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Passive Smoking and the Use of Noncigarette Tobacco Products in Association With Risk for Pancreatic Cancer:

A Case-Control Study

Manal M. Hassan, MD, PhD[1], **James L. Abbruzzese, MD**[1], **Melissa L. Bondy, PhD**[2], **Robert A. Wolff, MD**[1], **Jean-Nicolas Vauthey, MD**[3], **Peter W. Pisters, MD**[3], **Douglas B. Evans, MD**[3], **Rabia Khan, MD**[1], **Renato Lenzi, MD**[1], **Li Jiao, MD, PhD**[1], and **Donghui Li, PhD**[1]

1*Department of Gastrointestinal Medical Oncology, The University of Texas M. D. Anderson Cancer Center, Houston, Texas*

2*Department of Epidemiology, The University of Texas M. D. Anderson Cancer Center, Houston, Texas*

3*Department of Surgical Oncology, The University of Texas M. D. Anderson Cancer Center, Houston, Texas*

Abstract

BACKGROUND—The associations between passive smoking and the use of noncigarette tobacco products with pancreatic cancer are not clear.

METHODS—In this case-control study, the authors collected information on passive smoking and the use of noncigarette tobacco products in 808 patients with pancreatic adenocarcinoma and 808 healthy controls by personal interview. Multivariable logistic regression was performed to estimate the adjusted odds ratio (AOR) and 95% confidence interval (95% CI).

RESULTS—The results confirmed the previously reported association between active smoking and increased risk for pancreatic cancer. The AOR was 1.7 (95% CI, 1.4-2.2) for regular smokers, 1.8 (95% CI, 1.4-2.4) for long-term smokers, and 3.1 (95% CI, 2.2-4.3) for former smokers. Although passive smoking showed a nonsignificantly elevated risk for pancreatic cancer in the entire study population (AOR, 1.3; 95% CI, 0.9-1.7), the association was present among ever smokers (AOR, 1.7; 95% CI, 1.03-2.6) but was absent among never smokers (AOR, 1.1; 95% CI, 0.8-1.6). Neither intensity nor duration of passive smoking modified the risk of pancreatic cancer among never smokers. The use of chewing tobacco, snuff, and pipes showed no significant risk elevation for pancreatic cancer after controlling for the confounding effects of demographics and other known risk factors. The use of cigars in never smokers showed a borderline significant increase of risk for pancreatic cancer (AOR, 2.2; 95% CI, 1.0-4.7; P =.05).

CONCLUSIONS—The current observations did not support a role for passive smoking or the use of noncigarette tobacco products in the etiology of pancreatic cancer. The association between cigar use and the risk of pancreatic cancer needs to be confirmed in other study populations.

Keywords

passive smoking; tobacco product; pancreatic cancer; case-control study

Pancreatic cancer is the fourth leading cause of cancer-related deaths for both men and women in the United States. It has been estimated that, in 2006, about 33,730 Americans will be diagnosed with pancreatic cancer and that 32,300 will die of the disease. The etiology of

Address for reprints: Donghui Li, PhD, Department of Gastrointestinal Medical Oncology, Unit 426, The University of Texas M. D. Anderson Cancer Center, 1515 Holcombe Boulevard, Houston, TX 77030; Fax: (713) 834-6153; E-mail: dli@mdanderson.org.

pancreatic cancer remains perplexing, and few risk factors have been identified clearly.[1] It has been demonstrated that cigarette smoking is responsible for approximately 25% of pancreatic cancer cases.[2-5] Other factors, such as diet, history of chronic pancreatitis, diabetes, family history of pancreatic cancer, and some hereditary conditions, also may contribute to the development of this deadly disease.[6-11]

Smoking prevalence in the United States has declined since 1997; however, despite the overwhelming evidence of the harmful effects of smoking, almost 22% of adults in the United States still smoked cigarettes in 2003.[12,13] This prevalence of smoking may have disproportionately widespread implications. During smoking of cigarettes, cigars, pipes, and other tobacco products, not only is mainstream smoke drawn and inhaled by the smokers, but a sidestream of smoke also is released into the air. Once released, this sidestream smoke is mixed with exhaled mainstream smoke; together, they make up secondhand tobacco smoke, also referred to as involuntary, environmental, or passive smoking, to which both smokers and nonsmokers are exposed.[14] A recent report indicated that almost 60% of children in the United States ever are exposed to secondhand tobacco smoke. However, the proportion of nonsmokers with detectable cotinine levels, a marker of passive smoking, declined from 88% in 1988 to 1991 to 43% in 2001 to 2002. The greatest prevalence of exposure was reported among African Americans.[15]

