Prospective study of cigarette smoking, alcohol use, and the risk of diabetes in men

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Abstract

Objective—To examine the association between smoking, alcohol consumption, and the incidence of non-insulin dependent diabetes mellitus in men of middle years and older.

Design—Cohort questionnaire study of men followed up for six years from 1986.

Setting—The health professionals' follow up study being conducted across the United States.

Subjects—41 810 male health professionals aged 40-75 years and free of diabetes, cardiovascular disease, and cancer in 1986 and followed up for six years.

Main outcome measure—Incidence of non-insulin dependent diabetes mellitus diagnosed in the six years.

Results—During 230 769 person years of follow up 509 men were newly diagnosed with diabetes. After controlling for known risk factors men who smoked 25 or more cigarettes daily had a relative risk of diabetes of 1.94 (95% confidence interval 1.25 to 3.03) compared with non-smokers. Men who consumed higher amounts of alcohol had a reduced risk of diabetes (P for trend < 0.001). Compared with abstainers men who drank 30.0-49.9 g of alcohol daily had a relative risk of diabetes of 0.61 (95% confidence interval 0.44 to 0.91).

Conclusions—Cigarette smoking may be an independent, modifiable risk factor for non-insulin dependent diabetes mellitus. Moderate alcohol consumption among healthy people may be associated with increased insulin sensitivity and a reduced risk of diabetes.

Introduction

Diabetes is the seventh leading cause of death in the United States¹ and is associated with higher rates of cardiovascular disease,^{2,3} renal disease, and retinopathy.⁴ Non-insulin dependent diabetes mellitus is partially of genetic aetiology^{4,5} but is also strongly influenced by environmental and lifestyle factors.⁴

Obesity is by far the strongest modifiable risk factor for non-insulin dependent diabetes mellitus.^{6,7} However, cigarette smoking and alcohol consumption may also have important roles, either indirectly through their effects on obesity⁸⁻¹⁰ or directly through physiological factors related to insulin secretion or insulin resistance.¹¹⁻¹³ Independent of body size, people who smoke have a higher transient increase in blood glucose concentration after an oral glucose challenge^{14,15} than non-smokers and higher insulin resistance,¹¹ suggesting a potential to increase the risk of diabetes.¹⁶

Though heavy alcohol consumption may cause transient hypoglycaemia,¹⁷ regular moderate drinkers are more insulin sensitive than abstainers.¹² Among diabetic subjects alcohol taken with a meal does not substantially alter the blood glucose concentration.^{18,19}

Because most experimental data linking alcohol consumption to glucose concentrations and insulin resistance have been collected from studies with short duration, long term prospective epidemiological studies are needed.

Epidemiological data relating smoking or alcohol consumption to diabetes are inconclusive. Smoking was positively associated with the risk of diabetes in the nurses' health study²⁰ and the Zutphen study²¹ but not in other prospective studies.²²⁻²⁴ The association between alcohol consumption and risk of diabetes is also not clear from existing data, positive^{25,26} and inverse associations²⁷ having been recorded. Alcohol consumption, cigarette smoking, and obesity may be intercorrelated; typically, smokers tend to drink more than non-smokers, and in some groups alcohol use is more common in leaner people. Thus a large population with long enough follow up is needed accurately to quantify the independent risks of diabetes associated with smoking and alcohol consumption after adjustment for obesity.

We studied the associations between smoking and alcohol consumption and the incidence of non-insulin dependent diabetes mellitus among 41 810 men in the health professionals' follow up study followed up for six years.

Subjects and methods

The health professionals' follow up study is aimed at investigating diet and chronic disease among 51 529 men aged 40-75 years in 1986. Each participant completed a detailed questionnaire that included questions on medical and smoking history, current average alcohol consumption,²⁸ and other lifestyle characteristics. Every two years participants are mailed follow up questionnaires to obtain updated information and to ascertain newly diagnosed diseases. Follow up rates have been at least 94% for each two year cycle.

At baseline we asked about lifetime history of smoking. For former smokers we asked about years since quitting. For each decade of life we also asked about average number of cigarettes smoked daily. From these data we calculated—in pack years—a total lifetime smoking history.²⁹ A pack year is defined as smoking 20 cigarettes daily for one year.

