

### Comments

The incidence of skin cancer is high in Denmark. The detection and registration of cases of malignant melanoma is considered to be complete, whereas skin cancers other than melanoma are undoubtedly subject to some underreporting. If such underreporting is related to type of occupation, it may give rise to bias in occupational risk assessments of nonmelanoma skin cancer.

At first impression, the risk estimates for malignant melanoma for employees in the main branches of industry (figures 25.1 and 25.2) and for skin cancers other than melanoma (figures 26.1 and 26.2) did not show any clear-cut similarities. However, a distinction between indoor and outdoor work and social class gradation can be made for this apparently complex pattern of risk estimates.

**Indoor work.** Excess risks of both kinds of skin cancer were observed in the branch of community, social and personal services among both the men (figures 25.4 and 26.4) and the women (figures 25.9 and 26.9), although the excess of malignant melanoma among the male employees was the most distinct. The excesses were due mainly to increased risks in the subgroups of public administration, the judicial system, and the armed forces, but also in the educational, social and health services, particularly for nonmelanoma skin cancers.

The risks of skin cancers for the workers in sanitary services, which include garbage and sewage disposal, house cleaning, and chimney, window and office cleaning, and for workers in repair and household services, which include the repair of motor vehicles and motorcycles, laundries, laundry and cleaning plants, domestic services, and barber shops, were found to be below average. This result may reflect the fact that some such employees are outdoor workers and are of a lower social class.

Surprisingly, the risks of malignant melanoma among the employees in financing, insurance and real estate (figures 25.5 and 25.9) were found to be close to unity (women) or below expectancy (men), even though most such employees are assumed to work indoors. The risks of nonmelanoma skin cancers in this branch (figures 26.5 and 26.9) were again close to unity (women) or slightly above expectancy (men). These findings may be due to lower social status.

**Outdoor work.** Except in the branch of fishing, deficits of cases of malignant melanoma and of skin cancers other than melanoma were found in the subgroups of agriculture, forestry and fishing (figures 25.3 and 26.3). In another branch in which work is partly outdoors — transport, storage and communication — the risks of malignant melanoma were below average for both the men (figure 25.3) and the women (figure 25.8), with the striking exception of a significantly excess risk among the male employees in communication.

A pattern similar to that of malignant melanoma was observed for skin cancers other than melanomas, although it was the female employees in communication who demonstrated a significantly elevated risk (figures 26.3 and 26.8). This excess among workers in communication may reflect the fact that they have more in common with employees in public administration than with those in the other subgroups within transport, storage and communication or that specific carcinogens operate in the branch of communication (13, 190).

**Trade, restaurants and hotels.** The main branch of trade, restaurants and hotels is made up of employees in wholesale trade, retail trade, and restaurants and hotels, all of whom are assumed to be indoor workers. For both malignant melanoma (figures 25.6 and 25.10) and nonmelanoma skin cancers (figures 26.6 and 26.10), a substantial variation in risk was observed between the subgroups, from an almost average risk among employees in wholesale trade to a nonsignificantly decreased risk in retail trade to a significantly decreased risk among the employees in restaurants and hotels. This finding may also reflect a social class gradient.

**Manufacturing.** Significant or marginally significant deficits of skin cancers were detected in manufacturing, reflecting low risks in most of the subgroups of this branch (figures 25.7, 26.7, 25.11, and 26.11). Among the men, however, markedly excess risks of melanoma were observed in all the subgroups of the textile and wearing apparel industries. Such an excess was also seen for skin cancers other than melanoma. No similar effect was observed among the women, a finding which may indicate that the carcinogen occurs only in the work processes performed mainly by men, although in common use in the textile industry.

The excess risk of melanoma in the chemical industry reported elsewhere (20, 76) was not seen in this study.

### Lymphatic and hematopoietic tissues

#### *Non-Hodgkin's lymphoma*

The heterogeneous group of tumors non-Hodgkin's lymphoma (ICD-7 200, 202) accounts for 1.8 % of all malignancies in Denmark (48). The age-standardized rates are 6.4/100 000 men and 4.4/100 000 women (world standard), with a male:female sex ratio of 1.5:1 (48). The incidence has doubled 2.5 times since the inception of the Cancer Registry in 1942, among both men and women (158). No consistent urban-rural gradient has been observed (47).

Little is known of the etiology of non-Hodgkin's lymphoma, although a positive gradient with socioeconomic status may exist (163). Surveys of occupa-

tion and the risk of non-Hodgkin's lymphoma have been reviewed by Greene (60). An excess of unspecified lymphoma was reported among sales and clerical personnel, postal workers, insurance and real estate brokers, engineers, stationary engineers, several types of electrical workers, mechanics, machinists, primary metal workers, and farmers. Some of these excesses were thought to reflect socioeconomic and general environmental factors, while others were believed to involve chemical or physical exposures in the workplace. When more than one report was available, inconsistent findings were obtained for the following occupations: anesthesiologists (191), vinyl chloride workers (33), chemists (108, 147), and rubber workers (135). Excesses have also been suggested for workers involved in petroleum refining (184), in the processing of arsenic-containing ore (11), and in exposure to phenoxyacetic acid and chlorophenol herbicides (70).

**Findings.** In total, 2 735 cases of non-Hodgkin's lymphoma were included in this linkage study, of which 1 603 (in 1 085 men and in 518 women) were listed in the files of the Supplementary Pension Fund (table 4).

Figure 27.1 shows the risk of non-Hodgkin's lymphoma among the men in the main branches of industry. Slight excess risks were seen among the male employees in manufacturing (SPIR 105) and agriculture, forestry and fishing (SPIR 106). The excess risk estimate for the men in electricity, gas and water supply (SPIR 158) was based on only 10 observed cases. No consistent risk gradient was seen for industries in which blue-collar workers predominate or for those characterized mainly by white-collar workers.

Among the women in the main branches of industry (figure 27.2), quite another risk pattern appeared, with risks below expectancy in manufacturing (SPIR 87) and in agriculture, forestry and fishing (SPIR 61).