Previous studies demonstrated that passive smoking is associated positively with an increased risk for lung cancer and breast cancers.[16-19] The relation between passive smoking and pancreatic cancer previously had been investigated in only 1 study.[20] A weak but nonsignificant association between passive smoking and the risk of pancreatic cancer was observed among never smokers (odds ratio [OR], 1.21, 95% confidence interval [95% CI], 0.60-2.44), and passive smoking also was identified as a confounder for the risk of pancreatic cancer associated with active smoking.

In addition to cigarette smoking, noncigarette tobacco use has been increasing in the United States.[21] Several previous studies have reported significant associations between the use of pipes, [22] smokeless tobacco, [23] or cigars[24,25] and the risk of pancreatic cancer.

Because of the high prevalence of cigarette smoking among patients with pancreatic cancer, studies of passive smoking or of the use of noncigarette tobacco products often are limited by the small number of exposed individuals among never smokers. To further assess the associations between the risk of pancreatic cancer and passive smoking and the use of other tobacco products, we conducted a large-scale case-control study from 2000 to 2006. The current report includes findings on the relation between pancreatic cancer and smoking cigarettes, cigars, and pipes; the use of smokeless tobacco products; and passive smoking after controlling for the confounding effects of other confounders and major risk factors for this disease.

MATERIALS AND METHODS

This hospital-based study compared 808 patients with pancreatic adenocarcinoma with a control group of 808 healthy individuals. All participants were enrolled prospectively at The University of Texas M. D. Anderson Cancer Center (M. D. Anderson) between January 2000 and May 2006. Patients were newly diagnosed with pathologically confirmed pancreatic adenocarcinoma. Controls were selected from M. D. Anderson visitors who accompanied cancer patients. The control group included only healthy individuals who had no past history of cancer. All controls were genetically unrelated family members (usually spouses) of patients with cancers other than those of the pancreas, gastrointestinal system, or smoking-related cancers (lung and head and neck). Only United States residents who could communicate in

English were included in the study. The patients and controls were frequency-matched by age (±5 years), race/ethnicity, and sex.

The study was approved by the Institutional Review Board of M. D. Anderson. Written informed consent to participate in the study was obtained from all patients and controls. All participants were interviewed using a questionnaire that was structured to yield basic demographic data, including age, race/ethnicity, sex, state of residence, marital status, and educational level. Detailed information on other risk factors for pancreatic cancer, eg, smoking, diabetes mellitus, alcohol use, family histories of cancer and pancreatic cancer, and history of chronic medical diseases, also was collected.

Cigarette smokers were defined as individuals who had smoked >100 cigarettes during their lifetime. Former smokers were defined as individuals who had quit smoking for at least 1 year before enrollment. Former and current smokers were asked to indicate the average number of cigarettes they smoked per day, the age at which they began smoking, and the duration of smoking. Former smokers were questioned about the age at which they stopped smoking. Pack-years were estimated by multiplying the number of years of smoking and the number of packs of cigarettes smoked per day (1 pack-year = 1 pack of cigarettes per day for 1 year). Heavy smokers were defined as those who had >20 pack-years of smoking.

Patients and controls were asked about their history of passive smoking during childhood (from birth to age 18 years), adulthood at home (aged >18 years), and adulthood during work. For exposed individuals, the starting age or year of exposure and ending age or year of exposure was recorded for each period. The cumulative duration of passive smoking was estimated by summing the exposure duration of the 3 periods after controlling for possible overlapping time between the period of adulthood at home and the period of adulthood at work. Exposed individuals were then classified according to their cumulative life-years of passive smoking. Information on passive smoking was incomplete for 73 cases and 3 controls, and a statistical analysis was performed among 735 cases and 805 controls.