The 131 item semiquantitative food frequency questionnaire³⁰ included questions about average daily consumption of beer, wine, and spirits during the previous year. We calculated total daily alcohol consumption by multiplying the frequency of consumption of the standard portion size of a unit of beer (one 12 oz (355 ml) can, bottle, or glass), wine (4 oz (118 ml)), and spirits (1.5 oz (44 ml) shot) by the alcohol content of that beverage. The estimated alcohol content for beer is 13.2 g, for wine 10.8 g, and for spirits 15.1 g.³¹ Previously we have found this questionnaire

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to measure average alcohol consumption with a high degree of validity.²⁸

We assessed exercise from eight questions on specific moderate or vigorous activities.³² The contribution of each activity was based on its duration and its energy expenditure requirements in METs. One MET is defined as the energy expended sitting quietly, which is equivalent to 3.5 ml of oxygen uptake per kg body weight per minute for a 70 kg adult.

At baseline 41 810 men were free of diagnosed diabetes, coronary heart disease, and cancer and had reported information on smoking, alcohol consumption, height, and weight. We mailed a supplementary questionnaire to men who reported a new diagnosis of diabetes mellitus on the biennial questionnaires during the six year follow up period. Cases of diabetes were considered confirmed if any of the following were met: (a) one or more classic symptoms (thirst, polyuria, weight loss, hunger, pruritus) plus a raised fasting (≥ 7.8 mmol/l) or random (≥ 11.1 mmol/l) plasma glucose concentration; (b) at least two raised plasma glucose concentrations on separate occasions (fasting ≥ 7.8 mmol/l) or random (≥ 11.1 mmol/l, or 11.1 mmol/l after two hours or more on glucose tolerance testing) in the absence of symptoms; (c) treatment with a hypoglycaemic. Further details of the classification of diabetes were as reported.^{7 20 33}

Documenting diabetes from a self reported supplementary questionnaire compared with information obtained from medical records was found to be valid in over 98% of participants in a substudy of a similar cohort of medical professionals.^{20 33} This procedure for documenting incident diabetes has been effective in our previous studies^{6 7} of obesity and diabetes, in which results were similar to associations from smaller investigations which used clinical screening tools (reviewed by Barrett-Connor⁸).

Person months of follow up were accumulated for each risk factor, starting with the date of return of the 1986 baseline questionnaire. Men accumulated person time of exposure until either the date of diagnosis of diabetes, death, or 31 January 1992, whichever came first. Relative risks were calculated as the rate of disease among exposed subjects (total number of cases among smokers or former smokers divided by the total person time of exposure) divided by the rate of disease

among non-exposed subjects. Relative risks were initially calculated adjusting for deciles of body mass index (weight (kg)/height (m)²) and five year age intervals by using the Mantel-Haenszel summary statistic.³⁴ We also calculated 95% confidence intervals and, when applicable, Mantel extension tests³⁵ or trend across increasing levels of cigarette use and alcohol consumption. Multivariate logistic regression was used to control simultaneously for confounders.³⁴

Results

Mean body mass index did not vary appreciably among smoking and non-smoking men. Men who smoked had a lower frequency of a family history of diabetes, higher alcohol consumption, and lower physical activity levels (table I). There was no clear association between alcohol consumption and body mass index (table II). However, compared with abstainers men who drank alcohol were more likely to smoke, exercise, and have a family history of diabetes (parents or siblings diagnosed with diabetes) (table II).

During 230 769 person years of follow up we confirmed 509 incident cases of non-insulin dependent diabetes mellitus. The age and relative weight adjusted relative risk of diabetes among men smoking 15-24 cigarettes a day compared with never smokers was 2.06 (95% confidence interval 1.40 to 3.04) and 1.66 (1.08 to 2.55) for men smoking 25 or more a day (table III). After controlling for confounders, including body mass index and alcohol consumption, the relative risks of diabetes were somewhat stronger—relative risk 2.38 (95% confidence interval 1.57 to 3.59) for men smoking 15-24 cigarettes a day; 1.94 (1.25 to 3.03) for men smoking 25 or more a day.

Asymptomatic diabetes detected on routine examination may bias results in either direction if smokers have an increase in other adverse health effects (requiring heightened physician surveillance) or if men who smoke are less likely to obtain routine physical examinations. In 1988 we found that 19% of non-smokers and 21% of current smokers had not visited a doctor for two years. There was no clear trend for physician visits across levels of alcohol consumption. Nineteen per cent of abstainers and 20% of men drinking 30 to 49.9 g alcohol daily had not seen a doctor in the previous two years. These small differences in surveillance cannot explain differences in rates of diabetes. However, further to reduce the potential for diagnostic bias we calculated multivariate relative risk estimates of diabetes including only men with the disease who reported on their supplementary questionnaire any symptoms (see methods) at the time of diagnosis (n=273). Compared with never smokers the relative risk of diabetes was 2.73 (95% confidence interval 1.61 to 4.64) among men smoking 15-24 cigarettes a day and 2.09 (1.17 to 3.73) for those smoking 25 or more daily (table III).

