the extent of exposure to Agent Orange among American troops in Vietnam. The contamination of Agent Orange with TCDD and other herbicides containing 2,4,5-T makes it possible to use adipose tissue or serum measurements of body TCDD burden as surrogate measurements for prior exposure (in terms of absorbed dose) to such herbicides.

Evidence from recent investigations suggests that, with the exception of occupationally exposed military personnel (i.e., those who handled or sprayed herbicides or who handled equipment used with herbicides in Vietnam), the current TCDD body burdens of most Vietnam veterans are similar to those of other veterans and of nonveterans. In the largest of these investigations, serum TCDD levels of 646 Vietnam veterans were compared with those of 97 non-Vietnam veterans (CDC VHS, 1988; CDC VHS, 1989). Although all Vietnam veterans included in this study had served in the Army during 1967 and 1968 (the period of heaviest spraying) and had been in combat units that were stationed in III Corps (the region of heaviest spraying) (Craig, 1975), their TCDD levels were no higher than those of the non-Vietnam veterans. Furthermore, elevated levels (i.e., >20 parts per trillion (ppt)) were found for only 2 of these 646 Vietnam veterans (levels of 25 and 45 ppt). Similarly, Kang and coworkers (1989) found no difference among the mean TCDD levels of 40 Vietnam veterans, of 40 non-Vietnam veterans, and of 80 civilians. Although an alternative index of Agent Orange exposure—one based on a veteran's proximity to areas where spraying occurred or was occurring—has been proposed (Stellman and Stellman, 1986; Stellman et al., 1988), that index is similar to several similar indices that showed no meaningful correlation with actual serum levels of TCDD among Vietnam Army veterans (CDC VHS, 1988; CDC VHS, 1989).

Elevated levels of TCDD are found, however, among groups of Vietnam veterans who had a much greater opportunity for exposure to Agent Orange than combat troops. In Operation Ranch Hand, for example, Air Force personnel sprayed Agent Orange from fixed-wing aircraft. In a study of 147 Ranch Hand members, researchers found that 62% had TCDD levels above 20 ppt (CDC, 1988b) and that the member with the highest level had more than 300 ppt. The TCDD levels for several men who served in chemical units (they sprayed defoliants from helicopters or trucks) have also been measured, and elevated levels have been detected in some (Schecter et al., 1987; Kahn et al., 1988).

Even greater levels of TCDD (up to 750 ppt as long as 17 years after exposure) were found among persons exposed during the manufacture of 2,4,5-T (Patterson et al., 1989) and among persons living in the vicinity of an industrial explosion in Seveso, Italy (up to 27,000 ppt shortly after the explosion) (CDC, 1988a). Data indicate that the highest TCDD level found in a Seveso resident is 56,000 ppt (Mocarelli et al., 1990). An increased risk of cancer in general or of NHL in particular in these groups has not been confirmed (Riihimäki et al., 1982; Lynge, 1985; Bertazzi et al., 1989); however, the number of people in some of these exposed groups is small.

Our study *does not constitute* an adequate test of the hypothesis that exposure to Agent Orange or dioxin is associated with the development of these six malignancies. Probably many or most of the Vietnam veterans in this study were either not exposed or only minimally exposed to this chemical. To test this hypothesis adequately, a larger population with known exposure would be needed. In our study, we could not measure the serum dioxin levels of men with recently diagnosed cancer because of the large quantity of blood required.

9.3 BIAS

Although the observed association between military service in Vietnam and NHL may be due to chance, uncontrolled confounding, or some other bias, these explanations seem unlikely. In our study, the increased risk among Vietnam veterans was statistically significant ($p = 0.01$) after we controlled for numerous characteristics. Although the SCS was designed

to examine the associations between military service and six malignancies, whether to adjust for multiple comparisons is a controversial issue (Rothman, 1990). The probability, however, of observing one or more (out of six) associations as extreme as that observed for NHL (if in fact no association exists) is at most 0.07. Furthermore, as previously mentioned, results of several other studies of Vietnam veterans have suggested that military service in Vietnam may be associated with an increased risk for NHL (Fett et al., 1987; Breslin et al., 1988; U.S. Congress, 1988).

The generalizability of our study results is strengthened by the large size of the areas covered by the eight participating cancer registries. Together they include 9% to 10% of the total U.S. population, are geographically dispersed and include people with a variety of racial and ethnic backgrounds.

9.3.1 Selection Bias

Bias must always be considered as a possible explanation for a relative risk of the magnitude observed for NHL in our study. We were unable to identify, however, any substantial selection bias: all cases from eight geographic regions were eligible for inclusion in the study, and control subjects were selected by random digit dialing. Restricting the case subjects to those with phones (a criterion for selecting control subjects) did not alter any of the results. Although underascertainment of Vietnam veterans in the control group might be suggested as an explanation for the observed association, several findings in our study argue against this possibility. Participation rates were high for this type of study, and 7.5% of the control subjects reported having served in Vietnam, a figure similar to that expected on the basis of national estimates (VA, 1981; OASD, 1976). In addition, in a previous study (CDC VES, 1988a) investigators found that Vietnam veterans selected on the basis of military records (most of whom were not ill and could be compared with our living control subjects) were somewhat more willing to be interviewed than were other Vietnam-era veterans. Our results show that, even when compared with other Vietnam-era veterans or other referent groups, Vietnam veterans are at increased risk for NHL but not for any of the other five malignancies. The results do not appear to be influenced by any differential in researchers' ability to secure participation of veterans (Vietnam or otherwise).

Because the identical control group was used for each of the six cancers, this fact provides some additional assurance that a general selection bias did not influence our results. For instance, many articles in the national news media have suggested a link between Agent Orange and cancer in general, and soft tissue sarcoma has received as much news media attention as NHL. Any self-selection based on this news media coverage, therefore, would be expected to affect not only NHL but sarcoma as well.

9.3.2 Misclassification Bias

Because we restricted the analyses to case subjects with confirmed disease pathology, misclassification of disease status probably did not influence our results. We examined the possible effects misclassifying exposure status might have had on the association between military service in Vietnam and cancer. The lack of association between military service in Vietnam and other cancers (particularly sarcomas) in our study argues against recall bias as the cause of our positive finding for NHL.

Of the men who reported service in Vietnam and who met all study inclusion criteria, a larger proportion of case subjects with NHL (88%) than of control subjects (74%) gave permission to have their military records reviewed. This difference may reflect the subjects' interest in the study. Restricting the exposed group, however, to men who granted permission increased the estimated relative risk for NHL to 1.81 (95% CI 1.31-2.51). Of the records we were given permission to review, similar proportions for NHL case subjects (85%) and control subjects (87%) were found.

Using the located records, we confirmed an only slightly larger proportion of reports of Vietnam service for the control subjects (92%) than for the NHL subjects (88%). Several factors, however, suggest that this small differential is not due to reporting or recall bias. (1) The review of military records for the 16 men whose data on Vietnam service could not be confirmed (9 NHL subjects and 7 control subjects) did not definitely exclude the possibility of military service in Vietnam. Furthermore, the available information for these 16 men suggested that they could have had temporary assignments there. (2) During the telephone interview, the men were asked for details about their military service in Vietnam *before* they were asked for permission to review their military records. A subject who knowingly misreported his military service in Vietnam would probably not have given such permission. (3) Much of the information (such as occupational specialty and service in Southeast Asia) supplied during the interview was confirmed by the records. (4) None of the nine men with NHL whose service was not confirmed mentioned direct combat experience (although one said he flew "combat-ready aircraft"), as might be expected if they were attempting to embellish their pasts. (5) None of these nine men with NHL reported contact with Agent Orange, indicating that these men were not attempting to explain their cancer on the basis of the much publicized concern regarding this chemical. (In one case, information was provided by the man's widow who was not asked questions concerning herbicide exposure.)

Some of these 16 men might, however, have been more correctly classified as having been in Vietnam but not stationed there. We accounted for this possible misclassification in two ways. Our sensitivity analysis of the NHL data (Table 3.12), from which we excluded these 16 men, yielded an OR of 1.40 (95% CI 1.03-1.90). Another analysis, in which we included as exposed all men who reported being in Vietnam (whether or not they reported being stationed there), yielded an OR of 1.35 (95% CI 1.02-1.78).

An analysis of the NHL data, excluding data for men on whom information was provided by proxy respondents, did not result in any change in the OR (1.47), which argues that our overall finding is not due to widows' and other proxy respondents' overreporting Vietnam service (e.g., searching for an explanation for the death).

For comparison, excluding proxy interviews or the interviews of those whose presence in Vietnam could not be confirmed by a record review had virtually no effect on our estimates of risk for Hodgkin's disease (Table 5.10). If reporting bias had affected one type of lymphoma, it would probably have affected both.

9.3.3 Sensitivity Analyses

We were able to test the possibility that we may have introduced bias into our study through some aspect of study design or through our assumptions in including or excluding certain subjects from our analyses. In our sensitivity analyses, we were able to test the effect of changing various assumptions. A table of the results of each analysis is included at the end of the separate chapters on each cancer.

In general, the results of these analyses show that varying our assumptions had little effect on the magnitude of the association between Vietnam service and cancer: with various changes in assumptions, we still find an association with NHL and find no association with the other five malignancies.

Restricting the study subjects to those with a telephone, which adjusts for our use of the telephone to locate control subjects, had almost no effect on any results. In addition, excluding men who were interviewed in person or for whom information was provided by a proxy respondent had almost no effect on any results.

We also examined the effect of including men within a 25-year age span (aged 1[illegible]-39 years in 1968) because few men who were 30 or older in 1968 were Vietnam veterans. We reanalyzed our data after excluding these older men. The results did not alter our conclusions regarding any of the six malignancies.

9.4 NON-HODGKIN'S LYMPHOMA

Vietnam veterans were found to have a roughly 50% increased risk for NHL, but few characteristics of military service were useful in identifying differences in risk *among* subgroups of Vietnam veterans. Since only 99 men with NHL were stationed in Vietnam, however, these analyses have relatively low power. The relative risk tended to increase with increasing time spent in Vietnam, but the trend lacked statistical significance and showed no further increase for those who served for more than 1.5 to 1.9 years.

Previous studies of Vietnam veterans provide some support for an association between military service in Vietnam and NHL. In a proportionate mortality study that included 50,000 deceased Vietnam-era veterans, Breslin and coworkers (1988) observed a twofold increase in the proportion of deaths due to NHL among Marines who served in Vietnam compared with Marines who served elsewhere. In a historical cohort study of Army Vietnam veterans, CDC investigators used a combination of self-reports, medical-record reviews, and information from death certificates to identify men with NHL (U.S. Congress, 1988). In this study, several of the latency periods were short and the development of NHL may have been unrelated to service in Vietnam; however, investigators found seven cases of NHL among Vietnam veterans compared with only one case among similarly aged veterans who did not serve in Vietnam ($p = 0.07$). Furthermore, results of an examination of the death certificates of 19,000 Australian troops who served in Vietnam suggested an increased risk (RR = 1.8) for NHL, although the confidence interval for this estimate was very wide, ranging from 0.4 to 8 (Fett et al., 1987).

In contrast, other investigators have found no association between military service in Vietnam and NHL. Although Breslin and coworkers (1988) observed a significantly increased risk for NHL among Marine veterans, Vietnam veterans who served in the Army (four-fifths of all Vietnam veterans in the study) tended to have a lower risk, with a proportionate mortality ratio of 0.81. In our study, we found that the risk of NHL among Vietnam veterans who served in the Army was lower than that among Marines, but the variation across branches was not statistically significant. In proportionate mortality studies conducted in West Virginia (Bailey et al., 1986) and Wisconsin (Anderson et al., 1986), investigators did not find an increased number of deaths from NHL among Vietnam veterans. In a similar analysis of Vietnam veterans in New York (Lawrence et al., 1985), investigators found no association between Vietnam service and deaths due to lymphoma (NHL and Hodgkin's disease combined). In these more recent studies, however, investigators have not examined deaths according to branch of service in Vietnam. Only one man with NHL has been identified among members of Operation Ranch Hand (Thomas et al., 1990); the Ranch Hand group is, however, too small for definitive analysis of the risk of NHL.

Results of our study do not suggest that the risk of NHL varies according to known patterns of spraying in Vietnam. The estimated risk tended to be somewhat lower among Vietnam veterans who served in combat units, in the Army, or in III Corps than among other men. Compared with other Vietnam veterans, the risk of NHL tended to be higher among Navy veterans, most of whom were stationed on ocean-going vessels. Overall, the risk tended to be higher for men based at sea than for those based on land. Finally, no greater risk was associated with serving in Vietnam during the period of heaviest spraying, 1966 to 1969.

In addition, in this study Vietnam veterans with NHL did not report more exposure to Agent Orange than other Vietnam veterans. Because indices of self-perceived exposure to Agent Orange, which are based on questions similar to those asked in the SCS, have shown no meaningful correlation with actual TCDD levels (CDC VHS, 1988; CDC VHS, 1989), analyses that include self-reported exposure should be interpreted cautiously. Of the 99 Vietnam veterans with NHL in the current study, only one reported handling equipment or containers used with Agent Orange and none reported spraying defoliants, the self-reported characteristics that would be most likely to indicate actual absorption of TCDD.

We performed several supplementary analyses to test the sensitivity of our results to the source of information and to our choice of exclusion criteria (Table 3.10), and results showed that these factors had little effect on our earlier results. Some case subjects with unidentified AIDS may have remained in the study and might have artificially increased the OR for military service in Vietnam. An analysis that included the 281 men with identified AIDS (of whom all but one had NHL) yielded, however, an OR of only 1.34.

Although our results argue against the possibility that exposure to Agent Orange is responsible for the observed 50% increased risk of NHL among Vietnam veterans, we were unable to identify any other factor in the pathogenesis of NHL among these men that could account for the increase. In our analysis, none of the known or suspected risk factors for NHL that we controlled for explained the increased risk for Vietnam veterans. Dapsone, used in the prevention and treatment of malaria, may be associated with an increased incidence of lymphomas in animals (NCI, 1977). In our study, Vietnam veterans reported having received prophylaxis or treatment for malaria more frequently than other men, but this did not explain the increased risk for NHL. Neither did the greater reported illicit drug use among Vietnam veterans than among other men explain the increase.

