SMOKING-ADJUSTED

OCCUPATIONAL ASSOCIATIONS

WITH LUNG CANCER

BY HISTOLOGY

by Jeffrey Curtis

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Abstract

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This study quantifies various occupations' risk of lung cancer, adjusted for smoking, using Standardized Incidence Ratios (SIRs). Lung cancer cases with tumor pathology for a fifteen-year period in the Portland, Oregon area were collected, and gender-specific, age-specific, and histology-specific lung cancer incidence rates were computed for the population as a whole. Indirect standardization was used to apply these rates to the numbers of workers in their various occupations to derive an expected number of lung cancer cases. The observed versus expected numbers of lung cancer cases were used to compute occupational SIRs. Adjustment for smoking was performed using National Health Interview Survey data using the procedure detailed by Axelson (1978).

The occupations found to have statistically significant excess lung cancer risk included waitresses; auto mechanics; sheetmetal workers; electricians; plumbers; plaster and cement workers; heavy equipment operators; meat cutters and wrappers; paper mill workers; miners, drillers, and blasters; asbestos and insulation workers; construction laborers; farmers and farm laborers; machinists and setters; blacksmith and boilermakers; carpenters; painters; wood mill workers; truck drivers; freight and stock handlers; loggers; and cooks. Adjustment for smoking reduced the lung cancer risks of all occupations with excess lung cancer risk a mean of 36% but did not reduce any of the above-mentioned occupations' SIRs below 1.4

Conclusion: this study confirms many of the suspected associations between occupation and lung cancer with a larger sample size and more occupations than found in similar studies. The findings of elevated lung cancer in the agricultural and wood industry workers were particularly concerning in light of the published literature which usually reports decreased lung cancer risk in farmers and the remarkable consistency of increased risk across diverse occupational titles in the wood industry. Findings using the lung cancer histology data were largely consistent with the tumor types reported by others for various occupations but did not yield any additional sensitivity. Adjustment for smoking yielded results that had only a modest effect on the SIRs of occupations with excess lung cancer risks, suggesting that confounding by smoking is less of a problem that is commonly feared in studies of this type.

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BACKGROUND AND SIGNIFICANCE

Almost fifty years ago, Kreyberg proposed a classification system that divided lung cancers into two groups: Group I tumors were usually centrally located and were of squamous or small cell type. Group II tumors were mostly peripheral and were primarily adenocarcinomas (1954, 1962). He later posited that Group I tumors had strong associations with smoking and Group II tumors were only weakly associated with smoking (1971). This argument was extended by others to suggest that different histologic types of lung cancer represented different disease processes with different etiologies (Selawry, 1973; Straus, 1978). Since that time, numerous researchers have attempted, with moderate success, to extend this inquiry by demonstrating that various environmental and occupational exposures also contributed to increasing the incidence of specific cell types of lung cancer. The purpose of this analysis will be to provide estimates of lung cancer risk by occupation by histology, adjusted for smoking. Confounding by smoking is a ubiquitous problem in studies of occupation and lung cancer, yet it is usually unaccounted for, and this investigation is somewhat unique in that it is able to perform such an adjustment.

The designation of lung cancer as an epidemic by the Surgeon General in 1982 cannot be overstated. Lung cancer is the second most common cancer in both sexes and accounts for the highest cancer mortality. It surpassed breast cancer mortality in women about fifteen years ago and continues to do so. Approximately 177,000 new cases were diagnosed in 1996, and although the incidence rate peaked in men in 1984 and has slightly declined, the rate in women continues to increase (USDHHS, 1990; ACS, 1996). There is also some evidence that lung cancer is now the leading cause of mortality in smokers (Shopland, 1991) as compared to heart disease, which is much more common in the general population. The 5-year survival rate for lung cancer is still abysmal – only 13% (ACS, 1996; Miller, 1993), and screening technologies are still not sufficiently advanced to permit early detection leading to increased survival.

Overwhelming evidence for decades has implicated smoking as the major cause of lung cancer. Estimates of attributable risk suggest that smoking accounts for approximately 85% of all lung cancers (Devesa, 1989; Pierce, 1989; Doll and Peto, 1981) and occupational and environmental exposures for the remainder (Shopland, 1991; Lerchen, 1987; Damber 1987). As a greater proportion of women has begun to smoke since WWII, the incidence of lung cancer in women has steadily risen after a 20-30 year latency period. A number of interesting observations regarding the association between smoking and lung cancer deserve mention.

The first is Kreyberg's original finding that smoking seemed to greatly increase the risks of certain cell types of lung cancer but not others. He found that squamous and small cell cancers were the most related to smoking, and adenocarcinomas were more weakly associated with smoking. This finding has been duplicated by numerous researchers, who also found that although smoking elevated the relative risks of lung cancer for all cell types, the associations with smoking were much weaker for adenocarcinomas (Kabat, 1996; Muscat and Wynder, 1995; Risch 1993; Harris, 1993; Jedrychowski, 1992; Vena, 1985; Lubin 1984; Stayner and Wegman, 1983; USPHS, 1979; Vincent, 1977; Wynder and Stellman, 1977; Weiss, 1972). The general increase in risk for all histologic types is not surprising considering that cigarettes contain over 2,000 chemical compounds, and many others are formed during the combustion process (USDHHS 1986, Dube 1982). However, the attributable fraction of adenocarcinomas due to smoking is notably lower (estimated to be between 64% and 86%; Jedrychowski, 1992; Brownson, 1992) than other cell types' attributable fraction due to smoking (88%-97% for small cell). The relative risks for the various histologies of lung cancer due to smoking also seem to vary by gender; female smokers have higher risks for small cell cancers and less risk for adenocarcinomas than male smokers (Baldini, 1997; Osann, 1993; Brownson, 1992; Sobue, 1988). The varying degrees of association between different cell types and smoking and the differences in gender risk for the various histologies suggests that other factors, including environmental, hormonal, or occupational, also contribute to lung cancer.

Additionally, another interesting observation is that a significant amount of evidence documents an increase in the incidence of adenocarcinomas over the last two decades, out of proportion to the other cell types, in both sexes and in younger age groups (Wynder and Muscat, 1995; Zheng, 1994; Wynder and Covey, 1987; Dodds, 1986). Squamous and small cell histologies peaked in males in 1981-82 and 1986-87, respectively, and then declined; no decline has been observed in females (Travis, 1996). Adenocarcinomas, by comparison, have shown no decline in males and in females have climbed at a much faster rate than squamous cell cancers such that adenocarcinomas now have become the most common type of lung cancer in the U.S. (Levi, 1997; Thun, 1997; Travis, 1995). This finding appears to be only minimally related to classification or diagnostic modality changes during this period

It is true that a number of mechanisms could potentially account for this increasing incidence. First, beginning in the 1950s, filter tips became popular and tar levels declined. Although filter tips have been shown to decrease overall lung cancer risk by about 20%-50%, this reduction in risk appears limited to squamous cell cancers and not to adenocarcinomas (Stellman, 1997a; Stellman, 1997b; IARC, 1986; Stellman 1986; Lubin

1984b; Wynder, 1979). Smokers on average also appeared to compensate by smoking more intensely and inhaling deeper so that smoke would more often reach the outer lung fields (Muscat, 1996; Norman 1982; USDHHS 1989). These compensatory smoking behaviors probably partially offset the reduced risk of lung cancer from filter use and changed the cell type associations for smoking (Hoffmann, 1996). Second, the nitrate content in cigarettes also increased during this period (Wynder, 1995), exposing the lung periphery to carcinogenic tobacco-specific N-nitrosamines (TSNA), at the same time that the yields of polynuclear aromatic hydrocarbons (PAHs) decreased (Hoffman, 1997). PAHs have been linked by in-vitro and in-vivo bioassays to squamous cell cancers and TSNAs to adenocarcinomas. However, the true effect of the changes both in cigarette content and smoking behaviors still remains speculative, and a search for other possible lung cancer etiologies to explain the above epidemiologic histologic associations still needs to be undertaken.

One of the first indications that other factors besides smoking could be causally related to specific cell types of lung cancer was postulated by Weiss and Boucot in 1962, who investigated a chemical plant whose employees had an excess number of lung cancers. These workers were exposed to bis-chloromethyl ethers, and 80% of the moderately or heavily exposed cases were found to have developed a specific histology of lung cancer, small cell (Figueroa, 1973; Weiss and Boucot, 1982). Thirty years of follow-up have confirmed their results (Weiss and Nash, 1997) and documented this dose-related excess risk that persisted for decades after a latency period from time of exposure to death.

Since that time, numerous occupational and environmental exposures besides smoking have been linked to lung cancer, and often, specific cell types. These include radon and radiation – predominantly small cell (Land, 1993; Woodward, 1991; Hodgson, 1990;

Horacek, 1977; Saccomanno, 1971), chloromethyl ether – small cell (Weiss, 1976; Weiss, 1975; Lemen, 1976; Figueroa, 1973), arsenic (Simonato, 1994; Sobel, 1988; Jarup, 1989; Newman, 1976), asbestos – adenocarcinoma and squamous cell (Raffn, 1998; de Klerk, 1996; Raffn, 1993; Johansson, 1992; Talcott, 1989; Enterline, 1987; Hughes, 1987; Seidman, 1986; Whitwell, 1974), beryllium (Ward, 1992; Saracci, 1987; Wagoner, 1980), hexavalent chromates (Lees, 1991; Davies, 1991; Langard, 1990; Abe, 1982), mustard gas – squamous cell and undifferentiated (Easton, 1988; Nishimoto, 1987; Wada, 1968; Yamada, 1963), and diesel exhaust (Steenland, 1998; Bhatia, 1998). Other associations between an exposure and a specific cell type of lung cancer may exist yet have not been identified because studies of lung cancer often do not incorporate pathology information. The specificity sometimes observed between a given occupational exposure and certain histologies is in contrast to the pan-elevation in all histologies seen with smoking. Several researchers have postulated that this specificity is useful in distinguishing the neoplastic effects of specific occupational hazards from the general lung cancer risk (i.e. all histologies) of smoking.

Many of the associations between occupations and lung cancer were not made a priori but were the result of the observation of an excess number of lung cancer cases in certain occupational groups. Evidence also suggests that these occupational lung cancer risks may be multiplicative with smoking rather than simply additive (Lubin, 1990; Dave, 1988; Damber 1987; Saracci, 1987; IARC 1986; Steenland 1986), the best example of which is probably the multiplicative risk of asbestos exposure and concurrent smoking (Kjuus, 1986).

Later research has attempted to quantify excess risk in a population-based sample rather than simply in an isolated industry in order to develop novel associations regarding occupational exposures and lung cancer risk. This work is complicated by a number of factors. These include lack of quantifiable exposures to specific carcinogens, exposure to multiple carcinogens throughout one's lifetime, inadequate smoking data and confounding by smoking, inappropriate controls, and multiple occupational jobs and titles throughout a career that are difficult to lump together. Nevertheless, several studies have been performed in a population-based sample with large enough numbers that have fairly consistently demonstrated a number of putative occupational associations with lung cancer that cannot be ignored. This research then serves as the groundwork for additional inquiry into the specific occupations found to have excess risk and the occupational exposures that are possible etiologies for lung cancer. Moreover, analysis by histologic type has been demonstrated to increase the sensitivity of this process (Morton and Treyve, 1982; Stayner and Wegman, 1983) with notable elevations often observed in only one or two cell types in each occupation.

The present study seeks to confirm or repudiate similar population based studies that demonstrate excess lung cancer risk in certain occupations. All lung cancer cases for a fifteen-year period in the Portland, Oregon metropolitan area are analyzed by histologic type to assess those occupations that have excess lung cancer cases compared to the reference population. The large number of cases available not only provides statistical stability but also permits finer occupation descriptions than previously documented by others. While many occupational studies are unable to account for the confounding effects of smoking, the present study includes an adjustment that should reduce or eliminate the effect of smoking. The adjusted and unadjusted results are compared to assess the utility of this process.

METHODS

All 24 hospitals in the Portland-Vancouver Standard Metropolitan Statistical Area (SMSA) were searched for primary cancers of the lung, pleura, bronchus, and trachea. Cases found within this SMSA during the period 1963-1977 were included in the study, and only individuals who were residents of the SMSA counties were eligible. As Portland is a tertiary care center for Oregon and southwestern Washington, it is unlikely that cases would have been seen exclusively outside the SMSA. Case ascertainment used the SEER method and included searching hospital databases, discharge records, and pathology reports. An independent investigator and team of medical students usually unaffiliated with the hospital performed the data collection. Each medical record was abstracted to a standardized form used exclusively for the purposes of this data collection. Data acquired (when available) included age, sex, smoking history, and usual occupation as listed on hospital admission sheet. When records for a single patient were found at multiple hospitals (19.5%), those data were combined into a single record. During the exit interviews of the medical student abstractors, the principal investigators realized that some abstractors had been less than thorough in their data collection, and the principal investigator WM subsequently reviewed those medical students' work to fill in omissions or inconsistencies.

Lung cancer was defined based upon clinical, surgical, and pathologic diagnoses, and those cases that were microscopically confirmed by histology (90%) were included in the tumor pathology registry. The 1967 Kreyberg system of histologic classification accepted by the World Health Organization was used to categorize pathologic diagnoses. Initial pathologic diagnosis as originally read was accepted, and no independent slide review was conducted due to budget limitations. 6.7% of cases were read as having multiple histologies.

Cases with multiple histologies were included in the rates for each histology reported, although they were included only once in analyses involving all lung cancers. This process was expected to minimize differences between histologies and was intended to be a conservative procedure. Precedent for this process is found in the work of Archer (1974). Most other researchers have coded only the predominant cell type in their analysis.

The file of abstracted medical records was then alphabetized and compared to an alphabetized list of all death certificates from the Oregon State Health Division listing lung cancer in the years 1963-1978 for the Portland-Vancouver SMSA. An additional 10.1% of cases (n=708) were found in this manner, and the hospital and clinical records for these patients were then located when possible. A total of only 0.5% of the sample had information derived solely from death certificates (DCO). This figure is comparable to the SEER lung and bronchus figure of 1.9% for the period 1973-1977 and indicates a high degree of completeness of the data. 90% of all cases were microscopically confirmed (MC) with histology or cytology, a figure that compares favorably with the 89.6% SEER rate and suggests reliable diagnostic accuracy (Greenberg, 1984). Although cases may have been missed if patients were not found in the initial hospital record search (which identified 89.9%) and then subsequently moved to rural areas (so they would not have been found with SMSA death certificate information), the frequency of this occurrence is expected to be small given the short interval between diagnosis and the expected mortality from lung cancer.

One condition of data acquisition by the involved hospitals was that patients not be contacted. Therefore, usual occupation was coded from hospital charts and death certificates under the direction of WM, the senior investigator with extensive experience in this procedure. Usual occupation as listed on the hospital admission summary was almost always consistent with usual occupation as listed on the death certificate, but the infrequent discrepancies were resolved in favor of the hospital admission summary, which was felt to better match census reporting.

Occupations were coded according to a modified version of the 1971 U.S. Bureau of the Census classification (Appendix A). 141 male occupations and 81 female occupations were identified and each case was assigned to one of these occupations and also to a higher-level group category. For instance, a case assigned to the "waiter and waitress" category would also be assigned to the "service worker" category. When the patient's reported occupational category was ambiguous, the Census Index of Occupations was used to resolve appropriate occupational group coding ambiguities. Cases with occupations that did not match exactly with any census occupation category were classified into an "other" category for the most similar occupational group. Housewives were estimated by a procedure detailed by Morton and Ungs (1974) from the group "Unemployed or Not in the Labor Force". The information gathered also included the numbers of people in the Portland Standard Metropolitan Statistical Area (SMSA) employed in their various occupations, stratified by age in approximately ten-year age intervals.

Age-specific and sex-specific incidence rates for all lung cancers were adjusted using the direct standardization method according to 1970 U.S. Census Standard Million figures, the midpoint of the study. This incidence rate for the Portland-Vancouver SMSA was then compared with the Third National Cancer Survey and SEER data to assure similarity. The separate variable of race was not included in the current study since Portland was quite homogeneous during the study period (96.2% white). SEER data are described both for all races and for whites only.

The next phase of the analysis involved computation of the standardized incidence ratios (SIRs) for each occupation. Age-specific, sex-specific, and histology-specific incidence rates were computed for the SMSA population as a whole. During this process, the three age categories for individuals greater than 65 years old were collapsed into a single "65+" age category. and the two categories under 15 years old were collapsed into a single "Under 15" category. This was a requirement in order to compute occupational rates, since 1970 Census data for occupations grouped age categories in this fashion. The age, sex, and histologic specific rates computed for the SMSA population were then applied to the number of individuals working in their various occupations reported by the Bureau of the Census to derive age-specific expected numbers of lung cancer for that occupation for each gender and each histology (an indirect standardization). The small number of individuals older than 74 still working had their occupations recoded to "Unemployed or Not in Labor Force" to eliminate a retirement age bias between occupations. The summed expected number of cases was compared to the summed number of observed cases in each age group for each occupation for each histology. A Standardized Incidence Ratio (SIR) for each occupation was computed using the formula:

SIR = Observed number of cases / Expected number of cases

Most researchers assume that the number of cases in a particular cell conforms to a Poisson distribution if $Np < 5$, and if the reference population is much larger than the study population, the standard deviation of the SIR for an individual cell can be closely approximated by the equation:

Std Dev(SIR) = Sqrt(Observed) / Expected

Attention was then turned to the overall distribution of the Standardized Incidence Ratios. A characteristic of a Poisson distribution is that the variance (S^2) is approximately equal to the mean (X), so the S^2/X statistic should be approximately equal to 1.0. An alternate test involves summing the squares of (Observed – Expected) divided by the number of Expected cases; this should conform to a chi-square with N-1 degrees of freedom. Using the JMP 3.1 statistical software package, the distribution of SIRs did not meet criteria for a Poisson distribution using either of these statistics.

Tests for normality of the SIRs also were made using the Shapiro Wilkes test, and the distribution of SIRs was found to be non-normally distributed. A variety of transformations was applied to the data, including natural log, log base ten, inverse, square root, and arc sin, and even after excluding outliers, the distribution still did not satisfy formal tests for normality. However, when N becomes very large, a distribution of Poisson means approaches normality (as is true of binomial means). Therefore, the significance of each SIR was computed according to the test

$$Z = (SIR - 1) / StdDev(SIR) \qquad (\text{at } p < 0.01)$$

and N(0,1) critical values.

To summarize, the statistical methods were based upon the following: 1) the appropriateness of a Poisson distribution based upon Np < 5 for most individual cells 2) the Central Limits Theorem and the generally accepted practice of assuming a normal (or near-normal) distribution of Poisson means for very large N and 3) the large values of Np for the universe (total working age population) against which each occupation was compared. Basis for these methods is found in Fisher (1993).

Following this procedure, the results were adjusted for smoking prevalence within each occupation using data provided by Sterling and Weinkam (1978) derived from the 1970 National Health Interview Survey. Smoking prevalence for 92 male occupations and 62 female occupations was available. A smoking index for each occupation was computed by multiplying the proportion of never, former, and current smokers within that occupation by the relative risk of developing lung cancer for individuals in each of these three categories. The relative risk values used for each of these three smoking categories were 1.0, 4.5, and 9.3, respectively, and were derived from averaging (weighted by person years) the American Cancer Society's six year follow-up of 1 million persons, the 34,000 British physicians' 20 year mortality assessment, and the 8 ½ year follow-up of 290,000 U.S. Veterans (Hammond 1972, Doll and Peto 1976, Kahn 1966). The adjustment factor for the occupation was then divided by a similar smoking index for the reference population, and this result applied to the SIR for each occupation. This procedure has been detailed by Axelson (1978).