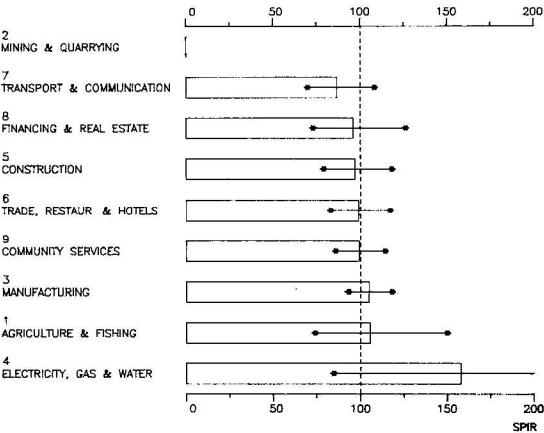


Figure 27.1. Risk of non-Hodgkin's lymphoma among the men.

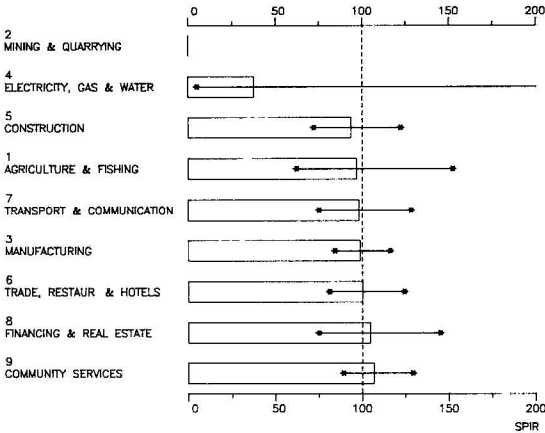


Figure 28.1. Risk of Hodgkin's disease among the men.

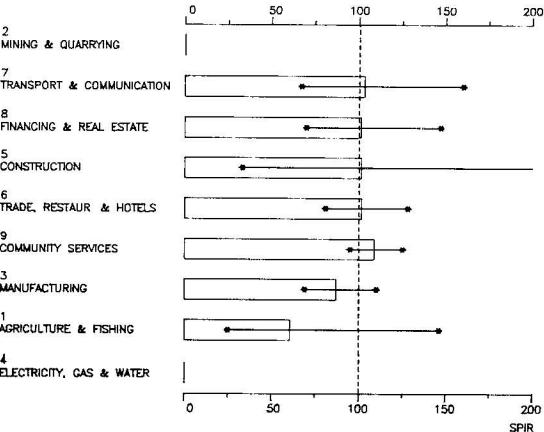


Figure 27.2. Risk of non-Hodgkin's lymphoma among the women.

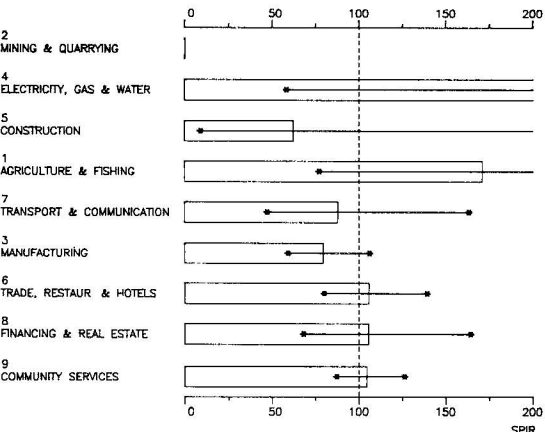


Figure 28.2. Risk of Hodgkin's disease among the women.

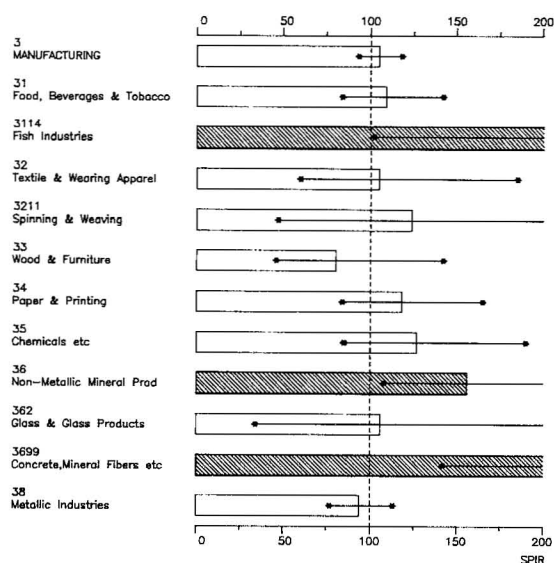


Figure 27.3. Risk of non-Hodgkin's lymphoma among the men.

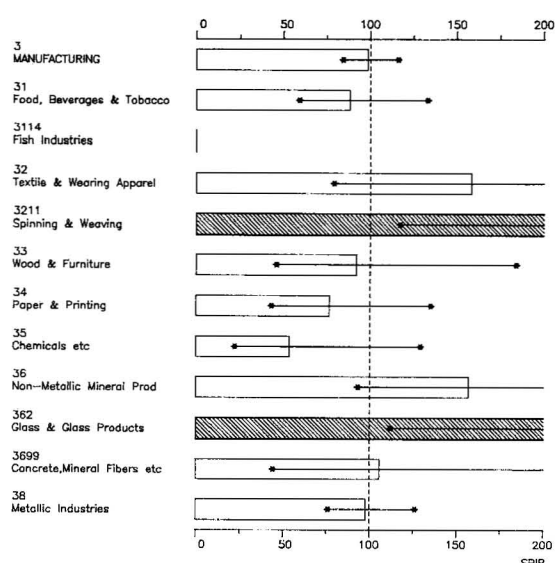


Figure 28.3. Risk of Hodgkin's disease among the men.

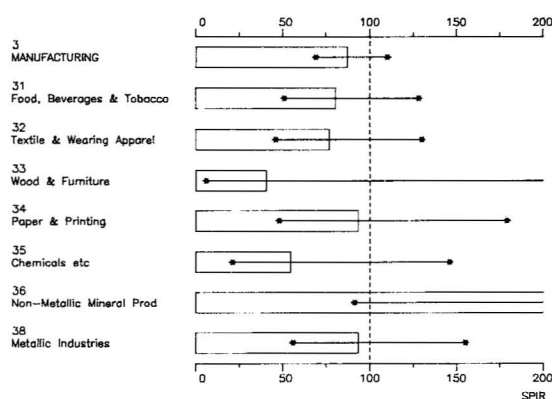


Figure 27.4. Risk of non-Hodgkin's lymphoma among the women.