We could not test several speculative hypotheses that might explain an increased risk among Vietnam veterans. The increased relative risk of NHL among Vietnam veterans may be due to (1) some unexamined characteristic of the men who went to Vietnam that is unrelated to anything that happened in Vietnam, (2) some characteristic (such as an immunologic abnormality or a viral or other infection) related specifically to Vietnam service, or (3) some characteristic of the men that resulted from service in Vietnam but developed after it (e.g., stress or a behavioral change). Any such speculative hypotheses should take into consideration the tendency toward higher risk among men based at sea and the lack of association with those who served in units more likely than others to have been in combat.

Although we could not test such hypotheses and we cannot completely rule out the role of chance or unrecognized bias, our results do suggest that Vietnam veterans have a higher risk of NHL and that this increased risk cannot be explained by exposure to Agent Orange.

9.5 SOFT TISSUE AND OTHER SARCOMAS

The results of this study provide no evidence that men who served in the U.S. military in Vietnam are at a higher risk for sarcoma than other men. This was true whether the Vietnam veterans were compared with other military veterans, other Vietnam-era veterans or nonveterans. We found no increased risk when the cases were restricted to soft tissue sarcoma. Finally, the results do not indicate that the risk of sarcoma varies according to any of the characteristics we analyzed.

The military service characteristics of men with sarcoma did not suggest that Vietnam veterans who might have been exposed to Agent Orange have a higher risk for sarcoma. In our study, none of the Vietnam veterans with sarcoma indicated that he was a member of the Air Force Ranch Hand unit or that he was assigned to a chemical detachment. Furthermore, the risk for sarcoma was not elevated among men with a greater potential for contact with

Agent Orange, including men who served in combat units, men in III Corps (the most heavily sprayed region) (Craig, 1975; Westing, 1984), or men stationed in Vietnam between 1966 and 1969 (the period of heaviest spraying). Because indices of self-perceived exposure to Agent Orange, which are based on questions similar to those asked in the SCS, have shown no meaningful correlation with actual serum TCDD levels (CDC VHS, 1988; CDC VHS, 1989), analyses that include self-reported exposure should be interpreted cautiously. Vietnam veterans with sarcoma showed a nonsignificant excess risk of reporting that they passed through a defoliated area. However, for more direct contact with herbicides, the reports were less frequent among those with sarcoma than among control subjects (again nonsignificant differences). Only one Vietnam veteran with sarcoma reported getting Agent Orange on his skin or clothing, and none reported spraying it themselves or handling equipment that had been used with it.

That we found no association between Vietnam service and sarcoma is probably not due to systematic bias in our study's design or execution. All men with sarcoma in eight geographic regions were eligible, and participation rates were high. As discussed earlier in this chapter, the possibility of overascertainment of Vietnam veteran control subjects through random digit dialing (which would have biased our study in the negative direction) seems unlikely. In addition, restricting the subjects to those with a telephone in the household resulted in no substantial difference in the risk estimate (OR=1.01, 95% CI 0.63-1.61). Therefore, selection bias probably did not greatly affect the results.

A misclassification bias (due to either inaccuracies in defining exposure or disease) probably does not explain our negative results. Restricting the analysis to men whose Vietnam service was confirmed after the records were reviewed did not substantially alter the OR (0.82, 95% CI 0.49-1.36), which argues against the possibility that misclassified military service artificially lowered the estimated relative risk. When we included in the case series all the cases whose diagnoses had not been confirmed because (1) a pathology specimen was not available or (2) the material reviewed by the panel of experts was inadequate to confirm the diagnosis, we obtained a risk estimate (1.04, 95% CI 0.67-1.64) that was similar to the estimate obtained when we used confirmed cases only. We performed several supplementary analyses to test the sensitivity of our results to the source of information and to our choice of exclusion criteria. These analyses had little effect on our results.

As indicated by the relative dearth of epidemiologic investigations of the subject, sarcomas are difficult to study. Neither sarcoma nor the more restricted group, soft tissue sarcoma, is a single form of cancer, the latter being a heterogeneous assortment of malignant tumors arising in the specialized connective tissues of the body (Enzinger and Weiss 1983). Sarcoma includes more than 20 morphologic types of cancer, with more detailed classification schemes differentiating between 60 or more subtypes. The scarcity of subjects with these tumors and the challenges in subclassifying them have led investigators to study these diverse malignancies as a group under the general category of soft tissue sarcoma. Even as a group, however, these cancers are rare compared with carcinomas. Subclassifying sarcomas accurately and consistently is more difficult than subclassifying other malignancies. Independent reviews of sarcoma cases submitted for study have frequently led to changes in subclassification (Fingerhut et al., 1984; Hoar et al., 1986; Lynge et al., 1987; Woods et al., 1987).

Several investigators have reported that a substantial proportion of cases submitted for review are not confirmed as sarcoma; confirmation rates are comparable with those in our study (Fingerhut et al., 1984; Hoar et al., 1986; Woods et al., 1987). This low rate of confirmation makes comparisons among studies difficult, especially among studies in which cases are not reviewed by experts in sarcoma pathology.

Studies of the risk of sarcoma among Vietnam veterans are hampered by the rarity of these tumors. In a study of Air Force Ranch Hand personnel who participated in the aerial spraying of Agent Orange in Vietnam, investigators have identified only one man with soft tissue sarcoma (Thomas et al., 1990). Case-control studies, two of which included independent reviews of pathology specimens, have produced negative results (Greenwald et al., 1984; Kang et al., 1986; Kang et al., 1987). The results of proportionate mortality studies have been inconsistent, with two groups of investigators finding an association (Holmes et al., 1986; Kogan and Clapp, 1988) and two groups not finding an association (Anderson et al., 1986; Breslin et al., 1988). All four studies were small and relied on death certificates to identify cases. In one of these studies, the results did verify that the death certificates accurately reflected the diagnoses as recorded on medical records (Kogan and Clapp, 1988), but none included independent reviews of pathology specimens.

Our study had a 97% power to detect a twofold risk for all sarcomas for all Vietnam veterans. Although we found no suggestion of elevation in risk, our study was not large enough to rule out completely a modest elevation in risk. (The upper limit of the 95% confidence interval is 1.58.) Because of the very large sample sizes required, an epidemiologic study probably could not rule out a modest (e.g., 25%) increase in risk. The power of the study was further limited for subgroup analyses. The negative results of our study, however, agree with the results of most other studies and suggest that Vietnam veterans do not have an excess risk of sarcoma 15 to 25 years after service. Among the subgroups of veterans we were able to examine, we did not identify any at higher risk. Neither did we identify any subtype of sarcoma for which Vietnam veterans were at greater risk.

9.6 HODGKIN'S DISEASE

Our results provide no evidence of a higher risk for Hodgkin's disease among Vietnam veterans. Compared with (1) men who did not serve in Vietnam, (2) men who served in the military but not in Vietnam, and (3) men who did not serve in the military, Vietnam veterans did not have a higher risk for this malignancy. Furthermore, we found no attributes of military service, among those we examined, that would identify subgroups of Vietnam veterans with higher risk of Hodgkin's disease. The estimated relative risk did not vary substantially according to branch, calendar year, or duration or region of military service in Vietnam. Nor did the estimated relative risk differ according to rank or age at the beginning of service in Vietnam.

Investigators in West Virginia reported a significantly increased number of deaths from Hodgkin's disease among Vietnam veterans (Bailey et al., 1986), but they observed this increase (5 deaths observed vs. 0.6 expected) only when they compared Vietnam veterans with veterans who had served elsewhere. They found a much smaller, nonsignificant increase in Hodgkin's disease among Vietnam veterans when nonveterans were the comparison group. In other proportionate mortality studies, investigators have reported no increase in the number of deaths from Hodgkin's disease among Vietnam veterans (Lawrence et al. 1985; Anderson et al., 1986; Breslin et al., 1988), and in two historical cohort studies, investigators have found similar mortality rates from Hodgkin's disease for troops that served in Vietnam and troops that served elsewhere (Boyle et al., 1987; CDC VES, 1987; Fett et al., 1987).

The evidence that suggests an association between Hodgkin's disease and potential exposure to phenoxyherbicides is equivocal. Results of several studies suggest an increased risk for Hodgkin's disease (Burmeister, 1981; Hardell et al., 1981; Hardell and Bengtsson, 1983; Dubrow et al., 1988; Wiklund et al., 1989), but the findings of other studies have been negative (Decoufle et al., 1977; Wiklund, 1983; Hoar et al., 1986; Brownson et al., 1989).

We included this malignancy in the Selected Cancers Study because results of a few studies suggested a possible association with phenoxyherbicides (or TCDD). Information, however, is now available concerning the exposure of American troops in Vietnam to Agent Orange. As previously described, results of several recent studies suggest that, unless duties in Vietnam required the handling or spraying of defoliants, most Vietnam veterans were not measurably exposed to Agent Orange (Schecter et al., 1987; CDC VHS, 1988; CDC VHS, 1989; Kang et al., 1989).

In our study, none of the Vietnam veterans with Hodgkin's disease indicated that he was a member of the Air Force Ranch Hand unit or that he was assigned to a chemical detachment. Furthermore, the risk for Hodgkin's disease was not elevated among men with greater potential for contact with Agent Orange, including men who served in combat units, men in III Corps (the most heavily sprayed area (Craig, 1975; Westing, 1984)), or men stationed in Vietnam between 1966 and 1969, the period of heaviest spraying. In addition, compared with other Vietnam veterans, the risk for Hodgkin's disease did not significantly differ between those in the Navy (most of whom were stationed on ocean-going vessels with little potential for exposure to Agent Orange) and men in other service branches. Although self-reports of possible exposure to Agent Orange should be interpreted cautiously (CDC VHS, 1988; CDC VHS, 1989), we observed that, among Vietnam veterans, the proportion of control subjects (35%) who reported passing through defoliated areas was slightly larger than the proportion of men with Hodgkin's disease (29%) who reported doing so. In addition, none of the Vietnam veterans with Hodgkin's disease reported spraying Agent Orange or handling equipment or containers that had been used with Agent Orange.

As discussed above, selection bias is not a likely explanation for our negative results on Hodgkin's disease. We included all men with newly diagnosed malignancies who lived in one of eight geographic regions and randomly selected the control subjects from the same regions by using random digit dialing. Participation rates were high, but if the participation rate of Vietnam veterans varied according to their disease status, a bias may have arisen. For example, if healthy Vietnam veterans were more likely to participate than Vietnam veterans with one of the cancers we were studying, the true OR would have been underestimated. This possibility seems unlikely, however, because the proportion of control subjects who reported having served in Vietnam (7.5%) was similar to the proportion that would be expected to have served on the basis of national estimates for men of this age (OASD, 1976; VA, 1981); moreover, the increased risk for NHL argues against this type of systematic bias.

We conducted additional analyses to assess the effect on our results of the various restriction criteria and to evaluate the effect of excluding men whose interview data might be of poorer quality. None of these sensitivity analyses had any substantial effect on our results.

9.7 NASAL CANCER, NASOPHARYNGEAL CANCER, AND PRIMARY LIVER CANCER

Our results provide no evidence of a higher risk for nasal carcinoma, nasopharyngeal carcinoma, or primary liver cancer among Vietnam veterans. Compared with (1) men who did not serve in Vietnam, (2) men who served in the military but not in Vietnam, and (3) men who did not serve in the military, Vietnam veterans did not have a higher risk for these three malignancies.

As noted earlier, these three malignancies were added to the study of lymphoma and sarcoma at the suggestion of an external review group. Obviously, since these malignancies are so rare in men in the age group of the men in our study, even a study as large as ours would have adequate power to detect (or rule out) only risks of a relatively high magnitude (greater than twofold). Although all of our estimates of risk are near 1.0 and the confidence

intervals all dip far below 1.0, the upper limits of the confidence intervals for these three malignancies range from 1.8 (nasopharyngeal) to 2.9 (nasal). Our results rule out greatly increased risk for these malignancies among Vietnam veterans but do not rule out small increases in risk.

These three malignancies have not received much attention in other studies of Vietnam veterans. Investigators have reported nonsignificant increases among Vietnam veterans in the number of cancers of the sinonasal cavities and of the liver (Lawrence et al., 1985; Breslin et al., 1988).

The evidence that suggests an association between these three malignancies and exposure to phenoxyherbicides is weak. For example, the evidence for primary liver cancer consists of the results of (1) animal studies showing that TCDD increased the frequency of hepatocellular tumors (Hay, 1982; IARC, 1987), (2) a study showing that the proportion of primary liver cancer cases among all cancer cases at one hospital in Hanoi was increased (Tung, 1973), and (3) two case-control studies (Stemhagan et al., 1983; Vân, 1984). The results of some studies suggest an increased risk for nasal cancer among farmers and other men who may have been exposed to phenoxyherbicides (Hardell et al., 1982; Gallagher et al., 1984; Coggon et al., 1986) and nasopharyngeal cancer (Hardell et al., 1982), but the results of other studies have not shown an increased risk (Hernberg et al., 1983).

We included these malignancies in the Selected Cancers Study because results of a few studies suggested a possible association with phenoxyherbicides (or TCDD). As previously described, results of several recent studies suggest, however, that, unless their duties in Vietnam required the handling or spraying of defoliants, most Vietnam veterans were not measurably exposed to Agent Orange (Schecter et al., 1987; CDC VHS, 1988; CDC VHS, 1989; Kang et al., 1989). The duties of the small number of Vietnam veterans with these three cancers did not suggest any increased contact with Agent Orange.

We conducted additional analyses to assess the effect on our results (1) of the various restriction criteria and (2) of excluding men whose interview data might be of poor quality. None of the results of these analyses altered our conclusions, though some of the results showed much variation due to the very small number of case subjects who had served in Vietnam (two men with nasal carcinoma, three with nasopharyngeal carcinoma, and eight with primary liver cancer).

That we confirmed all case diagnoses included in our analyses sets our study apart from many other studies of these malignancies. To evaluate the effects of pathology confirmation on the association between military service in Vietnam and nasal carcinoma, nasopharyngeal carcinoma, and primary liver cancer, we used in our analyses only cases with a definite diagnosis. These restrictions of the case groups changed the estimated relative risk for Vietnam veterans only slightly.

As expected, in our study most malignant neoplasms of the sinonasal cavities and nasopharynx were carcinomas. Risk factors for malignancies of these sites have, most consistently, been associated with this type of histology. Thus, our main analyses of these malignancies were restricted to carcinomas, but additional analyses were performed after other histologic types were included. Adding the 14 cases of nasal cancer and the 9 cases of nasopharyngeal cancer of other morphologies affected our risk estimates little. For nasal cancer, the OR increased to 0.72 (95% CI 0.21-2.44); and for nasopharyngeal cancer, it increased to 0.61 (95% CI 0.21-1.76).

