PET scan thereby further identifying the necessary treatment area for extrnal beam radiation therapy.

As tumor visualization techniques advanced with the advent of high-resolution CT and MRI scans and more detailed PET scan imaging, external beam radiation therapy units also became more precise with use of multileaf collimators and the advent of modern treatment planning computers which allowed for elaborate multifield setups. This approach, with treatment of the tumor from many different angles, allowed spreading the dose over a wider region and having fewer side effects on adjacent normal tissues.

The weakest link between these two advancing technologies however, was knowing exactly where the tumor was located. It is easy to spot a tumor on a CAT scan and then correlate this to a PET scan for a more accurate indication of the area that needs to be treated. In addition, regional lymph chains where the tumor is likely to spread can also be visualized and incorporated into the radiation therapy treatment planning. The linear accelerator with its capabilities of precisely shaping the beam can focus on a very tiny area. But just because a tumor could be visualized on a diagnostic scan, did not always mean it was going to be accurately centered within a small radiation therapy field on a non-stationary patient. One of the reasons the early radiation therapy using radioactive sources was effective is the fact that if there is any motion in the tumor, the source would move along with the tumor, providing a high dose rate independent of tumor motion.

The problem with current therapy is that PET scans and CAT scans are a snapshot of a living, breathing, and moving organism called the cancer patient. Unfortunately the motion from respiration, bowel gas, and sometimes even cardiac motion can cause a significant positional change in the tumor. By their very nature, radiation therapy fields are planned off of static images such as PET scans, CT scans, or MRI scans. Tumor motion is not taken into account, and if this is overlooked, a small precise radiation therapy field might be off target on any particular day depending if the tumor is moving within and outside of the radiation therapy field.

Fortunately we have been able to overcome some of these limitations. Fiducial markers (small metallic marker seeds) can be placed into various organs, in particular the prostate, which allows for visualization of a structure as it is set up on a daily basis before treatment. In some cases during the treatment course itself, if the markers that are placed within the cancer move outside a certain range of predetermined parameters, the treatment beam shuts off, and then restarts once the tumor is back in its original position. This “gated” type of treatment can also be used in other locations such as the lung, where the lung mass can be

New Directions in Radiation Therapy continued

by Dan Cornell, MD

visualized on fluoroscopic examination during the treatment course. Whenever the tumor is centered within the narrow radiation therapy beam, the radiation therapy is turned on; but if for some reason the patient takes a deep breath, or there is some other motion where the tumor is not within the narrowly focused beam area, the radiation therapy machine temporarily shuts off. By gating the beam and turning on the beam when the tumor is in position, a higher dose can be delivered accurately to the breathing lung tumor patient, increasing the likelihood of a cure. This imaging-guided radiation therapy is much more precise than the older form of treatment that relied on external markers such as tattoos to define where the radiation therapy beams were to be placed. By using real-time imaging, gating techniques, and dynamic treatment modalities, we are rapidly approaching the point where high doses of radiation therapy can be delivered anywhere within the body. Patients can now be treated dynamically so that tumors are less able to "dodge the radiation therapy bullet."

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