An example with fictitious numbers will demonstrate the process. If the fraction of never, former, and current smokers in the general population is 0.34, 0.33, and 0.33, and if the relative risk for lung cancer to individuals in these three smoking categories is 1.0, 4.5, and 9.3, respectively, the smoking index for the general population is:

$$0.34 \times 1.0 + 0.33 \times 4.5 + 0.33 \times 9.3 = 4.9$$

Similarly, if the prevalence of never, former, and current smokers in Occupation X is 0, 0.5, and 0.5, the smoking index for Occupation X is:

$$0 \times 1.0 + 0.5 \times 4.5 + 0.5 \times 9.3 = 6.9$$

The ratio of 4.9 / 6.9 would then be multiplied by the SIR of occupation X to reflect the expected contribution of smoking to that occupation's risk of lung cancer; presumably, any residual risk is due to the occupation's intrinsic risk.

This adjustment gave the expected result of increasing the SIRs for those occupations which had a lower smoking prevalence than the reference population and decreasing the SIRs of those occupations which had a higher smoking prevalence than the reference population. The results obtained after such adjustment were then compared with the unadjusted results for similarity. Because of concern over this process being sensitive to the particular values used for the relative risks of smoking, an empiric trial was made of not only inflating the relative risks of each smoking category by approximately 50% but also changing the ratio of the relative risk of former to current smokers (initially about 1:2, changed to 1:3). However, both of these changes had very little effect on the overall results, so the original values of 1.0, 4.5, and 9.3 were used.

RESULTS

All Lung Cancer Cases

A total of 7,076 primary malignant neoplasms of the lung, pleura, bronchus, and trachea were identified in the Portland-Vancouver SMSA for the fifteen-year period 1963 to 1977. 5,477 of them (77.7%) were in males, and the remaining 1,599 (22.3%) were found in females (see Table I). This corresponds to a male to female ratio of 3.4:1, a ratio similar to that found in other studies during this time period (see Table II). The annual age-adjusted incidence rate was 44.1 cases per 100,000 people, with males having a rate of 76.1 per 100,000 individuals and females with a rate of 18.4 per 100,000 individuals. This figure fell above the mean incidence rate of the nine 1973 SEER registry SMSAs for both men and women but was within the range reported by the SEER-NCI program (see Table III). 5.4% of cases were found in never smokers, 58.4% in current smokers, and 20.1% in former smokers. 16.0% of cases had an unknown or undisclosed smoking history. As expected, the prevalence of current and former smokers among those acquiring lung cancer exceeded the prevalence of smoking in the general population (Sterling, 1978).

Histologic Distributions

Table II identifies the sex-specific distributions of the various histologies in the study population compared to similar studies. In males, squamous cell accounted for over one-third of all lung cancer histologies (40.3%), with lesser contributions by adenocarcinoma (21.9%), small cell (14.9%), and large cell (9.6%). 9.9% of cases had unknown histologies. A different trend was observed in women. Adenocarcinoma was the most frequent histology (31.9%), with squamous cell (22.9%), small cell (17.6%), and large cell (11.9%) contributing the majority of the remaining cases. Unknown histologies represented 10.6%. Other histologies, including sarcomas and mesotheliomas, were uncommon. 7.0% of male cases and 5.6% of female cases demonstrated multiple histologies. These multiple histology figures exceed data from other published data (Butler, 1987) and may represent (1) increased scrutiny by local pathologists, (2) differing histologic coding rules between hospitals, (3) inter-observer variability, particularly as multiple histologies were strongly associated with records at multiple hospitals (42.1% of cases with multiple histologies had records at more than 1 hospital, compared to 17.9% of cases with only 1 histology), or (4) exclusions of particular histologies (e.g. carcinoids, sarcomas, mesotheliomas) by the researcher (some restricted their analyses to just the major cell types). An independent review of the slides by a single pathologist was not able to be included as part of the study but might have been desirable, although this could have introduced a systematic bias.

Table II also demonstrates that the gender and histologic distributions found in a number of other contemporaneous studies. The male to female ratio of approximately 3.5:1 is very consistent. Males are observed to have a predominance of squamous cell cancers and females a predominance of adenocarcinomas.

Figures 1 and 2 show the gender-specific and age-specific annual incidence rates by cell type. Rates for males exceeded the rates for females in all major histologic groupings, as expected. In males (Figure 1), all histologies gradually increase with age and peaked at the oldest age category, 65+. However, the rate of squamous cell cancers increased dramatically beginning at age 45, out of proportion to the other cell types. In women (Figure 2), adenocarcinomas had higher incidence rates than all other histologies for all age groups. Incidence rates for most other cell types in women generally increased with age, although they peaked earlier than in men, in the 55-64 age group. The rates for squamous cell cancer actually declined significantly in the "65+" age group. The peak in 55-64 year old women may reflect a latency period from the dramatic increase in smoking prevalence observed in the WWII era (Miller 1994; Devesa 1987; Harris 1983) and its attendant increase in lung cancer rates decades later (Walker, 1988; Greenberg, 1984; Harris, 1983; Horm and Asire, 1982). Additionally, both sexes show a trend for unknown histologic diagnoses to increase with age; this probably reflects a physician bias to be less thorough in working up disease in the elderly.

Table IVa details information about smoking status, by gender and histology. Smoking status was recorded in 84.9% of cases in males and 81.8% of cases in females. As expected, all major histologies were associated with smoking, although women with lung cancer were more likely to be never smokers (14.8%) than men (2.2%). In men, the distribution of never, former, and current smokers by cell type was remarkably similar. This distribution in women is also similar with one exception. Women with adenocarcinomas were more likely to be never-smokers (27%) than women with other cell types (about 10%) or men with adenocarcinomas (3.3%).

However, more important to consider are the absolute incidence rates between sexes. Using smoking prevalence data, the absolute incidence rates of lung cancer by gender, smoking status, and histology (for the three major cell types) are presented in Table IVb. Lung cancer rates in male smokers are much higher than corresponding rates in female smokers, as expected. Lung cancer rates in male nonsmokers are the same or higher than in female nonsmokers, with one interesting exception: the adenocarcinoma incidence rate in female nonsmokers is almost twice as high as that of male nonsmokers. Moreover, the etiologic fraction of cases due to smoking differs by gender only for adenocarcinomas. This gender difference for adenocarcinoma risk in nonsmokers lends weight to the hypothesis (mentioned above) that the etiologies for lung adenocarcinoma differ significantly by gender. These different etiologies may include occupational, hormonal, or other factors, and it suggests that women may have different susceptibilities to particular histologies of lung cancer than men.

Histologic Distributions by Occupation

Table V presents the data comparing the unadjusted Standardized Incidence Ratios (SIRs) for the 12 male and 13 female major occupational categories as defined by the U.S. Bureau of the Census. Ratios greater than 1 are excess risk over the baseline population SIR of 1.0, and less than 1 reflect decreased lung cancer risk compared to the general population. In males, blue-collar workers clearly showed an excess of lung cancer risk for most major cell types (squamous, adenocarcinoma, small cell, and large cell), a nonspecific pattern suggestive of the effects of increased smoking prevalence in those occupations. In comparison, white-collar workers, including professional, technical, and clerical workers, had SIRs below the baseline risk. In women, isolated elevations are noted, although only a few are significant at the $p < 0.01$ level. Managers and administrators had an elevated SIR in the large cell category, and clerical and kindred workers had increased risk for adenocarcinomas. Female services workers had numerous cell types with increased risk, most notably squamous and small cell cancers, also a pattern consistent with increased smoking prevalence in that occupation.

Housewives are noted to have elevated SIRs for all cell types, an observation which deserves explanation since this is not a group that has not been reported to be at elevated risk for lung cancer, and the prevalence of smoking in this group is less than the national average for women. Housewives represent a special group since their population numbers are estimated by calculation from the Unemployed, Retired, or Not in Labor Force Category. Additionally, older women commonly reported their occupation as housewife rather than as retired (40.4% of women reporting "Housewife" as their occupation were retired or were greater than 65 years old). Therefore, the most likely explanation for the elevations in risk for all cell types in the housewife category is that an occupational misclassification bias for the cases and perhaps an underestimation in the calculated numbers of the housewife population at risk were both at work to artificially elevate the SIRs. Therefore, few conclusions can be drawn for this subgroup of women. Although the housewife cases could be truncated at age 65 to permit better analysis of this subgroup, further analysis of housewives is unlikely to yield any useful conclusions given the varied and nonspecific exposures to housewives.

Table VI through table XVIII details the individual SIRs for all 141 male and 81 female occupations for all cell types and for the category "All Histologies", which represents all lung cancers in that occupation. (The following paragraphs will point out the unadjusted elevated SIRs in each of the various listed occupations. However, the reader should not become overly concerned with sifting for pertinent findings at this level of detail as the pertinent positive and negative findings will be summarized and discussed following this section.)

Table VI shows the SIRs for the Professional and Technical group of occupations. The only notable elevations in females are in accountants, where although all cell types show elevations, only the All Histologies group is large enough to achieve statistical significance. A similar finding is seen in the "other Professional and Technical" category for men, a wastebasket category which is difficult to interpret due to the diverse nature of the jobs included. No other elevations were seen in the Professional and Technical Category.

In Table VII, an elevation in the SIR for the female category "Bankers, Insurance, Finance, and Real Estate" is seen, although this elevation disappears after adjusting for smoking. In men, excess risk is seen in the Restaurant and Bar manager and Food Store manager categories and remains elevated even after adjusted for smoking. Besides having a high smoking prevalence themselves, these individuals are also heavily exposed to environmental tobacco smoke. The only other elevation in white-collar workers (including Sales and Clerical workers) is seen for the male "Other Salesman category", as shown in Table VIII. None of the white-collar occupations for either males or females had significant enough numbers in any one cell type to make their results statistically significant. Only the "All Histologies" grouping had a large enough sample size to make the excess risk significant at the $p < 0.01$ level.

Table X begins the start of the blue-collar occupations with Craftsmen and Kindred workers. Many male occupations showed significant excess risk. Auto mechanics showed excess risk in both the squamous and all histology groups, although both these elevations became non-significant once smoking was adjusted for. This occupation had been reported to be at increased risk for mesotheliomas since they used to blow asbestos dust from around worn brake shoes with air hoses, but this study finds no elevated risk for this cell type. Other mechanics, other craftsmen, and railroad carmen showed excess risk for the "all lung cancer" group although no single histology excess was statistically significant. Machinists and setters showed elevations in the rates of all lung cancers, as well as elevations in the rates of adenocarcinoma, squamous, and small cell cancers that persisted even after adjusting for the effects of smoking. Sheetmetal workers had an increased incidence of adenocarcinomas, although the significance of this result was reduced after adjusting for smoking. Blacksmiths and boilermakers showed elevations in the rates of adenocarcinoma, squamous, small cell and undifferentiated cell types that persisted even after adjustment for smoking. Carpenters showed elevations in adenocarcinomas, squamous, and large cell cancers. Electricians showed elevations only in the adenocarcinoma cell type. Plumbers and painters showed elevations in multiple cell types. Plaster and cement workers had excess risk significant only in the squamous cell category. Heavy equipment operations had an increased incidence of squamous cell cancers only.

A number of occupations achieved statistical significance for their excess risk only when all cell types were combined. These include roofers, engineering and power station operators, millwrights, masons and tile workers, and cabinetmakers. Other occupations that originally were shown to have excess risk had their results become nonsignificant when adjusted for smoking. These included printing craftsmen, cranemen, welders, and other metal worker operatives. Other operatives, including textile operatives and other food workers, also followed this pattern. Laundry and dry cleaning workers had an excess risk only for all cell types combined. Meat cutters and wrappers had elevations significant only for the undifferentiated cell type. Other chemical handlers and wood mill workers showed elevations in multiple cell types. The elevations in paper mill workers disappeared once the results were adjusted for smoking. The two groups of miners, drillers, & blasters and asbestos and insulation workers had excess risks only in the squamous cell type category, even after adjustment for smoking.

Table XII and XIII present the data for transport operatives and laborers. Elevations in lung cancer incidence were seen in numerous cell types in truck drivers, construction laborers, freight and stock handlers, and loggers, consistent with a smoking pattern. An interesting result for Farmers and Farm Laborers is presented in Table XIV. Elevations in both farmers and farm laborers in men that were of borderline statistical significance became very significant after accounting for the low prevalence of smoking in this occupation. These elevations were noted in both squamous and adenocarcinoma categories. This result is unusual in that it runs contrary to a number of published studies documenting decreased incidence of lung cancer in farmers (Carstensen, 1988; Damber and Larsson, 1987; Zahm 1989), although other studies have reported an increased rate of lung cancer, possibly due to pesticide use (Sankila, 1990; Benhamous, 1988).

Table XV details the rates of lung cancer in service workers. Waitresses are noted to have elevations in small cell cancers, and cooks, elevations in numerous cell types. Policemen have an increased incidence of all lung cancers which persists even after adjustment for smoking.

The remaining tables XVI through XVIII deal with household workers and those unemployed or not in the labor force and show a reduced incidence of lung cancers compared to baseline, consistent with reported findings.

Tables XIX and XX summarize those occupations with significantly increased and decreased risk for lung cancer risk by sex, occupation, and cell type that are significant at $p < 0.01$. They give the observed and expected numbers of lung cancer cases for the various occupations and histologies and the computed SIR. The adjusted SIR adjusts for the prevalence of smoking within that occupation using the method described above. Occupations with a higher smoking prevalence than the baseline population have adjusted SIRs that are lower than the unadjusted SIR, whereas occupations with lower smoking prevalence than the baseline population have SIRs that are higher than the unadjusted SIR.

The above results detail a variety of occupations with excess risk for lung cancer. Some priority needs to be established in pursuing potential occupational etiologic factors in the development of lung cancer. To that end, the following criteria are applied to the above results to discern occupations most deserving of further investigation.

1) Standardized incidence ratio different from baseline at a significance of $p < 0.01$
2) Number of observed cases >= 5
3) Occupational category for which a reasonably specific job description exists (as opposed to a group or summary category which could include a number of diverse jobs)
4) Prioritization but not exclusivity is given to those occupations that had smoking-adjusted SIR elevations found in the fewest number of histologies (less than three)

The rationale behind criterion number four is that a significant body of research has documented associations between occupational exposures and specific cell types of lung cancer (see Background). Many of the studies that document only associations between lung cancer (all histologies) and occupation did not include histologic information, or so few cases were available as to make histologic comparisons unreliable. If one accepts the premise that a specific occupational exposure does cause elevated risks in a single cell type of lung cancer, as has been documented for many carcinogens, this criterion is rational. Application of this criterion would also tend to reduce the confounding from smoking, which is expected to cause pan-elevations in histologic risk (although of different magnitudes). However, an occupation may have multiple neoplastic exposures, or pan-elevations in histologic risk might be seen for a single occupational exposure (like with radon). Therefore, data meeting criterion four will be given preferential mention, but data not meeting this criterion will also be presented.

Table XXI presents the occupations in Table XX that meet the above criteria; namely, those occupations that show increased lung cancer risk and have a specific job title (as opposed to an "other" group category). Further, they are separated into those that have elevations in only one or two cell types versus those with multiple histologic elevations. This grouping may elucidate those occupations for which a specific occupational factor may be contributing to an elevated risk in only one or two cell types. Only one female occupation appears on the list - waitresses. The male occupations meeting all four criteria include auto mechanics; sheetmetal workers; electricians; plaster and cement workers; heavy equipment operators; meat cutters and wrappers; paper mill workers; miners, drillers, and blasters; asbestos and insulation workers; plumbers; chemical handlers; construction laborers; farmers; and farm laborers. The occupations that met all the criteria except number four and had elevations in greater than two histologies included machinists; blacksmiths and boilermakers; carpenters; painters; wood mill workers; truck drivers; freight and stock handlers; loggers; and cooks. These occupations merit further investigation, including search for biologic plausibility for a possible occupational hazard and documented findings of similar risk in the published literature.

Regarding the effects of the smoking adjustment procedure (the SIR adj column in Tables XX and XXI), both the direction and magnitudes of the adjusted SIRs deserve mention. The goal of adjusting for smoking is to modify the SIRs in such a way as to reflect the relative contribution of smoking to the incidence of lung cancer for a particular occupation. If the adjustment procedure were ideal, the remaining excess (or decreased) lung cancer risk is expected to be due to other factors besides smoking (e.g. occupational hazards). For most occupations that have lung cancer risks greater than the general population, a large portion of their risk is generally accepted to be due to smoking prevalence within that occupation (Pukkala, 1983), and adjusting for smoking should therefore reduce the SIR. This hypothesis is well borne out by the data. Of all of the occupations with statistically significant lung cancer excesses, 97% of the smoking-adjusted SIRs are less than the unadjusted risk, just as expected. Moreover, this finding is similarly observed in both Table XIX (statistically significant excesses when histology is not considered) and in the database of all occupations' SIRs. Each time, approximately 90% of those SIRs that are higher than the general population's are decreased after adjustment for smoking (i.e. the inter-occupation variability in excess lung cancer risk is consistently decreased after adjustment for smoking). This is a reasonable validation of the smoking adjustment procedure, since we would expect that half of the occupations would adjust up and the other half would adjust downward if the smoking procedure were simply random.

The other important aspect of the adjustment procedure to consider is the magnitude of the adjustment. On average, the adjustment procedure modified the occupational SIRs by 36%. Others have reported slightly smaller but still similar figures: Levin (1990) – most less than 30%, Siemiatycki (1988b) - almost all between 20% and 40%; Carstensen (1988) – all but one less than 40%; Asp (1984) – all less than 31%. Moreover, none of the statistically significant SIRs in occupations with high smoking prevalences were lower than 1.6 (with or without histologic information), and the adjustment procedure did not decrease the SIRs lower than 1.4. Although some of the adjusted SIRs did fall outside the $p < 0.01$ significance level, almost all stayed within the $p < 0.05$ confidence interval, and all were still well above 1.0. This data supports the argument by Siemiatycki (1988b) who said, "our results support the view that relative risks between lung cancer and occupation in excess of 1.4 are unlikely to be artifacts due to uncontrolled confounding". The smoking adjustment procedure used appears to be both a reasonable and underused approach to account for the confounding effects on smoking.

DISCUSSION

The current study sought to describe the incidence and trends of lung cancer by gender and histology for the Portland-Vancouver SMSA. These data can not only serve as a source of comparison with other areas but also can provide a baseline from which future trends can be documented. It also attempted to elucidate those occupations for which the incidence of specific histologic types of lung cancer significantly exceeded the rates for the general population, after adjusting for the estimated prevalence of smoking in those occupations. In keeping with the published literature, the use of cell type information was anticipated to provide both greater sensitivity in enumerating high-risk occupations and greater specificity if certain occupational exposures caused excesses in specific histologies of lung cancer, as has been well documented for many carcinogens (refer to Background and Significance).

The SIRs for all cell types revealed 6 female and 47 male occupations with statistically significant elevations above the baseline lung cancer risk (Table XIX). While possible etiologic agents in the development of lung cancer have been documented for some of these occupations, the number of comparisons suggested that some of the findings were perhaps simply due to chance. However, the reduced risks were found largely in the white collar professions, and the significant excesses were mostly grouped in the blue-collar worker category and specifically to craftsmen and kindred workers, which would argue against these being purely chance findings. Moreover, the number of positive findings (53) far exceeds the number expected (2.2) purely by chance at $p < 0.01$ significance (1% of the 222 professions analyzed). Furthermore, many or most of these occupations are the same as reported by other researchers in similar studies. The positive results also might have been due to the confounding effects of smoking, an etiologic agent that has been shown to elevate the incidence of all cell types of lung cancer. Therefore, an adjustment for smoking and an additional analysis by cell type, with preference given to those occupations with elevations in one or two cell types, was undertaken to prioritize and narrow the list of suspect occupations.

The statistically significant elevated adjusted SIRs by histology documented twenty-two occupations at increased risk in men and one in women (Table XXI). A majority of occupations showed elevations in only or or two cell types, although many (nine) did have increased rates of multiple (greater than two) cell types. These nine high-risk occupations that showed elevated risk in multiple cell types have well-documented lung cancer risks categories for one or more cell types (Zahm, 1989; Benhamou, 1988; Vena, 1985). If the putative exposure for these occupations had the effect of elevating the incidence of all or most cell types (a pattern has been documented for radon, a common exposure for miners [Saccomanno, 1982]), limiting our analysis to only occupations with one or two cell type increases would be inappropriate, so all data will therefore be presented. The following paragraphs will document the biologic plausibility and literature support for these twenty-three occupations' lung cancer risks. Both the reproducibility of previous findings and the observation that many of the at-risk occupations often appear to be grouped around similar exposures are encouraging signs that these results are indeed valid.