Hepatitis and cirrhosis, possibly a result of Vietnam service, may have led to a slightly higher (although not significantly higher) risk of primary liver cancer among Vietnam veterans. In this interview study, we could not measure serum markers for hepatitis, but controlling for a reported history of either hepatitis or cirrhosis yielded a slightly reduced estimate of relative

risk for Vietnam veterans. Other investigators have found an elevated prevalence of serum markers for hepatitis B among Vietnam veterans (CDC VES, 1989b).

10. CONCLUSIONS

Our findings suggest that:

1. Vietnam veterans have a roughly 50% increased risk of developing non-Hodgkin's lymphoma 15 to 25 years after military service in Vietnam.
2. Veterans who served in locations other than Vietnam do not have a similar increased risk of non-Hodgkin's lymphoma.
3. The increased risk of non-Hodgkin's lymphoma among Vietnam veterans is not explained by exposure to Agent Orange. Because most of the Vietnam veterans in this study were probably not (or only minimally) exposed to Agent Orange, the results do not constitute an adequate test of the hypothesis that exposure to Agent Orange or dioxin is associated with the development of NHL. A sufficient test would require the study of persons with, and others without, known exposure.
4. Vietnam veterans are not at increased risk for soft tissue or other sarcomas, Hodgkin's disease, nasal cancer, nasopharyngeal cancer, or primary liver cancer.

REFERENCES

Acheson ED (1986). Epidemiology of nasal cancer. Chem Ind Inst Toxicol Ser 7:135-41.

Anderson HA, Hanrahan LP, Jensen M, Laurin D, Yick WY, Wiegman P (1986). Wisconsin Vietnam veteran mortality study: final report. Madison, WI: State of Wisconsin Department of Health and Social Services, Division of Health.

Bailey C, Baron RC, Basanac E, et al. (1986). West Virginia Vietnam Era Veterans Mortality Study: West Virginia residents 1968-1983: preliminary report. Charleston, WV: West Virginia Health Dept.

Balarajan R, Acheson ED (1984). Soft tissue sarcomas in agriculture and forestry workers. J Epidemiol Comm Health 38:113-6.

Berg JW (1982). Morphologic classification of human cancer. In: Schottenfeld D, Fraumeni JF (eds). Cancer epidemiology and prevention. Philadelphia: WB Saunders, pp. 74-89.

Bertazzi PA, Zocchetti C, Pesatori AC, Guercilena S, Sanarico M, Radice L (1989). Ten-year mortality study of the population involved in the Seveso incident in 1987. Am J Epidemiol 129:1187-200.

Bond GG, Bodner KM, Cook RR (1989). Phenoxyherbicides and cancer: insufficient epidemiologic evidence for a causal relationship. Fundam Appl Toxicol 12:172-88.

Boyle CA, Decoufle P, Delaney RJ, et al. (1987). Postservice mortality among Vietnam veterans. Atlanta: Centers for Disease Control.

Breslin P, Kang HK, Lee Y, et al. (1988). Proportionate mortality study of U.S. Army and U.S. Marine Corps veterans of the Vietnam war. J Occup Med 30:412-9.

Breslow NE, Day NE (1980). Statistical methods in cancer research I: the analysis of case-control studies, (Scientific Publications No. 32). Lyon, France: International Agency for Research on Cancer, pp. 192-279.

Brinton LA, Blot WJ, Becker JA, Winn DM, et al. (1984). A case-control study of cancers of the nasal cavity and paranasal sinuses. Am J Epidemiol 119:896-906.

Brownson RC, Reif JS, Chang JC, Davis JR (1989). Cancer risks among Missouri farmers. Cancer 64:2381-6.

Burmeister LF (1981). Cancer mortality in Iowa farmers, 1971-1978. J Natl Cancer Inst 66:461-4.

Cantor KP (1982). Farming and mortality from non-Hodgkin's lymphoma: a case-control study. Int J Cancer 29:239-47.

(CDC) Centers for Disease Control (1983). Protocol for epidemiologic studies of the health of Vietnam veterans. Atlanta: Centers for Disease Control.

(CDC) Centers for Disease Control (1988a). Preliminary report: 2,3,7,8-tetrachlorodibenzo-p-dioxin exposure in humans—Seveso, Italy. MMWR 37:733-6.

(CDC) Centers for Disease Control (1988b). Serum 2,3,7,8-tetrachlorodibenzo-p-dioxin levels in Air Force Health Study participants—preliminary report. MMWR 37:309-11.

(CDC VES) Centers for Disease Control Vietnam Experience Study (1987). Postservice mortality among Vietnam veterans. JAMA 257:790-5.

(CDC VES) Centers for Disease Control Vietnam Experience Study (1988a). Health status of Vietnam veterans I: psychosocial characteristics. JAMA 259:2701-7.

(CDC VES) Centers for Disease Control Vietnam Experience Study (1988b). Health status of Vietnam veterans II: physical health. JAMA 259:2708-14.

(CDC VES) Centers for Disease Control Vietnam Experience Study (1988c). Health status of Vietnam veterans III: reproductive outcomes and child health. JAMA 259:2715-19.

(CDC VES) Centers for Disease Control Vietnam Experience Study (1989a). Health status of Vietnam veterans II: telephone interview. Atlanta: Centers for Disease Control.

(CDC VES) Centers for Disease Control Vietnam Experience Study (1989b). Health status of Vietnam veterans III: medical examination. Atlanta: Centers for Disease Control.

(CDC VHS) Centers for Disease Control Veterans Health Studies (1988). Serum 2,3,7,8-tetrachlorodibenzo-*p*-dioxin levels in U.S. Army Vietnam-era veterans. JAMA 260:1249-54.

(CDC VHS) Centers for Disease Control Veterans Health Study (1989). Comparison of serum levels of 2,3,7,8-tetrachlorodibenzo-p-dioxin with indirect estimates of Agent Orange exposure among Vietnam veterans: final report. Atlanta: Centers for Disease Control.

Checkoway H, Pearce NE, Crawford-Brown DJ (1989). Research methods in occupational epidemiology. New York: Oxford University Press. pp. 78-79.

Coggon D, Pannett B, Winter PC, Acheson ED, Baonsall J (1986). Mortality of workers exposed to 2 methyl-4-chlorophenoxyacetic acid. Scand J Work Environ Health 12:448-54.

Cook RR, Bond GG, Olsen RA, Ott MG, Gondek MR (1986). Evaluation of the mortality experience of workers exposed to the chlorinated dioxins. Chemosphere 15:1769-76.

Cook-Mozaffari P, Van Rensburg S (1984). Cancer of the liver. Br Med Bull 40:342-5.

Courtney KD, Gaylor DW, Hogan MD, Falk KL, Bates RR, Mitchell T (1970). Teratogenic evaluation of 2,4,5-T. Science 168:864-6.

Craig DA (1975). Use of herbicides in Southeast Asia: historical report. Kelly Air Force Base, TX: San Antonio Air Logistics Center, Directorate of Energy Management.

Decoufle P, Stanislawizyk K, Houten L, Bross IDJ, Viadana E (1977). A retrospective survey of cancer in relation to occupation. Cincinnati: National Institute for Occupational Safety and Health. DHEW publication no. (NIOSH) 77-78.

Dixon WJ, Brown MB, Engelman L, Hill MA, Jennrich RI (1988). BMDP statistical software manual, vol 2 Los Angeles: BMDP Statistical Software, Inc. pp. 941-70.

Dubrow R, Paulson JO, Windian R (1988). Farming and malignant lymphoma in Hancock County, Ohio. Br J Ind Med 45:25-8.

Elwood JM (1981). Wood exposure and smoking. Association with cancer of the nasal cavity and paranasal sinuses in British Columbia. Can Med Assoc 124:1573.

Enzinger FM, Weiss SW (1983). Soft tissue tumors. St. Louis: The C.V. Mosby Company.

(EPA) Environmental Protection Agency (1971). Advisory Committee on 2,4,5-T. Report to the Administrator of Environmental Protection Agency. Washington, D.C.

Eriksson M, Hardell L, Berg NO, Mller T, Axelson O (1981). Soft-tissue sarcomas and exposure to chemical substances: a case-referent study. Br J Ind Med 38:27-33.

Falk H (1982). Liver. In: Schottenfeld D, Fraumeni JF Jr (eds). Cancer epidemiology and prevention. Philadelphia: WB Saunders Co. pp. 668-82.

Falk H, Telles NC, Ishak KG, Thomas LB, Popper H (1979). Epidemiology of Thorotrast-induced hepatic angiosarcoma in the United States. Environ Res 18:65-73.

Fedder M, Gonzalez MF (1985). Nasopharyngeal carcinoma: brief review. Am J Med 79:365-9.

Fett MJ, Nairn JR, Cobbin DM, Adena MA (1987). Mortality among Australian conscripts of the Vietnam conflict era II: causes of death. Am J Epidemiol 125:878-84.

Fingerhut MA, Halperin WE, Honchar PA, Smith AB, Groth DH, Russell WO (1984). An evaluation of reports of dioxin exposures and soft tissue sarcoma pathology among chemical workers in the United States. Scand J Work Environ Health 10:299-303.

Gajwani BW, Devereaux JM, Beg JA (1980). Familial clustering of nasopharyngeal carcinoma. Cancer 47:2325-7.

Gallagher DH, Peters JM, Jeffries E, Band PR, Spinelli J, Coldman AJ (1984). Cancer and aplastic anemia in British Columbia farmers. J Natl Cancer Inst 72:1311-5.

Gallagher RP, Threlfall WJ (1984). Cancer and occupational exposure to chlorophenols. Lancet II:48.

Gastpar H, Wilmes E, Wolf H (1981). Epidemiologic, etiologic and immunologic aspects of nasopharyngeal carcinoma (NPC). J Med 12:257-84.

Gordis L (1982). Should dead cases be matched to dead controls? Am J Epidemiol 115:1-5.

Greene MH (1980). A multidisciplinary approach to non-Hodgkin's lymphoma: clinical and environmental predisposing factors. Ann Intern Med 94:218-25.

Greene MH (1982). Non-Hodgkin's lymphoma. In: Schottenfeld D, Fraumeni JF Jr (eds). Cancer epidemiology and prevention. Philadelphia: WB Saunders Co. pp. 765-78.

Greenwald P, Kovasznay B, Collins DN, Therriault G (1984). Sarcoma of soft tissues after Vietnam service. J Natl Cancer Inst 73:1107-9.

Groves RM (1989). Survey errors and costs. New York: John Wiley and Sons. pp. 239-94.

Grufferman S, Delzell E (1984). Epidemiology of Hodgkin's disease. Epidemiol Rev 6:76-106.

Hammond EC (1966). Smoking in relation to the death rates of one million men and women. Natl Cancer Inst Monogr 19:129-204.

Hardell L (1979). Malignant lymphoma of histiocytic type and exposure to phenoxyacetic acids or chlorophenols. Lancet I:55-6.

Hardell L, Bengtsson NO (1983). Epidemiological study of socioeconomic factors and clinical findings in Hodgkin's disease and reanalysis of previous data regarding chemical exposure. Br J Cancer 49:217-25.

Hardell L, Bengtsson NO, Jonsson U, Eriksson S, Larsson LG (1984). Aetiological aspects on primary liver cancer with special regard to alcohol, organic solvents and acute intermittent porphyria: an epidemiological investigation. Br J Cancer 50:389-97.

Hardell L, Eriksson M (1988). The association between soft tissue sarcomas and exposure to phenoxyacetic acids: a new case-referent study. Cancer 62:652-6.

Hardell L, Eriksson M, Lenner P, Lundgren E (1981). Malignant lymphoma and exposure to chemicals, especially organic solvents, chlorophenols, and phenoxy acids: a case-control study. Br J Cancer 43:169-76.

Hardell L, Johansson B, Axelson O (1982). Epidemiological study of nasal and nasopharyngeal cancer and their relation to phenoxy acid or chlorophenol exposure. Am J Med 3:247-57.

Hardell L, Sandström A (1979). Case-control study: Soft-tissue sarcomas and exposure to phenoxyacetic acids or chlorophenols. Br J Cancer 39:711-7.

Hartge P, Brinton LA, Rosenthal JF, Cahill JI, Hoover RN, Waksberg J (1984). Random digit dialing in selecting a population-based control group. Am J Epidemiol 120:825-33.

Hay A (1982). The chemical scythe: lessons of 2,4,5-T and dioxin. New York: Plenum Press. pp. 25-69.

Hayes RB, Kardaun JWPF, de Bruyn A (1987). Tobacco use and sinonasal cancer: a case-control study. Br J Cancer 56:843-846.

Hernberg S, Westerholm P, Schultz-Larsen K, et al. (1983). Nasal and sinonasal cancer: connection with occupational exposures in Denmark, Finland, and Sweden. Scand J Work Environ Health 9:315-26.

Hirayama T (1984). Cancer mortality in nonsmoking women with smoking husbands based on a large cohort study in Japan. Prev Med 13:680-90.

Hoar SK, Blair A, Holmes FF, et al. (1986). Agricultural herbicide use and risk of lymphoma and soft-tissue sarcoma. JAMA 256:1141-7.

Holmes AP, Bailey C, Baron R, et al., (1986). West Virginia Veterans Mortality Study: West Virginia residents 1968-1983: preliminary report. Charleston, WV: Department of Health.

IARC [International Agency for Research on Cancer] Working Group (1977). Some fumigants, the herbicides 2,4-D and 2,4,5-T, chlorinated dibenzodioxins and miscellaneous industrial chemicals. In: IARC Monographs on the evaluation of the carcinogenic risk of chemicals to man, vol 15. Lyon, France: IARC pp. 41-102.

IARC [International Agency for Research on Cancer] Working Group (1986). Some halogenated hydrocarbons and pesticide exposures. In: IARC monographs on the evaluation of the carcinogenic risk of chemicals to humans, vol 41. Lyon, France: IARC. pp. 319-407.

IARC [International Agency for Research on Cancer] Working Group (1987). Overall evaluations of carcinogenicity: an updating of IARC monographs vol 1 to 42. In: IARC monographs on evaluation of carcinogenic risks to humans, suppl 7. Lyon, France: IARC. pp. 350-354.

Ipsen J (1984). The ubiquitous 2 x 2 table, its parameters and their confidence limits. Scand J Soc Med. 12:121-7.

Ireland B, Lanier AP, Knutson L, Clift SE, Harpster A (1988). Increased risk of cancer in siblings of Alaskan native patients with nasopharyngeal carcinoma. Int J Epidemiol. 17:509-11.