Obesity somewhat modified the association between smoking and diabetes. Among men with a body mass index of less than 27.8 the multivariate adjusted relative risk of diabetes was 3.27 (95% confidence interval 1.88 to 5.70) for those smoking 15-24 cigarettes a day and 2.46 (1.28 to 4.73) for those smoking 25 or more a day compared with never smokers. Among smokers with a body mass index of 27.8 or higher the multivariate adjusted relative risk of diabetes was 1.73 (0.93 to 3.23) for 15-24 cigarettes a day and 1.68 (0.91 to 3.09) for 25 or more. Though the relative risk of diabetes for smokers versus non-smokers was not as large among the more obese men, the attributable risk was larger (as shown by the absolute difference in rates of diabetes) because rates of diabetes were much greater in obese men (table IV).

Compared with non-smokers, former smokers had

TABLE I—Baseline characteristics by smoking status of 39 745 of 41 810 male health professionals aged 40-75 in 1986. Values are means unless stated otherwise

	Current smokers (cigarettes/day)				
	Never smokers	Past smokers	1-14	15-24	≥ 25
No studied*	19 386	16 774	1080	1316	1189
Age (years)	52.3	54.6	53.9	54.1	54.3
Body mass index (kg/m ²)	25.3	25.7	25.1	25.1	25.5
Alcohol intake (g/day)	8.3	14.4	16.4	16.4	16.7
% With family history of diabetes	17.7	16.9	14.4	13.7	17.3
Exercise (METs/week)	23.8	24.3	19.7	18.2	15.2

Characteristics are age standardised to age distribution of the 41 810 men free of chronic disease at baseline.

*2065 Men excluded from table were 420 current smokers who failed to state amount smoked and 1645 men who gave a smoking history but no current smoking status.

TABLE II—Baseline characteristics by alcohol intake of 41 810 male health professionals aged 40-75 in 1986. Values are means unless stated otherwise

	Alcohol intake (g/day)						
	0	0-14.9	5-0-9.9	10-0-14.9	15-0-29.9	30-0-49.9	≥ 50.0
No studied	9570	10 143	5989	4992	6016	3671	1429
Age (years)	53.6	52.8	52.8	53.6	53.8	55.1	55.2
Body mass index (kg/m ²)	25.6	25.6	25.3	25.3	25.3	25.4	25.7
% Past smokers	28.6	36.3	41.4	45.4	49.8	51.5	51.5
% Current smokers	6.1	6.8	7.6	7.5	9.4	16.7	20.2
% With family history of diabetes	12.7	18.5	18.3	16.3	16.1	14.8	14.1
Exercise (METs/week)	17.5	19.2	21.4	22.0	22.0	20.0	18.8

Characteristics are age standardised to age distribution of the 41 810 men free of chronic disease at baseline.

TABLE III—Cigarette smoking and risk of non-insulin dependent diabetes among 41 810 men during six years of follow up

	Never smokers	Past smokers	Current smokers (cigarettes/day)		
			1-14	15-24	≥ 25
No of cases*	188	239	13	28	24
Person years	107 062	92 625	5930	7201	6551
All cases:					
Age adjusted relative risk (95% confidence interval)	1.00 (referent)	1.17 (0.97 to 1.42)	1.21 (0.69 to 2.12)	2.06 (1.40 to 3.04)	1.66 (1.08 to 2.55)
Multivariate relative risk† (95% confidence interval)	1.00 (referent)	1.29 (1.05 to 1.57)	1.37 (0.77 to 2.43)	2.38 (1.57 to 3.59)	1.94 (1.25 to 3.03)
Symptomatic cases only‡:					
No of cases	119	149	7	20	18
Multivariate relative risk (95% confidence interval)	1.00 (referent)	1.27 (0.97 to 1.66)	1.00 (0.40 to 2.48)	2.73 (1.61 to 4.64)	2.09 (1.17 to 3.73)

*Seventeen cases were excluded because smoking information at baseline was missing.

†Multivariate analyses controlling for age (5 year age groups), body mass index (deciles), family history of diabetes, alcohol consumption (seven categories), and quintiles of physical activity.