In addition, participants were asked about their use of pipes and cigars as well as smokeless tobacco products (chewing tobacco and snuff). Frequency of daily intake (times per day) and duration of exposure to each type (years of use) were documented for each participant. The total duration of exposure (in time-years) was calculated by multiplying daily intake (times per day) by duration of exposure (years of use) for each tobacco type for all users. Participants were then classified according to their total time-years of exposure; the median value of the total time-years for controls was used as a cut-off point to discriminate between heavy users (greater than the median value among controls) and mild/moderate users (less than or equal to the median value among controls). All data were entered into a secure Microsoft Access database.

Statistical Methods

Stata software (Stata Corporation, College Station, Tex) was used for data management and statistical analysis. We compared the demographic characteristics and proportions of potential risk factors among patients and controls. The Student *t* test was used to compare mean ages between patients and controls. The chi-square test and Fisher exact test were used to compare proportions, and the Wilcoxon test was used to compare medians of duration. The Bonferroni correction was used to adjust the significance level in the case of multiple comparisons.

For the univariate and multivariate analyses, unconditional logistic regression was performed. The likelihood-ratio test, which is the difference between the maximized log-likelihood statistics, was used to assess the significance of additional covariates in the model.[26] The

adjusted OR (AOR) and 95% CI for each variable were estimated using the logistic regression coefficient.

RESULTS

Patient Characteristics

Table 1 shows the distribution of the patients with pancreatic cancer and the controls according to sex, age, race, level of education, and state of residence. Most study participants were non-Hispanic whites, and the racial distribution (white/nonwhite) was similar between patients and controls for both men and women (overall P =.1). Patients were slightly older and had a lower educational level than controls. Most participants were married; the proportion of widowed patients (10.9%) was significantly greater than the proportion of widowed controls (3.2%; P =.001). A significant, positive correlation was observed between marital status and age among patients (P < .001) and among controls (P < .001). The oldest participants were widows, and the youngest participants were unmarried or divorced. Most patients and controls were referred from the Southern region of the United States, whereas fewer participants were from the Western region. The prevalence of diabetes mellitus and a positive history of pancreatic cancer was significantly greater in cases than in controls.

Cigarette Smoking

Table 2 shows that cigarette smoking was a significant risk factor for pancreatic cancer. This significant relation between cigarette smoking and pancreatic cancer was observed only among regular smokers. Control participants started smoking at an earlier age than the patients with pancreatic cancer (P =.001); the mean age was 19.4 years (±0.28 years) for cases and 18.1 years (±0.21 years) for controls. However, the overall duration of smoking was longer among patients than among controls (P =.001); the mean duration was 27.1 years (±0.65 years) for cases and 23.2 years (±0.71) for controls. The median and range of smoked cigarettes per day were identical for patients and controls (median, 20 cigarettes per day; range, 1-80 cigarettes per day; P =.7). Compared with nonsmokers, smokers had no significant trend in risk for pancreatic cancer by number of smoked cigarettes per day. The estimated AOR for participants who smoked >20 cigarettes per day was 1.4 (95% CI, 1.1-2.0) compared with 1.5 (95% CI, 1.1-1.9) for individuals who smoked ≤20 cigarettes per day. However, when considering both parameters (years of smoking and number of cigarettes smoked each day), the median of pack-years was greater for patients (25.3 pack-years; range, 0.1-172 pack-years) than for controls (20 pack-years; range, 0.1-144 pack-years; P =.003).

Exsmokers continued to be at significantly increased risk for developing pancreatic cancer relative to nonsmokers. The estimated AOR was 1.6 (95% CI, 1.3-2.1) for all former smokers and 3.1 (95% CI, 2.2-4.3) for individuals who had quit smoking within 10 years of diagnosis or recruitment into the study.

Women with a history of smoking were at greater risk for pancreatic cancer than men who had a similar history. The estimated AOR was 2.4 (95% CI, 1.7-3.5) among women and 1.3 (95% CI, 1.1-1.7) among men for regular smokers; the AOR was 3.4 (95% CI, 2.2-5.3) among women and 1.5 (95% CI, 1.1-2.1) among men for individuals with >20 pack-years of smoking; and the AOR was 4.3 (95% CI, 2.4-7.6) among women and 2.3 (95% CI, 1.4-3.6) among men for individuals who had quit smoking within 10 years of diagnosis or recruitment into the study.