Johnson ES (1990). Association between soft tissue sarcomas, malignant lymphomas, and phenoxyherbicides/ chlorophenols: evidence from occupational cohort studies. Fundam Appl Toxicol 14:219-34.

Kahn PC, Gochfeld M, Nygren M, et al. (1988). Dioxins and dibenzofurans in blood and adipose tissue of Agent Orange exposed Vietnam veterans and matched controls. JAMA 259:1661-7.

Kang H, Enzinger F, Breslin P, Feil M, Lee Y, Shepard B (1987). Soft tissue sarcoma and military service in Vietnam: a case-control study. J Natl Cancer Inst. 79:693-9.

Kang H, Watanabe K, Remmers J, Breen J, Conomos M, Stanley J (1989). Dioxins and dibenzofurans in adipose tissue of U.S. Vietnam veterans and their controls [Abstract]. Am J Epidemiol 130:815.

Kang H, Weatherbee L, Breslin P, et al. (1986). Soft tissue sarcomas and military service in Vietnam: a case comparison group analysis of hospital patients. J Occup Med 28:1215-8.

Kaplan LD, Abrams DI, Feigal E, et al. (1989). AIDS-associated non-Hodgkin's lymphoma in San Francisco. JAMA 261:719-24.

Kaplan LD (1988). AIDS-associated lymphoma. Infect Dis Clin North Am 2:525-32.

Kleinbaum DG, Kupper LL, Morgenstern H (1982). Epidemiologic research: principles and quantitative methods. Belmont, CA: Lifetime Learning Publications.

Kogan MD, Clapp RW (1988). Soft tissue sarcoma mortality among Vietnam veterans in Massachusetts, 1972-83. Int J Epidemiol 17:39-43.

Lawrence CE, Reily AA, Quickenton P, et al. (1985). Mortality patterns of New York State Vietnam veterans. Am J Public Health 75:277-9.

Levy PS, Lemeshow S (1980). Sampling for health professionals. Belmont, CA: Lifetime Learning Publications. pp. 106-34.

Lilienfeld DA, Gallo MA (1989). 2,4-D, 2,4,5-T, and 2,3,7,8-TCDD: an overview. Epidemiol Rev 11:28-58.

Lin TM, Chen KP, Lin CC, et al. (1973). Retrospective study on nasopharyngeal carcinoma. J Natl Cancer Inst 51:1403-8.

Lynge E (1985). A follow-up study of cancer incidence among workers in manufacture of phenoxyherbicides in Denmark. Br J Cancer 52:259-70.

Lynge E, Storm HH, Jensen OM (1987). The evaluation of trends in soft tissue sarcoma according to diagnostic criteria and consumption of phenoxy herbicides. Cancer 60:1896-901.

McLaughlin JK, Blot WJ, Mehl ES, Mandel JS (1985). Problems in the use of dead controls in case-control studies I: general results. Am J Epidemiol 121:131-9.

Miettinen OS (1985). Theoretical epidemiology: principles and occurrence research in medicine. New York: John Wiley and Sons.

Milham S Jr (1983). Occupational mortality in Washington State, 1950-1979. Cincinnati: National Institute for Occupational Safety and Health. DHHS publication no. (NIOSH) 83-116.

Mocarelli P, Patterson DG, Marocchi A, Needham LL (1990). Pilot study (phase II) for determining polychlorinated dibenzo-p-dioxin (PCDD) and polychlorinated dibenzofuran (PCDF) levels in serum of Seveso, Italy residents collected at the time of exposure: future plans. Chemosphere (in press).

Mohadjer L, Morganstein D (1990). Quality improvement in telephone surveys. In: Proceedings of the seminar on the quality of federal data, May 1990.

Mueller NE (1987). The epidemiology of Hodgkin's disease. In: Selby P, McElwain TJ (eds). Hodgkin's disease. Boston: Blackwell Scientific Publications. pp. 68-93.

(NCI) National Cancer Institute (1977). Carcinogenesis Technical Report, Series No. 20: Bioassay of dapsone for possible carcinogenicity. Washington, D.C.: U.S. Government Printing Office. vii-viii. DHEW publication no. (NIH) 77-820.

(NCI) National Cancer Institute Sponsored Study of Classifications of non-Hodgkin's Lymphoma (1982). Summary and description of a working formulation for clinical usage. Cancer 49:2112-35.

(OASD) Office of the Assistant Secretary of Defense (1976). Selected manpower statistics. Washington, D.C. Department of Defense, Directorate for Information Operations and Control.

Patterson DG, Fingerhut MA, Roberts DW, et al. (1989). Levels of polychlorinated dibenzo-p-dioxins and dibenzofurans in workers exposed to 2,3,7,8-tetrachlorodibenzo-p-dioxin. Am J Ind Med 16:135-46.

Pearce NE, Smith AH, Fisher DO (1985). Malignant lymphoma and multiple myeloma linked with agricultural occupations in a New Zealand cancer registry-based study. Am J Epidemiol 121:225-37.

Pearce NE, Smith AH, Howard JK, Sheppard R, Giles HJ, Teague CA (1986). Non-Hodgkin's lymphoma and exposure to phenoxyherbicides, chlorophenols, fencing work, and meat works employment: a case-control study. Br J Ind Med 43:75-83.

Persson B, Dahlander AM, Fredriksson M, Brage HN, Ohlson CG, Axelson O (1989). Malignant lymphomas and occupational exposures. Br J Ind Med 46:516-20.

Pirkle JL, Wolfe WH, Patterson DG, et al. (1989). Estimates of the half-life of 2,3,7,8-tetrachlorodibenzo-p-dioxin in Vietnam veterans of Operation Ranch Hand. J Toxicol Environ Health 27:165-71.

Poole C (1987). Beyond the confidence interval. Am J Public Health 77:195-9.

Popper H, Gerber MA, Thung SN (1982). The relation of hepatocellular carcinoma to infection with hepatitis B and related viruses in man and animals. Hepatology 2(suppl.):1S-9S.

Popper H, Thomas LB, Telles NC, Falk H, Selikoff IJ (1978). Development of hepatic angiosarcoma in men induced by vinyl chloride, Thorotrast, and arsenic. Am J Pathol 93:349-76.

Redmond CK, Sass RE, Roush GC (1982). Nasal cavity and paranasal sinuses. In: Schottenfeld D, Fraumeni JF Jr (eds). Cancer epidemiology and prevention. Philadelphia: WB Saunders Co. pp. 519-35.

Reif J, Pearce N, Fraser J (1989). Cancer risks in New Zealand farmers. Int J Epidemiol 18:768-74.

Riihimäki V, Asp S, Hernberg S (1982). Mortality of 2,4- dichlorophenoxyacetic acid and 2,4,5- trichlorophenoxyacetic acid herbicide applicators in Finland. Scand J Work Environ Health 8:37-42.

Ron E, Modan B, Boice Jr. JD (1988). Mortality after radiotherapy for ringworm of the scalp. Am J Epidemiol 127:713-25.

Rothman KJ (1986). Modern epidemiology. Boston: Little, Brown and Company. pp. 237-310.

Rothman KJ (1990). No adjustments are needed for multiple comparisons. Epidemiology 1:43-6.

SAS Institute Inc. (1985). SAS user's guide: statistics, version 5 ed. Cary, NC: SAS Institute Inc. pp. 503-32.

Schecter A, Constable J, Arghenstani S, Tong H, Gross ML (1987). Elevated levels of 2,3,7,8-tetrachlorodibenzo-p-dioxin in adipose tissue of certain U.S. veterans of the Vietnam war. Chemosphere 16:1997-2002.

Schlesselman JJ (1982). Case-control studies. New York: Oxford University Press. pp. 105-23.

Schumacher MC (1985). Farming occupations and mortality from non-Hodgkin's lymphoma in Utah. J Occupational Med 27:580-4.

(SCS) Selected Cancers Cooperative Study Group (1990a). The Association of selected cancers with service in the U.S. military in Vietnam I: Non-Hodgkin's lymphoma. Arch Intern Med (in press).

(SCS) Selected Cancers Cooperative Study Group (1990b). The association of selected cancers with military service in Vietnam II: soft tissue and other sarcomas. Arch Intern Med (in press).

(SCS) Selected Cancers Cooperative Study Group (1990c). The association of selected cancers with service in the U.S. military in Vietnam III: Hodgkin's disease, nasal cancer, nasopharyngeal cancer, and primary liver cancer. Arch Intern Med (in press).

(SERC) Statistics and Epidemiology Research Corporation, Cytel Software Corporation (1990). Epidemiological graphics, estimation, and testing package: reference manual: first draft. Seattle: Statistics and Epidemiology Research Corporation. pp. 185-88.

Shanmugaratnam K (1982). Nasopharynx. In: Schottenfeld D, Fraumeni JF Jr (eds). Cancer epidemiology and prevention. Philadelphia: WB Saunders Co. pp. 536-53.

Shimizu H, Hozawa J, Saito H, Murai K, et al. (1989). Chronic sinusitis and woodworking as risk factors for cancer of the maxillary sinus in northeast Japan. Laryngoscope. 99:58-61.

Smith AH, Pearce NE, Fisher DO, Giles HJ, Teague CA, Howard JK (1984). Soft tissue sarcoma and exposure to phenoxyherbicides and chlorophenols in New Zealand. J Natl Cancer Inst 73:1111-7.

Stellman SD, Stellman JM (1986). Estimation of exposure to Agent Orange and other defoliants among American troops in Vietnam: a methodological approach. Am J Ind Med 9:305-21.

Stellman SD, Stellman JM, Sommer JF (1988). Combat and herbicide exposures in Vietnam among a sample of American Legionnaires. Environ Res 47:112-28.

Stemhagen A, Slade J, Altman R, Bill J (1983). Occupational risk factors and liver cancer: a retrospective case-control study of primary liver cancer in New Jersey. Am J Epidemiol 117-443-54.

Sterling TD, Arundel AV (1986). Health effects of phenoxyherbicides: a review. Scand J Work Environ Health 12:161-73.

Thomas WF, Grubbs WD, Karrison TG, et al. (1990). Air Force Health Study: an epidemiologic investigation of health effects in Air Force personnel following exposure to herbicides: summary: 1987 followup examination results. Springfield, VA: National Technical Information Service.

Thornberry OT, Massey JT (1988). Trends in United States telephone coverage across time and subgroups. In: Groves RM, Biemer PP, Lyberg LE, Massey JT, Nicholls WL, Waksberg J (eds). Telephone survey methodology. New York: John Wiley and Sons. pp. 25-49.

Tucker MA, Fraumeni JF (1982). Soft tissue. In: Schottenfeld D, Fraumeni JF Jr (eds). Cancer epidemiology and prevention. Philadelphia: WB Saunders Co. pp. 827-36.

Tung TT (1973). Primary carcinoma of the liver in Vietnam. Chirurgie. 99:427-36.

Tuyns AJ (1979). Epidemiology of alcohol and cancer. Cancer Res. 39:2840-3.

U.S. Congress (1988). House. Committee on Veterans' Affairs. Subcommittee on Hospitals and Health Care. Scientific research on the health of Vietnam veterans. Testimony of James O. Mason. 100th Cong., 2nd sess. Serial 100-151.

Vân DD (1984). Herbicides as a possible cause of liver cancer. In: Westing H (ed). Herbicides in war: the long-term ecological and human consequences. London: Taylor and Francis pp. 119-121.

Vaughan TL, Strader C, Daling JR (1986a). Formaldehyde and cancers of the pharynx, sinus and nasal cavity I: occupational exposures. Int J Cancer 38:677-83.

Vaughan TL, Strader C, Daling JR (1986b). Formaldehyde and cancers of the pharynx, sinus and nasal cavity II: residential exposures. Int J Cancer 38:685-8.

(VA) Veterans Administration (1981). Data on Vietnam era veterans. Washington, D.C.: Office of Reports and Statistics.

Vineis P, Terracini B, Ciccone G, et al. (1986). Phenoxy herbicides and soft-tissue sarcomas in female rice weeders: a population-based case-referent study. Scand J Work Environ Health 13:9-17.

Waksberg J (1978). Sampling methods for random digit dialing. J Am Stat Assoc 73:40-6.

Waterhouse J, Muir C, Corea P et al. (eds.) (1976). Cancer incidence in five continents, vol. 3, IARC Scientific Publications No. 15. Lyon, France: IARC.

Westing AH (1984). Herbicides in war: past and present. In: Westing AH (ed). Herbicides in war: the long-term ecologic and human consequences. Philadelphia: Taylor and Francis. pp. 3-24.

(WHO) World Health Organization (1976). International Classification of Disease for Oncology. 1st ed. Geneva: World Health Organization.

(WHO) World Health Organization (1977): Manual of the international statistical classification of diseases injuries and causes of death. 9th rev., vol I. Geneva: World Health Organization.

Wigle DT, Semenciw RM, Wilkins K, et al., (1990). Mortality study of Canadian male farm operators: Non-Hodgkin's lymphoma mortality and agricultural practices in Saskatchewan. J Natl Cancer Inst 82:572-72.

Wiklund K (1983). Swedish agricultural workers: a group with a decreased risk of cancer. Cancer 51:566-8.

Wiklund K, Dich J, Holm LE (1987). Risk of malignant lymphoma in Swedish pesticide appliers. Br J Cancer 56:505-8.

Wiklund K, Dich J, Holm LE, Eklund G (1989). Risk of cancer in pesticide applicators in Swedish agriculture. Br J Ind Med 46:809-14.

Wiklund K, Einhorn J, Wennstrom S, Papaprt E (1981). A Swedish cancer-environment register available for research. Scand J Work Environ Health 7:64-7.

Wiklund K, Holm LE (1986). Soft tissue sarcoma risk in Swedish agricultural and forestry workers. J Natl Cancer Inst 76:229-34.

Williams RR, Stegens NL, Goldsmith JR (1977). Associations of cancer site and type with occupation and industry from the Third National Cancer Survey Interview. J Natl Cancer Inst 59:1147-85.

Wingo PA, Ory HW, Layde PM, Lee NC (1988). The evaluation of the data collection process for a multicenter, population-based, case-control study. Am J Epidemiol 128:206-17.

Woods JS, Polissar L, Severson RK, Heuser LS, Kulander BG (1987). Soft tissue sarcoma and non-Hodgkin's lymphoma in relation to phenoxy herbicide and chlorinated phenol exposure in western Washington. J Natl Cancer Inst 78:899-910.

