

## SECTION 8 LYMPHOHEMATOPOIETIC CANCERS

*Cancers of the lymphohematopoietic system include the heterogeneous group of lymphomas, leukemias, and multiple myelomas.*

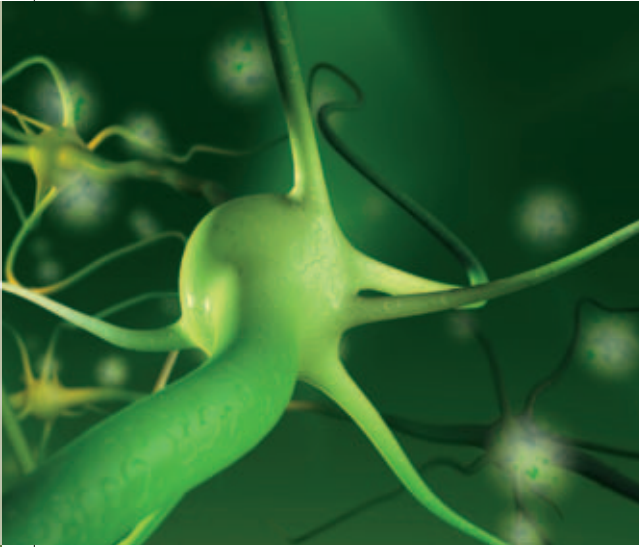
*Collectively, it is estimated that this group of cancers is the sixth most common type worldwide (Jemal et al. 2008).*

It was stated in the 2007 WCRF/AICR report on diet and cancer that “These cancers have different non-dietary causes and there is no reason to believe that they might be affected by food, nutrition, and physical activity in the same ways” (WCRF/AICR 2007). Furthermore, “There are no postulated mechanisms by which meat could increase the incidence of lymphoid and haemopoietic cancers” (WCRF/AICR 2007). Despite a lack of mechanisms and little evidence of biological plausibility, the epidemiologic literature pertaining to this group of cancers is summarized briefly in this section.

### NON-HODGKIN LYMPHOMA

The non-Hodgkin lymphomas (NHL) are a heterogeneous group of malignancies arising from lymphoid tissue, with varied clinical and biological features (Alexander et al. 2007B). Because of this heterogeneity, NHL is divided into B-cell and T-cell neoplasms based on histologic characteristics, especially lymphocyte developmental stage, and are classified further according to clinical features. Incidence rates of NHL increased during the 1970s and 1980s, but generally stabilized during the 1990s. NHL is currently the fifth most commonly diagnosed cancer among men and women in the United States (Jemal et al. 2008). To date, little is known about the etiology of NHL, as either a general class of malignancies or specific histologic types. Family history of NHL or other hematolymphoproliferative cancers and personal history of any one of several autoimmune disorders are associated with increased risk of NHL, but are not likely to account for a large proportion of cases (Alexander et al. 2007B). Infectious diseases, such as HIV/AIDS, human herpesvirus 8, and Epstein-Barr appear to be associated with differing types of NHL, such as some B-cell lymphomas (Alexander et al. 2007B).

In an analysis of more than 1,500 NHL cases, Cross et al. (2007) observed no effect of red or processed meat intake on risk of NHL. Similarly, Ward et al. (1994) found no significant difference in risk between the highest and lowest categories of processed meat intake (OR for processed meats among women = 1.2, 95% CI: 0.7–2.1; among men = 0.6, 95% CI: 0.4–1.1).



### HODGKIN LYMPHOMA

Hodgkin lymphoma is a rare malignancy, accounting for less than 10,000 cases in the United States per annum (Jemal et al. 2008). Although relatively little is known about the specific causes of Hodgkin lymphoma, diet does not appear to influence risk of disease. Epidemiologic data for Hodgkin lymphoma and red or processed meat consumption are limited. Tavani et al. (2000) reported a non-significant positive association between high red meat intake and Hodgkin lymphoma in a case-control study conducted in Italy (OR = 1.6, 95% CI: 0.9-2.9). Prospective cohort studies are needed to evaluate red/processed meat intake and Hodgkin lymphoma.

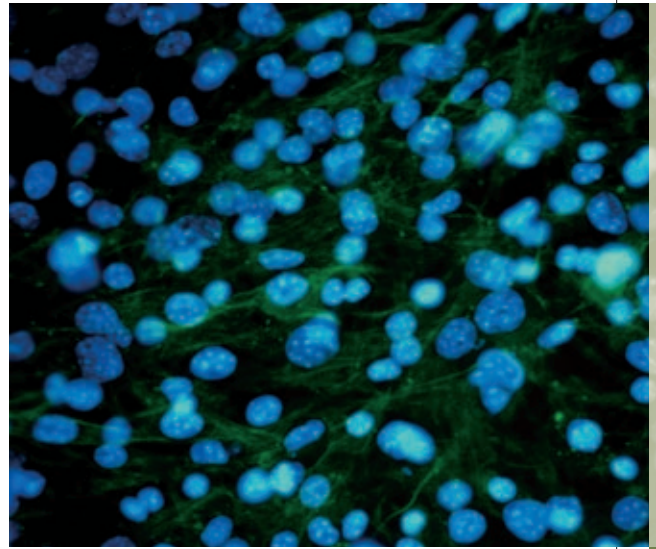
In a Japanese case-control study, no association between beef consumption and NHL was reported (OR = 0.99, 95% CI: 0.69–1.43) (Matsuo et al. 2001), while in Italian (Tavani et al. 2000) and Canadian (Hu et al. 2008) case-control studies, non-significant positive associations of 1.1 and 1.2 were reported for intake of red meat and processed meat. Zhang et al. (1999) reported a significant positive association between intake of beef, pork, or lamb as a main dish and NHL risk (at least once per day vs. < 1 per week) (RR = 2.2, 95% CI: 1.1–4.4), although the excess risk appeared confined to red meat that was broiled or barbecued rather than cooked by other methods (e.g., roasting, pan-frying, boiling, stewing). In contrast, Cross et al. (2006) reported a non-significant 33% decreased risk of NHL among the highest consumers of barbecued red meat.