Passive Smoking

Table 3 shows that the patients with pancreatic cancer had slightly higher levels of passive smoking exposure than controls, yielding an AOR of 1.3 (95% CI, 0.9-1.7). This positive association was significant among cigarette smokers (AOR, 1.7) but not among noncigarette

smokers (AOR, 1.1). This relation was observed for exposure during childhood, adulthood at home, and adulthood at work. In addition, compared with nonexposed participants, those who were exposed to passive smoking had no increased risk of pancreatic cancer that could be correlated with the initial age of passive smoking or the age of cancer diagnosis. The estimated AORs were 1.4 (95% CI, 0.5-4.4), 1.1 (95% CI, 0.6-2.3), 1.3 (95% CI, 0.6-2.4), and 1.2 (95% CI, 0.5-2.9) for patients who were diagnosed with cancer at ages ≤50 years, 51 to 60 years, 61 to 70 years, and >70 years, respectively. The null association between passive smoking and pancreatic cancer was observed in both women (AOR, 1.2; 95% CI, 0.7-2.1) and men (AOR, 0.9, 95% CI, 0.6-1.6) among never smokers.

In the current study, 63.7% of the patients and 61.7% of the controls reported passive smoking during childhood with no significant difference in this distribution between smokers and nonsmokers. Among nonsmokers, 49.0% of cases (n = 144) and 47.1% of controls (n = 194) had passive smoking exposure at birth, yielding no significant association with pancreatic cancer development compared with nonsmokers who were not exposed to passive smoking. The estimated AORs were 1.2 (95% CI, 0.7-2.1), 1.9 (95% CI, 0.8-4.4), and 0.9 (95% CI, 0.1-1.4) for all participants, for all women, and for all men, respectively.

The mean ± standard error duration of passive smoking during childhood among noncigarette smokers was significantly longer for cases (16.4 ± 0.3 years) than for controls (15.3 ± 0.3 years) (P =.008). The difference was even greater for exposure during adulthood at home and adulthood at work (cases, 21.9 ± 1.5 years; controls, 16.9 ± 1.2 years; P =.01). Consequently, the lifetime exposure duration was 29.3 ± 1.2 years for cases and 27.1 ± 0.7 years for controls (P < .05) among nonsmokers. The lifetime exposure duration of all study participants was 34.5 ± 7 years for cases and 30.4 ± 0.7 for controls (P < .0001). Logistic regression analysis revealed that there was a 40% increased risk of pancreatic cancer among individuals who had >20 years of lifetime exposure after adjusting for demographics and pancreatic cancer risk factors, including cigarette smoking. However, a stratified analysis showed no significant effect of long-term exposure to passive smoking among noncigarette smokers (Table 4).

In our entire study population, there were only 75 cases and 111 controls without either active or passive smoking exposure. Using these individuals as the reference group, those with self-reported active smoking alone or passive smoking alone did not have an increased risk of pancreatic cancer (Table 5); however, those with both active and passive smoking exposure had an AOR of 1.58 (95% CI, 1.12-2.23). Approximately 59% of the active smokers reported passive smoking exposure compared with 33% of the never smokers with such exposure.

Tobacco Use

Table 6 shows the distribution of exposure to chewing tobacco, snuff, pipes, and cigars among patients and controls according to their cigarette smoking status. Among cigarette smokers, the proportion of chewing tobacco (8.7%; 95% CI, 6.1-11.9%) was significantly greater for controls than for patients (4.2%; 95% CI, 3.2-7.3%; P =.03). The same trend was observed for pipe use (11.2% [95% CI, 8.3-14.7%] vs 7.2% [95% CI 5.1-9.9%] for controls and cases, respectively; P =.04). The frequency of exposure to snuff or cigars did not differ significantly between the patient and control groups overall. However, among the subgroup of cigarette smokers, cigar use was significantly more frequent for patients (6.2%; 95% CI, 3.8-9.4%) than for controls (1.9%; 95% CI, 0.8-3.8%; P =.03). Nevertheless, the mean values for times of daily use, years of use, and total time-years of use were similar between patients and controls among both smokers and nonsmokers (data not shown). The median total time-years of use of tobacco, snuff, pipes, or cigars was 15 time-years (range, 1-350 time-years) for patients and 20 time-years (range, 1-1000 time-years) for controls (P =.06). Accordingly, Table 6 shows that there was no significant association between ever-use or heavy intake (>20 total time-years) of chewing tobacco, snuff, pipes, or cigars and the risk of pancreatic cancer among

cigarette smokers. In noncigarette smokers, however, heavy use of pipes and cigars, respectively, conferred approximately 3-fold and 2-fold increases in the risk of pancreatic cancer. After controlling for demographic characteristics and other known risk factors for pancreatic cancer, the association was no longer statistically significant for heavy pipe use but maintained borderline significance for cigar use (P =.05).