Young JL, Percy CL, Asire AJ (eds). (1981). Surveillance, epidemiology, and end results: incidence and mortality data, 1973-1977: National Cancer Institute Monograph 57. Washington, D.C.: National Cancer Institute. DHHS publication no. (NIH) 81-2330.

Yu MC, Ho JHC, Ross RK, Henderson BE (1981). Nasopharyngeal carcinoma in Chinese—salted fish or inhaled smoke? Prev Med 10:15-24.

Zagars G, Norante JD (1983). Head and neck tumors. In: Rubin P (ed). clinical oncology: a multidisciplinary approach. Atlanta: American Cancer Society. pp. 249-51.

APPENDIX A

International Classification of Diseases— Oncology (ICD-O) Codes for Diseases for Inclusion in Study (Nasal and Nasopharyngeal Cancer; Primary Liver Cancer; Lymphoma; Soft Tissue and Other Sarcomas)

147 Nasopharynx

147.0 Superior wall of nasopharynx
Roof of nasopharynx

147.1 Posterior wall of nasopharynx
Adenoid
Pharyngeal tonsil

147.2 Lateral wall of nasopharynx
Fossa of Rosenmuller

147.3 Anterior wall of nasopharynx
Nasopharyngeal surface of soft palate
Pharyngeal fornix
Choana
Posterior margin of nasal septum

147.8 Overlaps with another site

147.9 Nasopharynx, NOS
Nasopharyngeal wall

160 Nasal Cavities and Accessory Sinuses

160.0 Nasal cavity
Internal nose
Naris
Nasal cartilage
Nasal mucosa
Nasal septum, NOS
Nasal turbinate
Nostril
Vestibule of nose

160.2 Maxillary sinus
Maxillary antrum
Antrum, NOS

160.3 Ethmoid sinus

160.4 Frontal sinus

160.5 Sphenoid sinus

160.8 Overlaps with another site

160.9 Accessory sinus, NOS
Accessory nasal sinus
Paranasal sinus

PRIMARY LIVER CANCER

Topography Codes

155 Liver and Intrahepatic bile ducts

155.0 Liver
Hepatic, NOS

155.1 Intrahepatic bile duct
Biliary canaliculus
Cholangiole

Morphology Codes

The following codes are included for informational purposes. Cases for the study will actually be chosen by topography codes as above. We are interested in primary liver cancer of any morphology. The following will be the most frequently occurring. The list is not all inclusive.

8160/3 Cholangiocarcinoma
Bile duct carcinoma
Bile duct adenocarcinoma

8161/3 Bile duct cystadenocarcinoma

8170/3 Hepatocellular carcinoma, NOS
Liver cell carcinoma
Hepatocarcinoma
Hepatoma, malignant
Hepatoma, NOS

8180/3 Combined hepatocellular carcinoma and cholangiocarcinoma
Mixed hepatocellular and bile duct carcinoma
Hepatocholangiocarcinoma

8970/3 Hepatoblastoma

9120/3 Hemangiosarcoma
Angiosarcoma

9124/3 Kupffer cell sarcoma

959-963 LYMPHOMAS, NOS OR DIFFUSE

9590/3 Malignant lymphoma, NOS
- Lymphoma, NOS
- Malignant lymphoma, diffuse, NOS

9591/3 Malignant lymphoma, non-Hodgkin's type

9600/3 Malignant lymphoma, undifferentiated cell type, NOS
- Malignant lymphoma, undifferentiated cell type, non-Burkitt's

9601/3 Malignant lymphoma, stem cell type
- Stem cell lymphoma

9602/3 Malignant lymphoma, convoluted cell type, NOS
- Malignant lymphoma, lymphoblastic, convoluted cell type

9610/3 Lymphosarcoma, NOS
- Lymphosarcoma, diffuse, NOS
- Malignant lymphoma, lymphosarcoma type

9611/3 Malignant lymphoma, lymphoplasmacytoid type
- Diffuse lymphosarcoma, lymphoplasmacytic
- Diffuse lymphosarcoma with plasmacytoid differentiation
- Malignant lymphoma, lymphocytic, with plasmacytoid differentiation, diffuse

9612/3 Malignant lymphoma, immunoblastic type
- Immunoblastic sarcoma
- Immunoblastic lymphosarcoma
- Immunoblastic lymphoma

9613/3 Malignant lymphoma, mixed lymphocytic-histiocytic, NOS
- Malignant lymphoma, mixed lymphocytic-histiocytic, diffuse
- Reticulolymphosarcoma, NOS
- Reticulolymphosarcoma, diffuse
- Malignant lymphoma, mixed cell type, NOS
- Malignant lymphoma, mixed cell type, diffuse
- Lymphosarcoma, mixed cell type, NOS
- Lymphosarcoma, mixed cell type, diffuse
- Malignant lymphoma, mixed small cell and large cell, NOS
- Malignant lymphoma, mixed small cell and large cell, diffuse

9614/3 Malignant lymphoma, centroblastic-centrocytic, diffuse
Germinoblastoma, diffuse

9615/3 Malignant lymphoma, follicular center cell, NOS
Malignant lymphoma, follicular center cell, diffuse, NOS

9620/3 Malignant lymphoma, lymphocytic, well differentiated, NOS
Malignant lymphoma, lymphocytic, well differentiated, diffuse
Lymphocytic lymphosarcoma, NOS
Lymphocytic lymphosarcoma, diffuse
Lymphocytic lymphoma, NOS
Lymphocytic lymphoma, diffuse, NOS
Malignant lymphoma, lymphocytic cell type

9621/3 Malignant lymphoma, lymphocytic, intermediate differentiation, NOS
Malignant lymphoma, lymphocytic, intermediate differentiation, diffuse
Lymphocytic lymphosarcoma, intermediate differentiation, NOS
Lymphocytic lymphosarcoma, intermediate differentiation, diffuse

9622/3 Malignant lymphoma, centrocytic
Malignant lymphoma, germinocytic

9623/3 Malignant lymphoma, follicular center cell, cleaved, NOS
Malignant lymphoma, follicular center cell, cleaved, diffuse

9630/3 Malignant lymphoma, lymphocytic, poorly differentiated, NOS
Malignant lymphoma, lymphocytic, poorly differentiated, diffuse
Lymphoblastic lymphosarcoma, NOS
Lymphoblastic lymphosarcoma, diffuse
Lymphocytic lymphoma, poorly differentiated, NOS
Lymphocytic lymphoma, poorly differentiated, diffuse
Lymphoblastoma, NOS
Lymphoblastoma, diffuse
Lymphoblastic lymphoma, NOS
Lymphoblastic lymphoma, diffuse

9631/3 Prolymphocytic lymphosarcoma

9632/3 Malignant lymphoma, centroblastic type, NOS
Malignant lymphoma, centroblastic type, diffuse
Germinoblastic sarcoma, NOS
Germinoblastic sarcoma, diffuse

9633/3 Malignant lymphoma, follicular center cell, non-cleaved, NOS
Malignant lymphoma, follicular center cell, non-cleaved, diffuse

964 RETICULOSARCOMAS

9640/3 Reticulosarcoma, NOS
- Malignant lymphoma, histiocytic, NOS
- Malignant lymphoma, histiocytic, diffuse
- Reticulum cell sarcoma, NOS
- Malignant lymphoma, reticulum cell type

9641/3 Reticulosarcoma, pleomorphic cell type
- Malignant lymphoma, histiocytic, pleomorphic cell type
- Reticulum cell sarcoma, pleomorphic cell type

9642/3 Reticulosarcoma, nodular
- Malignant lymphoma, histiocytic, nodular

965–966 HODGKIN'S DISEASE

9650/3 Hodgkin's disease, NOS
- Lymphogranuloma, malignant
- Lymphogranulomatosis, malignant
- Malignant lymphoma, Hodgkin's type

9651/3 Hodgkin's disease, lymphocytic predominance
- Hodgkin's disease, lymphocytic–histiocytic predominance

9652/3 Hodgkin's disease, mixed cellularity

9653/3 Hodgkin's disease, lymphocytic depletion, NOS

9654/3 Hodgkin's disease, lymphocytic depletion, diffuse fibrosis

9655/3 Hodgkin's disease, lymphocytic depletion, reticular type

9656/3 Hodgkin's disease, nodular sclerosis, NOS

9657/3 Hodgkin's disease, nodular sclerosis, cellular phase

9660/3 Hodgkin's paragranuloma

9661/3 Hodgkin's granuloma

9662/3 Hodgkin's sarcoma

969 LYMPHOMAS, NODULAR OR FOLLICULAR

9690/3 Malignant lymphoma, nodular, NOS
Malignant lymphoma, follicular, NOS
Nodular lymphosarcoma, NOS
Follicular lymphosarcoma, NOS
Brill-Symmer's disease
Giant follicular lymphoma
Lymphocytic lymphoma, nodular, NOS

9691/3 Malignant lymphoma, mixed lymphocytic-histiocytic, nodular
Malignant lymphoma, mixed lymphocytic-histiocytic, follicular
Reticulolymphosarcoma, nodular
Reticulolymphosarcoma, follicular
Malignant lymphoma, mixed cell type, nodular
Malignant lymphoma, mixed cell type, follicular
Lymphosarcoma, mixed cell type, nodular
Lymphosarcoma, mixed cell type, follicular
Malignant lymphoma, mixed small cell and large cell, nodular
Malignant lymphoma, mixed small cell and large cell, follicular

9692/3 Malignant lymphoma, centroblastic-centrocytic, follicular
Germinoblastoma, follicular

9693/3 Malignant lymphoma, lymphocytic, well differentiated, nodular
Malignant lymphoma, lymphocytic, well differentiated, follicular
Lymphocytic lymphoma, well differentiated, nodular
Lymphocytic lymphoma, well differentiated, follicular

9694/3 Malignant lymphoma, lymphocytic, intermediate differentiation, nodular
Malignant lymphoma, lymphocytic, intermediate differentiation, follicular
Lymphocytic lymphosarcoma, intermediate differentiation, nodular
Lymphocytic lymphoma, intermediate differentiation, nodular

9695/3 Malignant lymphoma, follicular center cell, cleaved, follicular

9696/3 Malignant lymphoma, lymphocytic, poorly differentiated, nodular
Malignant lymphoma, lymphocytic, poorly differentiated, follicular
Lymphocytic lymphoma, poorly differentiated, nodular
Lymphocytic lymphoma, poorly differentiated, follicular
Lymphoblastic lymphosarcoma, nodular
Lymphoblastic lymphosarcoma, follicular

9697/3 Malignant lymphoma, centroblastic type, follicular
Germinoblastic sarcoma, follicular

9698/3 Malignant lymphoma, follicular center cell, non-cleaved, follicular

975 BURKITT's TUMOR

9750/3 Burkitt's tumor
Burkitt's lymphoma
Malignant lymphoma, undifferentiated, Burkitt's type
Malignant lymphoma, lymphoblastic, Burkitt's type

880 SOFT TISSUE TUMORS AND SARCOMAS, NOS

8800/3 Sarcoma, NOS
Soft tissue tumor, malignant
Mesenchymal tumor, malignant

8801/3 Spindle cell sarcoma

8802/3 Giant cell sarcoma
Pleomorphic cell sarcoma

8803/3 Small cell sarcoma
Round cell sarcoma

8804/3 Epithelioid cell sarcoma

881–883 FIBROMATOUS NEOPLASMS

8810/3 Fibrosarcoma, NOS

8811/3 Fibromyxosarcoma

8812/3 Periosteal fibrosarcoma
Periosteal sarcoma, NOS

8813/3 Fascial fibrosarcoma

8830/3 Fibrous histiocytoma, malignant

8831/3 Fibroxanthoma, malignant
Fibroxanthosarcoma

8832/3 Dermatofibrosarcoma, NOS
Dermatofibrosarcoma protuberans

884 MYXOMATOUS NEOPLASMS

8840/3 Myxosarcoma

885–888 LIOPOMATOUS NEOPLASMS

8850/3 Liposarcoma, NOS
Fibroliposarcoma

8851/3 Liposarcoma, well differentiated type
Liposarcoma, differentiated type

8852/3 Myxoid liposarcoma
Myxoliposarcoma
Embryonal liposarcoma

8853/3 Round cell liposarcoma

8854/3 Pleomorphic liposarcoma

8855/3 Mixed type liposarcoma

8860/3 Angiomyoliposarcoma

889–892 MYOMATOUS NEOPLASMS

8890/3 Leiomyosarcoma, NOS

8891/3 Epithelioid leiomyosarcoma

8894/3 Angiomyosarcoma

8895/3 Myosarcoma

8900/3 Rhabdomyosarcoma, NOS
Rhabdosarcoma

8901/3 Pleomorphic rhabdomyosarcoma

8902/3 Mixed type rhabdomyosarcoma

8910/3 Embryonal rhabdomyosarcoma
Sarcoma botryoides
Botryoid sarcoma

8920/3 Alveolar rhabdomyosarcoma

SOFT TISSUE AND OTHER SARCOMAS (CONTINUED)

893–899 COMPLEX MIXED AND STROMAL NEOPLASMS

8990/3 Mesenchymoma, malignant
Mixed mesenchymal sarcoma

8991/3 Embryonal sarcoma

904 SYNOVIAL NEOPLASMS

9040/3 Synovial sarcoma, NOS
Synovioma, NOS
Synovioma, malignant

9041/3 Synovial sarcoma, spindle cell type

9042/3 Synovial sarcoma, epithelioid cell type

9043/3 Synovial sarcoma, biphasic type

9044/3 Clear cell sarcoma of tendons and aponeuroses

912–916 BLOOD VESSEL TUMORS

9120/3 Hemangiosarcoma
Angiosarcoma

9124/3 Kupffer cell sarcoma

9130/0 Hemangioendothelioma

9130/3 Hemangioendothelioma, malignant
Hemangioendothelial sarcoma

9150/0 Hemangiopericytoma, benign

9150/1 Hemangiopericytoma, NOS

9150/3 Hemangiopericytoma, malignant

9161/1 Hemangioblastoma
Angioblastoma

—— Proliferating angioendotheliomatosis

917 LYMPHATIC VESSEL TUMORS

9170/3 Lymphangiosarcoma
Lymphangioendothelial sarcoma
Lymphangioendothelioma, malignant

918-920 OSTEOMAS AND OSTEOSARCOMAS

9180/3 Osteosarcoma, NOS
Osteogenic sarcoma, NOS
Osteochondrosarcoma
Osteoblastic sarcoma