‡Ten cases were excluded because smoking information at baseline was missing.

TABLE IV—Age standardised rates of non-insulin dependent diabetes per 100 000 person years among men by body mass index and smoking status

	Body mass index (kg/m ²)	
	< 27.8	≥ 27.8
Never smokers	94	632
Past smokers	138	616
Current smokers:		
1-24 Cigarettes/day	228	708
≥ 25 Cigarettes/day	205	875

an increased risk of diabetes (relative risk 1.29; 95% confidence interval 1.05 to 1.57) (table III). This risk may be due to a long term cumulative effect of smoking on insulin secretion or sensitivity. Further supporting this hypothesis, we found a strong dose-response relation between lifetime pack years of cigarettes and risk of diabetes (table V). Compared with non-smokers men who had a cumulative lifetime dose of 40-60 pack years had a relative risk of 1.60 (1.17 to 2.19) after controlling for known confounders (table V).

To further test the hypothesis that smoking exerts both an acute effect and a long term effect on the risk of diabetes we calculated the relative risk of disease by years since quitting among former smokers. Compared with never smokers men who had stopped smoking within the last two years (relative risk 1.61; 95% confidence interval 1.05 to 2.46) were at higher risk of diabetes than men who had stopped three or more years before (table VI). Some of the raised risk among the most recent former smokers may have been caused by high recidivism rates. However, after removing 836 men who did not report past smoking on the subsequent follow up questionnaires (1988 and 1990) the increased risk was essentially unchanged among the former smokers who had stopped in the two years before 1986. Weight gain associated with having recently given up smoking could explain some of the increased risk of diabetes among men who had recently stopped. The relative risk of diabetes among men who had recently quit was moderately attenuated after adjusting for weight change in the five years before baseline (relative risk 1.46; 0.93 to 2.29) (table VI).

There was a strong inverse association between alcohol consumption and the risk of non-insulin dependent diabetes mellitus (P for trend=0.001) (table VII). After controlling for known confounders, including body mass index and smoking, men who consumed 30.0 to 49.9 g of alcohol daily (about two to four drinks a day) had a relative risk of 0.61 (95% confidence interval 0.44 to 0.91) compared with abstainers. At the heaviest level of alcohol consumption (≥ 50 g/day) the reduction in risk was less (relative risk 0.84, 0.51 to 1.40). After excluding 236 cases with a diagnosis of asymptomatic diabetes we still found a strong inverse association between alcohol consumption and risk of diabetes (P for trend=0.001) (table VII). Obesity did not appreciably modify the inverse

association between alcohol consumption and the risk of diabetes.

Discussion

In these prospectively collected data we observed lower rates of diabetes among men who did not smoke and among men who consumed alcohol. For smoking and alcohol the risk was more pronounced after simultaneously controlling for each other and for other established predictors of non-insulin dependent diabetes mellitus.

Because the overall follow up of this cohort was over 94% the results are unlikely to be biased by losses to follow up. However, in the general population up to half of patients with diabetes may be undiagnosed³⁶; consequently biased surveillance among smokers or among non-drinkers could theoretically inflate the diagnosis rate in these groups. In this analysis and in a previous analysis among women we found that participants who smoked were only marginally less likely to visit a physician over a two year period.²⁰ As screening the entire population is not practicable, including only those patients who presented with symptoms provides the best unbiased assessment of the association between smoking, alcohol consumption, and the risk of diabetes. Though restricting the outcome to symptomatic cases increased the confidence intervals, we still found incidence rates of diabetes to be highest among men who smoked (table III) or abstained from alcohol (table VII).

Previously we reported a strong association between relative weight and incident diabetes in this popula-

TABLE VI—Years since quitting smoking among past smokers and risk of non-insulin dependent diabetes among 41 810 men during six years of follow up

Years since quitting	Multivariate relative risk (95% confidence interval)	
	A*	B†
Never smokers	1.00 (referent)	1.00 (referent)
0-2	1.61 (1.05 to 2.46)	1.46 (0.93 to 2.29)
3-9	1.25 (0.89 to 1.75)	1.16 (0.82 to 1.65)
≥ 10	1.27 (1.02 to 1.58)	1.23 (0.99 to 1.54)

*A=Multivariate analyses controlling for age (five year age groups), body mass index (deciles), family history of diabetes, alcohol consumption (seven categories), and quintiles of physical activity.

†B=Multivariate analyses controlling for weight change in previous five years.