DISCUSSION

The results from this large case-control study confirmed the previously reported positive association between cigarette smoking and the risk of pancreatic cancer and identified no significant association between the risk of pancreatic cancer and passive smoking or the use of chewing tobacco, snuff, and pipes among noncigarette smokers. A borderline significant association was observed between cigar use and the risk of pancreatic cancer among nonsmokers.

In our analysis of cigarette smoking as an independent risk factor for pancreatic cancer, we observed an approximately 2-fold increased risk for pancreatic cancer among ever-smokers relative to nonsmokers (AOR, 1.6). However, the strongest associations were observed among regular smokers and among women, consistent with previous findings.[3-5] We also observed that the most important parameter of smoking that affected pancreatic cancer risk was the duration of regular smoking, although risk also increased with the number of cigarettes smoked per day. The finding that the risk of pancreatic cancer was associated more strongly with the duration than with the intensity of smoking may reflect in part the accuracy with which these 2 parameters are measured. Although the duration of smoking can be measured reasonably and accurately in epidemiologic studies, the intensity of smoking is subject to misclassification bias. Intensity is influenced not only by the number of cigarettes per day but also by the depth of inhalation and number of puffs taken per cigarette. It is possible that smokers compensate for a reduction in the number of cigarettes smoked per day by smoking each cigarette more intensively.[27] Arguments about the effects of the duration and the intensity of smoking on cancer development have been elaborated in lung cancer studies.[27,28] Like in lung cancer studies, the estimated risk for pancreatic cancer has been correlated positively with the number of pack-years of smoking.[3,4,8] In addition, we observed that the excess risk persisted among former smokers who had <10 years of smoking cessation, independent of the presence of other risk factors. This result is in agreement with other reports that have indicated the lack of an association between the risk of pancreatic cancer and status as a long-term former smoker.[3,4]

The major finding of the current study is that passive smoking was not associated with the risk for pancreatic cancer among nonsmokers. This finding is in agreement with the results from the population-based case-control study conducted in Canada by Villeneuve et al.[20] To our knowledge, ours is the only study that has been conducted in the United States to explore the association between passive smoking and risk for pancreatic cancer. The assessment on passive smoking included both intensity and duration at different life periods. Data analyses were performed in all study participants with adjustment of other factors, including smoking, as well as in nonsmokers only. Although the majority of participants recalled passive smoking exposure during childhood, we found no evidence of increased pancreatic cancer risk among those who were exposed at birth, as reported previously in lung cancer studies.[29-31] Similar to what was observed for active smoking, the longer duration of passive smoking (>20 years) significantly increased the risk for pancreatic cancer among all study participants. However, our subgroup analysis demonstrated that this effect was present in smokers only. Although passive smoking significantly increased the risk for pancreatic cancer among smokers, probably is a residual effect of active smoking, because 90% of the passive smokers also were active smokers.

There are several limitations of our study that may have an impact on the true association between pancreatic cancer and passive smoking. Because we relied on a questionnaire as the primary tool to collect information about passive smoking, misclassification of exposure is possible. The use of questionnaires has been criticized for not measure passive smoking exposure precisely, because such questionnaires may be vulnerable to several confounding factors, like size of space, ventilation, crowding, and the exact time spent with each active smoker.[32,33] However, using a questionnaire to assess passive smoking exposure has an advantage over biomarker measurements, because the later could not reflect the long-term exposure caused by the short biologic half-life of the markers.[34] Another limitation of our study is the potential selection bias related to the use of hospital visitors as a control group. Because individuals in the control group were the companions of cancer patients, there is a possibility that the prevalence of passive smoking among controls was overestimated. However, it is unlikely that the true association between passive smoking and pancreatic cancer risk is masked by selection bias in this study for the following arguments. Our control recruitment excluded individuals who were accompanying patients who had cancers that were associated strongly with cigarette smoking, eg, lung cancer and head and neck cancer. Consequently, the prevalence of passive smoking exposure among noncigarette-smoking controls was comparable to that reported for United States adults by Pirkle et al[15] and in other population-based studies.[35,36]