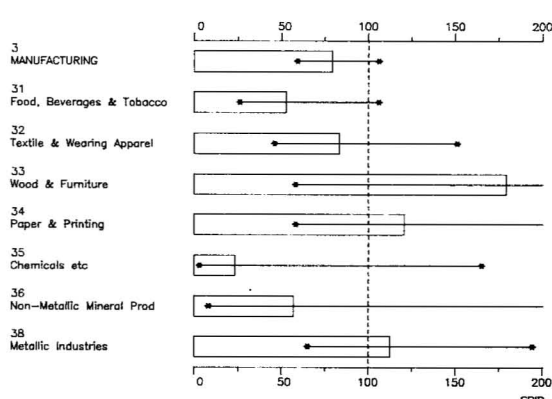


Figure 28.4. Risk of Hodgkin's disease among the women.

None of the SPIR values showed a significant deviation from 100.

Figure 27.3 shows the risk of non-Hodgkin's lymphoma among the men employed in selected subgroups of the manufacturing industries. A significantly elevated risk was detected in the processing of fish and similar foods (SPIR 246). However, only 5 lymphoma cases were observed with 2.0 expected (95 % CI 102—591). More striking was the excess risk discovered in the manufacture of nonmetallic mineral products (SPIR 156), which was due exclusively to an excess of 19 observed cases of non-Hodgkin's lymphoma, with 8.5 expected, in the manufacture of miscellaneous non-metallic mineral products such as concrete, gypsum and plaster products, mineral wool, abrasives, asbestos products, and all other nonmetallic mineral products not elsewhere classified (SPIR 223, 95 % CI 142—349).

Deficits were observed among the women in the subgroups of manufacturing (figure 27.4), except for those engaged in the manufacture of nonmetallic mineral products (SPIR 220), for which 5 cases of non-Hodgkin's lymphoma were detected compared to 2.3 expected (95 % CI 91—528).

### Hodgkin's disease

Hodgkin's disease (ICD-7 201), or Hodgkin's lymphoma, accounts for 0.6 % of all malignancies in Denmark (48). The age-standardized rates are 2.7/100 000 men and 1.7/100 000 women (world standard) with a male:female sex ratio of 1.6:1 (48). A 50 % increase in incidence was observed in the period 1943—1960 followed by a period of stagnation and, after 1970, a decline in incidence (158). A slightly decreasing urban-rural gradient has been observed among men living in

Denmark, but this gradient does not apply to women (47).

Relatively little is known about occupational exposures related to the risk of Hodgkin's disease (62). A few studies have reported a moderately increased risk of Hodgkin's disease associated with woodworking (63, 131); and work with chemicals has also been linked to this malignancy (108, 147, 152).

**Findings.** In total, 1 207 cases of Hodgkin's disease were included in the study, of which 926 (in 610 men and in 316 women) were included in the Supplementary Pension Fund (table 4).

Figure 28.1 shows the risks of Hodgkin's disease among the men employed in the nine main branches of industry. No major deviation from unity was seen. However, a slightly increasing risk with increasing socioeconomic status may be present. This tendency was confirmed among the women (figure 28.2), although the risk estimates were unstable for the women in agriculture, in construction, and in electricity, gas and water supply due to the small numbers of cases.

Figure 28.3 gives the risk estimates for the male employees in selected subgroups of manufacturing. The excess risk in the textile industries was found in the subgroup of employees in the spinning, weaving and finishing of textiles, with 4 cases of Hodgkin's disease observed and 1.3 expected (SPIR 312, 95 % CI 117—832). The nonsignificantly elevated risk in the manufacture of nonmetallic mineral products was due mainly, but not exclusively, to an excess of 4 cases detected with 1.3 expected in the manufacture of glass and glass products (SPIR 299, 95 % CI 112—797). No excess risk was discovered in the wood and furniture-making industries (SPIR 92) or in the chemical industries (SPIR 54).

Figure 28.4, which shows the risks of Hodgkin's disease among the women in the subgroups of manufacturing, did not reveal any significant deviation from expectancy.

#### *Comments on non-Hodgkin's lymphoma and Hodgkin's disease*

No socioeconomic trend was observed among the patients with non-Hodgkin's lymphoma, while a positive one was discernible among the patients with Hodgkin's disease (figures 27.1, 27.2, 28.1, and 28.2). Although non-Hodgkin's lymphoma has been associated with a number of working processes and job titles (11, 33, 60, 70, 108, 135, 184, 191), only a few significant associations were found in the present linkage study. The risk of both Hodgkin's disease and non-Hodgkin's lymphoma were positively associated with the manufacture of nonmetallic mineral products. For Hodgkin's disease, this association was found among the subgroup of workers engaged in the manufacture of glass and glass products, and, for non-Hodgkin's

lymphoma, the association was confirmed among the workers in the manufacture of miscellaneous nonmetallic mineral products, mainly made of glass, cement and clay (figures 27.3 and 28.3). These associations may deserve further investigation.

#### *Acute leukemia*

The subgroup acute leukemia (ICD-7 204, partly) accounts for 1.0 % of all malignancies in Denmark (47). The age-standardized rates are 3.9/100 000 men and 2.3/100 000 women (world standard) with a male:female sex ratio of 1.2:1 (47). Owing to major changes in the diagnostic classification of leukemias, no time trend has been calculated for the subgroups of these malignancies. However, a 50 % increase in the incidence of the entire group of leukemias was observed among the men in the period 1943—1972 followed by a decrease, and a 40 % increase was determined for the women in the period 1943—1977 (158). The risk for acute leukemia seems slightly more common in the rural areas of Denmark than in the urban ones (47).

Even though leukemias have been investigated extensively, little is known of their etiology. The international variation in incidence is less marked than for most other forms of malignancy (71), and this lack of variation indicates that factors other than the environment play a major role in the induction of leukemias. Radiation has long been known to cause leukemia, mainly of the nonlymphatic variety, and leukemia is particularly frequent among radiologists (125). Benzene, another agent occurring in the occupational environment, is known to possess leukemogenic potential (86). Increased risks of leukemia have been reported among rubber workers and chemists (127, 147). Alkylating agents used in cancer chemotherapy have also been incriminated (96, 182).

**Findings.** A total of 1 402 cases of acute leukemia were included in the study, of which 861 (in 534 men and in 327 women) had been included in the Supplementary Pension Fund (table 4).