9181/3 Chondroblastic osteosarcoma

9182/3 Fibroblastic osteosarcoma
Osteofibrosarcoma

9183/3 Telangiectatic osteosarcoma

9184/3 Osteosarcoma in Paget's disease of bone

9190/3 Juxtacortical osteosarcoma
Juxtacortical osteogenic sarcoma
Parosteal osteosarcoma
Periosteal osteogenic sarcoma

9200 Osteoblastoma (if malignant)

—— Fibrosarcoma of bone

—— Osteolytic sarcoma

921-924 CHONDROMATOUS NEOPLASMS

9210 Osteochondroma (if malignant change)

9220/3 Chondrosarcoma, NOS
Fibrochondrosarcoma

9221/3 Juxtacortical chondrosarcoma

9230/3 Chondroblastoma, malignant

9240/3 Mesenchymal chondrosarcoma

925 GIANT CELL TUMORS

9250/3 Giant cell tumor of bone, malignant
Osteoclastoma, malignant
Giant cell sarcoma of bone

9251/3 Malignant giant cell tumor of soft parts

926 MISCELLANEOUS BONE TUMORS

9260/3 Ewing's sarcoma
Ewing's tumor
Endothelial sarcoma of bone

9261/3 Adamantinoma of long bones
Tibial adamantinoma

935-937 MISCELLANEOUS TUMORS

9370/3 Chordoma

953 MENINGIOMAS

9530/3 Meningioma, malignant
Leptomeningeal sarcoma
Meningeal sarcoma
Meningothelial sarcoma

9539/3 Meningeal sarcomatosis

954-957 NERVE SHEATH TUMORS

9540/3 Neurofibrosarcoma
Neurogenic sarcoma
Neurosarcoma

9560/3 Neurilemmoma, malignant
Schwannoma, malignant
Neurilemmosarcoma

958 GRANULAR CELL TUMORS AND ALVEOLAR SOFT PART SARCOMA

9580/3 Granular cell tumor, malignant
Granular cell myoblastoma, malignant

9581/3 Alveolar soft part sarcoma

APPENDIX B

Selected Cancers Study Random Digit Dialing Screening Questionnaire

Note: This questionnaire for Atlanta is similar to those used for the other seven cancer registries. Question 3 varied to represent the geographic areas covered by the registry.

For each registry, the acceptable age range in Question 7a (e.g., age is 31 to 55 in 1984, the first year of screening) was adjusted in later years to reflect the eligibility criterion for year of birth (born 1929 to 1953).

MEN'S HEALTH STUDY

ATLANTA

INTERVIEWER: |__|__|__.__|

FINAL RESULT: |__|__|

DATE OF RESULT: |__|__| .__|__| |__|__|
MONTH DAY YEAR

Hello, this is (YOUR NAME). I am calling for the United States Public Health Service. We are preparing for an important study about factors that may affect people's health.

1. First, I'd like to make sure that I have dialed correctly. Is this area code

(__ __ __)__ __ __ - __ __ __ __ ?
AREA CODE TELEPHONE NUMBER

YES 1
NO ..... 2 Thank you very much, but I seem to have dialed a wrong number. It is possible that your number may be called again at a later time. (END)

2. Is this a residential phone number?

YES 1
NO ..... 2 Thank you very much, but we are only interviewing in private residences. (END)

3. In what county do you live?

CLAYTON 1
COBB 2
DEKALB 3
FULTON 4
GWINNETT 5
OTHER ..... 6 Thank you very much, but we are only interviewing in certain areas across the United States. (END)
DON'T KNOW 8 (Q.3a)

3a. In what city do you live?

_____

4. Are you a member of the household and at least 18 years old?

YES 1
NO ..... 2 ASK FOR AN ADULT. IF NOT AVAILABLE, MAKE APPOINTMENT.

NO HH MEMBER
18 OR OLDER .. 3 Thank you very much. At this time we are only interviewing in households with people who are 18 years of age or older. (END)

5. The purpose of this study will be to gather health information. We will be choosing people from some households to participate in this study. I would just like to ask you a few general questions about members of your household. First, how many people living in this household, including yourself, are at least 18 years old?

ONE 01 (Q6)

NUMBER: |__|__| (Q9)

ONE PERSON HOUSEHOLD

6. (CODE WITHOUT ASKING IF SEX IS KNOWN.)
Are you a male or a female?

MALE 1 (Q.7)
FEMALE ..... 2 Thank you very much. At this time we are only interviewing in households with men. (END)

7. What is (your/his) date of birth?

_____/_____/_____
MONTH DAY YEAR

YEAR OF BIRTH IS 1929 TO 1953 ..... 1 (Q.8)
YEAR OF BIRTH IS BEFORE 1929 OR AFTER 1953 ..... 2 Thank you very much. At this time we are only interviewing households with men who are 31 55 years old. (END)
DON'T KNOW 8 (Q.7a)

7a. How old (are you/is he)?

AGE: |__|__|

AGE IS 31 TO 55 ..... 1 (Q.8)
AGE IS LESS THAN 31 OR GREATER THAN 55 ..... 2 Thank you very much. At this time we are only interviewing in households with men who are 31 to 55 years old. (END)

8. If (you are/he is) selected to participate, a letter will be sent explaining more about the study. In order to do this, I need to get (your/his) name. What is (your/his) first name? What is (your/his) middle initial? And how do you spell (your/his) last name? (VERIFY THE SPELLING AS NAME IS ENTERED. THEN, GO TO Q12.)

_____ / / _____
FIRST NAME MI LAST NAME

MULTIPLE PERSON HOUSEHOLD

9. Of those (NUMBER FROM Q5) household members, how many are men who were born betwen 1929 and 1953?

NONE 00	Thank you very much. At this time we are only interviewing in households with men who were born between 1929 and 1953. (END)
ONE 01	(Q10a)
NUMBER: |__|__|	(Q10b)

10a. What is (your/his) date of birth? (RECORD BELOW AND GO TO Q.11. PROBE FOR BEST ESTIMATE OF AGE IF RESPONDENT SAYS DON'T KNOW.)

10b. What is the date of birth of the (oldest/next oldest) male who was born between 1929 and 1953? (RECORD BELOW. PROBE FOR BEST ESTIMATE OF AGE IF RESPONDENT SAYS DON'T KNOW.)

11. If anyone in your household is selected to participate, he will receive a letter explaining more about the study. In order to do this, I would like to get the names of the men who were born between 1929 and 1953. What is the first name of the male born in (YEAR)? What is his middle initial? And how do you spell his last name? (RECORD BELOW. VERIFY THE SPELLING OF EACH NAME AS IT IS ENTERED.)

DATES OF BIRTH	NAMES
_____ / _____ / _____	_____ / / _____
MONTH DAY YEAR	FIRST NAME MI LAST NAME
_____ / _____ / _____	_____ / / _____
MONTH DAY YEAR	FIRST NAME MI LAST NAME
_____ / _____ / _____	_____ / / _____
MONTH DAY YEAR	FIRST NAME MI LAST NAME
_____ / _____ / _____	_____ / / _____
MONTH DAY YEAR	FIRST NAME MI LAST NAME
_____ / _____ / _____	_____ / / _____
MONTH DAY YEAR	FIRST NAME MI LAST NAME

12. What is your mailing address? (VERIFY SPELLING OF STREET AND CITY NAMES.)

|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|
STREET: # AND NAME

|__|__|__|__|__|
APARTMENT

|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|
CITY

|__|__| |__|__|__|__|__|
STATE ZIP CODE

13. Finally, are there any residential telephone numbers in addition to (READ TELEPHONE NUMBER FROM CALL RECORD) in your home?

YES 1
NO 2 (Q.15)

13a. Is that telephone number a different number than the one I'm calling you on, or is it an extension phone which uses the same number?

EXTENSION PHONE 1
DIFFERENT NUMBER 2 (Q.14)

13b. Are there any different residential telephone members in addition to (READ TELEPHONE NUMBER FROM CALL RECOR)) in your home?

YES 1
NO 2 (Q.15)

14. Is that telephone number used mainly for residential or business purposes?

RESIDENTIAL .. 1
BUSINESS 2

COMMENTS: ________________________________

15. Under what name is the number that I am calling you on, that is, (READ TELEPHONE NUMBER FROM CALL RECORD) listed?

____

CLOSING: Thank you very much for your time and help. Your household will be contacted if someone has been chosen to participate in this important health study.

APPENDIX C

Selected Cancers Study
Pathology Panel Report Form for Lymphoma

MEN'S HEALTH STUDY
PATHOLOGY PANEL REPORT FORM
LYMPHOMA |1|

CASE STUDY ID# |__|__|__|__|__|__|-|__|

TUMOR REGISTRY _____

DATE OF SURGERY OR BIOPSY |__|__| |__|__| |__|__|
MO DA YR

MATERIALS REVIEWED

Slides

stained |__|__|

unstained |__|__|

Tissue block

Yes |__| 1 ⟶ If yes, how many? |__|

No |__| 2

Other (describe) _____

ANATOMIC SOURCE OF SPECIMEN

_____

TYPE OF SPECIMEN REVIEWED

Aspirate |__| 1

Needle Biopsy |__| 2

Punch Biopsy |__| 3

Surgical (Excision or Wedge) Specimen |__| 4

ADEQUACY OF MATERIAL

Adequate |__| 1

Marginal |__| 2 } EXPLAIN BELOW

Inadequate |__| 3 }

_____

_____

MEN'S HEALTH STUDY
PATHOLOGY PANEL REPORT FORM (continued)
LYMPHOMA |1|

CASE STUDY ID# |__|__|__|__|__|__|-|__|

SPECIAL STAINS PERFORMED

1. _____
2. _____
3. _____
4. _____
5. _____

OTHER SPECIAL STUDIES

1. _____
2. _____
3. _____

CONSENSUS DATA

Do all panel members agree on diagnosis? Yes |__| 1
No |__| 2

IF NO, LIST DIAGNOSIS OF EACH PANEL MEMBER BELOW
OTHERWISE, GO TO PAGE 3

	(Initials)		ICD/O Code
PI	_____	_____	
		_____	
		_____	
2	_____	_____	
		_____	
		_____	
3	_____	_____	
		_____	
		_____	
Consultant 4	_____	_____	
		_____	
		_____	

MEN'S HEALTH STUDY
PATHOLOGY PANEL REPORT FORM (continued)
LYMPHOMA |1|

CASE STUDY ID# |__|__|__|__|__|__|-|__|

DESCRIPTION OF HISTOLOGY:

_____

_____

_____

_____

_____

_____

_____

_____

_____

DIAGNOSIS:

If not a lymphoma

_____ |__|__|__|__|__|
ICD/O Code

_____

_____

If a lymphoma
Classification by Modified Rappaport System

_____ |__|__|__|__|__|
ICD/O Code

_____

_____

Classification by Working Formulation

_____ |__|__|__|__|__|
ICD/O Code

Date Review Completed:
|__|__| |__|__| |__|__|
MO DA YR

_____
Signature of Principal Investigator

APPENDIX D

Selected Cancers Study
Pathology Panel Report Form for Sarcoma

MEN'S HEALTH STUDY
PATHOLOGY PANEL REPORT FORM
SOFT TISSUE SARCOMA |2|

CASE STUDY ID# |__|__|__|__|__|__|-|__|

TUMOR REGISTRY _____

DATE OF SURGERY OR BIOPSY |__|__| |__|__| |__|__|
MO DA YR

MATERIALS REVIEWED

Slides

stained |__|__|

unstained |__|__|

Tissue block

Yes |__| 1 ⟶ If yes, how many? |__|

No |__| 2

Other (describe) _____

ANATOMIC SOURCE OF SPECIMEN

_____

TYPE OF SPECIMEN REVIEWED

Aspirate |__| 1

Needle Biopsy |__| 2

Punch Biopsy |__| 3

Surgical (Excision or Wedge) Specimen |__| 4

ADEQUACY OF MATERIAL

Adequate |__| 1

Marginal |__| 2 } EXPLAIN BELOW

Inadequate |__| 3 }

_____

_____

MEN'S HEALTH STUDY
PATHOLOGY PANEL REPORT FORM (continued)
SOFT TISSUE SARCOMA |2|

CASE STUDY ID# |__|__|__|__|__|__|-|__|

SPECIAL STAINS PERFORMED

1. _____
2. _____
3. _____
4. _____
5. _____

OTHER SPECIAL STUDIES

1. _____
2. _____
3. _____

CONSENSUS DATA

Do all panel members agree on diagnosis? Yes |__| 1
No |__| 2

IF NO, LIST DIAGNOSIS OF EACH PANEL MEMBER BELOW, OTHERWISE, GO TO PAGE 3

	(Initials)		ICD/O Code
PI	_____	_____	
		_____	
		_____	
2	_____	_____	
		_____	
		_____	
3	_____	_____	
		_____	
		_____	
Consultant 4	_____	_____	
		_____	
		_____	

MEN'S HEALTH STUDY
PATHOLOGY PANEL REPORT FORM (continued)
SOFT TISSUE SARCOMA |2|

CASE STUDY ID# |__|__|__|__ __|__|-|__|

DESCRIPTION OF HISTOLOGY:

_____

_____

_____

_____

_____

_____

_____

_____

_____

DIAGNOSIS:

If not a sarcoma

_____ |__|__.|__|__|__|
ICD/O Code

_____

_____

If a sarcoma
Classification by AFIP System

_____ |__|__.|__|__|__|
ICD/O Code

_____

_____

Date Review Completed:
|__|__| |__|__| |__|__|
MO DA YR

_____
Signature of Principal Investigator

APPENDIX E

Selected Cancers Study
Pathology Panel Report Form for
Nasal and Nasopharyngeal Cancer