TABLE V—Pack years of cigarette smoking and risk of non-insulin dependent diabetes among 41 810 men during six years of follow up

	Non-smokers	Pack years						P for trend
		0-1-10-0	10-1-20-0	20-1-30-0	30-1-40-0	40-1-60-0	≥ 60-1	
No of cases	227	59	47	50	40	52	34	
Person years	123 847	29 263	26 154	19 037	12 753	13 810	5905	
Age and body mass index adjusted relative risk (95% confidence interval)	1.00 (referent)	1.18 (0.89 to 1.57)	0.96 (0.70 to 1.31)	1.19 (0.87 to 1.62)	1.33 (0.95 to 1.86)	1.40 (1.04 to 1.90)	1.66 (1.16 to 2.38)	< 0.001
Multivariate risk (95% confidence interval)	1.00 (referent)	1.23 (0.92 to 1.65)	1.04 (0.76 to 1.44)	1.31 (0.95 to 1.79)	1.48 (1.04 to 2.09)	1.60 (1.17 to 2.19)	1.93 (1.32 to 2.84)	< 0.001

*Multivariate analyses controlling for age (five year age groups), body mass index (deciles), family history of diabetes, alcohol consumption (seven categories), and quintiles of physical activity.

TABLE VII—Alcohol intake and risk of non-insulin dependent diabetes among 41 810 men during six years of follow up

	Alcohol intake (g/day)							P for trend
	0	0.1-4.9	5.0-9.9	10.0-14.9	15.0-29.9	30.0-49.9	≥ 50	
No of cases	127	149	63	54	65	33	18	
Person years	52 661	55 919	33 101	27 600	33 267	20 317	7903	
All cases:								
Age and body mass index adjusted relative risk (95% confidence interval)	1.00 (referent)	1.22 (0.96 to 1.54)	0.92 (0.68 to 1.25)	0.93 (0.67 to 1.28)	0.95 (0.70 to 1.28)	0.69 (0.47 to 1.02)	0.89 (0.54 to 1.46)	0.03
Multivariate relative risk* (95% confidence interval)	1.00 (referent)	1.17 (0.91 to 1.49)	0.88 (0.64 to 1.20)	0.90 (0.64 to 1.24)	0.91 (0.67 to 1.24)	0.61 (0.44 to 0.91)	0.84 (0.51 to 1.40)	0.001
Symptomatic cases only:								
No of cases	75	78	38	26	32	14	10	
Multivariate relative risk* (95% confidence interval)	1.00 (referent)	1.04 (0.75 to 1.44)	0.91 (0.61 to 1.36)	0.75 (0.47 to 1.18)	0.79 (0.51 to 1.20)	0.46 (0.26 to 0.82)	0.80 (0.41 to 1.56)	0.001

*Multivariate analyses controlling for age (five year age groups), body mass index (deciles), family history of diabetes, alcohol consumption (seven categories), and quintiles of physical activity.

tion.⁷ Even after controlling for deciles of relative weight residual confounding may exist among the top deciles, where the increased relative risk of diabetes is over 30 times that of men in the lowest decile.⁷ However, because smoking is either unrelated or inversely related to body mass index³⁷ residual confounding by relative weight, if anything, attenuates the association between smoking and diabetes. Also, because men who smoke tend to drink more and men who drink smoke more (tables I and II) measurement error in our assessment of smoking or alcohol consumption would also only attenuate our results.

Shaper *et al* suggested that men who abstain from alcohol are a heterogeneous group of lifetime abstainers, men who are ill, and recovering alcoholics.³⁸ As alcoholics are at higher risk of diabetes,³⁹ including these men in the reference group could artificially create an inverse association between alcohol and diabetes. However, when we excluded men who reported no alcohol consumption at baseline and who reported dramatically reducing their alcohol consumption in previous 10 years (presumably because of illness or recovery from alcohol abuse) we still found a strong inverse association between alcohol and diabetes (P for trend = 0.006).

We previously reported a positive association between smoking and non-insulin dependent diabetes mellitus among 114 247 women in the nurses' health study.²⁰ Compared with women who had never smoked, those who smoked 25 or more a day had a relative risk of 1.42 (95% confidence interval 1.18 to 1.72) after controlling for known confounders. A positive association between smoking and diabetes was also reported among 841 middle aged men from Zutphen²¹; however, no association was seen in three studies.²²⁻²⁴ These previous studies may have missed an association between smoking and diabetes owing to small numbers or inadequate control for obesity, family history of diabetes, physical activity, or alcohol intake.