Although somewhat limited, the available epidemiologic evidence is not supportive of an independent association between red or processed meat intake and NHL. Additional research is necessary to explore any potential associations among specific histologic types of this malignancy.

## MULTIPLE MYELOMA

Multiple myeloma is a malignancy of plasma cells, resulting in an overproduction of light and heavy chain monoclonal immunoglobulins (Alexander et al. 2007C). Multiple myeloma is a relatively uncommon cancer, accounting for fewer than 20,000 cases annually (Jemal et al. 2008). The specific causes of this malignancy are largely unknown, with no established lifestyle, occupational, or environmental factors. African-Americans are twice as likely to be diagnosed with multiple myeloma than Caucasians, and men are more likely to develop this cancer than women. Persons with a positive family history of lymphohematopoietic cancer and those with a pre-cursor condition called monoclonal gammopathy of undetermined significance are at an increased risk of multiple myeloma (Alexander et al. 2007C).

Dietary risk factors for multiple myeloma have been studied infrequently, and no consistent associations have emerged from the literature. In the largest cohort evaluation of meat intake and multiple myeloma, no association was reported for the highest intake category of red meat (RR = 1.03, 95% CI: 0.77-1.39), but a modest association was observed for processed meat (RR = 1.30, 95% CI: 0.98-1.71) (Cross et al. 2007).

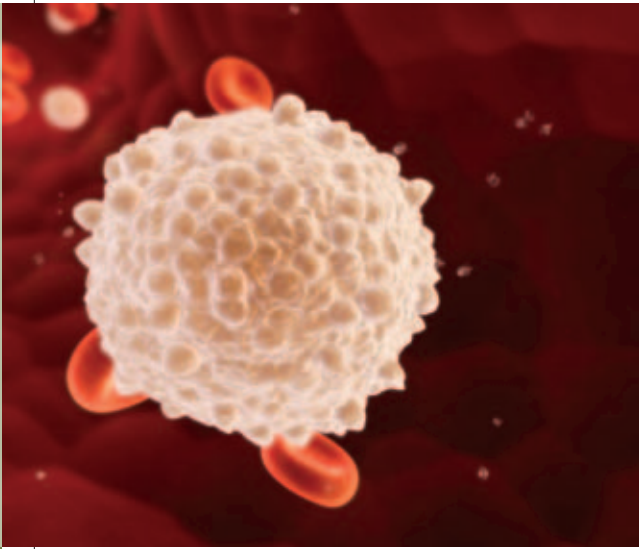


Cells of skin

In a U.S. case-control study, inverse associations for red and processed meat were observed among Caucasians (OR for red meat = 0.8, OR for processed meat = 0.7), while positive (OR = 1.3) and null (OR = 1.0) associations were reported for red meat and processed meat, respectively, among African-Americans (Brown et al. 2001). Tavani et al. (2000) reported a non-significant association between the highest category of red meat intake and multiple myeloma in an Italian case-control study (OR = 1.4, 95% CI: 0.9-2.2).

The scientific evidence for red/processed meat and multiple myeloma is limited to few studies, and collectively, the epidemiologic data do not appear to support an independent association between red meat or processed meat consumption and this malignancy.

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White blood cell

## LEUKEMIA

The leukemias comprise a diverse group of acute, chronic myelogenous, and lymphocytic malignancies that originate in various cells of the hematopoietic system (Petridou et al. 2008). The incidence rates of leukemia by age groups vary according to malignancy type. Leukemia, primarily acute lymphoid leukemia, is the most common form of malignancy among children (Petridou et al. 2008). Other types of leukemia, such as chronic lymphocytic leukemia, commonly occur among the elderly. Although a few risk factors have been identified as contributing to certain types of leukemia, no dietary factors have been identified as playing a significant role in leukemogenesis.

In a large prospective cohort study, red meat intake and processed meat intake were associated with non-significant decreased risks (range 9%-20%) of leukemia in all non-referent quintiles of consumption (Cross et al. 2007). In a Canadian case-control study, all non-referent quartiles were 1.0 for red meat and 1.6 for processed meat (Hu et al. 2008). Consumption of cured meat/fish was associated positively with childhood leukemia (OR = 1.74, 95% CI: 1.15-2.64), but this result was modified markedly by vegetable and bean-curd intake (Liu et al. 2009).

The epidemiologic evidence for red/processed meat consumption and leukemia is limited, and the available data do not indicate an increased risk. Additional studies are necessary to adequately evaluate meat intake and specific types of adult and child leukemia.

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