MEN'S HEALTH STUDY
PATHOLOGY PANEL REPORT FORM
NASAL/NASOPHARYNGEAL |3|

CASE STUDY ID# |__|__|__|__|__|__|-|__|

TUMOR REGISTRY _____

DATE OF SURGERY OR BIOPSY |__|__| |__|__| |__|__|
MO DA YR

MATERIALS REVIEWED

Slides

stained |__|__|

unstained |__|__|

Tissue block

Yes |__| 1 ⟶ If yes, how many? |__|

No |__| 2

Other (describe) _____

ANATOMIC SOURCE OF SPECIMEN

_____

TYPE OF SPECIMEN REVIEWED

Aspirate |__| 1

Needle Biopsy |__| 2

Punch Biopsy |__| 3

Surgical (Excision or Wedge) Specimen |__| 4

ADEQUACY OF MATERIAL

Adequate |__| 1

Marginal |__| 2 } EXPLAIN BELOW

Inadequate |__| 3 }

_____

_____

MEN'S HEALTH STUDY
PATHOLOGY PANEL REPORT FORM (continued)
NASAL/NASOPHARYNGEAL |3|

CASE STUDY ID# |__|__|__|__|__|__|-|__|

SPECIAL STAINS PERFORMED

1. _____
2. _____
3. _____
4. _____
5. _____

OTHER SPECIAL STUDIES

1. _____
2. _____
3. _____

CONSENSUS DATA

Do all three panel members agree on diagnosis? Yes |__| 1
No |__| 2

IF NO, LIST DIAGNOSIS OF EACH PANEL MEMBER BELOW,
OTHERWISE, GO TO PAGE 3

	(Initials)		ICD/O Code
PI	_____	_____	
		_____	
		_____	
2	_____	_____	
		_____	
		_____	
3	_____	_____	
		_____	
		_____	

MEN'S HEALTH STUDY
PATHOLOGY PANEL REPORT FORM (continued)
NASAL/NASOPHARYNGEAL |3|

CASE STUDY ID# |__|__|__|__|__|__|-|__|

DESCRIPTION OF HISTOLOGY:

_____

_____

_____

_____

_____

_____

_____

_____

_____

DIAGNOSIS:

Classification by WHO System

_____ |__|__ __|__|__|
ICD,'J Code

_____

_____

Classification by Heffner Modification

_____ |__|__|__|__|__|
ICD,'J Code

_____

_____

Date Review Completed:
|__|__| |__|__| |__|__|
MO DA YR

_____
Signature of Principal Investigator

APPENDIX F

Selected Cancers Study
Pathology Panel Report Form
for Primary Liver Cancer

MEN'S HEALTH STUDY
PATHOLOGY PANEL REPORT FORM
LIVER |4|

CASE STUDY ID# |__|__|__|__|__|__|-|__|

TUMOR REGISTRY _____

DATE OF SURGERY OR BIOPSY |__|__| |__|__| |__|__|
MO DA YR

MATERIALS REVIEWED

Slides

stained |__|__|

unstained |__|__|

Tissue block

Yes |__| 1 ⟶ If yes, how many? |__|

No |__| 2

Other (describe) _____

ANATOMIC SOURCE OF SPECIMEN

_____

TYPE OF SPECIMEN REVIEWED

Aspirate |__| 1

Needle Biopsy |__| 2

Punch Biopsy |__| 3

Surgical (Excision or Wedge) Specimen |__| 4

ADEQUACY OF MATERIAL

Adequate |__| 1

Marginal |__| 2 } EXPLAIN BELOW

Inadequate |__| 3 }

_____

_____

MEN'S HEALTH STUDY
PATHOLOGY PANEL REPORT FORM (continued)
LIVER |4|

CASE STUDY ID# |__|__|__|__|__|__|-|__|

SPECIAL STAINS PERFORMED

1. _____
2. _____
3. _____
4. _____
5. _____

OTHER SPECIAL STUDIES

1. _____
2. _____
3. _____

CONSENSUS DATA

Do all three panel members agree on diagnosis? Yes |__| 1
No |__| 2

IF NO, LIST DIAGNOSIS OF EACH PANEL MEMBER BELOW,
OTHERWISE GO TO PAGE 3

	(Initials)		ICD/O Code
PI	_____	_____	
		_____	
		_____	
2	_____	_____	
		_____	
		_____	
3	_____	_____	
		_____	
		_____	

MEN'S HEALTH STUDY
PATHOLOGY PANEL REPORT FORM (continued)
LIVER |4|

CASE STUDY ID# |__|__|__|__|__|__|-|__|

DESCRIPTION OF HISTOLOGY:

_____

_____

_____

_____

_____

_____

_____

_____

_____

DIAGNOSIS:

Classification by WHO System

_____ |__|__|.__|__|__|
ICD/O Code

_____

_____

Classification by Peters Modification

_____ |__|__|.__|__|__|
ICD/O Code

_____

_____

Date Review Completed:
|__|__| |__|__| |__|__|
MO DA YR

_____
Signature of Principal Investigator

APPENDIX G

Selected Cancers Study Subject Questionnaire

Note: The questionnaire used for a next-of-kin or other sutiable proxy respondent did not include certain questions (e.g., about their sexual orientation or contact with chemicals in Vietnam). Otherwise, the questions were identical except that the proxy questionnaire referred to a third party (e.g., "Did he ever . . .?" rather than "Did you ever . . .?"). In addition, the proxy respondent was asked five questions about his or her relationship to the study subject (Section I—note there is no Section H).

Interviewers who were fluent in each language administered the questionnaire in English, Spanish, and Cantonese Chinese, using professionally-made translations.

TIME BEGAN |__|__|:|__|__| AM PM

INTRODUCTION

Hello, may I speak to Mr. (NAME)?

- IF RESPONDENT NOT AVAILABLE,ASK: Can you suggest a convenient time when I could reach him? TERMINATE CONTACT AND RECORD RESULTS ON RECORD OF CALLS.

- IF RESPONDENT AVAILABLE, CONTINUE.

Hello, my name is (NAME). I am calling on behalf of the (TUMOR REGISTRY) and the Centers for Disease Control of the U.S. Public Health Service. Under the authority of the Public Health Service Act, we are conducting a nationwide study concerned with the health of men in the United States called the Men's Health Study. You should have received a letter describing this important study from Dr. (NAME), of (TUMOR REGISTRY). Do you remember receiving this letter?

YES 1
NO . . . . 2 (BOX 1)

The letter you received described the Men's Health Study, which will involve telephone interviews with over 3,000 men. You are one of a number of people in the (TUMOR REGISTRY) area being asked to participate. All information you give us during the interview will be kept strictly confidential as described in the letter. Unless you have questions or would like some more information, I would like to begin the interview now. (ANSWER ANY QUESTIONS BEFORE CONTINUING) (START INTERVIEW)

BOX 1

INTERVIEWER, READ IF RESPONDENT DID NOT RECEIVE LETTER:

I'm sorry that you haven't received the letter. We mailed the letter to (ADDRESS, CITY, STATE, ZIP). Is that your correct mailing address?

- (IF YES) Apparently it has been delayed in the mail, but let me briefly tell you what it says.

- (IF NO) What is your complete address? (RECORD ON RIS) Let me briefly tell you what the letter says.

You are one of over 3,000 men being asked to participate. The purpose of the Men's Health Study is to collect information that will be used to find out if there is a link between certain occupations, environmental and medical factors and a number of illnesses. Through the information obtained from this study, we hope to find a better means of preventing these illnesses. This information will be collected in a telephone interview, which contains questions on topics such as medical history, occupation, and lifestyle. The interview usually takes less than an hour.

I want to assure you that the information you give us will be kept strictly confidential. Your name will never be used in any reports and no one outside the U.S. Public Health Service or the private research firms involved with this study will know you have participated. I also want you to know your participation is entirely voluntary. There is no penalty for not participating, nor will it affect any benefits you might be entitled to. If at any time you do not wish to answer a question, please let me know, and I will go on to the next question. Unless you have questions or would like some more information, I would like to begin the interview now. (ANSWER ANY QUESTIONS BEFORE CONTINUING) (START INTERVIEW)

SECTION A

BACKGROUND CHARACTERISTICS

A-1. First, I'd like to ask you some questions about your background.
What is your date of birth?

|__|__| |__|__| |1|9|__|__| 27-32
MONTH DAY YEAR

BOX A

IS BIRTH YEAR BETWEEN 1929 AND 1953?

YES. 1 (A-2)
NO 2

Thank you very much. At this time we are only interviewing men who were born betwen 1929 and 1953.

A-2. What (county/state) did you live in four months ago?

_____ (A-4) 33-35
COUNTY
DK 998 (A-3)

OR

_____ (A-4) 36-37
STATE
DK 98 (A-3)

A-3. What city did you live in four months ago?

_____
CITY

A-4. Did you have a telephone in your household four months ago?

YES 1
NO 2 38

A-5. In what city and state or foreign country were you born?

_____ 39-42
CITY
DK 9998

_____ (A-7) 43-44
STATE
DK 98

OR

_____ (A-6) 45-47
FOREIGN COUNTRY
DK 998 (A-7)

A-6. When did you first move to the U.S.? 48-49

| 1 | 9 | | |

DK 98

A-7. What is your present marital status? Are you:

Married, ... 1
Living as Married,. . . . 2
Widowed, ... 3
Divorced, ... 4
Separated, or 5
Never Married? 6 50
DK 8

A-8. What is your race? Are you:

White, ... 1
Black, ... 2
Asian, Pacific Islander, ... 3
American Indian, or Alaskan Native? . . 4
DK 8 51

A-9. Are you Hispanic?

YES 1
NO 2
DK 8 52

A-10. Was your mother born in the United States?

YES 1 (A-12)
NO 2 (A-11)
DK 8 (A-12) 53

A-11. In what country was your mother born?

_____
COUNTRY
DK 998 54-56

A-12. Most people in the United States have ancestors who came from other parts of the world. Which countries did your mother's ancestors come from? (LIST UP TO 4) 57

_____ 58-60
COUNTRY #1

_____ 61-63
COUNTRY #2

_____ 64-66
COUNTRY #3

_____ 67-69
COUNTRY #4
DK 998

A-13. Was your father born in the United States?

YES 1 (A-15) 70
NO 2 (A-14)
DK 8 (A-15)

A-14. In what country was your father born?

_____
COUNTRY
DK 998 71-73

A-15. Which countries did your father's ancestors come from? (LIST UP TO 4) 74

_____ 75-77
COUNTRY #1

_____ 78-80
COUNTRY #2

_____ 81-83
COUNTRY #3

_____ 84-86
COUNTRY #4

DK 998

A-16. What is the highest grade or year of regular school or college that you have completed?

NO FORMAL SCHOOLING 01
KINDERGARTEN - 6TH GRADE 02
7TH - 9TH GRADE 03
10TH - 11TH GRADE 04
12TH GRADE, COMPLETED HIGH SCHOOL . . . 05
POST HIGH SCHOOL TRAINING OTHER THAN COLLEGE (E.G., VOCATIONAL OR TECHNICAL TRAINING). 06
1 - 3 YEARS OF COLLEGE, ... 07
4 YEARS OF COLLEGE, BACHELOR'S DEGREE 08
5 OR MORE YEARS OF COLLEGE, POST-GRADUATE WORK 09 87-88
DK 98

A-17. What is the highest grade or year of regular school or college that your mother completed?

NO FORMAL SCHOOLING 01
KINDERGARTEN - 6TH GRADE 02
7TH - 9TH GRADE 03
10TH - 11TH GRADE 04
12TH GRADE, COMPLETED HIGH SCHOOL . . . 05
POST HIGH SCHOOL TRAINING OTHER THAN COLLEGE (E.G., VOCATIONAL OR TECHNICAL TRAINING). 06
1 - 3 YEARS OF COLLEGE, ... 07
4 YEARS OF COLLEGE, BACHELOR'S DEGREE 08
5 OR MORE YEARS OF COLLEGE, POST-GRADUATE WORK 09 89-90
DK 98

A-18. How many brothers and sisters do you have <u>who lived with you when you were growing up</u>? Please include those who are living or deceased as well as half or step brothers and sisters.

|__|__|
NUMBER

NONE 00 (A-25)
DK 98 (A-25) 91-92

Please give me the sex and age of each of these brothers and sisters who is still alive.		
	A-19. SEX	A-20. AGE
a.	MALE. . . . . 1 FEMALE. 2	|__|__| DK 98
b.	MALE. . . . . 1 FEMALE. 2	|__|__| DK 98
c.	MALE. . . . . 1 FEMALE. 2	|__|__| DK 98
d.	MALE. . . . . 1 FEMALE. 2	|__|__| DK 98
e.	MALE. . . . . 1 FEMALE. 2	|__|__| DK 98
f.	MALE. . . . . 1 FEMALE. 2	|__|__| DK 98

93-95
96-98
99-101
102-104
105-107
108-110
111-128

A-21. Have any of your brothers or sisters who lived with you when you were growing up died? 32

YES. 1 (A-22)
NO 2 (A-25)
DK 8 (A-25) 6

Please give me the sex, age at death, and year of death for each of these brothers or sisters who died.			
	A-22. SEX	A-23. AGE AT DEATH	A-24. YEAR OF DEATH
a.	MALE. . . . 1 FEMALE. . . 2	|__|__| DK 98	|1|9|__|__| DK 98
b.	MALE. . . . 1 FEMALE. . . 2	|__|__| DK 98	|1|9|__|__| DK 98
c.	MALE. . . . 1 FEMALE. . . 2	|__|__| DK 98	|1|9|__|__| DK 98
d.	MALE. . . . 1 FEMALE. . . 2	|__|__| DK 98	|1|9|__|__| DK 98
e.	MALE. . . . 1 FEMALE. . . 2	|__|__| DK 98	|1|9|__|__| DK 98
f.	MALE. . . . 1 FEMALE. . . 2	|__|__| DK 98	|1|9|__|__| DK 98

17-21

22-26

27-31

32-36

37-41

42-46

47-76

A-25. In what city and state or foreign country did you live the longest during your childhood, that is, the time up to the age of 18?

77-80

_____.__
CITY
DK 998

OR

81-82

_____.__
STATE
DK 98

83-85

_____.__
FOREIGN COUNTRY
DK 998

A-26. For how many years, up to age 18, did you live there?

86-87

\|__\|__\|
NUMBER
DK 98

A-27. Would you describe the area where you lived during your childhood as:

Rural, farm land, ... 1
Town or village, ... 2
Suburban, ... 3
Urban, city, or 4
Something else? 5

_____ 88-89
(SPECIFY)
DK 8

A-28. When you were 8 years old, in what kind of dwelling did you live? Was it a:

Single family house, ... 1
Duplex or 2-family house, ... 2
An apartment, or 3
Something else? 4

_____ 90-91
(SPECIFY)
DK 8

A-29. Did your family own or rent that dwelling?

OWN 1
RENT 2 92
DK 8

A-30. In what religion were you raised? (CODE ALL THAT APPLY)

NONE 1 93
CATHOLIC 1 94
PROTESTANT 1 95
JEWISH 1 96
MORMON OR LATTER DAY SAINTS 1 97
SEVENTH DAY ADVENTIST 1 98
OTHER 1 99

_____ 100-101
(SPECIFY)
DK 8

SECTION B

MEDICAL HISTORY

Now I'd like to ask you some questions about your health and medical history. Some of the conditions I will ask about are rare and you may not have heard of them.