Table XXI shows that plaster and cement workers had elevated rates of squamous cell lung cancers. Others have also documented this risk (Rafnsson, 1986; McDowell, 1984; Coggon, 1984), which was likely due to asbestos and/or chromium exposures. Increased risk for construction workers has been similarly documented (Keller, 1993; Morabia, 1992; Hall, 1991; Coggon, 1984; Pukkala, 1983) and was confirmed in the present study (SIR =

3.77), with the same etiology suspected. Electricians also have been suspected of having increased lung cancer risk (both squamous cell and adenocarcinomas) from exposure either to construction materials (including asbestos) like the above jobs, or to magnetic fields (Morabia, 1992). This study documented increased risks for adenocarcinomas (SIR = 2.86) and squamous cell cancers (SIR = 2.05; although significant only at $p < 0.05$). Finally, out of the entire population, asbestos and insulation workers had the highest relative risks for squamous cell cancers (unadjusted SIR > 14). Although mesotheliomas were both anticipated and found to have the highest unadjusted SIR in this occupation (SIR=181), the number of cases in the sample (n=4 mesotheliomas) was not large enough to permit statistical significance for this histology. Others have also documented asbestos exposure leading to increased squamous cell lung cancer risk (Vena, 1985; Stayner, 1983).

Miners have long been known to be at increased risk from lung cancer, particularly from radon exposure or radioactive ores, or in some mining environments, silica or arsenic (Land, 1993; Sankila, 1990; Samet, 1989; Roscoe, 1989; Siemiatycki, 1989; Samet, 1984; Benhamou, 1988; Carstensen, 1988; Lerchen, 1987; Damber 1987). This group continues to have demonstrated higher lung cancer risk, particularly in of the squamous cell histology.

Machinists are known to sometimes be exposed to both asbestos dust and cutting oil mists and have repeatedly been observed to be at elevated risks for lung cancer (Acquavella, 1993; Park, 1988; Vena, 1985). Our findings confirm this risk for the squamous and adenocarcinoma cell types. Likewise, both mechanics (possibly from asbestos brake pads) and sheetmetal workers have been similarly implicated as being exposed to these agents or nickel or crystalline silica dust (Hilt, 1997; Morabia, 1992; Carstensen, 1988; Benhamou, 1988). This study finds elevations for both these occupations in the squamous and adenocarcinoma cell types, respectively.

Meat cutters were observed to have an excess of lung cancers (adjusted SIR = 5.14), and much literature support exists for various meat handlers' elevated lung cancer risks (Lagorio, 1995; Johnson, 1995; Johnson, 1986; Coggon, 1989; Johnson 1989; Reif, 1989; Guberand, 1993). The possible etiologic agents include oncogenic viruses (demonstrated in animal models but with limited data suggesting causality in humans) and exposure to vinyl chloride fumes (Johnson, 1994; Coggon, 1989; Wegman, 1987; Johnson, 1986) from the use of hot wire plastic wrap film cutters, a practice that now has been largely discontinued. Elevations in risks for cooks (adjusted SIR = 3.73 for squamous cell, SIR = 3.44 for adenocarcinoma) have been documented (Carstensen, 1988; Tuchsen, 1986), specifically adenocarcinomas (Ger, 1993), without much elucidation of a specific exposure beyond "aerosolized carcinogens". Waiters and waitresses (adjusted SIR = 4.32), too, have had increased lung cancer risks documented (Kjaerheim, 1993).

Workers in the wood industry (e.g. carpenters, wood kiln workers) have been observed to have elevated risks for adenocarcinoma of the nasal sinuses, wood dust (sometimes chemically treated) being one of the posited etiologic agents (Gordon, 1998; Zahm, 1989; Hall, 1991; Gerhardsson, 1985). The results show increased risk in carpenters for lung adenocarcinomas and, to a lesser degree, squamous cell cancers, similar to others' findings (Blair, 1990; Blot, 1982; Siemiatycki, 1989), with phenols, urea, and wood dust being possible etiologies. Additionally, the study confirmed published elevated lung cancer risks in loggers, paper mill, and wood mill workers (Toren, 1996; Lagorio, 1995; Jappinen, 1991; Damber, 1987) with similar cell type distributions. Possible exposures include either wood dust (like carpenters) or organic chlorinated compounds formed during chlorine pulp bleaching. A recent review by the IARC (1995) linking lung cancer and occupational wood dust exposure was inconclusive. However, the consistent finding of increased lung cancer risks, and specifically, adenocarcinomas, in those employed in the wood industry continues to bear investigation.

Both plumbers and painters were observed to have elevated rates for both adenocarcinomas and squamous cell cancers. The same observation has been made for plumbers by Hall (1991), Zahm (1989), Benhamou (1988), Damber (1987), Kaminski (1980), Englund (1980), and Cantor (1986). Documented risks for painters are noted by the IARC (1989), Zahm, (1989), Lerchsen (1987), Chiazze (1980), Englung (1980), Olsen (1987), Bethwaite (1990).

Chemical handlers were observed in our study to have elevated risks of both adenocarcinomas and squamous cell lung cancers. This finding has been observed by others (Hall, 1991; Bond, 1985a and 1985b; Wolf, 1987; Delell, 1982; O'Berg, 1980) and possible exposures to dioxins, acrylonitrile, or benzene were postulated, although a variety of chemical exposures in this field is likely. Multiple and often unique chemical exposures to an individual may also be synergistic in effect (and may interact with tobacco smoke), complicating search for an etiology.

Heavy equipment operators demonstrated elevated risks for the squamous cell type, with exposure to diesel fumes, coal tar pitch, or asphalt and welding fumes as possible etiologies (Stern, 1997). Freight and stock handlers, who show increased SIRs in multiple cell types (SIRs = 1.8 – 2.3), are also likely exposed to diesel exhaust and have been found by others to have increased lung cancer risks (Carstensen, 1988). Truck drivers, who had elevated risks in numerous cell types, are certainly exposed to diesel exhaust and have an increased lung cancer risk (Steenland, 1998; Keller, 1993). One recent paper found the lifetime excess risk of those occupationally exposed to diesel (including truck drivers) was ten times that allowable by OSHA (Steenland, 1998). Despite controversy (Muscat, 1995, 1996), diesel exposure is a probable if not certain lung carcinogen (Bhatia, 1998; Steenland, 1998; IARC, 1989), and several regulatory agencies are considering regulating levels of diesel exhaust (the California EPA and the Mine Safety Health Administration).

The finding of increased risk of lung cancer in farmers and farm workers is surprising since most research has documented decreased lung cancer risk in this occupational group (Mastrangelo, 1996; Zahm 1989; Carstensen, 1988; Pukkala 1983; Burmeister, 1981). This finding is even more marked since farmers have a smoking prevalence much less than that of the general population (Sterling, 1978). However, a number of other studies have also found elevated rates of lung cancer in farmers (Sankila, 1990; McDuffie, 1990; Benhamou, 1988; Barthel, 1981;) and have suggested that exposure to pesticides (perhaps with arsenic as a constituent) or its byproducts may account for this increased risk, although no specific exposures could be pinpointed conclusively (IARC, 1991).

In contrast to others' findings, the present analysis did not reveal any additional occupations with excess lung cancers when analyzed by histologic subtype that were not identified in the analysis with all histologies combined. This result initially suggests that no increased sensitivity was achieved using the additional cell type information. However, the information gleaned from histologic subtype excesses did allow us to exclude occupations with elevations in all cell types, a pattern most consistent with the largely non-differential effects of smoking. It also allowed us greater specificity when comparing results with other researchers, who have sometimes documented specific occupational exposures' associations with specific lung cancer histologies. However, the use of imprecise pathological diagnoses such as "Undifferentiated", "Unknown", and even "Large Cell" (a wastebasket category) somewhat hampered this effort. Of note is that a majority of the significant excess lung cancers by occupation were of the squamous cell variety. Although this result is not as helpful in identifying occupational exposures as would be excesses in other cell types due to the lack of specificity of squamous cell cancers, it is a finding consistent with the published literature (Vena, 1985; Stayner and Wegman, 1983).

One concern with the current study is that pathology slides were not reviewed by an outside agency or preferably, by a single reference pathologist. However, other researchers have demonstrated a high concordance rate for pathologic diagnosis of the three major cell types: squamous (84%), small cell (86%), and adenocarcinoma (71%), with much less reliability in the other and large cell categories (13%) (Campobasso, 1993; Greenberg, 1984; Vincent, 1977). Moreover, the pathologic classification schema used in the present study and by most investigators, although modified by the World Health Organization in 1977, did not affect these three major cell types and only affected the large cell category (Butler 1987; Dodds, 1986; Percy and Sobin, 1983). Since almost all of the major findings were restricted to these three major cell types, we have confidence that our results were not due to misclassification of pathology. Moreover, any misclassification bias, if it existed, would be non-differential by occupation and would bias the cell type results towards the null.

Another limitation of the current study is that occupations were coded according to hospital admission summary or, when that was not available, by using death certificate data. Previous work has documented reasonably high agreement between death certificate data and actual lifetime occupation (Zahm, 1989). It is possible, though, that individuals were exposed to multiple potential carcinogens in numerous occupations, and the single occupation coded might not even be the occupation with the exposure of interest. This effect would most likely weaken any association between an occupation and lung cancer risk, although it might create a bias if individuals in a given occupation would be more likely to switch jobs to a different but related occupation (e.g. transition because of changes in industrial processes or technology). This is a plausible supposition, but it is largely unmeasureable by our current study design.

Bias might also exist because of the tendency for individuals to be promoted from the time of census data collection to the time of death and because of the tendency for family members to promote the deceased's occupation on their death certificate (for the minority of cases where data from death certificates were used). This would have the effect of overestimating deaths in the foreman, executive, and supervisor categories and underestimating blue-collar occupation deaths. However, almost all of the significant lung cancer risks were found to be in blue-collar workers, and the described bias would have weakened such associations. Therefore, this effect seems to be only a minor consideration based upon our findings.

Individuals also might be employed in occupations in past years that were not accurately reflected in the numbers of individuals at risk within each occupation reported by the Census. This could inflate or deflate estimates of risk, depending upon demographic changes in that occupation, so the impact on our results is not known. Additionally, even if a positive association were found between an occupational exposure and lung cancer, changes in the workplace over the last several decades from the time of exposure to the present might have modified exposure to the carcinogen of interest for that occupation. This is a valid concern and a noted limitation of our findings that should motivate additional research into the occupations found to be at higher risk. Finally, some real associations might have been non-significant because of a lack of power due to small sample size in each occupation.

Transition from employed to retired status excluded many potential cases that could not be associated with an occupation. A potential source of bias would exist if sicker workers (from lung cancer) would be more likely to retire early than healthy workers. This bias should not be serious since our study spanned fifteen years, and even healthy workers would be expected to retire within several years of the median age of diagnosis of lung cancer (age 64). However, even if this bias did exist, the effect should simply weaken any association between an occupation and lung cancer risk.

It is possible that the smoking adjustment was inadequate in reflecting the actual contribution of smoking to the lung cancer excesses found within each occupation. This could be due to a number of reasons. One is that the smoking prevalence data did not include as many occupational categories as the modified U.S. Bureau of the Census Occupational Classification used by the current study; in that case, a more general occupational category's smoking prevalence was used. Thus, the excess risks for lung cancer might simply be due to a higher smoking prevalence within that specific occupation. While this is possible, it is unlikely to have a significant effect unless the prevalence of smokers within that occupation is drastically far from the population and group category prevalence. This was not observed for any of the occupations that did have very specific smoking prevalence information available.

Criticism might also be made regarding the relative risks for lung cancer used for the never, former, and current smoker categories. Various studies have documented that relative risks of smoking may differ not only by smoking status but also by gender and by cell type (Wynder and Muscat, 1995; Risch 1993; Osann, 1993; Lubin and Blot, 1986; Lubin and Blot 1984; IARC 1986). Another possible problem with the smoking adjustment is that smoking status simply characterized by never, former, and current smokers might not be adequate in reflecting the complex and variable nature of cigarette smoking in accounting for tar content, filter usage, intensity and duration of smoking, and pack years (Muscat, 1996; Doll and Peto, 1978; Peto 1986). However, the study results showed that the smoking adjustment had only a modest effect on our final results. An empiric attempt to elevate the relative risks associated with each smoking category by 50% and also to change the relative risk ratios of former and current smokers (from 1:2 to 1:3) had little affect on the final result (the mean SIR adjustment increased only 7%). Other researchers similarly have published a relatively moderate effect of adjusting for smoking (Levin, 1990; Carstensen, 1988; Damber 1987; Hinds, 1985; Asp, 1984), even after modifying the relative risks of various smoking categories and adjusting for the duration of smoking in various occupational groups.

Siemiatycki (1994, 1988) found that smoking was unlikely to significantly confound the results of occupational studies such as ours, especially after even a reasonable attempt at smoking adjustment. His work also showed that there did not appear to be an interaction between smoking status and degree of occupational exposure within a specific job category (i.e. nonsmokers with the same job title as smokers do not seek out cleaner work environments). Other confounding factors, such as indoor radon exposure, would be expected to be non-differential by specific occupational title (although it might be if simply comparing blue collar versus white collar jobs) and thus any misclassification bias would bias results towards a null finding.

Another issue not yet addressed is the possibility of an interaction between smoking and an occupational exposure. The adjustment for smoking performed should incorporate such an interaction term, and some helpful examples will demonstrate the effect of the adjustment procedure.

Examples of Smoking Adjustment on Various Occupations' Smoking Prevalences

Smoking Description	General Population Baseline	Occupation A Heavy	Occupation A Heavy	Occupation B Very Heavy	Occupation B Very Heavy	Occupation C Ex-smokers	Occupatio C Ex-smokers
Smokers	40%	50%	50%	65%	65%	10%	10
Former Smokers	30%	25%	25%	10%	10%	70%	70
Nonsmokers	30%	25%	25%	25%	25%	20%	20
Smoking Index	11.3	12.75	12.75	14.25	14.25	9.2	9.
Crude SIR	**1.0**	**2.0**	**1.75**	**2.0**	**1.75**	**2.0**	**1.7**
Adjusted SIR	**1.0**	**1.77**	**1.55**	**1.59**	**1.39**	**2.46**	**2.1**

This above table demonstrates the modest effect that even a significant departure from the baseline population's smoking prevalence has on an occupation's SIR. These examples reflect the extreme limits of the variation of smoking prevalence by occupation. In actual practice, most occupations fall much closer to the population smoking prevalence, and thus, the effect of the adjustment procedure is much more moderate than demonstrated by these examples.

Therefore, the conclusions that can be drawn from the smoking adjustment procedure are as follows:

1) the smoking adjustment procedure used appears to be intuitively reasonable and gave us adjusted SIRs that were consistent and logical in both magnitude and direction

2) the adjustment procedure can be applied to a large database, if good smoking prevalence data are available (and more smoking prevalence data by specific occupational titles would thus be helpful)

3) the results of the procedure are similar to those found by other researchers who have attempted to adjust for smoking, using a variety of methods

4) the magnitude of smoking adjustment on the SIR is slightly larger than most others report but is still modest (on the order of about 40%)

5) modifying various parameters of the procedure (e.g. RR of smoking categories, increased number of smoking gradations and exposures) are of little benefit

6) a crude SIR greater than 1.7 is unlikely to be significantly affected by smoking prevalence for that occupation

7) uncontrolled confounding by smoking should not compromise the integrity of the results of studies of occupation and lung cancer as much as sometimes feared

The strengths of the study deserve mention. The study is population based, so that referral patterns did not dictate patient selection; case ascertainment within the catchment area for the studied time period was almost 100%. Since the source of pathologic specimens include surgical pathology, autopsy, and cytology, there was not a differential histologic classification bias, as has been demonstrated in other series where histology was related to specimen origin (Wu, 1986; Petersen 1961; Whitwell, 1961; Herrold, 1972). The number of cases available was large enough to permit statistical stability for most major occupational titles for the major histologies, although some categories did have small numbers.

An improvement on the methodology of the present study that has been suggested by several investigators involves the creation of a job exposure matrix that links several occupational groups and common prospective carcinogen(s) in those occupations. Details of this process are found in Coggon, 1984 and Hoar, 1980. The pooling of data of several occupations potentially allows for a larger sample size and is theorized to increase the specificity of any occupational associations uncovered. However, several studies have found that this procedure is not helpful and that it has "low sensitivity and limited usefulness as a tool for hypothesis generation" (Hinds, 1985; Magnani, 1988). Even its use in hypothesis testing requires inference to exposure to occupational carcinogens, a limiting drawback to the current study. The above studies concluded that a job exposure matrix is not a helpful tool for studies involving the general population but might be helpful in industrial cohort studies where jobs titles are detailed and specific exposures (with dose information) are identified.

Cole and Merletti (1983) make specific suggestions on policies and institutional programs that would assist epidemiologic research in gathering and analyzing standardized and continuous occupational data. They recommend (1) *a list of known and suspected carcinogens be created and updated regularly.* The IARC has been vigilant in developing such a list. (2) *An exposure based classification system for occupations be developed.* The retrospective job exposure classification matrix described above has proved disappointing, but perhaps a prospective approach with specific exposures and doses by industry will prove useful. (3) *The National Death Index to be extended back in time.* The U.S. has data available only since 1979 (Wentworth, 1983), and the long latency from exposure to noxious substances to diagnosis of disease argues for increasing the history available through the NDI to better follow occupational cohorts. Tumor pathology, if applicable and available, might also prove useful. The more recent implementation of cancer registries will be useful in fulfilling the purpose of the NDI, but only if complete and accurate occupational data is available (4) *Registries of exposed workers should be established.* Ideally, both duration and intensity of exposure (to known and suspected carcinogenic materials) could be recorded. (5) *Medical and occupational information should be linked.* Workers occupationally exposed to suspect toxic substances would be followed via ongoing prospective cohort studies. This approach addresses all components of the required epidemiology needed to assess and prevent occupational diseases: identification and classification of toxic exposures, exposure based data collection, disease and mortality based data collection, and epidemiologic studies relating each of these components.

SUMMARY AND CONCLUSION

The present study has generated a moderately sized list of occupations for which excess lung cancer risks for specific cell types were observed. The study is the largest of its kind and so permits more reliable associations for a greater number and finer categorization of occupations than previously allowed. Most of these occupations have documented literature support for elevations in lung cancer risk and suspected carcinogenic exposures, and so the current study confirms many of these associations with its similar results and larger sample size. The large number of comparisons would suggest that some associations were due to chance or bias, but the number of positive findings exceeded that expected by chance alone, and the positive and negative findings were remarkably similar to those previously documented by others.

Attempting to find meaning in the many positive findings in studies of this type can often be a daunting task and some prioritization therefore needs to be made in deciding which avenues of research to pursue. Given the present findings, the results of increased lung cancer risk in agricultural workers is concerning given the usual findings of decreased lung cancer risk usually reported. The few other studies that have also found increased lung cancer risk in farm workers have posited that perhaps regional agricultural practices and the attendant pesticide constituents may account for the differences in risk. Additionally, the remarkable consistency of increased lung cancer risk in the several wood industry occupations, including carpenters, paper mill workers, wood mill workers, and loggers, is notable, particularly given the relative dearth of both basic science and clinical information to explain this risk. These two industries would appear to be areas ripe for investigation based upon the results of this study.

Although cell type information did not add to the list of at-risk occupations when compared with all histologies combined, it did allow us to identify those occupations that had elevations in only one or two cell types and to increase our specificity of association. Since this study is simply at the stage of hypothesis generation, the utility of this specificity can only be judged by additional studies that incorporate tumor pathology into its dataset, although the confirmation of the existing literature's cell type associations (while sometimes inconsistent) are so far encouraging.