The risks of acute leukemia among the men in the nine main branches of industry are shown in figure 29.1. Slight excesses were detected in occupations predominated by white-collar workers, ie, trade, restaurants and hotels (SPIR 106), financing, insurance and real estate (SPIR 107), and community, social and personal services (SPIR 110). In agriculture, forestry and fishing, a marked excess risk of 148 was observed, particularly in the subgroups of men employed in agriculture (SPIR 180), with 22 acute leukemias observed and 12.3 expected (95 % CI 118—273). (See the appendix.) The risk of leukemia in manufacturing was close to expectancy (SPIR 103), and slightly decreased risks were observed in construction (SPIR 95) and in transport, storage and communication (SPIR 91).

Risks among women in the same main branches of industry are shown in figure 29.2. Again, excess risks

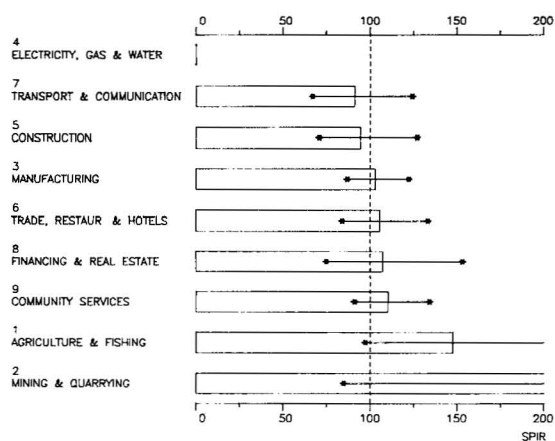


Figure 29.1. Risk of acute leukemia among the men.

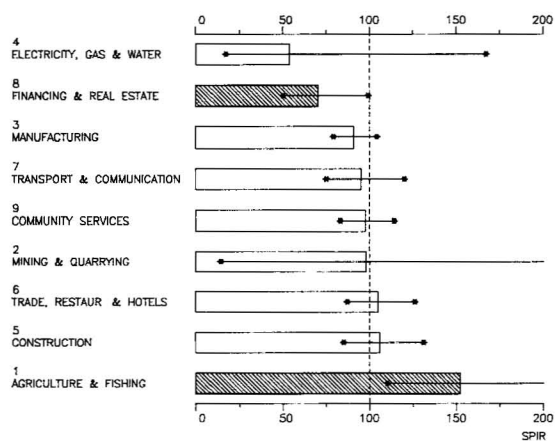


Figure 30.1. Risk of nonacute leukemia among the men.

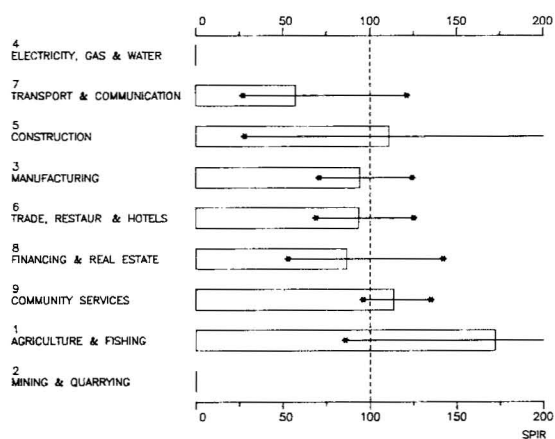


Figure 29.2. Risk of acute leukemia among the women.

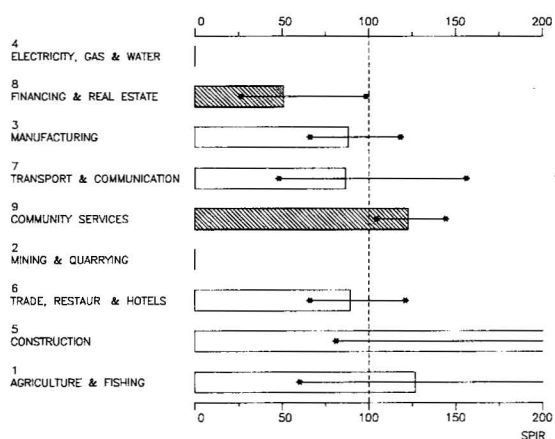


Figure 30.2. Risk of nonacute leukemia among the women.

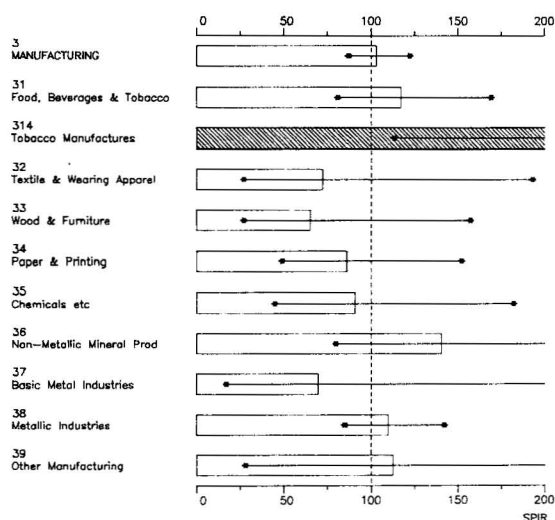


Figure 29.3. Risk of acute leukemia among the men.

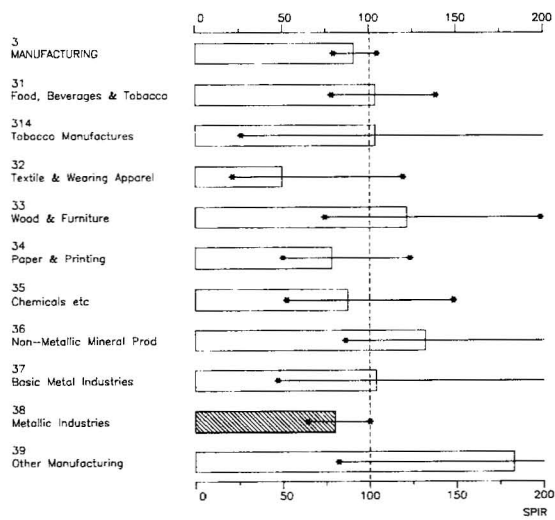


Figure 30.3. Risk of nonacute leukemia among the men.

