Chapter 2

Macronutrients and Cancer

LIPIDS

Epidemiological Evidence

Fats

Of all dietary factors associated epidemiologically with cancer of various sites, fat has been studied the most thoroughly and has produced the greatest number of direct associations. Dietary fat is highly correlated with consumption of other nutrients present in the same foods, especially protein, in Western diets. Therefore, it is not always possible to attribute these associations to intake \textit{per se} with absolute certainty.

Breast Cancer

Correlation Studies/Several international correlation studies show direct associations between per-capita fat intake and breast cancer incidence or mortality. In general, these correlations were greater for total fat than for several other dietary factors studied, e.g., animal protein, meat, specific fat components, and oils.

Intracounty data sets have been used to compare dietary fat and breast cancer in other correlation studies (Fig. 2-1).\(^1\) When the per-capita intake of various foods was compared by state within the United States with the corresponding breast cancer mortality rates, Gaskill \textit{et al.} found a significant direct correlation with fat intake when results from all states studied were combined. These correlations disappeared, however, when the Southern states were excluded from the study or when they controlled for age at first marriage (as a reflection of age at first pregnancy) or for median income. The results of this study also suggested that dairy products as a class increased the risk of breast cancer. In another study, Hems observed that time trends for breast cancer mortality in England and Wales from 1911 to 1975 correlated best with the corresponding per-capita intake patterns for fat, sugar, and animal protein one
decade later. In studies based on personal interview data, Kolonel et al. correlated the ethnic patterns of breast cancer incidence in Hawaii and the individual consumption of fat. Significant associations with total fat, animal fat, and both saturated and unsaturated fat were found by these investigators.

**Controlled Studies**/Three controlled studies support the role of dietary fat as an important risk factor in breast cancer. A direct association between the frequency of consumption of high-fat foods and breast cancer in a study of 77 breast cancer cases and matched controls among Seventh-Day Adventists in California was reported by Phillips. A weak direct association, but no evidence of a dose response, between total fat consumption (based on quantitative dietary histories) and breast cancer in a study of 400 cases and 400 matched neighborhood controls in Canada has been observed by Miller et al.

The weakly positive association may partly reflect the fact that recent food consumption was measured, rather than dietary intake patterns earlier in life, which may have been the more important exposure period. For example, the changing breast cancer incidence among Japanese migrants to the United States and their descendents suggests that early-life exposures are an important factor in breast cancer risk.

In a third controlled study, Lubin et al. reported significant increasing trends in relative risk with more frequent consumption of beef and other red meat, pork, and sweet desserts. When the computed mean daily nutrient intake