The smoking adjustment procedure appeared to be a valid yet underutilized method to reduce the confounding from smoking usually present in studies of occupation and lung cancer. Application of this technique yielded quantitative estimates of confounding that are not only intuitively logical and similar to the few other published findings on this topic but also useful in reassuring the investigator that an occupations' excess lung cancer risk is not exclusively due to higher smoking prevalences. More detailed information regarding the various smoking prevalences within specific occupational titles would be useful in future studies to do this adjustment. The author would recommend this technique if the smoking patterns of a cohort could not be assessed directly, either for financial or practical reasons. Obviously, current smoking prevalence data by detailed occupational categories (preferably sampled in the geographic region studied) are required. However, even if such data are not available, there does appear to be a threshold risk above which such data are not critically necessary, i.e. an SIR (greater than 1.7) above which confounding by smoking is unlikely to significantly distort a true association between an occupational exposure and lung cancer risk.

Somewhat concerning was the result in the present study that few statistically significant lung cancer excesses by occupation were found in women, and that women were underrepresented in our review of occupational lung cancer studies. Given that the histologic epidemiology of lung cancer differs significantly by gender and more women have entered the workplace in recent years, more research should be directed at female workers and their possible occupational exposures. Finally, since recent and laudable efforts have been directed at encouraging smoking cessation, and since smoking prevalence and lung cancer rates are peaking & declining in males and are expected to soon in most female age groups (ACS 1996; Pierce, 1989; Devesa 1989), the search for other etiologic factors for lung cancer will become increasingly more important.

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TABLES, FIGURES, AND APPENDICES

Gender & Age Distribution of Lung Cancers

GENDER	Age Group	Cases	% of Sex
F	15-24	4	0.3%
F	25-34	16	1.0%
F	35-44	81	5.1%
F	45-54	300	18.8%
F	55-64	529	33.1%
F	65+	669	41.8%
All Females		**1,599**	100.0%
M	15-24	4	0.1%
M	25-34	20	0.4%
M	35-44	172	3.1%
M	45-54	766	14.0%
M	55-64	1,680	30.7%
M	65+	2,835	51.8%
All Males		**5,477**	100.0%
Total Population		**7,076**	

Table I

Comparison of the Histologic Distributions in Similar Studies

[illegible]	[illegible]		TNCI		SEER		Dodds		Greenberg		[illegible]	Percy and Sobin	Butler	
Location	Portland-Vancouver		TNCI		9 SEER Regions		Washington		Vermont & NH		Finland	SEER	New Mexico	
Time Period	1963-1977		1969-1971		1973-1977		1974-1981		1973-1976		1973-1976	1977-1979	1970-72, 80-81	
Published							1986		1984		1990	1983	1987	
Cases	7,076		39,807				5,897		1,580		6,878	28,119	725	
	% Distribution		% Distribution		% Distribution		% Distribution		% Distribution		% Distribution	% Distribution	% Distribution	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Both sexes	Males	Females
% of Total	77.7%	22.3%	73.8%	26.2%	78.6%	21.4%	68.9%	31.1%	78.9%	21.1%	100.0%	100.0%	71.3%	28.7%
Male:Female Ratio	3.48		2.81		3.68		2.21		3.74				2.49	
Squamous	40.3%	22.9%	37.1%	21.7%	37.2%	21.0%	34.5%	19.2%	53.6%	28.2%	40.3%	32.1%	29.4%	20.5%
Adenocarcinoma	21.9%	31.9%	21.1%	33.6%	15.8%	24.0%	25.1%	37.2%	17.3%	30.6%	12.3%	26.6%	26.5%	29.1%
Small Cell	14.9%	17.6%	14.5%	17.1%	14.0%	16.6%	16.5%	18.7%	19.8%	27.6%	20.6%	16.3%	18.5%	29.1%
Large Cell	9.6%	11.9%							7.1%	9.3%		7.5%	16.1%	13.7%
Undifferentiated NOS	13.2%	15.6%	1.5%	1.5%								12.5%		
Carcinoma NOS			22.2%	20.8%	21.9%	20.4%	14.9%	14.4%			23.1%			
Other			4.0%	5.0%	11.0%	18.0%	1.7%	3.0%	2.1%	4.2%	3.6%	5.1%	9.2%	8.0%
Totals	100%	100%	100%	100%	100%	100%	93%	93%	100%	100%	100%	100%	100%	100%
Unknown	9.9%	10.6%					17.0%				19%			

Studies with data prior to 1977 lumped large cell diagnoses into Other or one of the nonspecific cell type categories

Table II

Butler had mixed types account for the difference
Dodds has a table that doesn't add to 100%
SEER data not verified for Other category

Lung Cancer Incidence Rates

Third National Cancer Survey			
1969-1971	39.9	71.9	14.3

1973 SEER Registry	SEX		
	Both Sexes	Male	Female
9 Standard SEER Registries, Whites Only	41.6	72.4	17.8
9 Standard SEER Registries, All Races	42.4	73.2	18.2
San Francisco-Oakland SMSA	47.3	78	24
Connecticut	42.2	75.8	17.7
Metropolitan Detroit	47.2	82.5	18.9
Hawaii	41.9	58.3	25.6
Iowa	40.4	74	13.6
New Mexico	34.2	53.4	17.7
Utah	23.6	41.5	8.7

Portland-Vancouver Area (current study)			
1963-1977, All Races	44.1	76.1	18.4

9 Standard SEER Registries, All Races			
1973-1994	54.4	81.6	33.8

** Rates are age-adjusted to the 1970 U.S. Standard Million*

Table III

Age-Specific Mean Annual Lung Cancer Incidence Rates in Men

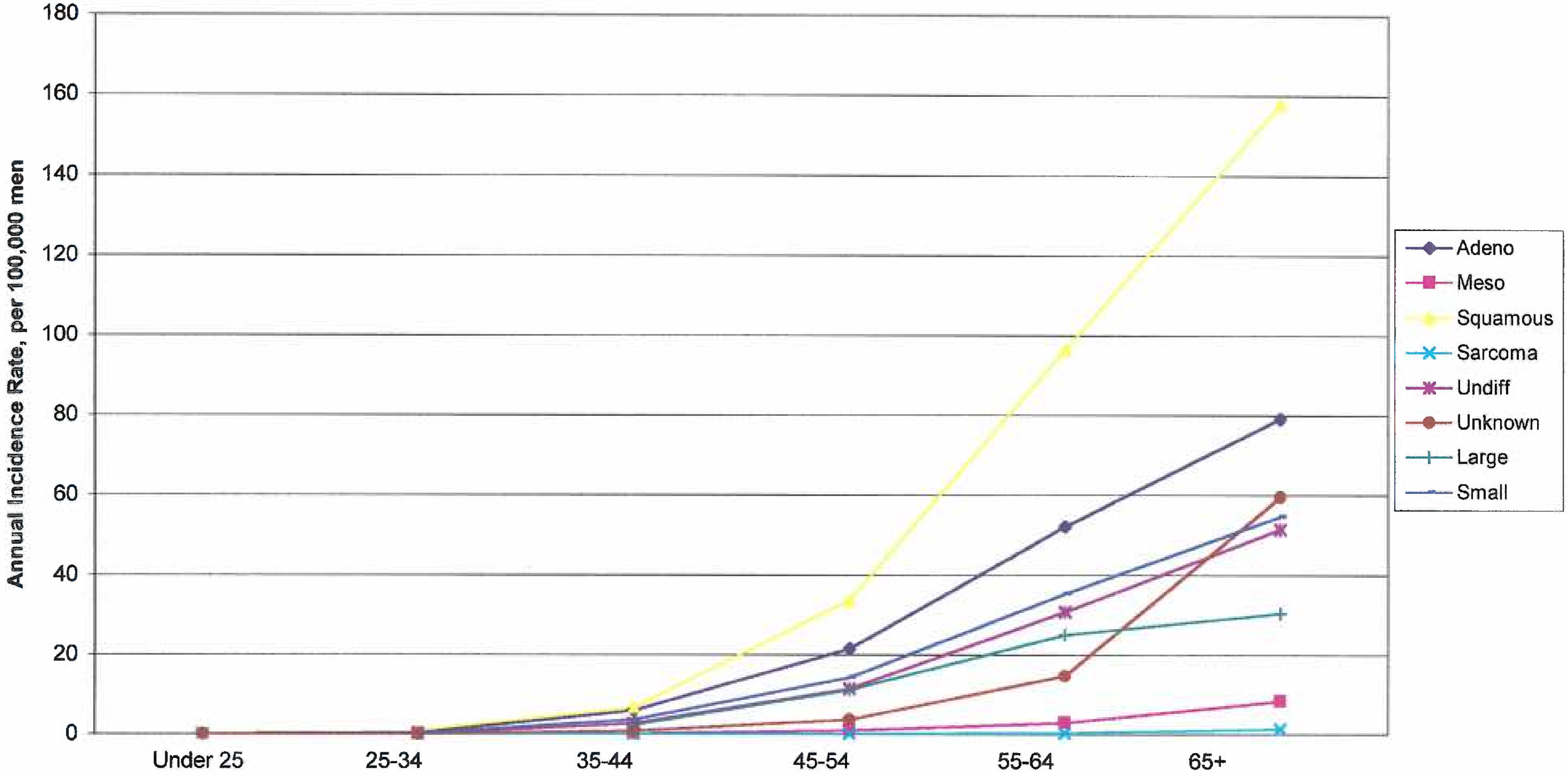

Figure A

Age-Specific Mean Annual Lung Cancer Incidence Rates in Women

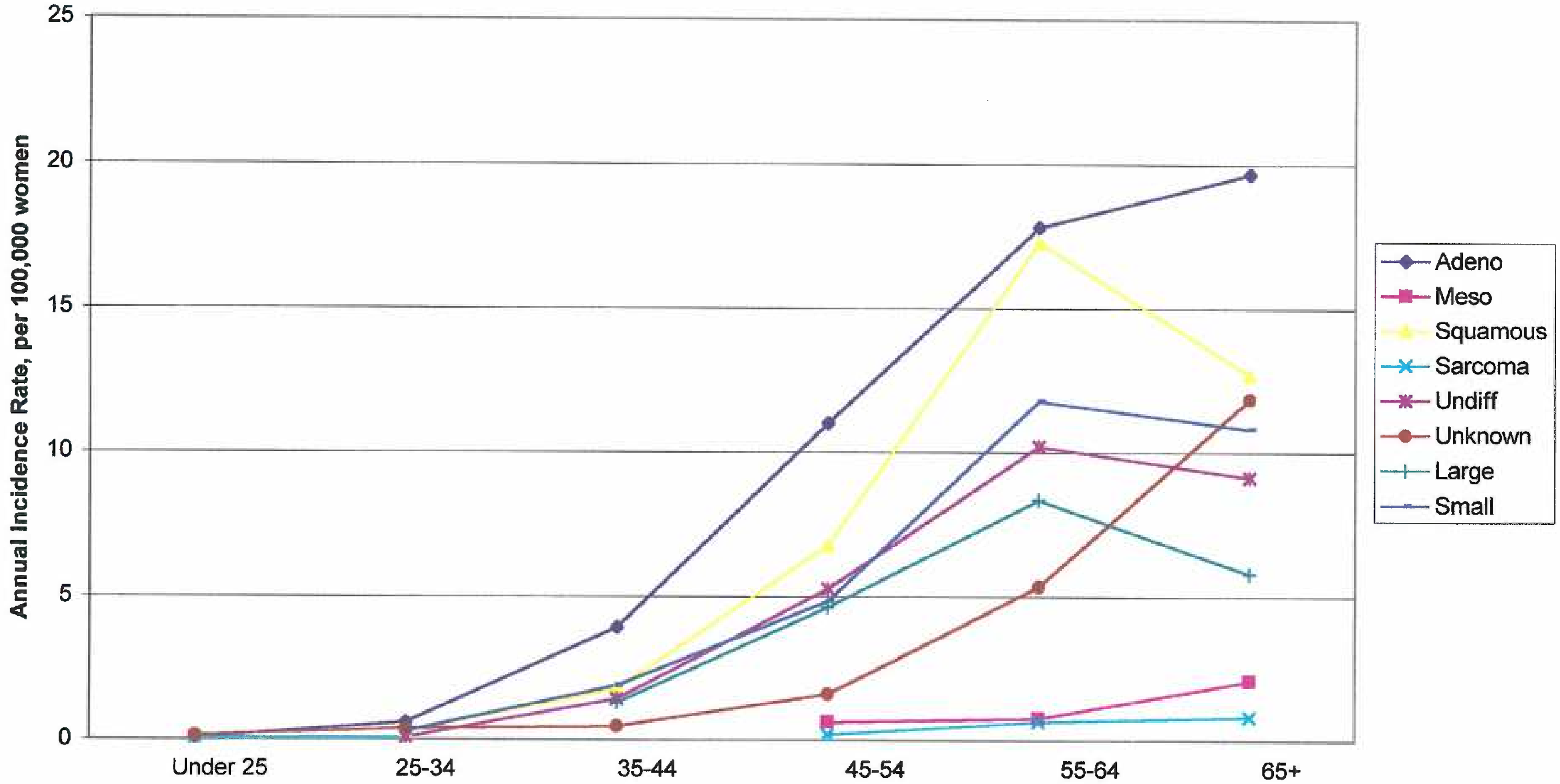

Figure B

Smoking Status, by Histology, for Major Cell Types

Gender	Histology	Total	Total %	Never	Never %	Former	Former %	Current	Current %	Unknown	Unknown %
M	Squamous	2105	36.5%	50	2.4%	522	24.8%	1282	60.9%	251	11.9%
M	Adenocarcinoma	1145	19.9%	38	3.3%	252	22.0%	681	59.5%	174	15.2%
M	Small Cell	777	13.5%	9	1.2%	153	19.7%	518	66.7%	97	12.5%
M	Undifferentiated	690	12.0%	10	1.4%	166	24.1%	387	56.1%	127	18.4%
M	Unknown	551	9.6%	14	2.5%	119	21.6%	253	45.9%	165	29.9%
M	Large Cell	500	8.7%	5	1.0%	91	18.2%	353	70.6%	51	10.2%
	Total	**5768**	**100%**	126	**2.2%**	1303	**22.6%**	3474	**60.2%**	865	**15.0%**
F	Adenocarcinoma	467	28.4%	126	27.0%	51	10.9%	214	45.8%	76	16.3%
F	Squamous	335	20.4%	23	6.9%	49	14.6%	220	65.7%	43	12.8%
F	Small Cell	258	15.7%	22	8.5%	26	10.1%	182	70.5%	28	10.9%
F	Undifferentiated	228	13.9%	28	12.3%	27	11.8%	117	51.3%	56	24.6%
F	Large Cell	174	10.6%	10	5.7%	19	10.9%	123	70.7%	22	12.6%
F	Unknown	180	11.0%	34	18.9%	17	9.4%	64	35.6%	65	36.1%
	Total	**1642**	**100%**	243	**14.8%**	189	**11.5%**	920	**56.0%**	290	**17.7%**
		7410									

Table IVa

Crude Lung Cancer Rates by Gender, Smoking Status and Histology

		Smokers & Nonsmokers	Ever Smoked #	Ever Smoked %	Never Smoked #	Never Smoked %	Etiologic Fraction due to smoking
	Male Population in Portland (1970)	486,449	332,439	68.3%	154,010	31.7%	
All Lung Cancers	Lung cancer cases (15 yr period)	5,477	5335	97.4%	142	2.6%	
	Crude lung cancer rate per 100,000	75.1	107.0		6.1		94.3%
Adeno CA	Lung cancer cases (15 yr period)	971	933	96.1%	38	3.9%	
	Crude lung cancer rate per 100,000	13.3	18.7		1.6		91.2%
Squamous	Lung cancer cases (15 yr period)	1,854	1804	97.3%	50	2.7%	
	Crude lung cancer rate per 100,000	25.4	36.2		2.2		94.0%
Small Cell	Lung cancer cases (15 yr period)	680	671	98.7%	9	1.3%	
	Crude lung cancer rate per 100,000	9.3	13.5		0.4		97.1%
	Female Population in Portland (1970)	522,680	224,857	43.0%	297,823	57.0%	
All Lung Cancers	Lung cancer cases (15 yr period)	1599	1311	82.0%	288	18.0%	
	Crude lung cancer rate per 100,000	20.4	38.9		6.4		83.4%
Adeno CA	Lung cancer cases (15 yr period)	391	265	67.8%	126	32.2%	
	Crude lung cancer rate per 100,000	5.0	7.9		2.8		64.1%
Squamous	Lung cancer cases (15 yr period)	292	269	92.1%	23	7.9%	
	Crude lung cancer rate per 100,000	3.7	8.0		0.5		93.5%
Small Cell	Lung cancer cases (15 yr period)	230	208	90.4%	22	9.6%	
	Crude lung cancer rate per 100,000	2.9	6.2		0.5		92.0%

Table IVb

Elevated SIRs, Stratified by Gender, Occupation and Histology

3 Digit Occupational Groupings - Table V

	Occupation	Occ Popn	Gender	Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
	Category: Major Occupational Groupings											
100	Professional & Technical	24,526	Female	1.56 *	0.85	1.24	1.28	1.11	1.35	1.22	0.8	1.24
110	Managers & Administrators	6,420	Female	1.71	0.00	2.40 *	0.00	2.12	3.63 **	2.30 *	0.7	2.08 **
120	Sales Workers	11,935	Female	1.59	0.00	1.01	0.00	1.06	0.74	0.69	1.1	1.12
130	Clerical & Kindred Wkrs	59,429	Female	1.45 **	0.86	1.20	1.90	1.06	1.06	1.08	1.0	1.19 *
240	Craftsmen & Kindred Worke	2,717	Female	0.57	0.00	0.00	0.00	0.56	2.74	1.02	1.0	0.84
250	Operatives, excl. transpo	14,368	Female	0.80	0.00	1.07	0.00	1.73	0.80	0.97	1.8	1.12
260	Transport Operatives	790	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
270	Laborers	1,650	Female	0.67	0.00	0.96	0.00	0.00	0.00	0.00	0.0	0.41 *
380	Farm Workers	1,414	Female	0.49	0.00	0.65	0.00	0.97	1.22	0.87	0.0	0.71
400	Service Workers	27,709	Female	1.28	2.12	1.95 **	2.17	1.90 *	1.88 *	2.65 **	1.9	1.85 **
410	Pd. Household Wkrs	3,886	Female	0.00	0.00	1.19	0.00	0.70	0.46	0.62	0.0	0.50 **
500	Housewives	119,459	Female	1.36 **	2.19 *	1.47 **	0.92	1.37 **	1.27	1.46 **	1.3	1.40 **
900	Unemployed or not in Labo	104,723	Female	0.49 **	0.59 *	0.32 **	0.91	0.45 **	0.37 **	0.35 **	0.8	0.49 **
100	Professional & Technical	36,248	Male	1.05	1.20	0.70 **	0.75	0.74 *	0.79	0.66 **	0.5 **	0.76 **
110	Managers & Administrators	32,593	Male	0.95	1.73	0.97	0.00	1.07	1.32	1.13	1.0	1.05
120	Sales Workers	21,494	Male	1.11	0.25 **	1.01	0.00	1.31	1.09	1.08	1.2	1.07
130	Clerical & Kindred Wkrs	18,285	Male	0.89	0.72	0.83	2.97	0.68	0.78	0.92	1.0	0.86 *
240	Craftsmen & Kindred	50,552	Male	1.86 **	3.59 **	2.23 **	1.53	2.20 **	1.81 **	2.16 **	2.2 **	2.10 **
250	Operatives,Excel.Trnspt	27,857	Male	2.10 **	2.50	1.95 **	4.31	1.98 **	2.41 **	1.87 **	2.3 **	2.05 **
260	Transport Operatives	15,584	Male	1.75 **	0.90	1.99 **	1.79	2.17 **	1.67 *	1.92 **	1.3	1.89 **
270	Laborers	17,122	Male	2.32 **	0.00	2.55 **	1.62	2.68 **	1.68 *	2.07 **	2.4 **	2.31 **
380	Farm Workers	5,189	Male	1.66 *	2.23	1.98 **	2.89	1.08	1.39	1.74 *	1.2	1.61 **
400	Service Workers	19,759	Male	1.63 **	0.00	1.35 **	1.14	1.10	1.35	1.52 **	0.9	1.38 **
410	Paid Household Workers	127	Male	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
900	Unemployed	92,060	Male	0.42 **	0.52 **	0.45 **	0.54	0.45 **	0.38 **	0.42 **	0.8 **	0.48 **