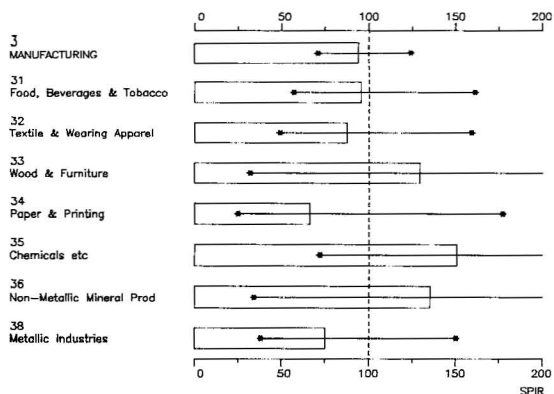


Figure 29.4. Risk of acute leukemia among the women.

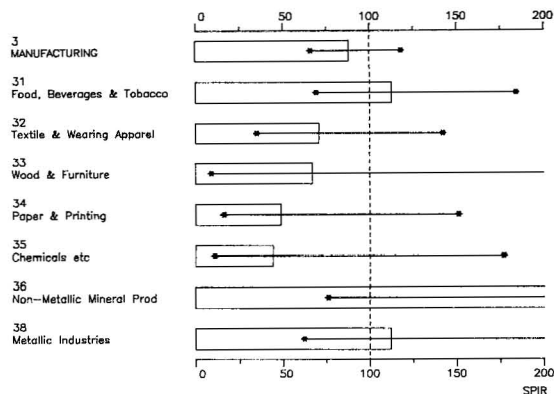


Figure 30.4. Risk of nonacute leukemia among the women.

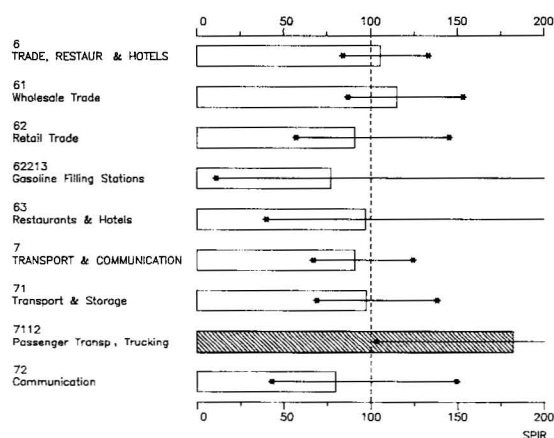


Figure 29.5. Risk of acute leukemia among the men.

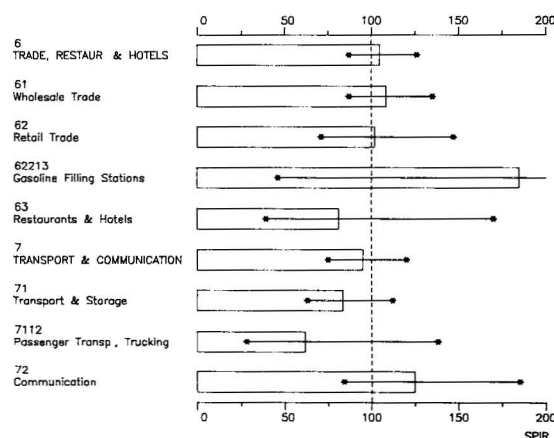


Figure 30.5. Risk of nonacute leukemia among the men.

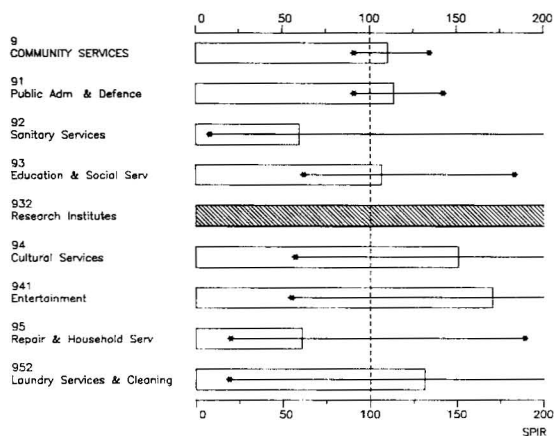


Figure 29.6. Risk of acute leukemia among the men.

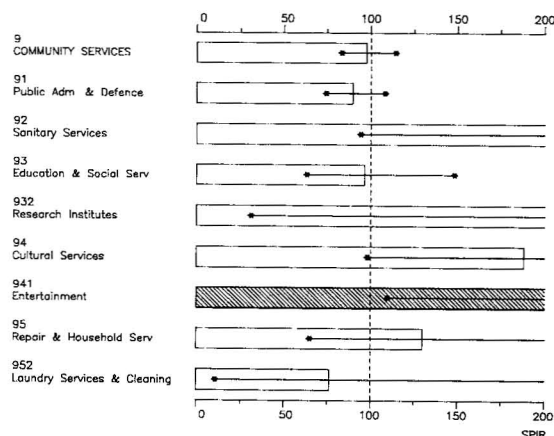


Figure 30.6. Risk of nonacute leukemia among the men.

were observed in agriculture, forestry and fishing (SPIR 172) and in community, social and personal services (SPIR 114).

Figure 29.3 shows the risks of acute leukemia among the men in selected subgroups of manufacturing. A significantly excess risk was detected in tobacco manu-

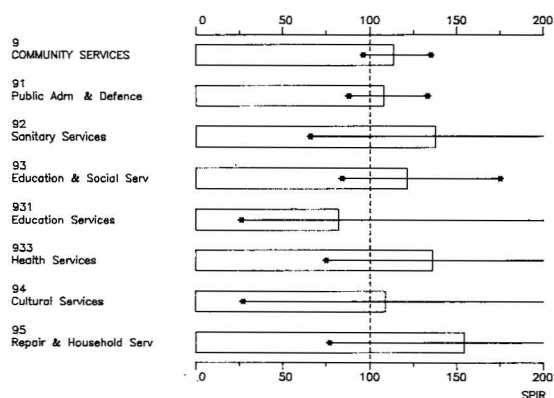


Figure 29.7. Risk of acute leukemia among the women.