Previous studies conducted in this country and in Europe have reported positive associations between the use of pipes, smokeless tobacco, and cigars and pancreatic cancer.[22-25] However, in the current study, we did not identify any significant associations between the use of chewing tobacco, snuff, or pipes and the risk for pancreatic cancer either in general or among noncigarette smokers. We observed a borderline significant association between cigar use and the risk of pancreatic cancer among nonsmokers. The inconsistent findings between these studies may be related to the small number of patients with such exposures. The accurate assessment of tobacco use and the risk of cancer is difficult. Obstacles include the lack of standard measurements for cigar size and tobacco type, variations in the behavior of individuals who use these types of products (inhalation vs chewing), the low prevalence of noncigarette tobacco exposure in the general population (compared with the marked prevalence of cigarette smoking, especially among heavy users), and the potential confounding effect of high socioeconomic status among cigar and pipe users. All of these factors may bias measurements of the cumulative intake of noncigarette tobacco products. Therefore, we believe that these discrepancies warrant additional studies (with adjustment for potential confounders) and meta-analyses so that the true relation between noncigarette tobacco exposure and pancreatic cancer can be elucidated.

In conclusion, in this hospital-based case-control study, we did not observe significant associations between passive smoking and the use of noncigarette tobacco products and risk of pancreatic cancer among noncigarette smokers after adjusting for other known risk factors for this disease. Nevertheless, we report a borderline significant association between cigar use and risk for pancreatic cancer among nonsmokers. Theses findings need to be confirmed in population-based studies. In the meantime, control of all sources of smoking exposure would appear to be a prudent approach to the prevention of pancreatic cancer.

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TABLE 1

Characteristics of Patients and Controls

Characteristics	Patients, n = 808		Controls, n = 808		*P*
	No.	%	No.	%	
Sex					.1
Men	449	55.6	478	59.2	
Women	359	44.4	330	40.8	
Race					.1
White	698	86.4	721	89.2	
Nonwhite	110	13.6	87	10.8	
Education					.002
≤High school degree	307	38	247	30.6	
>High school degree	501	62	561	69.4	
Age at recruitment, y					.02
≤40	15	1.9	33	4.1	
41-50	96	11.9	120	14.9	
51-60	236	29.2	243	30.1	
61-70	289	35.8	261	32.3	
>70	172	21.3	151	18.7	
Marital status					.02
Married	627	77.6	716	88.6	
Never married	23	2.8	16	2.0	
Widowed	88	10.9	26	3.2	
Divorced/separated	70	8.7	50	6.2	
Residency by region*					<.001
Northeast	36	4.5	31	3.8	
Midwest	104	12.9	79	9.8	
South	596	73.8	664	82.2	
West	72	8.9	34	4.2	
History of alcohol drinking					.7
Never	371	45.9	364	45.0	
Ever	437	54.1	444	55.0	
History of diabetes mellitus					<.001
Never	614	76.0	729	90.2	
Ever	194	24.0	79	9.8	
Family history of pancreatic cancer					<.001
Never	733	91.5	775	95.9	
Ever†	69	8.5	30	3.7	

*United States Census Bureau.

†Data on family history of pancreatic cancer was missing for 6 patients and 3 controls.