Columns Adeno through All Hist.: Standardized Incidence Ratios (SIR) by histology

** = $p < 0.01$; * = $p < 0.05$

Elevated SIRs, Stratified by Gender, Occupation and Histology

Table 6

Occupation		Occ Popn	Gender	Standardized Incidence Ratios (SIR) by histology								
				Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
Category: Professional & Technical												
101	Engineers	107	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1021	Practitioners	238	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1025	Registered Nurses	4,932	Female	2.49 *	3.90	1.54	0.00	1.15	1.86	1.05	2.2	1.55
1026	Dieticians	188	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1027	Therapists et al.	261	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1030	Others	281	Female	13.28	0.00	0.00	0.00	14.27	0.00	12.51	0.0	8.29
1031	Clinical Lab Tech	557	Female	0.00	0.00	4.96	0.00	0.00	0.00	0.00	0.0	1.07
1032	X-ray Tech	264	Female	7.28	0.00	0.00	0.00	15.74	19.15	0.00	0.0	4.58
1033	Dental Hygenists	96	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
104	School Teachers	8,418	Female	1.17	0.00	1.03	3.88	1.04	0.32 *	0.93	0.5	0.97
1050	Others	472	Female	1.68	0.00	0.00	0.00	0.00	0.00	3.18	0.0	1.03
1051	Computer Specialists	169	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1052	Life, Physical Scientists	177	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1053	Draftsmen, Surveyors	157	Female	22.71	0.00	0.00	0.00	0.00	0.00	0.00	0.0	7.20
1054	Electronic Eng. Tech.	103	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1060	Other Professionals	2,018	Female	0.00	0.00	0.00	0.00	0.00	1.32	0.00	1.6	0.31 **
1061	Accountants	1,346	Female	4.17	0.00	3.73	0.00	2.79	5.10	2.52	0.0	3.11 **
1063	Religious Wkrs.	370	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1064	Social Wkr, Scientist	925	Female	2.05	0.00	1.36	0.00	0.00	5.01	3.68	0.0	2.14
1065	Librarians	532	Female	0.00	0.00	0.00	0.00	2.82	0.00	0.00	0.0	0.42
1070	Others	892	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1071	College Professors	804	Female	0.00	0.00	1.94	0.00	0.00	3.42	0.00	0.0	0.84
1080	Others	378	Female	0.00	0.00	3.37	0.00	0.00	0.00	0.00	0.0	0.74
1081	Author, Editor, Reporter	229	Female	0.00	0.00	0.00	0.00	0.00	0.00	7.35	0.0	1.21
1083	Musicians	207	Female	0.00	0.00	8.93	0.00	0.00	0.00	23.95	0.0	5.94
1086	Painters, Sculptors	208	Female	4.76	0.00	6.43	0.00	9.62	0.00	0.00	0.0	4.26

** = $p < 0.01$; * = $p < 0.05$

				Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
1087	Athlete, Actor, Dancer	196	Female	0.00		0.00	0.00	0.00	0.00	0.00	0.0	0.00
1010	Other	2,132	Male	1.72	3.98	1.18	0.00	1.76	1.05	1.85	0.9	1.53
1011	Civil	1,630	Male	0.94	3.78	1.09	0.00	2.06	1.00	1.40	0.8	1.27
1012	Electrical/Electronic	1,431	Male	2.03	0.00	0.61	0.00	0.00	2.81	2.03	1.4	1.26
1013	Mechanical	844	Male	1.54	0.00	0.91	0.00	0.91	1.09	0.00	0.0	0.82
1021	Physicians	1,753	Male	0.98	0.00	0.68	0.00	1.02	0.00	0.00	0.0	0.52 **
1022	Dentists	622	Male	1.57	0.00	1.20	0.00	0.00	0.00	0.78	0.0	0.81
1023	Pharmacisticts	505	Male	0.00	0.00	1.21	0.00	0.92	0.00	0.00	0.0	0.58
1024	Other Practitioners	326	Male	0.00	0.00	0.00	0.00	0.00	0.00	2.40	0.0	0.35 **
102x	Nurses,Therapists	300	Male	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1030	Others	273	Male	2.44	0.00	5.68	0.00	4.31	0.00	14.59	0.0	5.47 **
1031	Clin.lab.tech	285	Male	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1032	X ray tech	73	Male	10.05	0.00	5.98	0.00	0.00	0.00	0.00	0.0	2.30
104	School Teachers	4,265	Male	0.69	2.82	0.54	0.00	0.64	0.37	0.26 **	0.0	0.49 **
1050	Others	1,252	Male	1.81	0.00	1.11	0.00	2.21	2.56	2.73	0.0	1.56
1051	Computer Specialist	942	Male	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1052	Life and Physical scienti	682	Male	1.55	0.00	1.43	0.00	1.41	0.00	1.17	3.4	1.46
1053	Draftsmen and Surveyers	1,806	Male	1.50	0.00	1.33	0.00	1.34	2.43	0.56	1.3	1.28
1054	Electrical and Electronic	742	Male	1.42 .	0.00	0.90	0.00	5.34	0.00	4.32	5.7	2.37
1060	Others	4,994	Male	0.18 **	0.00	0.05 **	0.00	0.16 **	0.59	0.27 **	0.0	0.14 **
1061	Accountants	3,237	Male	1.69	1.84	0.84	0.00	0.63	1.04	0.18 **	0.7	0.89
1062	Lawyers and Judges	1,518	Male	0.88	3.13	0.75	0.00	0.00	0.97	0.00	0.6	0.62 *
1063	Religious Workers	1,156	Male	0.47	3.49	0.00	16.79	0.40	0.51	0.00	0.0	0.31 **
1064	Social Workers & Scientis	1,044	Male	0.00	0.00	1.38	0.00	0.00	0.00	0.00	2.0	0.66
1071	College Professors	1,745	Male	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.11 **
1080	Others	287	Male	0.00	0.00	2.10	0.00	3.15	4.25	0.00	0.0	1.19
1081	Authors,Editors,Reporters	454	Male	2.49	0.00	1.42	0.00	0.00	0.00	1.24	0.0	0.93
1082	Public Relations	330	Male	0.00	0.00	0.00	0.00	0.00	0.00	1.77	0.0	0.26 **
1083	Musicians	370	Male	2.93	0.00	1.71	0.00	2.58	3.15	2.19	0.0	2.30
1084	Designers	335	Male	1.45	0.00	0.00	0.00	2.49	0.00	0.00	0.0	0.63
1085	Photographers	347	Male	1.30	0.00	1.47	0.00	0.00	0.00	0.00	0.0	0 84

** = $p < 0.01$; * = $p < 0.05$

				Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
1086	Painters & Sculptors	295	Male	6.40	0.00	0.00	0.00	0.00	2.82	0.00	3.3	1 67
1087	Athlete,Actor,Dancer	275	Male	0.00	0.00	25.76	0.00	0.00	0.00	0.00	133.	18.81

Occupation		Occ Popn	Gender	Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
				Standardized Incidence Ratios (SIR) by histology								
Category: Managers & Administrators												
1110	Buyer, Purch, Agent, Sale	643	Female	1.19	0.00	0.00	0.00	0.00	8.71	0.00	0.0	1.07
1120	Public Agency Adminis	700	Female	0.91	0.00	2.35	0.00	3.57	2.16	0.00	3.4	1.61
1130	Restaurant & Bar Mgrs	654	Female	1.06	0.00	5.61	0.00	4.20	5.16	1.90	3.6	3.12 *
1140	Banke,Finance,Insur, Real	866	Female	3.13	0.00	2.07	0.00	4.65	3.82	5.61	0.0	3.22 **
1163	Food Store Mgr.	269	Female	2.54	0.00	3.35	0.00	0.00	12.36	0.00	0.0	2.24
1166	Other Managers & Administ	3,288	Female	1.66	0.00	2.20	0.00	1.24	2.03	2.61	0.0	1.84 *
1110	Buyer,Purch, Agent, Sales	4,730	Male	0.88	0.00	1.04	0.00	0.94	0.74	0.66	1.2	0.92
1120	Public Agency Administrat	2,460	Male	0.70	1.97	0.95	0.00	1.64	1.47	1.05	0.8	1.08
1130	Restaurant & Bar Mgr	1,063	Male	1.82	0.00	2.25 *	0.00	2.10	3.91	1.35	0.9	2.01 **
1140	Bnkr,Finacne,Insur,Rlty	3,293	Male	0.29 **	1.50	0.39 **	0.00	0.68	1.48	1.31	0.6	0.65 **
1150	Construction Contractors	2,654	Male	1.00	3.87	1.00	0.00	1.08	0.27 **	1.48	0.4	1.00
1161	Ship Officer,Pilot	205	Male	4.33	21.76	2.46	0.00	0.00	9.34	0.00	0.0	2.85
1162	RR Conductor	132	Male	2.11	0.00	0.00	0.00	3.61	0.00	3.13	11.5	2.30
1163	Food Store manager	909	Male	1.07	0.00	2.23	0.00	0.61	2.29	4.22 *	2.1	2.12 **
1164	Service Station Manager	840	Male	1.54	0.00	1.98	0.00	2.67	0.83	0.57	0.0	1.62
1165	Union & Society Official	380	Male	2.69	0.00	1.13	0.00	1.15	0.00	1.00	3.5	1.46
1166	Other Managers & Administ	15,927	Male	0.94	1.87	0.84	0.00	0.95	1.31	1.00	1.0	0.95

Category: Sales Workers

Code	Occupation	N	Sex	Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
121	Manufac, Rep & wholesale	446	Female	0.00	0.00	3.28	0.00	4.86	0.00	0.00	0.0	1.46
122	Retail Salesmen & Clerks	7,625	Female	1.94 *	0.00	1.35	0.00	0.68	0.82	0.82	1.6	1.31
123	Insur,Realtor,Broker	1,018	Female	3.07	0.00	0.00	0.00	1.55	1.91	0.00	0.0	1.39
1240	Other Salesmen	1,612	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
1242	Demonst., huckster	1,234	Female	0.00	0.00	0.00	0.00	3.61	0.00	1.62	0.0	0.80
121	Manufact. Rep & Wholesale	8,178	Male	0.81	0.00	1.03	0.00	1.26	1.02	1.07	1.2	1.00
122	Retail Salesmen & Clerks	6,212	Male	1.27	0.84	0.88	0.00	0.82	1.34	1.26	1.4	1.08
1231	Insurance Sales	2,459	Male	0.74	0.00	0.92	0.00	1.78	0.65	0.22 **	0.8	0.81
1232	Real Estate Sales	1,410	Male	1.43	0.00	0.85	0.00	1.66	0.32 *	1.05	0.3 *	0.99
1233	Stock Broker	526	Male	1.61	0.00	1.49	0.00	0.00	3.59	1.59	1.3	1.38
1240	Other Salesmen	1,593	Male	2.90	0.00	2.44	0.00	2.93	2.71	3.11	6.3	2.89 **
1241	Service & Construction	1,116	Male	0.41	0.00	0.73	0.00	2.19	0.00	0.00	0.0	0.56

Occupation		Occ Popn	Gender	Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
Category: Clerical & Kindred Wkrs												
131	Bookkeeper, Billing Clerk	8,253	Female	1.57	2.29	0.61	0.00	1.81	1.90	1.46	2.2	1.50*
132	Secretary,Typist, et al	22,295	Female	1.42	0.00	1.32	1.78	0.85	0.87	1.11	1.2	1.18
1330	Others	17,823	Female	0.98	1.43	1.16	4.25	0.57	0.51	1.05	0.3 **	0.86
1331	Office Machine Op.	2,347	Female	2.84	0.00	1.34	0.00	2.02	0.00	0.00	3.7	1.77
1332	Teleph & Teleg. Op.	2,286	Female	1.34	0.00	3.71	0.00	2.76	1.69	2.48	0.0	2.02
1334	Lib. Asst., Teacher aide	1,417	Female	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.23**
1336	Estimator, Investigator	317	Female	11.60	0.00	0.00	0.00	0.00	0.00	0.00	0.0	3.54
134	Bank Tellers, Cashiers	4,307	Female	2.67	0.00	2.08	0.00	1.83	2.92	0.56	0.0	1.74
135	Mail Handler, Postal Cler	701	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
131	Bookkeepers & Billing Cle	1,174	Male	1.64	0.00	0.92	18.21	0.00	0.00	0.81	0.0	0.83
132	Secretaries,Typists et al	522	Male	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.25**
1330	Others	7,040	Male	0.78	1.85	0.79	3.83	0.73	0.89	0.53*	1.1	0.81
1331	Office Machine Operator	634	Male	1.45	0.00	0.42	0.00	1.28	0.00	0.00	0.0	0.65
1333	Shipping Clerk	2,359	Male	0.54	0.00	0.93	0.00	0.94	0.77	1.60	1.7	1.00
1336	Estimator,Investg	1,456	Male	0.87	0.00	1.00	0.00	0.00	1.24	0.43	0.9	0.84
134	Bank Tellers & Cashiers	1,075	Male	1.19	0.00	0.68	0.00	1.04	1.28	2.66	0.0	0.93
135	Mail Handlers, Postal Clk	2,574	Male	1.32	0.00	1.22	0.00	1.30	0.91	1.97	1.7	1.34
136	Stock Clerks & Storekprs	1,451	Male	0.00	0.00	0.34**	0.00	0.00	0.62	0.00	0.0	0.19**

Occupation		Occ Popn	Gender	Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
				Standardized Incidence Ratios (SIR) by histology								
Category: Craftsmen & Kindred												
240	Craftsmen & Kindred Worke	2,717	Female	0.57	0.00	0.00	0.00	0.56	2.74	1.02	1.0	0.84
241	Auto Mechanics	5,065	Male	1.35	0.00	1.95 **	0.00	1.04	1.79	1.51	1.7	1.57 **
2420	Other Mechanics	1,665	Male	1.42	0.00	2.48 *	0.00	2.92	1.48	3.53 *	2.6	2.41 **
2421	Heavy Equipt & Diesel	2,604	Male	0.76	4.91	1.67	0.00	0.80	1.61	1.58	1.0	1.37
2422	Air Cond, Heat, Refrig	434	Male	2.53	0.00	1.41	0.00	3.22	1.39	1.87	3.2	2.18 *
2423	Aircraft	314	Male	0.00	0.00	3.35	0.00	0.00	0.00	0.00	0.0	1.25
2424	Radio & T.V.	633	Male	2.04	11.05	1.98	0.00	3.60	1.43	2.03	2.3	2.31 *
2425	Household. Appliance	601	Male	0.66	0.00	1.14	0.00	3.46	0.00	0.98	0.0	1.04
2426	RR Carmen	289	Male	5.13	0.00	3.69	0.00	13.45 *	5.45	9.56 *	16.6	6.31 **
2431	Machinists & Setters	2,661	Male	3.32 **	2.29	3.23 **	0.00	3.53 **	2.46	2.80 *	4.2 *	3.13 **
2432	Tool & Die Makers	409	Male	1.69	0.00	1.51	0.00	3.01	5.28	3.80	0.0	2.33 *
2440	Others	906	Male	1.97	0.00	2.28	0.00	1.73	0.68	1.47	3.8	2.01 **
2441	Sheetmetal Wkr	1,168	Male	5.01 **	6.01	2.86 *	0.00	2.17	3.67	5.60 *	1.2	3.31 **
2442	Blksmth,Blrmkr	687	Male	7.17 **	17.69	10.80 **	0.00	10.60 **	2.34	9.04 **	12.7 *	8.89 **
2450	Others	717	Male	3.85	0.00	1.84	0.00	7.16	0.00	4.38	4.1	3.23 **
2451	Carpenters	4,559	Male	2.46 **	9.16 *	2.30 **	5.30	2.38 *	2.76 **	2.15 *	2.5 *	2.41 **
2452	Electricians	2,044	Male	2.86 **	8.62	2.05 *	12.49	1.87	2.65	1.86	3.6	2.52 **
2453	Plumbers etc.	1,498	Male	5.23 **	27.40 *	4.99 **	0.00	3.90 *	4.04 *	3.29 *	1.0	4.31 **
2454	Painters etc.	1,618	Male	3.96 **	0.00	5.31 **	0.00	3.05 *	2.16	3.82 **	3.8	4.18 **
2455	Plaster & Cement	405	Male	2.04	0.00	8.33 **	0.00	3.60	2.15	4.57	7.3	5.32 **
2456	Masons & Tile	603	Male	2.89	0.00	2.12	0.00	10.26 *	4.55	2.16	2.7	3.46 **
2457	Heavy Equipt. Oper	1,358	Male	2.47	0.00	3.21 **	0.00	3.41	2.28	2.05	2.1	2.88 **
2458	Roofers	304	Male	5.54	22.73	5.66 *	0.00	4.89	5.85	10.34 *	19.4	7.53 **
2459	Foremen, Nos	687	Male	0.43	0.00	2.20	0.00	1.49	0.00	0.00	1.3	1.05
2461	Teleph.instal. & Rep	1,247	Male	0.96	0.00	1.46	0.00	2.61	3.01	2.16	0.0	1.68
2462	Teleph & Lineman	617	Male	1.93	0.00	4.15 *	0.00	3.52	4.06	4.37	0.0	2.72 *
2470	Others	11,329	Male	0.25 **	0.50	0.45 **	0.00	0.38 **	0.20 **	0.55 **	0.3 **	0.39 **
2471	Stat. Eng.Pwr. Stat.Op	724	Male	4.15 *	7.63	2.96 *	34.11	4.06	3.84	2.06	6.5	3.65 **
2472	Cranemem etc.	886	Male	1.58	0.00	2.28	0.00	2.76	4.99	0.00	2.7	2.21 **

** = $p < 0.01$; * = $p < 0.05$

				Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
2473	RR Engineers	522	Male	2.06	0.00	2.01	0.00	1.22	1.43	1.03	5.2	2.03
2474	Millwrights	531	Male	1.31	10.73	3.80 *	0.00	3.45	4.16	5.88 *	0.0	3.40 **
2475	Cabinetmakers	635	Male	1.65	8.98	3.18 *	0.00	3.86	1.16	3.28	1.8	2.97 **
2476	Bakers	622	Male	1.13	0.00	2.62	0.00	1.98	3.58	5.06 *	0.0	2.29 *
248	Printing Craftsmen	1,689	Male	1.08	4.24	2.49 *	0.00	2.84	0.58	2.41	2.6	1.99 **
249	Apparel Crafts & Upholsts	521	Male	1.52	0.00	0.83	0.00	0.00	1.15	5.22 *	0.0	1.38