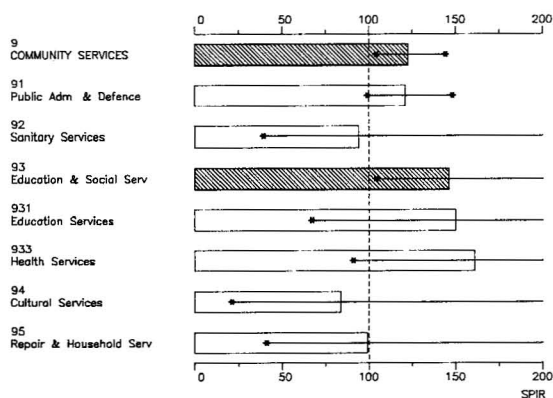


Figure 30.7. Risk of nonacute leukemia among the women.

facturing (SPIR 351), but the number of observed cases was small. A slight nonsignificant excess risk of 110 was observed for the men in the metal industries.

The nonsignificantly elevated risk in the main branch of trade, restaurants and hotels (figure 29.5) was due to an excess number of leukemia cases in wholesale trade, although it was nonsignificant (SPIR 115). The risk in the retail trade was reduced (SPIR 91) among the male employees in gasoline service stations, with only 1 case of acute leukemia observed and 1.3 expected. Although the overall risk among the men in transport, storage and communication was decreased, an excess number of leukemias was discovered in the part of the transport business involved in overland passenger transport (SPIR 182), with 12 cases observed and 6.6 expected (95 % CI 103–321).

Figure 29.6 gives the risk estimates for the men employed in subgroups of community, social and personal services. Even though the figures are small, all white-collar groups demonstrated an excess risk. In particular, a high excess risk was observed for the men employed in research institutes (SPIR 826), with 2 cases of acute leukemia observed and 0.2 expected (95 % CI 206–3 301).

#### Other leukemias

The group of malignancies “other leukemias” (ICD-7 204, partly), which is predominated by chronic leukemias, accounts for approximately 1.5 % of all cancers in Denmark (47). The age-standardized rates are 5.1/100 000 men and 2.7/100 000 women (world standard), with a male:female sex ratio of 1.9:1 (47). No urban-rural gradient has been found.

**Findings.** In total, 2 265 cases of nonacute leukemia were included in this study, of which 1 261 (in 927 men and in 334 women) were recovered from the files of the Supplementary Pension Fund (table 4).

Figure 30.1 shows the risks of nonacute leukemia among the male employees in the nine main branches

of industry. A significantly excess risk was detected in agriculture, forestry and fishing (SPIR 152), due exclusively to an elevated risk of 167 in agriculture, with 32 nonacute leukemias observed and 19.2 expected (95 % CI 118–236). (See the appendix.) The risk in manufacturing was slightly below expectancy (SPIR 91) and that in financing, insurance and real estate was significantly below expectancy (SPIR 70), with only 32 cases observed compared with 45.5 expected (95 % CI 50–99).

Figure 30.2 gives the corresponding risk estimates for the female employees. A moderately excess risk was observed in agriculture, forestry and fishing (SPIR 127), but the numbers were small. A significant excess of 145 cases of nonacute leukemia, compared to 118.1 expected, was discovered for the female employees in the main branch of community, social and personal services (SPIR 123, 95 % CI 104–144). A deficit of cases was observed in financing, insurance and real estate (SPIR 51), with 9 cases observed and 17.7 expected (95 % CI 26–98).

Figure 30.3 shows the risks of nonacute leukemia among the male employees in selected subgroups of manufacturing. In metal industries, 76 cases of leukemia were observed with 94.9 expected (SPIR 80, 95 % CI 64–100). This deficit was due mainly to a decreased risk for the men in the manufacture of fabricated metal products, except machinery and equipment (SPIR 49) and in the manufacture of transport equipment (SPIR 70). (See the appendix.)

Within the main branch of community, social and personal services, an excess of nonacute leukemia was observed for the male employees in recreational and cultural services (SPIR 188), due mainly to an excess among the men in entertainment services, including motion picture production and theatrical producers (SPIR 231), with 7 cases of nonacute leukemia observed and 3.0 expected (95 % CI 110–484) (figure 30.6). Among the women in this main branch, excess risks were detected in public administration (SPIR 121) and in educational, social and health services (SPIR

146), with 34 cases observed and 23.3 expected in the latter main branch (95 % CI 104—204) (figure 30.7).

### Comments on acute and other leukemias

The classification of leukemia has been subject to much debate, which has given rise over time to substantial changes in diagnostic criteria. Thus the distinction between acute and nonacute leukemias used in the present analysis must be interpreted with caution.

An inverse social risk gradient would appear to exist for acute leukemia (figures 29.1 and 29.2), which was not detectable for nonacute leukemia (30.1 and 30.2). Outstanding are the excess risks of both acute and nonacute leukemia among male and female employees in farming. Among men, this excess was found to occur in agricultural services (SPIR 424), which include persons engaged in pest destruction and spraying.

A small, but significant excess number of acute leukemias was detected in urban, suburban, and inter-urban highway passenger transport. However, no equivalent excess risk of nonacute leukemia was observable (figures 29.4 and 30.4).

A striking excess risk of leukemia was detected among the male employees in research institutes (figures 29.6 and 30.6). The reason for this finding is not obvious; however, exposures to leukemogenic chemicals may occur in this trade. Excess risks of nonacute leukemia appeared among the men engaged in entertainment, but that for acute leukemia was not significant (figures 29.6 and 30.6). This finding may be spurious. Similarly, the excess risks of nonacute leukemia observed among the women in public administration and in educational and social services, including health services, must await confirmation by further data.

### Summary tables

Tables 5 (men) and 6 (women) give a summary of the most noticeable positive statistical associations found in this record linkage study. The findings are grouped according to the branches of industrial activity, and cancer sites, risk estimates, and 95 % confidence intervals are given.

