Radioimmunotherapy for Non-Hodgkin’s Lymphoma With Yttrium 90 Ibritumomab Tiuxetan

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The term non-Hodgkin’s lymphoma (NHL) refers to more than a dozen malignancies that arise from a proliferation of B or T lymphocytes at various stages of differentiation. Approximately 95% are derived from B cells. The average age at the onset of the disease is 42 years, and the incidence continues to increase with age. Because so many years of life are lost to NHL, it ranks fourth in economic impact among cancers in the United States (Shipp, Mauch, & Harris, 1997). The current treatment options for NHL are limited, and interest now is focusing on novel immunobiologic approaches. One such strategy is radioimmunotherapy, which uses targeted monoclonal antibodies to deliver radioactive isotopes directly to tumor sites. This review focuses on the potential therapeutic role of radioimmunotherapy in B-cell NHL.

Non-Hodgkin’s Lymphoma

Classification and Presentation

NHLs are classified into low, intermediate, and high grades. This classification scheme is useful for predicting the survival of patients who go untreated, but it does not reliably predict outcomes after treatment. The increasing incidence of non-Hodgkin’s lymphoma (NHL), coupled with the lack of optimal treatment options, has prompted the development of novel treatments. Of these, radioimmunotherapy is one of the most promising. Two of the radiolabeled monoclonal antibody therapies being studied in the treatment of NHL are yttrium 90 (90Y) ibritumomab tiuxetan and iodine 131 (131I) tositumomab. The radionuclides 90Y and 131I emit beta radiation; 131I also emits gamma radiation, thus requiring more elaborate precautionary measures to limit radiation exposure. The monoclonal antibody portions of the drugs target the CD20 surface antigen that is present on the majority of B-cell lymphomas, resulting in direct radiation to the targeted cells, as well as indirect targeting of adjacent cells (known as the crossfire effect). Clinical trials of 90Y ibritumomab tiuxetan in patients with NHL have produced promising results. The safe and effective use of radioimmunotherapy requires a multidisciplinary team approach in which nurses play a central role.

Low-grade, or indolent, lymphomas are slow-growing tumors on which chemotherapy often is initially successful, but cancer usually recurs within five years. Recurrent tumors may be treated with chemotherapy or radiotherapy, but response rates diminish over time, and the malignancies eventually are fatal to most patients. Despite widespread use of single- or multiagent chemotherapy, the actuarial survival rates of 1.021 patients with low-grade lymphoma were similar in the periods 1960–1975, 1976–1986, and 1987–1992, with a median overall survival of 8–10 years (Horning, 1993). Intermediate-grade and high-grade lymphomas, on the other hand, are fast-growing tumors that generally are fatal a year or two after diagnosis if left untreated. These lymphomas, however, are more responsive to chemotherapy, and their prognosis is better than that of low-grade lymphomas in terms of cure (Jaffee, 1998).

Incidence and Mortality

The incidence of lymphoma has increased steadily since 1950. National surveillance data indicate that the incidence of NHL increased by 3%—mortality by 6%—between 1991 and 1995. The reasons for these increases are not clear, but changes in diagnostic and classification practices might have contributed (McKean-Cowdin, Feigelson, Ross, Pike, & Henderson, 2000). According to estimates, 56,200 new cases of NHL were predicted to be diagnosed in 2001. The incidence of this cancer almost has doubled since the early 1970s but has slowed in the past decade. The American Cancer Society (2002) further estimates that 24,400 people will die of NHL in 2002.