Category: Operatives,Excel.Trnspt

				Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
2510	other machine op.	1,893	Female	0.59	0.00	0.00	0.00	2.40	0.00	1.10	0.0	0.72
2511	assemblers	2,379	Female	1.15	0.00	0.83	0.00	2.41	1.41	0.00	0.0	0.91
2512	inspectors, sorters	967	Female	1.71	0.00	0.00	0.00	0.00	0.00	1.56	7.1	1.28
252	Machinery Mfg., Solder, W	1,434	Female	0.99	0.00	2.74	0.00	0.00	0.00	1.85	3.8	1.52
2530	Textile factory operative	2,867	Female	0.64	0.00	0.84	0.00	1.90	2.29	1.15	2.4	1.33
2534	nonfactory sewers	377	Female	1.38	0.00	0.00	0.00	8.15	0.00	0.00	0.0	1.56
254	Laundry & Dry Cleaner	1,298	Female	0.55	0.00	2.10	0.00	2.13	0.00	0.97	2.0	1.28
2550	other food workers	255	Female	0.00	0.00	0.00	0.00	0.00	7.30	0.00	0.0	0.91
2551	meat wrapper, cutter	310	Female	0.00	0.00	6.46	0.00	0.00	0.00	0.00	0.0	1.48
2552	canning & bottling	59	Female	0.00	0.00	0.00	0.00	0.00	0.00	23.72	48.4	7.90
256	Chemical & Gas Handlers	463	Female	3.04	0.00	0.00	0.00	6.30	0.00	0.00	0.0	1.88
257	Paper & Wood Mill Workers	519	Female	2.12	0.00	6.04	0.00	0.00	0.00	0.00	0.0	2.00
258	Other Operatives	1,547	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.0	0.14 **
2510	Other Machine Op	5,324	Male	0.40 **	0.00	0.41 **	0.00	0.00	0.63	0.30 **	0.7	0.36 **
2511	Assemblers	1,399	Male	0.00	0.00	0.74	0.00	0.75	0.00	0.00	0.0	0.38 **
2512	Inspectors,Sorters	788	Male	0.00	0.00	0.37	0.00	1.13	0.00	0.00	2.2	0.43 *
2513	Precision Machine Op	1,368	Male	1.08	0.00	0.41 *	0.00	0.63	1.55	1.07	4.3	1.04
2520	Other Metal Wkg. Oper	1,511	Male	3.17 *	0.00	3.10 **	0.00	1.87	3.75	3.70	7.3	3.28 **
2521	Welders & Burners	3,465	Male	2.12 *	0.00	1.56	7.78	1.24	2.01	1.40	1.2	1.58 **
2522	Metal Produc. & Fabric	1,652	Male	1.39	0.00	1.03	0.00	1.25	0.73	0.00	0.0	0.88
2523	Mach. & Elect Mfg.Wkr	956	Male	1.48	0.00	1.30	0.00	0.00	1.59	0.00	0.0	0.83
253	Textile Operatives	276	Male	1.79	0.00	4.05	0.00	12.41	7.62	2.66	0.0	4.75 **
254	Laundry & Dry Cleaning	384	Male	4.65	0.00	5.27 *	0.00	3.22	3.97	1.38	0.0	3.49 **
2550	Other Food Wkrs.	530	Male	1.62	0.00	4.24 *	0.00	2.87	1.66	4.83	0.0	2.96 **
2551	Meat Cutters & Wrappers	1,158	Male	0.85	4.47	1.94	0.00	5.41 **	1.21	3.80 *	2.6	2.58 **
2552	Canning & Bottling	193	Male	3.61	0.00	2.07	0.00	3.14	0.00	2.69	5.9	2.82
2560	Gas Station Attendants &	2,541	Male	0.38	0.00	1.08	0.00	1.32	0.00	1.16	1.8	0.91
2565	Other Chem. Handlers	1,190	Male	9.54 **	0.00	5.58 **	0.00	3.18	10.25 *	3.58	6.0	6.20 **
2571	Wood Mill Wkrs	1,656	Male	5.58 **	3.53	3.56 **	15.60	3.49 *	4.74 *	5.64 **	3.5	4.46 **

** = $p < 0.01$; * = $p < 0.05$

				Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
2573	Paper Mill Wkrs	1,628	Male	2.30	0.00	0.98	0.00	0.59	6.91**	2.47	2.5	2.20**
2581	Miners,Drillers,Blasters	225	Male	1.51	24.54	9.61**	06.18	2.65	0.00	2.26	24.9 *	6.79**
2582	Asbestos, Insulation, Wor	140	Male	11.37	81.03*	14.80**	86.90	4.98	12.10	4.24	18.6	12.75**
2583	Drywall Installers	346	Male	2.09	0.00	1.20	0.00	1.83	0.00	1.56	0.0	1.17
259	Other Operatives	1,127	Male	2.67 *	7.26	2.92**	0.00	5.37 **	4.17*	1.97	0.6	3.00**

** = $p < 0.01$; * = $p < 0.05$

Category: Transport Operatives

				Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
260	Transport Operatives	790	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
261	Truck Drivers	8,064	Male	2.59 **	1.88	2.99 **	3.61	2.85 **	2.31 *	2.48 **	1.9	2.67 **
262	Cab & Bus Drivers	1,358	Male	2.27	0.00	2.60 *	0.00	2.47	2.42	3.37 *	2.6	2.71 **
263	Route & Deliverymen	2,944	Male	0.60	0.00	0.71	0.00	1.34	0.63	0.90	0.6	0.79
264	RR Brakemen,Switchmen	757	Male	1.53	0.00	1.75	0.00	0.89	1.09	3.03	0.0	1.59
265	Others	2,461	Male	0.31 **	0.00	0.27 **	0.00	1.36	0.67	0.23 **	0.5	0.49 **

Occupation		Occ Popn	Gender	Standardized Incidence Ratios (SIR) by histology								
				Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
Category: Laborers												
270	Laborers	1,650	Female	0.67	0.00	0.96	0.00	0.00	0.00	0.00	0.0	0.41 *
271	Construction Laborers	2,198	Male	3.34 **	0.00	3.77 **	13.84	3.32 *	1.31	3.75 *	5.3 *	3.46 **
272	Freight & Stock Handlers	7,542	Male	2.33 **	0.00	1.79 **	0.00	2.65 **	0.80	1.69	1.5	1.76 **
2730	Others	4,704	Male	1.58	0.00	2.20 **	0.00	1.82	2.41 *	0.98	2.3 *	1.88 **
2731	Gardeners	2,010	Male	1.88	0.00	1.33	0.00	1.45	1.50	1.77	1.3	1.51 *
2732	Loggers	628	Male	6.85 *	0.00	13.38 **	0.00	14.44 **	4.99	10.20 **	6.3	10.34 **
2733	Fishermen & oystermen	40	Male	11.28	0.00	19.07	0.00	0.00	24.80	16.78	29.8	17.19 *

	Occupation	Occ Popn	Gender	Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
Category: Farm Workers												
381	Farmers	403	Female	0.00	0.00	0.00	0.00	2.68	3.47	0.00	0.0	0.77
382	Farm Laborers	1,011	Female	0.77	0.00	1.01	0.00	0.00	0.00	1.36	0.0	0.67
381	Farmers	2,633	Male	1.34	3.37	1.48 *	4.54	1.21	1.23	1.68	1.0	1.33 *
382	Farm Laborers	2,536	Male	2.27 *	0.00	2.94 **	0.00	0.84	1.70	1.86	1.7	2.14 **

Occupation		Occ Popn	Gender	Standardized Incidence Ratios (SIR) by Histology								
				Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
Category: Service Workers												
401	Cleaning Services	3,339	Female	1.57	0.00	1.76	5.90	1.91	0.95	3.10*	1.3	1.80*
4020	Others	2,030	Female	1.16	.0.00	1.61	17.32	1.19	1.45	1.07	0.0	1.23
4021	Bartenders	821	Female	0.94	19.61	4.88	0.00	3.70	4.46	10.09*	3.7	4.45**
4022	Cook	2,754	Female	1.51	0.00	1.62	0.00	0.98	2.96	3.14	1.0	1.91*
4023	Waitresses	5,870	Female	1.69	0.00	2.82	0.00	5.31 *	2.84	5.90**	4.3	3.50**
4030	Others	970	Female	1.60	0.00	0.00	0.00	0.00	0.00	2.91	0.0	0.95
4031	Practical Nurses	1,274	Female	2.61	12.37	6.85*	0.00	1.29	0.00	0.00	2.3	2.68*
4032	Nurses Aides	3,298	Female	0.60	5.88	1.55	0.00	1.18	2.16	1.59	2.1	1.40
4033	Dental Asst.	758	Female	0.00	0.00	2.72	0.00	0.00	0.00	0.00	7.6	1.22
4040	Others	1,936	Female	0.49	0.00	1.24	0.00	0.00	2.40	0.00	0.0	0.42*
4042	Beauticians	2,052	Female	2.12	0.00	0.00	0.00	5.83	3.53	2.65	7.9	2.59*
405	Protective Services	222	Female	4.92	0.00	0.00	0.00	0.00	0.00	0.00	0.0	1.48
406	Other Services	2,385	Female	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
401	Cleaning Services	6,986	Male	1.52 *	0.00	0.98	0.00	1.06	0.63	0.78	0.7	1.03
4020	Others	2,157	Male	1.12	0.00	2.58	0.00	5.94	2.70	5.25	2.5	3.16*
4021	Bartenders	736	Male	1.44	0.00	2.99*	0.00	0.00	4.14	2.14	0.0	2.12*
4022	Cooks	1,811	Male	3.83 **	0.00	4.16**	15.72	2.35	4.82*	4.49**	4.4	3.99**
4023	Waiters	521	Male	0.80	0.00	0.92	0.00	0.00	3.43	0.00	4.7	1.24
403	Health Services	593	Male	1.08	0.00	1.87	0.00	0.00	0.00	4.86	0.0	1.67
4040	Others	850	Male	2.38	0.00	2.13	0.00	2.43	1.05	0.71	0.0	1.74
4041	Barbers	988	Male	2.79	0.00	0.69	0.00	0.53	2.06	2.75	0.0	1.40
4050	Others	1,144	Male	0.71	0.00	1.23	0.00	0.87	1.60	1.55	0.4	1.10
4051	Policeman	1,290	Male	2.21	0.00	2.15	0.00	1.61	2.77	3.99	1.9	2.48**
4052	Fireman	1,094	Male	3.13	0.00	1.98	0.00	1.16	0.00	2.84	2.7	1.95
406	Other Service Workers	1,589	Male	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00

** = $p < 0.01$; * = $p < 0.05$

Occupation		Occ Popn	Gender	Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
Category: Pd. Household Wkrs												
410	Pd. Household Wkrs	3,886	Female	0.00	0.00	1.19	0.00	0.70	0.46	0.62	0.0	0.50**
410	Paid Household Workers	127	Male	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00

** = $p < 0.01$; * = $p < 0.05$

Category: Housewives

				Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
500	Housewives	119,459	Female	1.36 **	2.19 *	1.47 **	0.92	1.37 **	1.27	1.46 **	1.3	1.40 **

				Adeno	Meso	Squam	Sarcoma	Undif	Large	Small	Unknown	All Hist.
Category: Unemployed or not in Labor Force												
900	Unemployed or not in Labo	104,723	Female	0.49 **	0.59 *	0.32 **	0.91	0.45 **	0.37 **	0.35 **	0.8	0.49 **
900	Unemployed	92,060	Male	0.42 **	0.52 **	0.45 **	0.54	0.45 **	0.38 **	0.42 **	0.8 **	0.48 **

SIRs statistically significant at $p < 0.01$ by gender by occupation (all histologies grouped)

Table XIX

Sex		Occ Code	Histology	Occupation	Observed	Expected	SIR	SIR adj.
F								
	1	1061	CA	Accountants	15	4.82	3.11**	3.07**
	2	1140	CA	Banke,Finance,Insur, Realt	14	4.35	3.22**	2.42
	3	401	CA	Cleaning Services	32	17.78	1.80*	1.89**
	4	4021	CA	Bartenders	16	3.60	4.45**	3.94**
	5	4023	CA	Waitresses	40	11.43	3.50**	2.57**
	6	406	CA	Other Services	0	7.25	0.00	0.00
	7	410	CA	Pd. Household Wkrs	10	19.96	0.50**	0.54**
	8	500	CA	Housewives	629	450.82	1.40**	1.48**
M								
	1	1021	CA	Physicians	12	22.99	0.52**	0.72
	2	1030	CA	Others	10	1.83	5.47**	5.52**
	3	104	CA	School Teachers	12	24.52	0.49**	0.56**
	4	1060	CA	Others	7	48.87	0.14**	0.16**
	5	1063	CA	Religious Workers	6	19.43	0.31**	0.57*
	6	1130	CA	Restaurant & Bar Mgr	30	14.90	2.01**	1.94**
	7	1140	CA	Bnkr,Finacne,Insur,Rlty	30	46.10	0.65**	0.64**
	8	1163	CA	Food Store manager	27	12.73	2.12**	2.04**
	9	1240	CA	Other Salesmen	31	10.72	2.89**	2.80**
	10	241	CA	Auto Mechanics	83	52.83	1.57**	1.37*
	11	2420	CA	Other Mechanics	45	18.65	2.41**	2.14**
	12	2426	CA	RR Carmen	22	3.49	6.31**	5.59**
	13	2431	CA	Machinists & Setters	97	31.00	3.13**	2.77**
	14	2440	CA	Others	27	13.45	2.01**	1.78*
	15	2441	CA	Sheetmetal Wkr	36	10.88	3.31**	2.61**
	16	2442	CA	Blksmth,Blrmkr	72	8.10	8.89**	7.87**
	17	2450	CA	Others	14	4.34	3.23**	2.86*
	18	2451	CA	Carpenters	150	62.30	2.41**	2.10**
	19	2452	CA	Electricians	63	25.04	2.52**	2.23**
	20	2453	CA	Plumbers etc.	69	16.00	4.31**	3.82**
	21	2454	CA	Painters etc.	97	23.20	4.18**	3.18**
	22	2455	CA	Plaster & Cement	23	4.33	5.32**	4.71**
	23	2456	CA	Masons & Tile	21	6.07	3.46**	2.93**
	24	2457	CA	Heavy Equipt. Oper	46	15.95	2.88**	2.55**
	25	2458	CA	Roofers	24	3.19	7.53**	6.66**
	26	2470	CA	Others	56	144.04	0.39**	0.34**
	27	2471	CA	Stat. Eng.Pwr. Stat.Op	35	9.58	3.65**	3.23**
	28	2472	CA	Cranemem etc.	25	11.29	2.21**	1.78*

*** = $p < 0.01$; * = $p < 0.05$; Occupations listed with 0 cases are significant at the $p < 0.01$ level*

Sex	Occ Code	Histology	Occupation	Observed	Expected	SIR	SIR adj.
29	2474	CA	Millwrights	23	6.77	3.40**	2.82**
30	2475	CA	Cabinetmakers	24	8.09	2.97**	2.63**
31	248	CA	Printing Craftsmen	33	16.56	1.99**	1.66*
32	2510	CA	Other Machine Op	16	43.99	0.36**	0.32**
33	2520	CA	Other Metal Wkg. Oper	41	12.52	3.28**	2.89**
34	2521	CA	Welders & Burners	60	37.95	1.58**	1.39*
35	253	CA	Textile Operatives	12	2.53	4.75**	4.19*
36	254	CA	Laundry & Dry Cleaning	17	4.86	3.49**	3.08**
37	2550	CA	Other Food Wkrs.	16	5.41	2.96**	2.61*
38	2551	CA	Meat Cutters & Wrappers	41	15.89	2.58**	2.45**
39	2565	CA	Other Chem. Handlers	46	7.42	6.20**	5.46**
40	2571	CA	Wood Mill Wkrs	90	20.19	4.46**	3.93**
41	2573	CA	Paper Mill Wkrs	29	13.20	2.20**	1.94*
42	2581	CA	Miners,Drillers,Blasters	20	2.95	6.79**	5.72**
43	2582	CA	Asbestos, Insulation, Worke	20	1.57	12.75**	11.24**
44	259	CA	Other Operatives	53	17.66	3.00**	2.64**
45	261	CA	Truck Drivers	212	79.27	2.67**	2.17**
46	262	CA	Cab & Bus Drivers	43	15.87	2.71**	2.30**
47	265	CA	Others	14	28.79	0.49**	0.43**
48	271	CA	Construction Laborers	73	21.11	3.46**	3.30**
49	272	CA	Freight & Stock Handlers	104	59.09	1.76**	1.68**
50	2730	CA	Others	106	56.53	1.88**	1.79**
51	2732	CA	Loggers	62	5.99	10.34**	9.86**
52	381	CA	Farmers	96	72.01	1.33*	1.64**
53	382	CA	Farm Laborers	81	37.78	2.14**	2.40**
54	4022	CA	Cooks	67	16.77	3.99**	3.58**
55	4051	CA	Policeman	24	9.69	2.48**	2.37**
56	406	CA	Other Service Workers	0	16.99	0.00	0.00

*** = $p < 0.01$; * = $p < 0.05$; Occupations listed with 0 cases are significant at the $p < 0.01$ level*

SIRs statistically significant at $p < 0.01$ for all histologies by gender by occupation by histology

Table XX

Sex		Occ Code	Histology	Occupation	Observed	Expected	SIR	SIR adj.
F								
	1	1330	UK	Others	1	3.67	0.27**	0.29*
	2	4023	US	Waitresses	11	1.87	5.90**	4.32*
	3	410	AD	Pd. Household Wkrs	0	5.71	0.00	0.00
	4	500	AD	Housewives	183	134.16	1.36**	1.45**
	5	500	SQ	Housewives	145	98.89	1.47**	1.56**
	6	500	UD	Housewives	91	66.19	1.37**	1.46**
	7	500	US	Housewives	108	74.03	1.46**	1.55**
M								
	1	104	US	School Teachers	1	3.83	0.26**	0.30*
	2	1060	AD	Others	2	11.00	0.18**	0.21**
	3	1060	SQ	Others	1	18.77	0.05**	0.06**
	4	1060	UD	Others	1	6.24	0.16**	0.18**
	5	1060	US	Others	2	7.37	0.27**	0.31**
	6	1061	US	Accountants	1	5.55	0.18**	0.20**
	7	1063	SQ	Religious Workers	0	7.54	0.00	0.00
	8	1071	SQ	College Professors	0	6.72	0.00	0.00
	9	1140	AD	Bnkr,Finacne,Insur,Rlty	3	10.20	0.29**	0.29**
	10	1140	SQ	Bnkr,Finacne,Insur,Rlty	7	17.84	0.39**	0.39**
	11	1150	UL	Construction Contractors	1	3.76	0.27**	0.26**
	12	1231	US	Insurance Sales	1	4.56	0.22**	0.21**
	13	136	SQ	Stock Clerks & Storekprs	2	5.97	0.34**	0.33**
	14	241	SQ	Auto Mechanics	40	20.49	1.95**	1.71*
	15	2431	AD	Machinists & Setters	23	6.92	3.32**	2.94**
	16	2431	SQ	Machinists & Setters	39	12.06	3.23**	2.86**
	17	2431	UD	Machinists & Setters	14	3.97	3.53**	3.13*
	18	2441	AD	Sheetmetal Wkr	12	2.39	5.01**	3.95*
	19	2442	AD	Blksmth,Blrmkr	13	1.81	7.17**	6.34**
	20	2442	SQ	Blksmth,Blrmkr	34	3.15	10.80**	9.56**
	21	2442	UD	Blksmth,Blrmkr	11	1.04	10.60**	9.39**
	22	2442	US	Blksmth,Blrmkr	11	1.22	9.04**	8.00**
	23	2451	AD	Carpenters	34	13.83	2.46**	2.15**
	24	2451	SQ	Carpenters	56	24.30	2.30**	2.01**
	25	2451	UL	Carpenters	18	6.53	2.76**	2.41*
	26	2452	AD	Electricians	16	5.60	2.86**	2.53*
	27	2453	AD	Plumbers etc.	19	3.63	5.23**	4.63**
	28	2453	SQ	Plumbers etc.	31	6.21	4.99**	4.42**
	29	2454	AD	Painters etc.	20	5.05	3.96**	3.02**