**Table 5.** Risks found to be significantly above expectancy among the men.

| Industry                                                         | Cancer site                             | Risk estimate <sup>a</sup> | 95 % CI   |
|------------------------------------------------------------------|-----------------------------------------|----------------------------|-----------|
| Agriculture                                                      | Buccal cavity and pharynx               | 147                        | 112—193   |
|                                                                  | Acute leukemia                          | 169                        | 109—262   |
|                                                                  | Nonacute leukemia                       | 160                        | 112—229   |
| Agricultural services                                            | Acute leukemia                          | 462                        | 116—1 847 |
| Forestry and logging                                             | Stomach                                 | 207                        | 125—344   |
|                                                                  | Renal pelvis                            | 344                        | 129—917   |
| Fishing                                                          | Buccal cavity and pharynx               | 217                        | 123—382   |
|                                                                  | Breast                                  | 695                        | 174—2 779 |
| Manufacture of food, beverages and tobacco                       | Pancreas                                | 122                        | 102—146   |
| Slaughtering, preparing and preserving meat                      | Larynx                                  | 173                        | 113—265   |
|                                                                  | Renal pelvis                            | 229                        | 130—403   |
| Canning, preserving and processing of fish, etc                  | Non-Hodgkin's lymphoma                  | 246                        | 102—591   |
| Manufacture of vegetable and animal oils and fats                | Stomach                                 | 171                        | 112—263   |
|                                                                  | Gallbladder, biliary passage, amp Vater | 274                        | 114—658   |
| Grain-mill products                                              | Esophagus                               | 464                        | 150—1 439 |
|                                                                  | Gallbladder, biliary passage, amp Vater | 473                        | 118—1 891 |
|                                                                  | Bladder, including papilloma            | 192                        | 100—369   |
|                                                                  | Non-Hodgkin's lymphoma                  | 332                        | 107—1 029 |
| Beverage industries                                              | Esophagus                               | 257                        | 162—408   |
|                                                                  | Liver                                   | 216                        | 128—365   |
|                                                                  | Larynx                                  | 218                        | 149—318   |
| Tobacco manufacture                                              | Lung and primary trachea                | 142                        | 103—196   |
|                                                                  | Acute leukemia                          | 351                        | 113—1 088 |
| Manufacture of textiles                                          | Pancreas                                | 168                        | 110—258   |
| Spinning, weaving and finishing textiles                         | Hodgkin's disease                       | 312                        | 117—831   |
| Manufacture of made-up textile goods except wearing apparel      | Nasal cavities and sinuses              | 758                        | 107—5 381 |
|                                                                  | Melanoma of skin                        | 590                        | 221—1 572 |
| Manufacture of footwear                                          | Nasal cavities and sinuses              | 777                        | 109—5 116 |
|                                                                  | Breast                                  | 993                        | 140—7 050 |
| Manufacture of wood                                              | Stomach                                 | 182                        | 134—247   |
|                                                                  | Breast                                  | 386                        | 124—1 197 |
| Manufacture of wood furniture                                    | Nasal cavities and sinuses              | 588                        | 245—1 414 |
| Other manufacture of furniture                                   | Small intestine, colon and rectum       | 1 014                      | 143—7 197 |
| Manufacture of paper and paper products, printing and publishing | Renal pelvis                            | 180                        | 120—271   |

(continued)

Table 5. Continued.

| Industry                                                                     | Cancer site                          | Risk estimate <sup>a</sup> | 95 % CI   |
|------------------------------------------------------------------------------|--------------------------------------|----------------------------|-----------|
| Printing, publishing                                                         | Renal pelvis                         | 254                        | 137—473   |
|                                                                              | Bladder                              | 140                        | 108—182   |
| Bookbinding                                                                  | Liver                                | 834                        | 313—2 221 |
|                                                                              | Renal pelvis                         | 489                        | 122—1 955 |
| Manufacture of industrial chemicals                                          | Larynx                               | 181                        | 107—305   |
| Paint, varnish and lacquer industries                                        | Nasal cavities and sinuses           | 620                        | 155—2 480 |
| Glue industries                                                              | Bladder                              | 511                        | 128—2 043 |
| Manufacture of products of petroleum and coal                                | Nonacute leukemia                    | 459                        | 115—1 835 |
| Manufacture of nonmetallic mineral products                                  | Non-Hodgkin's lymphoma               | 156                        | 108—224   |
| Manufacture of pottery, china and earthenware                                | Liver                                | 312                        | 117—832   |
| Manufacture of glass and glass products                                      | Hodgkin's disease                    | 299                        | 112—797   |
| Manufacture of other nonmetallic mineral products                            | Stomach                              | 135                        | 101—179   |
| Manufacture of nonmetallic mineral products not elsewhere classified         | Non-Hodgkin's lymphoma               | 223                        | 142—349   |
| Basic iron and steel industries                                              | Nasal cavities and sinuses           | 376                        | 121—1 167 |
| Manufacture of machinery (excluding electrical)                              | Stomach                              | 125                        | 103—153   |
| Manufacture of electrical machinery, apparatus, appliances and supplies      | Liver                                | 165                        | 101—270   |
|                                                                              | Breast                               | 317                        | 132—761   |
| Shipbuilding and repairing                                                   | Lung and trachea                     | 117                        | 106—128   |
|                                                                              | Mesothelioma (pleura and peritoneum) | 379                        | 258—557   |
| Manufacture of motor vehicles                                                | Stomach                              | 164                        | 105—258   |
|                                                                              | Nasal cavities and sinuses           | 745                        | 310—1 790 |
| Electricity, gas and steam                                                   | Stomach                              | 152                        | 103—223   |
| Gas manufacture and distribution                                             | Bladder                              | 242                        | 115—508   |
| Waterworks and supply                                                        | Buccal cavity and pharynx            | 781                        | 195—3 122 |
|                                                                              | Stomach                              | 503                        | 126—2 011 |
|                                                                              | Non-Hodgkin's lymphoma               | 817                        | 115—5 801 |
| Contractors                                                                  | Buccal cavity and pharynx            | 137                        | 110—169   |
|                                                                              | Stomach                              | 127                        | 106—152   |
| Bricklayers                                                                  | Buccal cavity and pharynx            | 143                        | 108—189   |
| Painters                                                                     | Lung and trachea                     | 149                        | 119—185   |
| Construction work not classified elsewhere                                   | Mesothelioma (pleura and peritoneum) | 431                        | 108—1 724 |
| Wholesale trade of cars, gasoline and fuel                                   | Prostate                             | 133                        | 101—175   |
| Retail trade of paint, wallpaper, perfumery and medical drugs                | Renal pelvis                         | 501                        | 162—1 554 |
|                                                                              | Bladder                              | 243                        | 146—403   |
| Garages                                                                      | Stomach                              | 335                        | 168—671   |
|                                                                              | Breast                               | 1 101                      | 155—7 818 |
| Restaurants, cafes and other eating and drinking places                      | Liver                                | 390                        | 227—672   |
|                                                                              | Lung and trachea                     | 125                        | 102—154   |
| Hotels, rooming houses, camps and other lodging places                       | Buccal cavity and pharynx            | 189                        | 104—341   |
| Transport and storage                                                        | Mesothelioma (pleura and peritoneum) | 155                        | 101—238   |
| Urban, suburban and interurban highway and other passenger transport by land | Lung and trachea                     | 130                        | 111—152   |
|                                                                              | Acute leukemia                       | 182                        | 103—321   |
| Water transport                                                              | Esophagus                            | 166                        | 105—264   |
|                                                                              | Liver                                | 165                        | 101—270   |
|                                                                              | Lung and trachea                     | 122                        | 108—138   |
| Services allied to transport                                                 | Liver                                | 269                        | 121—599   |
| Communication                                                                | Melanoma of skin                     | 146                        | 105—202   |
| Monetary institutions                                                        | Small intestine, colon and rectum    | 131                        | 103—167   |
| Civil services                                                               | Small intestine, colon and rectum    | 115                        | 100—131   |
|                                                                              | Melanoma of skin                     | 163                        | 125—211   |
| Police and administration of justice                                         | Bladder                              | 139                        | 111—173   |
|                                                                              | Melanoma of skin                     | 223                        | 152—327   |
|                                                                              | Skin (nonmelanoma)                   | 124                        | 100—153   |
| Defense and administrative structure of counties and municipalities          | Testis                               | 120                        | 103—140   |
|                                                                              | Melanoma of skin                     | 145                        | 123—172   |
|                                                                              | Skin (nonmelanoma)                   | 118                        | 110—127   |