TABLE 2

Cigarette Smoking and Risk of Pancreatic Cancer

Variable	Patients, n = 808		Controls, n = 808		AOR
	No.	%	No.	%	(95% CI)*
Cigarette smoking					
Never	323	40	415	51.4	1 (reference)
Ever	485	60	393	48.6	1.6 (1.2-1.9)
Regular smoking	459	56.8	361	44.7	1.7 (1.4-2.2)
Non-regular smoking	26	3.2	32	4.0	1.0 (0.6-1.8)
Duration of smoking, y					
≤20	174	21.5	195	24.1	1.2 (0.9-1.6)
>20	311	34.5	198	24.5	1.8 (1.4-2.4)
No. of smoking cigarettes/day					
≤20 cigarettes/day	344	42.6	269	33.3	1.5 (1.1-1.9)
>20 cigarettes per day	141	17.5	124	15.3	1.4 (1.1-2)
Pack-years of smoking					
≤20	199	24.6	203	25.1	1.4 (1.1-1.8)
>20	286	38.5	190	23.5	2.0 (1.6-2.6)
Former smoker					
No	109	13.5	88	10.9	1.8 (1.3-2.5)
Yes	376	46.5	305	37.7	1.6 (1.3-2.1)
Quit smoking for ≤10 y	148	18.3	67	8.3	3.1 (2.2-4.3)
Quit smoking for >10 y	228	28.2	238	29.5	1.2 (0.9-1.6)

* AOR indicates odds ratio adjusted for age, sex, race/ethnicity, education level, state of residency, marital status, history of diabetes, family history of pancreatic cancer, and alcohol consumption.

TABLE 3

Passive Smoking Exposure and Risk of Pancreatic Cancer

	Total population		Cigarette smokers		Noncigarette smokers	
Exposure status	**Cases/ Controls 735/805**	**AOR 95% CI***	**Cases/ Controls 441/393**	**AOR 95% CI***	**Cases/ Controls 294/412**	**AOR 95% CI***
Passive smoking						
Never	114/163	1	39/52	1	75/111	1
Ever	621/642	1.3 (0.9-1.7)	402/341	1.7 (1.03-2.6)	219/301	1.1 (0.8-1.6)
Childhood exposure						
Occasionally	74/96	1.2 (0.8-1.9)	46/42	1.8 (0.95-3.4)	28/54	0.9 (0.5-1.6)
Regularly	394/401	1.3 (0.9-1.7)	262/218	1.7 (1.0-2.8)	132/183	1.1 (0.7-1.6)
Adulthood at home						
Occasionally	75/67	1.6 (1.02-2.5)	43/33	2.2 (1.1-4.3)	32/34	1.4 (0.7-2.5)
Regularly	311/267	1.3 (0.96-1.9)	231/156	1.9 (1.2-3.2)	80/111	1.03 (0.7-1.6)
Adulthood at work						
Occasionally	103/149	0.9 (0.7-1.4)	63/72	1.3 (0.7-2.3)	40/77	0.8 (0.5-1.3)
Regularly	235/213	1.4 (0.96-1.9)	187/153	1.7 (1.02-2.8)	48/60	1.2 (0.7-1.9)
Exclusive exposure						
Childhood only	95/133	1.2 (0.8-1.8)	40/49	1.3 (0.7-2.5)	55/84	1.2 (0.7-1.9)
Adulthood only	153/145	1.3 (0.9-1.8)	94/81	1.5 (0.9-2.6)	59/64	1.3 (0.8-2.2)
Childhood & adulthood	373/364	1.3 (0.9-1.8)	268/211	1.8 (1.1-2.9)	105/153	1.0 (0.6-1.5)

*AOR indicates odds ratio adjusted for age, sex, race/ethnicity, cigarette smoking, history of diabetes, alcohol consumption, educational level, state of residency, and marital status. All AOR values were estimated using the group of “never use” as the reference category.

TABLE 4

Duration of Passive Smoking Exposure and Risk of Pancreatic Cancer

	Total population		Cigarette smokers		Noncigarette smokers	
Exposure status	**Cases/Controls n/n**	**AOR 95% CI**	**Cases/Controls n/n**	**AOR 95% CI**	**Cases/Controls n/n**	**AOR 95% CI**
Never exposed	114/163	1	39/52	1	75/111	1
Childhood, y						
1-5	17/20	1.1 (0.5-2.4)	11/6	2.5 (0.8-7.8)	6/14	0.6 (0.2-1.7)
6-10	18/34	0.8 (0.4-1.6)	11/11	1.5 (0.5-4)	7/23	0.6 (0.2-1.5)
>10	416/431	1.3 (0.9-1.7)	273/234	1.7 (1.02-2.7)	143/197	1.1 (0.7-1.6)
Adulthood, y						
1-10	97/84	1.3 (0.9-1.9)	36/48	2.1 (1.1-4.1)	61/36	1 (0.5-1.7)
11-20	108/88	1.01 (0.7-1.5)	64/59	1.2 (0.7-2.1)	44/29	1.1 (0.6-2.01)
>20	261/315	1.4 (1.01-1.9)	167/226	1.8 (1.1-2.9)	94/89	1.2 (0.8-1.9)
Lifetime. y						
1-10	32/55	0.9 (0.5-1.5)	13/16	1.3 (0.4-3.2)	19/39	0.8 (0.4-1.6)
11-20	144/175	1.3 (0.9-1.8)	78/73	1.6 (0.9-2.8)	66/102	1.1 (0.7-1.7)
>20	417/378	1.4 (1.01-1.9)	293/234	1.7 (1.1-2.7)	124/144	1.2 (0.8-1.8)