*** = $p < 0.01$; * = $p < 0.05$; Occupations listed with 0 cases are significant at the $p < 0.01$ level*

Sex	*Occ Code*	*Histology*	*Occupation*	*Observed*	*Expected*	*SIR*	*SIR adj.*
30	2454	SQ	Painters etc.	48	9.03	5.31**	4.05**
31	2454	US	Painters etc.	13	3.40	3.82**	2.91*
32	2455	SQ	Plaster & Cement	14	1.68	8.33**	7.37**
33	2457	SQ	Heavy Equipt. Oper	20	6.22	3.21**	2.85**
34	2470	AD	Others	8	32.33	0.25**	0.22**
35	2470	SQ	Others	25	55.98	0.45**	0.40**
36	2470	UD	Others	7	18.47	0.38**	0.34**
37	2470	UK	Others	3	9.67	0.31**	0.27**
38	2470	UL	Others	3	15.29	0.20**	0.17**
39	2470	US	Others	12	21.69	0.55**	0.49**
40	2510	AD	Other Machine Op	4	10.04	0.40**	0.35**
41	2510	SQ	Other Machine Op	7	17.07	0.41**	0.36**
42	2510	UD	Other Machine Op	0	5.64	0.00	0.00
43	2510	US	Other Machine Op	2	6.70	0.30**	0.26**
44	2520	SQ	Other Metal Wkg. Oper	15	4.84	3.10**	2.73*
45	2551	UD	Meat Cutters & Wrappers	11	2.03	5.41**	5.14**
46	2565	AD	Other Chem. Handlers	16	1.68	9.54**	8.40**
47	2565	SQ	Other Chem. Handlers	16	2.87	5.58**	4.92**
48	2571	AD	Wood Mill Wkrs	25	4.48	5.58**	4.91**
49	2571	SQ	Wood Mill Wkrs	28	7.86	3.56**	3.14**
50	2571	US	Wood Mill Wkrs	17	3.01	5.64**	4.97**
51	2573	UL	Paper Mill Wkrs	10	1.45	6.91**	6.09*
52	2581	SQ	Miners,Drillers,Blasters	11	1.14	9.61**	8.10**
53	2582	SQ	Asbestos, Insulation, Worke	9	0.61	14.80**	13.04**
54	259	SQ	Other Operatives	20	6.86	2.92**	2.57*
55	259	UD	Other Operatives	12	2.24	5.37**	4.73*
56	261	AD	Truck Drivers	47	18.14	2.59**	2.11**
57	261	SQ	Truck Drivers	92	30.73	2.99**	2.43**
58	261	UD	Truck Drivers	29	10.19	2.85**	2.31**
59	261	US	Truck Drivers	30	12.11	2.48**	2.01*
60	265	AD	Others	2	6.41	0.31**	0.28**
61	265	SQ	Others	3	11.16	0.27**	0.24**
62	265	US	Others	1	4.30	0.23**	0.20**
63	271	AD	Construction Laborers	16	4.79	3.34**	3.18**
64	271	SQ	Construction Laborers	31	8.21	3.77**	3.60**
65	272	AD	Freight & Stock Handlers	31	13.31	2.33**	2.22**
66	272	SQ	Freight & Stock Handlers	41	22.91	1.79**	1.71**
67	272	UD	Freight & Stock Handlers	20	7.55	2.65**	2.53**
68	2730	SQ	Others	48	21.83	2.20**	2.10**
69	2732	SQ	Loggers	31	2.32	13.38**	12.75**
70	2732	UD	Loggers	11	0.76	14.44**	13.76**
71	2732	US	Loggers	9	0.88	10.20**	9.72**
72	381	SQ	Farmers	41	27.79	1.48*	1.82**
73	382	AD	Farm Laborers	18	7.94	2.27*	2.54**

*** = $p < 0.01$; * = $p < 0.05$; Occupations listed with 0 cases are significant at the $p < 0.01$ level*

Sex		*Occ Code*	*Histology*	*Occupation*	*Observed*	*Expected*	*SIR*	*SIR adj.*
	74	382	SQ	Farm Laborers	43	14.64	2.94**	3.29**
	75	4022	AD	Cooks	14	3.65	3.83**	3.44*
	76	4022	SQ	Cooks	27	6.49	4.16**	3.73**
	77	4022	US	Cooks	11	2.45	4.49**	4.03*
	78	406	SQ	Other Service Workers	0	6.56	0.00	0.00

*** = $p < 0.01$; * = $p < 0.05$; Occupations listed with 0 cases are significant at the $p < 0.01$ level*

Occupations with unadjusted elevated SIRs significant at $p < 0.01$, grouped by # of elevated histologies

Table XXI

:	Occ Code	Histology	Occupation	Observed	Expected	SIR	SIR adj.
upations with 1 or 2 elevated histologic risks							
1	4023	US	Waitresses	11	1.87	5.90**	4.32*
2	241	SQ	Auto Mechanics	40	20.49	1.95**	1.71*
3	2441	AD	Sheetmetal Wkr	12	2.39	5.01**	3.95*
4	2452	AD	Electricians	16	5.60	2.86**	2.53*
5	2453	AD	Plumbers etc.	19	3.63	5.23**	4.63**
6	2453	SQ	Plumbers etc.	31	6.21	4.99**	4.42**
7	2455	SQ	Plaster & Cement	14	1.68	8.33**	7.37**
8	2457	SQ	Heavy Equipt. Oper	20	6.22	3.21**	2.85**
9	2551	UD	Meat Cutters & Wrappers	11	2.03	5.41**	5.14**
10	2573	UL	Paper Mill Wkrs	10	1.45	6.91**	6.09*
11	2581	SQ	Miners,Drillers,Blasters	11	1.14	9.61**	8.10**
12	2582	SQ	Asbestos, Insulation, Worke	9	0.61	14.80**	13.04**
13	271	AD	Construction Laborers	16	4.79	3.34**	3.18**
14	271	SQ	Construction Laborers	31	8.21	3.77**	3.60**
15	381	SQ	Farmers	41	27.79	1.48*	1.82**
16	382	AD	Farm Laborers	18	7.94	2.27*	2.54**
17	382	SQ	Farm Laborers	43	14.64	2.94**	3.29**
ıpations with 3 or more elevated histologic risks							
1	2431	AD	Machinists & Setters	23	6.92	3.32**	2.94**
2	2431	SQ	Machinists & Setters	39	12.06	3.23**	2.86**
3	2431	UD	Machinists & Setters	14	3.97	3.53**	3.13*
4	2442	AD	Blksmth,Blrmkr	13	1.81	7.17**	6.34**
5	2442	SQ	Blksmth,Blrmkr	34	3.15	10.80**	9.56**
6	2442	UD	Blksmth,Blrmkr	11	1.04	10.60**	9.39**
7	2442	US	Blksmth,Blrmkr	11	1.22	9.04**	8.00**
8	2451	AD	Carpenters	34	13.83	2.46**	2.15**
9	2451	SQ	Carpenters	56	24.30	2.30**	2.01**
10	2451	UL	Carpenters	18	6.53	2.76**	2.41*
11	2454	AD	Painters etc.	20	5.05	3.96**	3.02**
12	2454	SQ	Painters etc.	48	9.03	5.31**	4.05**
13	2454	US	Painters etc.	13	3.40	3.82**	2.91*
14	2571	AD	Wood Mill Wkrs	25	4.48	5.58**	4.91**
15	2571	SQ	Wood Mill Wkrs	28	7.86	3.56**	3.14**
16	2571	US	Wood Mill Wkrs	17	3.01	5.64**	4.97**
17	261	AD	Truck Drivers	47	18.14	2.59**	2.11**
18	261	SQ	Truck Drivers	92	30.73	2.99**	2.43**
19	261	UD	Truck Drivers	29	10.19	2.85**	2.31**

*· < 0.01; * = p < 0.05*

	Occ Code	Histology	Occupation	Observed	Expected	SIR	SIR adj.
20	261	US	Truck Drivers	30	12.11	2.48**	2.01*
21	272	AD	Freight & Stock Handlers	31	13.31	2.33**	2.22**
22	272	SQ	Freight & Stock Handlers	41	22.91	1.79**	1.71**
23	272	UD	Freight & Stock Handlers	20	7.55	2.65**	2.53**
24	2732	SQ	Loggers	31	2.32	13.38**	12.75**
25	2732	UD	Loggers	11	0.76	14.44**	13.76**
26	2732	US	Loggers	9	0.88	10.20**	9.72**
27	4022	AD	Cooks	14	3.65	3.83**	3.44*
28	4022	SQ	Cooks	27	6.49	4.16**	3.73**
29	4022	US	Cooks	11	2.45	4.49**	4.03*

*'p < 0.01; * = p < 0.05*

US Bureau of the Census Occupation Categories
Appendix A

Sex	Secondary	OccupationName
F		
	100	Professional & Technical
	101	Engineers
	102	Health Professional
	1021	Practitioners
	1025	Registered Nurses
	1026	Dieticians
	1027	Therapists et al.
	103	Health Technologists
	1030	Others
	1031	Clinical Lab Tech
	1032	X-ray Tech
	1033	Dental Hygenists
	104	School Teachers
	105	Nonhealth Technologists
	1050	Others
	1051	Computer Specialists
	1052	Life, Physical Scientists
	1053	Draftsmen, Surveyors
	1054	Electronic Eng. Tech.
	106	Other Professionals
	1060	Other Professionals
	1061	Accountants
	1063	Religious Wkrs.
	1064	Social Wkr, Scientist
	1065	Librarians
	107	Nonschool Teachers
	1070	Others
	1071	College Professors
	108	Writer, Artist, Entertainer
	1080	Others
	1081	Author, Editor, Reporter
	1083	Musicians
	1086	Painters, Sculptors
	1087	Athlete, Actor, Dancer
	110	Managers & Administrators
	1110	Buyer, Purch, Agent, Sales Mgr
	1120	Public Agency Adminis
	1130	Restaurant & Bar Mgrs
	1140	Banke,Finance,Insur, Realty
	1160	Other Managers & Administrators
	1163	Food Store Mgr.
	1166	Other Managers & Administrators
	120	Sales Workers
	121	Manufac, Rep & wholesale

Sex	Secondary	OccupationName
	122	Retail Salesmen & Clerks
	123	Insur,Realtor,Broker
	124	Other Sales
	1240	Other Salesmen
	1242	Demonst., huckster
	130	Clerical & Kindred Wkrs
	131	Bookkeeper, Billing Clerk
	132	Secretary,Typist, et al
	133	Other Clerical Wkrs
	1330	Others
	1331	Office Machine Op.
	1332	Teleph & Teleg. Op.
	1334	Lib. Asst., Teacher aide
	1336	Estimator, Investigator
	134	Bank Tellers, Cashiers
	135	Mail Handler, Postal Clerk
	240	Craftsmen & Kindred Workers
	250	Operatives, excl. transport
	251	Assemblers, Machine Op.
	2510	Other machine op.
	2511	Assemblers
	2512	Inspectors, sorters
	252	Machinery Mfg., Solder, Welder
	253	Textile Operatives
	2530	Textile factory operatives
	2534	Nonfactory sewers
	254	Laundry & Dry Cleaner
	255	Food & Beverage Processor
	2550	Other food workers
	2551	Meat wrapper, cutter
	2552	Canning & bottling
	256	Chemical & Gas Handlers
	257	Paper & Wood Mill Workers
	258	Other Operatives
	260	Transport Operatives
	270	Laborers
	380	Farm Workers
	381	Farmers
	382	Farm Laborers
	400	Service Workers
	401	Cleaning Services
	402	Food & Drink Services
	4020	Others
	4021	Bartenders
	4022	Cook
	4023	Waitresses
	403	Health Services
	4030	Others
	4031	Practical Nurses

Sex	Secondary	OccupationName
	4032	Nurses Aides
	4033	Dental Asst.
	404	Personal Services
	4040	Others
	4042	Beauticians
	405	Protective Services
	406	Other Services
	410	Pd. Household Wkrs
	500	Housewives
	900	Unemployed or not in Labor Force
M		
	100	Professional & Technical
	101	Engineers
	1010	Other
	1011	Civil
	1012	Electrical/Electronic
	1013	Mechanical
	102	Health Professionals
	1021	Physicians
	1022	Dentists
	1023	Pharmacisticts
	1024	Other Practitioners
	102x	Nurses,Therapists
	103	Health Technologists
	1030	Others
	1031	Clin.lab.tech
	1032	X ray tech
	104	School Teachers
	105	Non-Health Technologists
	1050	Others
	1051	Computer Specialist
	1052	Life and Physical scientist
	1053	Draftsmen and Surveyers
	1054	Electrical and Electronic tech
	106	Other Professionals
	1060	Others
	1061	Accountants
	1062	Lawyers and Judges
	1063	Religious Workers
	1064	Social Workers & Scientists
	1071	College Professors
	108	Writers,Artists,Entert
	1080	Others
	1081	Authors,Editors,Reporters
	1082	Public Relations
	1083	Musicians
	1084	Designers
	1085	Photographers
	1086	Painters & Sculptors

Sex	Secondary	OccupationName
	1087	Athlete,Actor,Dancer
	110	Managers & Administrators
	1110	Buyer,Purch, Agent, Sales Mgr
	1120	Public Agency Administrator
	1130	Restaurant & Bar Mgr
	1140	Bnkr,Finacne,Insur,Rlty
	1150	Construction Contractors
	1160	Other Managers & Administrators
	1161	Ship Officer,Pilot
	1162	RR Conductor
	1163	Food Store manager
	1164	Service Station Manager
	1165	Union & Society Official
	1166	Other Managers & Administrators
	120	Sales Workers
	121	Manufact. Rep & Wholesale
	122	Retail Salesmen & Clerks
	123	Insur,Realtor,Broker
	1231	Insurance Sales
	1232	Real Estate Sales
	1233	Stock Broker
	124	Other Salesmen
	1240	Other Salesmen
	1241	Service & Construction
	130	Clerical & Kindred Wkrs
	131	Bookkeepers & Billing Clerks
	132	Secretaries,Typists et al
	133	Other Clerical wkrs
	1330	Others
	1331	Office Machine Operator
	1333	Shipping Clerk
	1336	Estimator,Investigator
	134	Bank Tellers & Cashiers
	135	Mail Handlers, Postal Clk
	136	Stock Clerks & Storekprs
	240	Craftsmen & Kindred
	241	Auto Mechanics
	242	Other Mechanics
	2420	Other Mechanics
	2421	Heavy Equipt & Diesel
	2422	Air Cond, Heat, Refrig
	2423	Aircraft
	2424	Radio & T.V.
	2425	Household. Appliance
	2426	RR Carmen
	243	Machinists
	2431	Machinists & Setters
	2432	Tool & Die Makers
	244	Other Metal Craftsmen

Sex	Secondary	OccupationName
	2440	Others
	2441	Sheetmetal Wkr
	2442	Blksmth,Blrmkr
	245	Construction Craftsmen
	2450	Others
	2451	Carpenters
	2452	Electricians
	2453	Plumbers etc.
	2454	Painters etc.
	2455	Plaster & Cement
	2456	Masons & Tile
	2457	Heavy Equipt. Oper
	2458	Roofers
	2459	Foremen, Nos
	246	Telephone& Pwr Linemen etc
	2461	Teleph.instal. & Rep
	2462	Teleph & Lineman
	247	Other Craftsmen
	2470	Others
	2471	Stat. Eng.Pwr. Stat.Op
	2472	Cranemem etc.
	2473	RR Engineers
	2474	Millwrights
	2475	Cabinetmakers
	2476	Bakers
	248	Printing Craftsmen
	249	Apparel Crafts & Upholsts
	250	Operatives,Excel.Trnspt
	251	Assemblers,Machine Op
	2510	Other Machine Op
	2511	Assemblers
	2512	Inspectors,Sorters
	2513	Precision Machine Op
	252	Welders,Foundry Wkrs
	2520	Other Metal Wkg. Oper
	2521	Welders & Burners
	2522	Metal Produc. & Fabric
	2523	Mach. & Elect Mfg.Wkr
	253	Textile Operatives
	254	Laundry & Dry Cleaning
	255	Food & Beverage Processors
	2550	Other Food Wkrs.
	2551	Meat Cutters & Wrappers
	2552	Canning & Bottling
	256	Chem & Gas Handlers
	2560	Gas Station Attendants & Oilers
	2565	Other Chem. Handlers
	257	Wood & Paper Mill Wkrs.
	2571	Wood Mill Wkrs

Sex	*Secondary*	*OccupationName*
	2573	Paper Mill Wkrs
	258	Dust Operatives
	2581	Miners,Drillers,Blasters
	2582	Asbestos, Insulation, Workers
	2583	Drywall Installers
	259	Other Operatives
	260	Transport Operatives
	261	Truck Drivers
	262	Cab & Bus Drivers
	263	Route & Deliverymen
	264	RR Brakemen,Switchmen
	265	Others
	270	Laborers
	271	Construction Laborers
	272	Freight & Stock Handlers
	273	Other Laborers
	2730	Others
	2731	Gardeners
	2732	Loggers
	2733	Fishermen & oystermen
	380	Farm Workers
	381	Farmers
	382	Farm Laborers
	400	Service Workers
	401	Cleaning Services
	402	Food & Drink Services
	4020	Others
	4021	Bartenders
	4022	Cooks
	4023	Waiters
	403	Health Services
	404	Personal Services
	4040	Others
	4041	Barbers
	405	Protective Services
	4050	Others
	4051	Policeman
	4052	Fireman
	406	Other Service Workers
	410	Paid Household Workers
	900	Unemployed

Alphabetized U.S. Bureau of the Census Modified Occupational Classifications with Smoking Prevalence
Appendix B

Occ Code	Occupation Name	16-24	25-34	35-44	45-54	55-64	65+	Total	Smoking Status Never	Former	Current
Sex	F										
1061	Accountants	245	252	278	288	223	60	1346	55%	14.2%	30.8%
2511	Assemblers	649	495	543	482	210	0	2379	45.3%	11.1%	43.6%
1087	Athlete, Actor, Dancer	120	71	5	0	0	0	196	54.61%	16.69%	28.4%
1081	Author, Editor, Reporter	13	82	35	50	43	6	229	35.5%	22.6%	41.9%
134	Bank Tellers, Cashiers	1380	723	855	833	445	71	4307	52.58%	11.54%	36.1%
1140	Banke,Finance,Insur, Realty	53	114	181	241	204	73	866	37.9%	17.2%	44.8%
4021	Bartenders	104	97	192	210	193	25	821	52.33%	9.79%	38.18%
4042	Beauticians	683	523	269	348	185	44	2052	44.6%	10.9%	44.6%
131	Bookkeeper, Billing Clerk	1194	1550	1822	2191	1252	244	8253	49.5%	11.9%	38.6%
1110	Buyer, Purch, Agent, Sales	73	82	135	197	115	41	643	38%	15.5%	46.5%
2552	Canning & bottling	5	8	18	12	13	3	59	55.9%	6.6%	37.4%
256	Chemical & Gas Handlers	153	90	92	78	43	7	463	52.4%	9.1%	38.5%
401	Cleaning Services	493	320	430	859	899	338	3339	59.2%	12.2%	28.6%
1031	Clinical Lab Tech	173	185	96	60	35	8	557	62.3%	14.1%	24%
1071	College Professors	61	214	257	158	83	31	804	54.61%	16.69%	28.4%
1051	Computer Specialists	63	38	49	14	5	0	169	36.7%	23.3%	40%
4022	Cook	331	239	510	840	716	118	2754	52.33%	9.79%	38.18%
240	Craftsmen & Kindred Worker	335	403	565	677	610	127	2717	49.12%	10.18%	40.27%
1242	Demonst., huckster	137	359	302	241	148	47	1234	43.4%	16.2%	40.4%
4033	Dental Asst.	390	90	81	103	84	10	758	52.33%	9.79%	38.18%
1033	Dental Hygenists	30	32	17	10	6	1	96	62.3%	14.1%	24%
1026	Dieticians	11	40	54	45	29	9	188	56.7%	23.3%	20%
1053	Draftsmen, Surveyors	40	56	28	22	11	0	157	36.7%	23.3%	40%
1054	Electronic Eng. Tech.	16	45	27	12	3	0	103	36.7%	23.3%	40%
101	Engineers	7	35	31	23	11	0	107	54.61%	16.69%	28.4%
1336	Estimator, Investigator	106	52	52	65	35	7	317	52.58%	11.54%	36.1%
382	Farm Laborers	180	112	221	192	218	88	1011	78.63%	2.56%	18.8%