(continued)

Table 5. Continued.

| Industry                                        | Cancer site                | Risk estimate <sup>a</sup> | 95 % CI   |
|-------------------------------------------------|----------------------------|----------------------------|-----------|
| Sanitary and similar services                   | Liver                      | 472                        | 212—1 050 |
| Educational services                            | Skin (nonmelanoma)         | 144                        | 111—185   |
| Research and scientific institutes              | Acute leukemia             | 826                        | 206—3 301 |
| Motion picture and other entertainment services | Nonacute leukemia          | 231                        | 110—484   |
| Personal and household services                 | Lung and trachea           | 126                        | 103—154   |
| Car painting                                    | Nasal cavities and sinuses | 1 403                      | 198—9 958 |

<sup>a</sup> SPIR; average risk = 100.

Table 6. Risks found to be significantly above expectancy among the women.

| Industry                                                              | Cancer site                             | Risk estimate <sup>a</sup> | 95 % CI   |
|-----------------------------------------------------------------------|-----------------------------------------|----------------------------|-----------|
| Canning, preserving and processing of fish, etc                       | Cervix uteri                            | 157                        | 116—212   |
| Manufacture of bakery products                                        | Liver                                   | 290                        | 109—772   |
|                                                                       | Gallbladder, biliary passage, amp Vater | 247                        | 111—550   |
| Beverage industries                                                   | Gallbladder, biliary passage, amp Vater | 264                        | 119—589   |
|                                                                       | Lung and trachea                        | 197                        | 135—287   |
| Tobacco manufacture                                                   | Larynx                                  | 557                        | 209—1 484 |
|                                                                       | Lung and trachea                        | 183                        | 118—284   |
| Manufacture of textiles                                               | Cervix uteri                            | 132                        | 107—163   |
| Manufacture of made-up textile goods, except wearing apparel          | Larynx                                  | 570                        | 142—2 278 |
| Manufacture of wearing apparel, except footwear                       | Renal pelvis                            | 331                        | 172—637   |
| Manufacture of wood and wood products, including furniture            | Mesothelioma (pleura and peritoneum)    | 565                        | 141—2 259 |
|                                                                       | Cervix uteri                            | 152                        | 106—217   |
| Manufacture of furniture (other than metal)                           | Esophagus                               | 658                        | 165—2 633 |
|                                                                       | Stomach                                 | 307                        | 138—683   |
| Manufacture of paper, and paper products                              | Renal pelvis                            | 659                        | 274—1 583 |
| Printing, publishing and allied industries                            | Lung and trachea                        | 139                        | 103—187   |
| Manufacture of chemical, petroleum, coal, rubber and plastic products | Stomach                                 | 171                        | 109—268   |
| Manufacture of nonmetallic mineral products                           | Other female genital organs             | 156                        | 110—223   |
| Manufacture of metal products (excluding machinery and equipment)     | Lung and trachea                        | 175                        | 122—250   |
|                                                                       | Cervix uteri                            | 137                        | 103—182   |
| Restaurants and hotels                                                | Esophagus                               | 273                        | 137—546   |
|                                                                       | Lung and trachea                        | 145                        | 116—182   |
|                                                                       | Cervix uteri                            | 138                        | 118—163   |
| Water transport                                                       | Stomach                                 | 214                        | 102—449   |
|                                                                       | Larynx                                  | 543                        | 175—1 685 |
|                                                                       | Kidney                                  | 242                        | 109—538   |
| Communication                                                         | Other female genital organs             | 119                        | 101—141   |
|                                                                       | Skin (nonmelanoma)                      | 129                        | 104—159   |
| Financial institutions                                                | Mesothelioma (pleura and peritoneum)    | 381                        | 159—916   |
| Real estate and business services                                     | Nasal cavities and sinuses              | 274                        | 103—731   |
|                                                                       | Larynx                                  | 211                        | 106—423   |
| Public administration and defence                                     | Breast                                  | 105                        | 101—110   |
|                                                                       | Melanoma of skin                        | 119                        | 107—132   |
| Sanitary and similar services                                         | Larynx                                  | 248                        | 112—553   |
|                                                                       | Cervix uteri                            | 125                        | 103—152   |
| Social and related community services                                 | Pancreas                                | 125                        | 100—156   |
|                                                                       | Nonacute leukemia                       | 146                        | 104—204   |
| Educational services                                                  | Gallbladder, biliary passage, amp Vater | 193                        | 100—371   |
|                                                                       | Kidney                                  | 176                        | 104—298   |
| Medical, dental, other health and veterinarian services               | Breast                                  | 115                        | 102—130   |
| Personal and household services                                       | Esophagus                               | 259                        | 108—622   |
|                                                                       | Liver                                   | 257                        | 128—513   |
|                                                                       | Gallbladder, biliary passage, amp Vater | 205                        | 114—370   |

<sup>a</sup> SPIR; average risk = 100.