INSULIN RESISTANCE AND SENSITIVITY

Smoking is generally inversely associated with body mass index³⁷ and therefore a lower risk of diabetes. However, smoking is associated with larger upper body fat distribution,⁸ a marker of insulin resistance,⁴¹ raised plasma glucose concentrations (after an oral glucose load),²⁴⁻⁴² and overt diabetes.⁷⁻⁴³⁻⁴⁴ In a recent study of 20 smokers and 20 non-smokers with a similar distribution of age, body mass index, and family history of diabetes Facchini *et al* reported higher postload insulin concentrations among smokers.¹¹ They also reported higher glucose concentrations among smokers after infusing steady state insulin. These results suggest an independent association between current smoking and insulin resistance.

If smoking increases insulin resistance, then in former smokers postload insulin and glucose concentrations should return to those of never smokers after a period of smoking cessation. However, Janzon *et al*

found that former smokers had plasma glucose concentrations that were intermediate between those of never and current smokers after an oral glucose load.⁴⁵ The increased risk of diabetes that we found for former smokers among men (table III) and women²⁰ and the dose-response association that we found for total lifetime dose (table V) corroborate these experimental findings. Smoking may also be directly toxic to pancreatic tissue, as the risk of pancreatic cancer is increased among smokers⁴⁶ and diabetic populations.⁴⁷

The epidemiological findings relating alcohol consumption to the risk of diabetes are equivocal. Several prospective studies have reported a positive association²⁵⁻²⁶ whereas others have reported null⁴⁸ or inverse associations.²⁷ Incomplete control for confounders like obesity or smoking, a limited number of incident cases, or measurement error in alcohol assessment may explain the positive associations. In a four year follow up of women in the nurses' health study, with 526 cases of incident diabetes, Sampfer *et al* found that women who drank 15 g or more of alcohol daily had a relative risk of diabetes of 0.6 (95% confidence interval 0.3 to 0.9) compared with non-drinkers. Heavy alcohol consumption clearly alters metabolism and causes hepatic damage which can lead to diabetes and increased mortality.³⁹⁻⁴⁹ In the nurses' health study and in this study there were too few heavy drinkers to quantify the risk of diabetes precisely.

Insulin sensitivity is increased among people who consume on average one to three alcohol containing drinks a day.¹²⁻¹³ Among female monozygotic twins who consume alcohol Mayer *et al* reported a significant 12.4% reduction in two hour postload insulin and a similar reduction in postload glucose concentrations associated with a 12 g/day increase in alcohol consumption.¹³ Further investigation of the interrelations between smoking, alcohol consumption, insulin resist-

Key messages

- In addition to obesity, other modifiable life-style practices may influence the risk of non-insulin dependent diabetes
- Epidemiological studies have not adequately examined the independent associations between smoking, alcohol, and the risk of diabetes after accounting for obesity
- This paper shows that current smoking roughly doubles the risk of diabetes among a healthy population of men
- Moderate alcohol consumption, however, significantly decreases the risk of diabetes
- Smoking and alcohol may alter the risk of diabetes through long term effects on insulin secretion and insulin resistance

ance, and diabetes is needed to help clarify these mechanisms.

In conclusion, after controlling for known predictors of diabetes we found a positive association between smoking and the subsequent risk of diabetes. We found an increased risk among current and former smokers, supporting experimental evidence that smoking exerts both a short term effect on insulin sensitivity and a long term effect on insulin secretion. Our data confirm results in women for both alcohol consumption and smoking and support laboratory evidence that, compared with men who abstain, men who take up to three drinks a day are more insulin sensitive and may be at lower risk of diabetes. These findings from a large prospective cohort of men suggest that factors in addition to obesity can modify the incidence of diabetes.

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ONE HUNDRED YEARS AGO

MATERNAL IMPRESSION.

A woman in the early months of pregnancy was attending the Electrical Department in St. Bartholomew's Hospital, and while she was sitting upon a bench in the waiting room, she was startled by a little boy who had two fingers of one hand fused together.

The boy was standing on the bench and put his hand upon her shoulder; she turned to see what it was that touched her, and then saw for the first time his deformed hand, and was agitated at the sight of it. Her baby now has a double fifth toe upon each foot. The right one is almost completely double, and the left one is so to a less degree, being bifurcated, and having two separate toe nails. The deformity had not occurred before in any of her children or relations. I give this case for what it is worth, the relation between the alleged cause and effect being a fairly direct one.

Upper Wimpole Street.

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