									Smoking Status		
Occ Code	*Occupation Name*	*16-24*	*25-34*	*35-44*	*45-54*	*55-64*	*65+*	*Total*	*Never*	*Former*	*Current*
381	Farmers	4	45	49	122	88	95	403	65.57%	13.11%	21.31%
1163	Food Store Mgr.	17	36	56	75	63	22	269	43%	15.3%	41.8%
500	Housewives	12619	30272	24699	24022	19214	8633	119459	59.8%	11.9%	28.3%
2512	Inspectors, sorters	105	144	236	272	191	19	967	51.9%	10.8%	37.3%
123	Insur,Realtor,Broker	71	214	180	317	160	76	1018	37.9%	17.2%	44.8%
270	Laborers	498	250	341	277	163	121	1650	55.71%	11.43%	32.86%
254	Laundry & Dry Cleaner	187	147	200	364	343	57	1298	55.1%	6.5%	38.3%
1334	Lib. Asst., Teacher aide	226	358	291	312	178	52	1417	58.1%	18.6%	23.3%
1065	Librarians	80	111	66	107	141	27	532	63.9%	19.7%	16.4%
1052	Life, Physical Scientists	28	39	39	42	25	4	177	36.7%	23.3%	40%
252	Machinery Mfg., Solder, Wel	472	333	229	235	142	23	1434	49.12%	10.18%	40.27%
135	Mail Handler, Postal Clerk	76	121	183	214	98	9	701	52.58%	11.54%	36.1%
121	Manufac, Rep & wholesale	36	136	106	102	58	8	446	55.03%	10.63%	34.33%
2551	Meat wrapper, cutter	24	46	83	75	76	6	310	55.9%	6.6%	37.4%
1083	Musicians	54	52	41	35	22	3	207	66.7%	12%	21.3%
2534	Nonfactory sewers	8	29	64	75	113	88	377	76%	3.8%	20.3%
4032	Nurses Aides	1024	449	496	587	611	131	3298	54.2%	9.3%	36.5%
1331	Office Machine Op.	983	647	336	230	148	3	2347	54%	9.5%	36.5%
2550	Other food workers	19	45	54	76	52	9	255	55.24%	8.7%	36.23%
2510	Other machine op.	436	400	377	398	262	20	1893	45.3%	11.1%	43.6%
1166	Other Managers & Administr	213	442	683	913	767	270	3288	43%	15.3%	41.8%
258	Other Operatives	181	155	319	439	340	113	1547	52.4%	9.1%	38.5%
1060	Other Professionals	433	537	273	378	244	153	2018	54.61%	16.69%	28.4%
1240	Other Salesmen	438	277	273	317	244	63	1612	41.9%	16.3%	41.9%
406	Other Services	600	470	487	401	291	136	2385	52.33%	9.79%	38.18%
1080	Others	56	99	64	75	56	28	378	54.61%	16.69%	28.4%
1050	Others	67	44	96	175	78	12	472	36.7%	23.3%	40%
1330	Others	5873	2866	2863	3584	1911	409	17506	59.8%	11.9%	28.3%
1030	Others	87	93	48	30	18	5	281	62.3%	14.1%	24%
4030	Others	498	116	103	132	107	14	970	54.2%	9.3%	36.5%
4040	Others	608	290	270	238	392	138	1936	69%	8.6%	22.4%
1070	Others	92	213	163	138	181	105	892	53.6%	20.2%	26.2%
4020	Others	627	345	379	367	229	83	2030	52.33%	9.79%	38.18%

Occ Code	Occupation Name	16-24	25-34	35-44	45-54	55-64	65+	Total	Smoking Status Never	Former	Current
1086	Painters, Sculptors	38	50	37	41	31	11	208	54.61%	16.69%	28.4%
257	Paper & Wood Mill Workers	101	83	148	124	59	4	519	52.4%	9.1%	38.5%
410	Pd. Household Wkrs	998	281	422	638	715	832	3886	61.7%	9.8%	28.5%
4031	Practical Nurses	199	233	215	305	254	68	1274	46.8%	14.7%	38%
1021	Practitioners	1	50	75	61	32	19	238	56.7%	23.3%	20%
405	Protective Services	56	44	45	37	27	13	222	52.33%	9.79%	38.18%
1120	Public Agency Adminis	30	66	151	219	200	34	700	66.7%	6.7%	26.7%
1025	Registered Nurses	616	1262	921	1171	812	150	4932	46.8%	14.7%	38%
1063	Religious Wkrs.	21	63	82	95	81	28	370	54.61%	16.69%	28.4%
1130	Restaurant & Bar Mgrs	42	88	141	182	148	53	654	43.64%	14.74%	42.09%
122	Retail Salesmen & Clerks	2069	696	1249	1778	1462	371	7625	54.3%	9.7%	36.1%
104	School Teachers	1504	2384	1550	1452	1323	205	8418	63.8%	16.8%	19.4%
132	Secretary,Typist, et al	6901	4784	3674	4346	2264	326	22295	51.1%	11.1%	37.8%
1064	Social Wkr, Scientist	111	231	208	179	162	34	925	50%	22.7%	27.3%
1332	Teleph & Teleg. Op.	990	428	284	305	202	77	2286	53.6%	8.9%	37.4%
2530	Textile factory operatives	581	501	496	675	529	85	2867	65.9%	8.5%	25.6%
1027	Therapists et al.	47	106	59	25	24	0	261	56.7%	23.3%	20%
260	Transport Operatives	80	144	326	130	91	19	790	55.24%	8.7%	36.23%
900	Unemployed or not in Labor	31353	5890	3308	5666	9203	49303	104723	59.8%	11.9%	28.3%
4023	Waitresses	2588	950	952	844	428	108	5870	41%	9.4%	49.7%
1032	X-ray Tech	82	88	46	28	16	4	264	62.3%	14.1%	24%
Sex	***M***										
1061	Accountants	254	946	700	752	451	134	3237	35.8%	30.9%	33.3%
2422	Air Cond, Heat, Refrig	21	79	109	96	90	39	434	21.3%	27.9%	50.8%
2423	Aircraft	39	99	116	44	15	1	314	23%	32.4%	44.6%
249	Apparel Crafts & Upholsts	65	102	101	85	98	70	521	23.42%	26.37%	51.27%
2582	Asbestos, Insulation, Worker	15	36	32	31	22	4	140	26.27%	21.37%	53.67%
2511	Assemblers	441	372	212	200	148	26	1399	24.6%	22.7%	52.7%
1087	Athlete,Actor,Dancer	168	100	5	1	1	0	275	36.61%	32.04%	31.86%
1081	Authors,Editors,Reporters	26	163	69	99	85	12	454	42.2%	22.2%	35.6%
241	Auto Mechanics	835	1340	905	1130	717	138	5065	24.4%	21%	54.6%
2476	Bakers	51	135	141	163	115	17	622	12.8%	25.6%	61.5%
134	Bank Tellers & Cashiers	458	228	142	103	127	17	1075	52.5%	18%	29.5%

									Smoking Status		
Occ Code	*Occupation Name*	*16-24*	*25-34*	*35-44*	*45-54*	*55-64*	*65+*	*Total*	*Never*	*Former*	*Current*
4041	Barbers	157	178	181	221	161	90	988	26.9%	30.1%	43%
4021	Bartenders	147	130	147	139	141	32	736	18.4%	13.2%	68.4%
2442	Blksmth,Blrmkr	71	172	155	148	122	19	687	23.42%	26.37%	51.27%
1140	Bnkr,Finacne,Insur,Rlty	198	675	794	872	581	173	3293	27.3%	30.3%	42.4%
131	Bookkeepers & Billing Clerk	148	259	221	253	211	82	1174	32.51%	25.35%	43.21%
1110	Buyer,Purch, Agent, Sales	292	1165	1325	1222	617	109	4730	28.8%	35.6%	35.6%
262	Cab & Bus Drivers	240	282	260	315	210	51	1358	26.7%	13.3%	60%
2475	Cabinetmakers	52	137	144	166	118	18	635	23.42%	26.37%	51.27%
2552	Canning & Bottling	29	38	36	46	38	6	193	26.6%	21.3%	52.1%
2451	Carpenters	509	1043	741	1165	933	168	4559	20.7%	27.2%	52.1%
1011	Civil	56	444	421	410	254	45	1630	34.6%	35.6%	29.8%
401	Cleaning Services	1828	590	799	1174	1774	821	6986	25%	12.5%	62.5%
1031	Clin.lab.tech	87	86	44	42	21	5	285	28.3%	31.7%	40%
1071	College Professors	161	435	556	340	177	76	1745	36.61%	32.04%	31.86%
1051	Computer Specialist	172	506	173	75	16	0	942	36.61%	32.04%	31.86%
1150	Construction Contractors	151	546	657	714	462	124	2654	27.73%	29.53%	43.91%
271	Construction Laborers	612	393	363	478	323	29	2198	34.39%	17.16%	49.8%
4022	Cooks	853	197	239	220	223	79	1811	32.7%	9.7%	57.5%
2472	Cranemem etc.	72	192	200	232	165	25	886	12.3%	30.8%	56.9%
1022	Dentists	0	130	200	164	82	46	622	33.3%	36.8%	29.8%
1084	Designers	33	109	102	45	25	21	335	36.61%	32.04%	31.86%
1053	Draftsmen and Surveyers	431	625	310	268	144	28	1806	37.9%	27.9%	34.2%
2583	Drywall Installers	35	85	70	82	64	10	346	26.27%	21.37%	53.67%
1054	Electrical and Electronic tec	108	327	197	83	22	5	742	36.61%	32.04%	31.86%
1012	Electrical/Electronic	76	441	358	389	158	9	1431	42.9%	36.8%	20.3%
2452	Electricians	157	559	449	424	402	53	2044	23.42%	26.37%	51.27%
1336	Estimator,Investigator	281	355	260	304	210	46	1456	27.3%	30.3%	42.4%
382	Farm Laborers	970	316	195	351	441	263	2536	47.97%	10.41%	42.39%
381	Farmers	94	222	473	533	704	607	2633	40.1%	31.8%	28.1%
4052	Fireman	66	386	323	272	39	8	1094	31.07%	21.87%	47.72%
2733	Fishermen & oystermen	14	7	6	6	5	2	40	34.39%	17.16%	49.8%
1163	Food Store manager	55	186	219	241	160	48	909	27.73%	29.53%	43.91%
2459	Foremen, Nos	40	129	152	178	156	32	687	26.4%	26.4%	47.2%

									Smoking Status		
Occ Code	*Occupation Name*	*16-24*	*25-34*	*35-44*	*45-54*	*55-64*	*65+*	*Total*	*Never*	*Former*	*Current*
272	Freight & Stock Handlers	2849	1431	1076	1194	862	130	7542	34.39%	17.16%	49.8%
2731	Gardeners	506	352	297	378	330	147	2010	31.2%	22.3%	46.4%
2560	Gas Station Attendants & Oil	1715	305	177	134	137	73	2541	39.6%	8.6%	51.8%
403	Health Services	299	68	83	82	38	23	593	31.07%	21.87%	47.72%
2421	Heavy Equipt & Diesel	307	649	551	613	419	65	2604	23.42%	26.37%	51.27%
2457	Heavy Equipt. Oper	81	356	274	381	254	12	1358	23.42%	26.37%	51.27%
2425	Household. Appliance	71	150	127	141	97	15	601	23.42%	26.37%	51.27%
2512	Inspectors,Sorters	130	304	103	125	114	12	788	18%	26.2%	55.7%
1231	Insurance Sales	134	715	569	565	317	159	2459	29.19%	27.68%	44.33%
254	Laundry & Dry Cleaning	88	72	55	79	76	14	384	26.27%	21.37%	53.67%
1062	Lawyers and Judges	5	446	397	331	232	107	1518	30.8%	38.9%	30.3%
1052	Life and Physical scientist	65	164	229	150	73	1	682	39%	32.2%	28.8%
2732	Loggers	221	114	97	93	77	26	628	34.39%	17.16%	49.8%
2523	Mach. & Elect Mfg.Wkr	315	289	129	130	78	15	956	26.27%	21.37%	53.67%
2431	Machinists & Setters	322	687	556	552	466	78	2661	23.42%	26.37%	51.27%
135	Mail Handlers, Postal Clk	280	409	597	860	396	32	2574	21.9%	37.5%	40.6%
121	Manufact. Rep & Wholesale	549	2337	1836	1984	1206	266	8178	29.19%	27.68%	44.33%
2456	Masons & Tile	64	165	140	135	91	8	603	18.4%	27.2%	54.4%
2551	Meat Cutters & Wrappers	127	224	252	274	234	47	1158	29.4%	22.5%	48%
1013	Mechanical	28	247	258	171	128	12	844	32.7%	37.3%	30%
2522	Metal Produc. & Fabric	365	506	312	251	212	6	1652	26.27%	21.37%	53.67%
2474	Millwrights	43	115	120	139	99	15	531	18.2%	25%	56.8%
2581	Miners,Drillers,Blasters	13	47	60	54	44	7	225	21.4%	21.3%	57.3%
1083	Musicians	94	93	73	63	38	9	370	36.61%	32.04%	31.86%
102x	Nurses,Therapists	92	91	45	44	22	6	300	36.61%	32.04%	31.86%
1331	Office Machine Operator	132	155	113	132	92	10	634	32.51%	25.35%	43.21%
1010	Other	125	707	639	410	216	35	2132	24.8%	38.1%	37.1%
2565	Other Chem. Handlers	392	360	161	162	97	18	1190	26.27%	21.37%	53.67%
2550	Other Food Wkrs.	127	112	65	132	93	1	530	26.27%	21.37%	53.67%
2510	Other Machine Op	1227	1407	975	1007	652	56	5324	26.27%	21.37%	53.67%
1166	Other Managers & Administr	988	3284	3823	4199	2798	835	15927	27.73%	29.53%	43.91%
2420	Other Mechanics	195	422	311	423	292	22	1665	23.42%	26.37%	51.27%
2520	Other Metal Wkg. Oper	405	338	313	248	183	24	1511	22.6%	25.3%	52.1%

									Smoking Status		
Occ Code	*Occupation Name*	*16-24*	*25-34*	*35-44*	*45-54*	*55-64*	*65+*	*Total*	*Never*	*Former*	*Current*
259	Other Operatives	253	212	172	152	231	107	1127	26.27%	21.37%	53.67%
1024	Other Practitioners	0	11	137	99	37	42	326	44.7%	34.1%	21.3%
1240	Other Salesmen	561	352	287	246	106	41	1593	29.19%	27.68%	44.33%
406	Other Service Workers	428	339	229	327	183	83	1589	49.2%	8.2%	42.6%
4020	Others	1926	85	41	30	47	28	2157	31.07%	21.87%	47.72%
2730	Others	1852	637	508	728	615	364	4704	34.39%	17.16%	49.8%
265	Others	435	510	471	571	382	92	2461	26.27%	21.37%	53.67%
4040	Others	303	116	119	152	102	58	850	31.07%	21.87%	47.72%
4050	Others	105	148	172	214	294	211	1144	31.07%	21.87%	47.72%
1050	Others	192	469	308	193	86	4	1252	36.61%	32.04%	31.86%
2450	Others	107	187	226	162	30	5	717	23.42%	26.37%	51.27%
1330	Others	1346	1715	1261	1470	1016	232	7040	32.51%	25.35%	43.21%
1030	Others	84	83	38	41	21	6	273	28.3%	31.7%	40%
2440	Others	27	165	203	258	245	8	906	23.42%	26.37%	51.27%
2470	Others	988	2428	2578	2895	2114	326	11329	23.42%	26.37%	51.27%
1080	Others	26	99	96	30	18	18	287	36.61%	32.04%	31.86%
1060	Others	510	1386	1281	1122	531	164	4994	36.61%	32.04%	31.86%
410	Paid Household Workers	45	5	6	16	13	42	127	31.07%	21.87%	47.72%
1086	Painters & Sculptors	54	71	53	58	40	19	295	36.61%	32.04%	31.86%
2454	Painters etc.	218	381	290	294	338	97	1618	16.6%	15.1%	68.3%
2573	Paper Mill Wkrs	317	416	370	326	185	14	1628	26.27%	21.37%	53.67%
1023	Pharmacisticts	6	110	145	107	71	66	505	24.1%	41.4%	34.5%
1085	Photographers	30	111	106	47	28	25	347	36.61%	32.04%	31.86%
1021	Physicians	7	386	566	449	245	100	1753	44.7%	34.1%	21.3%
2455	Plaster & Cement	46	104	91	92	65	7	405	23.42%	26.37%	51.27%
2453	Plumbers etc.	152	399	311	385	224	27	1498	23.42%	26.37%	51.27%
4051	Policeman	185	378	321	274	127	5	1290	31.07%	21.87%	47.72%
2513	Precision Machine Op	283	444	203	226	170	42	1368	26.27%	21.37%	53.67%
248	Printing Craftsmen	295	471	343	295	243	42	1689	16.7%	27.8%	55.6%
1120	Public Agency Administrator	39	341	621	818	570	71	2460	29.4%	32.9%	37.7%
1082	Public Relations	29	95	91	54	37	24	330	36.61%	32.04%	31.86%
2424	Radio & T.V.	106	162	108	155	88	14	633	23.42%	26.37%	51.27%
1232	Real Estate Sales	26	233	274	250	378	249	1410	29.19%	27.68%	44.33%

									Smoking Status		
Occ Code	*Occupation Name*	*16-24*	*25-34*	*35-44*	*45-54*	*55-64*	*65+*	*Total*	*Never*	*Former*	*Current*
1063	Religious Workers	66	198	255	296	253	88	1156	54.8%	37.5%	7.7%
1130	Restaurant & Bar Mgr	64	218	256	281	188	56	1063	27.73%	29.53%	43.91%
122	Retail Salesmen & Clerks	1400	1337	1064	1138	834	439	6212	29.19%	27.68%	44.33%
2458	Roofers	34	79	71	68	46	6	304	23.42%	26.37%	51.27%
263	Route & Deliverymen	421	692	692	679	425	35	2944	26.27%	21.37%	53.67%
264	RR Brakemen,Switchmen	134	157	145	176	117	28	757	26.27%	21.37%	53.67%
2426	RR Carmen	32	69	61	68	50	9	289	23.42%	26.37%	51.27%
1162	RR Conductor	2	23	34	37	26	10	132	27.73%	29.53%	43.91%
2473	RR Engineers	22	123	128	141	101	7	522	9.7%	29%	61.3%
104	School Teachers	364	1661	1293	659	262	26	4265	30.1%	41.4%	28.6%
132	Secretaries,Typists et al	132	132	96	102	53	7	522	32.51%	25.35%	43.21%
1241	Service & Construction	128	292	272	282	109	33	1116	29.19%	27.68%	44.33%
1164	Service Station Manager	50	172	204	222	148	44	840	27.73%	29.53%	43.91%
2441	Sheetmetal Wkr	227	355	225	188	124	49	1168	16.7%	20.2%	63.1%
1161	Ship Officer,Pilot	10	38	49	55	40	13	205	27.73%	29.53%	43.91%
1333	Shipping Clerk	455	575	422	492	341	74	2359	28.6%	21.4%	50%
1064	Social Workers & Scientists	115	379	270	174	89	17	1044	25%	37.5%	37.5%
2471	Stat. Eng.Pwr. Stat.Op	14	170	139	259	122	20	724	23.42%	26.37%	51.27%
1233	Stock Broker	22	129	115	111	94	55	526	29.19%	27.68%	44.33%
136	Stock Clerks & Storekprs	280	354	259	303	209	46	1451	32.51%	25.35%	43.21%
2462	Teleph & Lineman	101	164	158	145	43	6	617	26.4%	26.4%	47.2%
2461	Teleph.instal. & Rep	204	331	320	292	88	12	1247	26.4%	26.4%	47.2%
253	Textile Operatives	111	51	28	37	43	6	276	26.27%	21.37%	53.67%
2432	Tool & Die Makers	17	48	119	160	54	11	409	23.42%	26.37%	51.27%
261	Truck Drivers	1153	1897	1895	1860	1165	94	8064	17.6%	22.9%	59.5%
900	Unemployed	29704	7508	3494	5690	10294	35370	92060	40.06%	29.83%	30.31%
1165	Union & Society Official	8	63	85	107	82	35	380	27.73%	29.53%	43.91%
4023	Waiters	152	77	83	122	65	22	521	42.9%	11.9%	45.2%
2521	Welders & Burners	446	972	702	682	571	92	3465	22.6%	25.3%	52.1%
2571	Wood Mill Wkrs	361	318	244	379	297	57	1656	26.27%	21.37%	53.67%
1032	X ray tech	22	22	12	11	5	1	73	28.3%	31.7%	40%