Did a doctor ever tell you that you had (CONDITION)?	In what year were you first told by a doctor that you had that?	
B-1a. Infectious mononucleosis or mono? YES . . . . . 1 (B-1b) NO . . . . . 2 (B-2a) DK 8 (B-2a)	B-1b. |1|9|__|__| DK 98	16-18
B-2a. Hepatitis, serum hepatitis or yellow jaundice? YES . . . . . 1 (B-2b) NO . . . . . 2 (B-3a) DK 8 (B-3a)	B-2b. |1|9|__|__| DK 98	19-21
B-3a. Cirrhosis of the liver? YES . . . . . 1 (B-3b) NO . . . . . 2 (B-4a) DK 8 (B-4a)	B-3b. |1|9|__|__| DK 98	22-24
B-4a. Liver disease other than hepatitis or cirrhosis? YES . . . . . 1 (B-4b) NO . . . . . 2 (B-5a) DK 8 (B-5a)	B-4b. |1|9|__|__| DK 98	25-27
B-5a. Multiple sclerosis? YES . . . . . 1 (B-5b) NO . . . . . 2 (B-6a) DK 8 (B-6a)	B-5b. |1|9|__|__| DK 98	28-30
B-6a. Leprosy? YES . . . . . 1 (B-6b) NO . . . . . 2 (B-7a) DK 8 (B-7a)	B-6b. |1|9|__|__| DK 98	31-33

Did a doctor ever tell you that you had (CONDITION)?	In what year were you first told by a doctor that you had that?	
B-7a. Systemic lupus erythematosis, Lupus or SLE? YES . . . . . 1 (B-7b) NO . . . . . 2 (B-8a) DK 8 (B-8a)	B-7b. | 1 | 9 | __ | __ | DK 98	34-36
B-8a. Celiac disease or nontropical sprue? YES . . . . . 1 (B-8b) NO . . . . . 2 (B-9a) DK 8 (B-9a)	B-8b. | 1 | 9 | __ | __ | DK 98	37-39
B-9a. Neurofibromatosis or Von Recklinghausen's Disease? YES . . . . . 1 (B-9b) NO . . . . . 2 (B-10a) DK 8 (B-10a)	B-9b. | 1 | 9 | __ | __ | DK 98	40-42
B-10a. Familial polyposis of the colon or Gardner's Syndrome? YES . . . . . 1 (B-10b) NO . . . . . 2 (B-11a) DK 8 (B-11a)	B-10b. | 1 | 9 | __ | __ | DK 98	43-45
B-11a. Hemochromatosis? YES . . . . . 1 (B-11b) NO . . . . . 2 (B-12a) DK 8 (B-12a)	B-11b. | 1 | 9 | __ | __ | DK 98	46-48
B-12a. Bell's Palsy? YES . . . . . 1 (B-12b) NO . . . . . 2 (B-13a) DK 8 (B-13a)	B-12b. | 1 | 9 | __ | __ | DK 98	49-51
B-13a. Chloracne, that is, acne caused by exposure to chemicals, not regular acne? YES . . . . . 1 (B-13b) NO . . . . . 2 (B-14a) DK 8 (B-14a)	B-13b. | 1 | 9 | __ | __ | DK 98	52-54
B-14a. Paget's disease? YES . . . . . 1 (B-14b) NO . . . . . 2 (B-15) DK 8 (B-15)	B-14b. | 1 | 9 | __ | __ | DK 98	55-57

B-15. Did you ever have chicken pox?

YES	1	58
NO	2	
DK	8	

B-16. Did a <u>doctor</u> ever tell you that you had allergies?

YES	1 (B-17)	59
NO	2 (B-18)	
DK	8 (B-18)	

B-17. What are you allergic to? 60-61

a. _____ 62-64

b. _____ 65-67

c. _____ 68-70

DK 998

B-18. Did a <u>doctor</u> ever tell you that you had arthritis?

YES	1 (B-19)	71
NO	2 (B-20)	
DK	8 (B-20)	

B-19. Did the doctor say it was <u>rheumatoid</u> arthritis?

YES	1	72
NO	2	
DK	8	

B-20. These next questions are about operations or surgical procedures you might have had. Have you had your appendix removed?

YES	1	73
NO	2	
DK	8	

B-21. Have you had your tonsils removed?

YES	1	74
NO	2	
DK	8	

B-22. Have you had a joint replaced by an artificial one?

YES 1 (B-23)
NO 2 (B-26)
DK 8 (B-26) 75

76-77

B-23. Which joints were replaced? (PROBE FOR SIDE OF BODY)	B-24. In what year was your (JOINT) first replaced?	B-25. Have any other joints been replaced?	
a. FINGER - LEFT 1 (B-24a)	a. |1|9|__|__| DK 98	YES . . . . . 1 (B-23) NO . . . . . 2 (B-26) DK 8 (B-26)	78-80
b. FINGER - RIGHT 1 (B-24b)	b. |1|9|__|__| DK 98		81-83
c. WRIST - LEFT 1 (B-24c)	c. |1|9|__|__| DK 98	YES . . . . . 1 (B-23) NO . . . . . 2 (B-26) DK 8 (B-26)	84-86
d. WRIST - RIGHT 1 (B-24d)	d. |1|9|__|__| DK 98		87-89
e. ELBOW - LEFT 1 (B-24e)	e. |1|9|__|__| DK 98	YES . . . . . 1 (B-23) NO . . . . . 2 (B-26) DK 8 (B-26)	90-92
f. ELBOW - RIGHT 1 (B-24f)	f. |1|9|__|__| DK 98		93-95
g. SHOULDER- LEFT 1 (B-24g)	g. |1|9|__|__| DK 98	YES . . . . . 1 (B-23) NO . . . . . 2 (B-26) DK 8 (B-26)	96-98
h. SHOULDER- RIGHT 1 (B-24h)	h. |1|9|__|__| DK 98		99-101
i. HIP - LEFT 1 (B-24i)	i. |1|9|__|__| DK 98	YES . . . . . 1 (B-23) NO . . . . . 2 (B-26) DK 8 (B-26)	102-104
j. HIP - RIGHT 1 (B-24j)	j. |1|9|__|__| DK 98		105-107
k. KNEE - LEFT 1 (B-24k)	k. |1|9|__|__| DK 98	YES . . . . . 1 (B-23) NO . . . . . 2 (B-26) DK 8 (B-26)	108-110
l. KNEE - RIGHT 1 (B-24l)	l. |1|9|__|__| DK 98		111-113
m. ANKLE - LEFT 1 (B-24m)	m. |1|9|__|__| DK 98	YES . . . . . 1 (B-23) NO . . . . . 2 (B-26) DK 8 (B-26)	114-116
n. ANKLE - RIGHT 1 (B-24n)	n. |1|9|__|__| DK 98		117-119
o. TOE - LEFT 1 (B-24o)	o. |1|9|__|__| DK 98	YES . . . . . 1 (B-23) NO . . . . . 2 (B-26) DK 8 (B-26)	120-122
p. TOE - RIGHT 1 (B-24p)	p. |1|9|__|__| DK 98		123-125

B-26. Have you ever had a pin, plate, staple, or screw inserted after an injury or for some other reason?

YES 1 (B-27)
NO 2 (B-31)
DK 8 (B-31)

16

17-18

	a. SITE 1	b. SITE 2	c. SITE 3
B-27. In which parts of your body? (PROBE FOR SIDE OF BODY)	_____ BODY SITE	_____ BODY SITE	_____ BODY SITE
B-28. In what year was it first inserted?	|1|9|__|__| DK 98	|1|9|__|__| DK 98	|1|9|__|__| DK 98
B-29. Is it still in place?	YES . . . . . 1 NO . . . . . 2 DK 8	YES . . . . . 1 NO . . . . . 2 DK 8	YES . . . . . 1 NO . . . . . 2 DK 8
B-30. Have any <u>other</u> parts of your body had a pin, plate, staple, or screw inserted?	YES. . . 1 (B-27b) NO . . . 2 (B-31) DK . . . 8 (B-31)	YES. . . 1 (B-27c) NO . . . 2 (B-31) DK . . . 8 (B-31)	YES. . . 1 (B-27d) NO . . . 2 (B-31) DK . . . 8 (B-31)

19-24

25-30

31-33

34-36

37-53

B-31. Have you ever had any other pieces of metal or plastic implanted by a doctor?

YES 1 (B-32)
NO 2 (B-37)
DK 8 (B-37) 54

55-56

	a. SITE 1	b. SITE 2	c. SITE 3	
B-32. In what part of your body? (PROBE FOR SIDE OF BODY)	_____ BODY SITE	_____ BODY SITE	_____ BODY SITE	57-62
B-33. What was implanted?				63-68
B-34. In what year was it first implanted?	| 1 | 9 | __ | __ | DK 98	| 1 | 9 | __ | __ | DK 98	| 1 | 9 | __ | __ | DK 98	69-74
B-35. Is it still in place?	YES . . . . . 1 NO . . . . . 2 DK 8	YES . . . . . 1 NO . . . . . 2 DK 8	YES . . . . . 1 NO . . . . . 2 DK 8	75-77
B-36. Have any <u>other</u> pieces of metal or plastic been implanted by a doctor?	YES. . . 1 (B-32b) NO . . . 2 (B-37) DK . . . 8 (B-37)	YES. . . 1 (B-32c) NO . . . 2 (B-37) DK . . . 8 (B-37)	YES. . . 1 (B-32d) NO . . . 2 (B-37) DK . . . 8 (B-37)	78-80

81-103

B-37. After age eighteen, were you ever injured seriously enough to require medical attention?

YES 1 (B-38)
NO 2 (B-42)
DK 8 (B-42)

16

17-18

	a. 1ST INJURY	b. 2ND INJURY	c. 3RD INJURY
B-38. In that injury, what parts of your body were affected? (PROBE FOR SIDE OF BODY AND SITES OF BODY INJURED)	1. _____ SITE OF INJURY 2. _____ SITE OF INJURY 3. _____ SITE OF INJURY	1. _____ SITE OF INJURY 2. _____ SITE OF INJURY 3. _____ SITE OF INJURY	1. _____ SITE OF INJURY 2. _____ SITE OF INJURY 3. _____ SITE OF INJURY
B-39. What type of injury did you have to your (SITE)?	1. _____ TYPE OF INJURY 2. _____ TYPE OF INJURY 3. _____ TYPE OF INJURY	1. _____ TYPE OF INJURY 2. _____ TYPE OF INJURY 3. _____ TYPE OF INJURY	1. _____ TYPE OF INJURY 2. _____ TYPE OF INJURY 3. _____ TYPE OF INJURY
B-40. In what year did this happen?	|1|9|__|__| DK 98	|1|9|__|__| DK 98	|1|9|__|__| DK 98
B-41. Have you had any other injuries serious enough to require medical attention after age eighteen?	YES. . 1 (B-38b) NO . . 2 (B-42) DK . . 8 (B-42)	YES. . 1 (B-38c) NO . . 2 (B-42) DK . . 8 (B-42)	YES. . 1 (B-38d) NO . . 2 (B-42) DK . . 8 (B-42)

19-24
25-30
31-36
37-42
43-48
49-54
55-60
61-63
64-107

B-42. Did you ever receive wounds where any pieces of metal or plastic were not completely removed?

YES 1 (B-43)
NO 2 (B-44)
DK 8 (B-44)

108

B-43. Have you already told me about all of these injuries? (IF YES, ASK "Which injuries were they?" IF NO, ASK B-38 - B-41. ENTER INJURY #.)

a. _____ INJURY #

b. _____ INJURY #

YES 1
NO 2 (B38-B41) 109-113

B-44. Before two years ago, were you ever told by a doctor that you had cancer, including skin cancer? 6

YES 1 (B-45)
NO 2 (B-50)
DK 8 (B-50) 16

17-18

	a. 1ST CANCER	b. 2ND CANCER	c. 3RD CANCER	
B-45. What type of cancer was it?	_____ SITE/TYPE	_____ SITE/TYPE	_____ SITE/TYPE	29-30
B-46. In what year were you first told that you had (SITE/TYPE)	|1|9|_|_| DK 98	|1|9|_|_| DK 98	|1|9|_|_| DK 98	31-36
B-47. Were you treated with surgery, radiation, or chemotherapy? (CIRCLE ALL THAT APPLY)	NO TREATMENT 1 (B-49) SURGERY. . . 1 (B-49) RADIATION. . 1 (B-49) CHEMOTHERAPY 1 (B-48)	NO TREATMENT 1 (B-49) SURGERY. . . 1 (B-49) RADIATION. . 1 (B-49) CHEMOTHERAPY 1 (B-48)	NO TREATMENT 1 (B-49) SURGERY. . . 1 (B-49) RADIATION. . 1 (B-49) CHEMOTHERAPY 1 (B-48)	37-39 40-42 43-45 46-48
B-48. What drugs were used?	1. _____ 2. _____ 3. _____ DK 998	1. _____ 2. _____ 3. _____ DK 998	1. _____ 2. _____ 3. _____ DK 998	47-57 58-66 67-75
B-49. Were you told by a doctor that you had any other type of cancer, before two years ago?	YES. . . . . 1 (B-45b) NO . . . . . 2 (B-50) DK 8 (B-50)	YES. . . . . 1 (B-45c) NO . . . . . 2 (B-50) DK 8 (B-50)	YES. . . . . 1 (B-45d) NO . . . . . 2 (B-50) DK 8 (B-50)	76-78

07

16-74

B-50. Did you ever have an organ transplant?

YES	1	(B-51)	75
NO	2	(B-54)	
DK	8	(B-54)	

B-51. Which organs did you have transplanted? (CIRCLE ALL THAT APPLY)

KIDNEY	1	76
LIVER	1	77
HEART	1	78
CORNEA	1	79
OTHER	1	80

81-82

_____
(SPECIFY)

DK 8

B-52. Were you given drugs to suppress your immune system so that you wouldn't reject the organ(s)?

YES	1	(B-53)	83
NO	2	(B-54)	
DK	8	(B-54)	

B-53. What were the names of these drugs?

84-85

a. _____ 86-88

b. _____ 89-91

c. _____ 92-94

DK 998

B-54. Did a doctor ever tell you that you had an immunodeficiency problem or a defect in your immune system?

YES	1	(B-55)	95
NO	2	(B-57)	
DK	8	(B-57)	