TABLE 5

Active and Passive Smoking and Risk of Pancreatic Cancer

		Cases, n = 735	Controls, n = 805	AOR
Active Smoking	**Passive Smoking**	**No. (%)**	**No. (%)**	**(95% CI)**
None	None	75 (10.2)	111 (13.8)	1.00 (reference)
Yes	None	39 (5.3)	52 (6.5)	0.86 (0.50-1.49)
None	Yes	219 (29.9)	301 (37.4)	1.02 (0.72-1.46)
Yes	Yes	402 (54.6)	341 (42.3)	1.58 (1.12-2.23)

TABLE 6

Use of Noncigarette Tobacco Products and Risk for Pancreatic Cancer

	Total population		Cigarette smokers		Noncigarette smokers	
	Cases/Controls	AOR*	Cases/controls	AOR*	Cases/controls	AOR*
Noncigarette tobacco products	**n/n**	**95% CI**	**n/n**	**(95% CI)**	**n/n**	**(95% CI)**
Chewing tobacco						
Never use	774/754	1.0	461/359	1.0	313/395	1.0
Ever use	34/54	0.7 (0.4-1.1)	24/34	0.7 (0.4-1.2)	10/20	0.6 (0.3-1.4)
Low or moderate intake†	22/32	0.6 (0.3-1.2)	19/24	0.7 (0.4-1.4)	3/8	0.6 (0.2-2.3)
High intake‡	12/22	0.6 (0.3-1.2)	5/10	0.5 (0.2-1.5)	7/12	0.6 (0.2-1.7)
Snuff						
Never use	790/774	1.0	471/373	1.0	319/401	1.0
Ever use	18/34	0.6 (0.3-1.1)	14/20	0.7 (0.3-1.4)	4/14	0.5 (0.1-1.5)
Low or moderate intake†	9/13	0.6 (0.2-1.5)	9/10	0.8 (0.3-2.1)	0/3	—
High intake‡	9/21	0.6 (0.2-1.3)	5/10	0.5 (0.2-1.5)	4/11	0.6 (0.2-2.1)
Pipe						
Never use	761/756	1.0	450/349	1.0	311/407	1.0
Ever use	47/52	0.9 (0.6-1.3)	35/44	0.8 (0.5-1.3)	12/8	1.9 (0.7-4.9)
Low or moderate intake†	35/41	0.8 (0.5-1.2)	29/35	0.7 (0.4-1.3)	6/6	1.4 (0.4-4.6)
High intake‡	12/11	1.2 (0.5-2.9)	6/9	0.7 (0.2-2.3)	6/2	3.3 (0.6-17.9)
Cigar						
Never use	739/749	1.0	436/346	1.0	303/403	1.0
Ever use	69/59	1.1 (0.7-1.6)	49/47	0.9 (0.6-1.5)	20/12	2.2 (0.99-4.7)
Low or moderate intake†	51/52	1.0 (0.6-1.5)	38/43	0.9 (0.5-1.4)	13/9	2.1 (0.8-5.2)
High intake‡	18/7	2.2 (0.9-5.5)	11/4	1.9 (0.6-6.1)	7/3	2.4 (0.6-9.9)

*AOR indicates odds ratio adjusted for age, sex, race/ethnicity, cigarette smoking, history of diabetes, alcohol consumption, educational level, state of residency, and marital status. All AOR values were estimated using the group of "never use" as the reference category.

†Low or moderate intake: ≤20 time-years

‡High intake: >20 time-years.