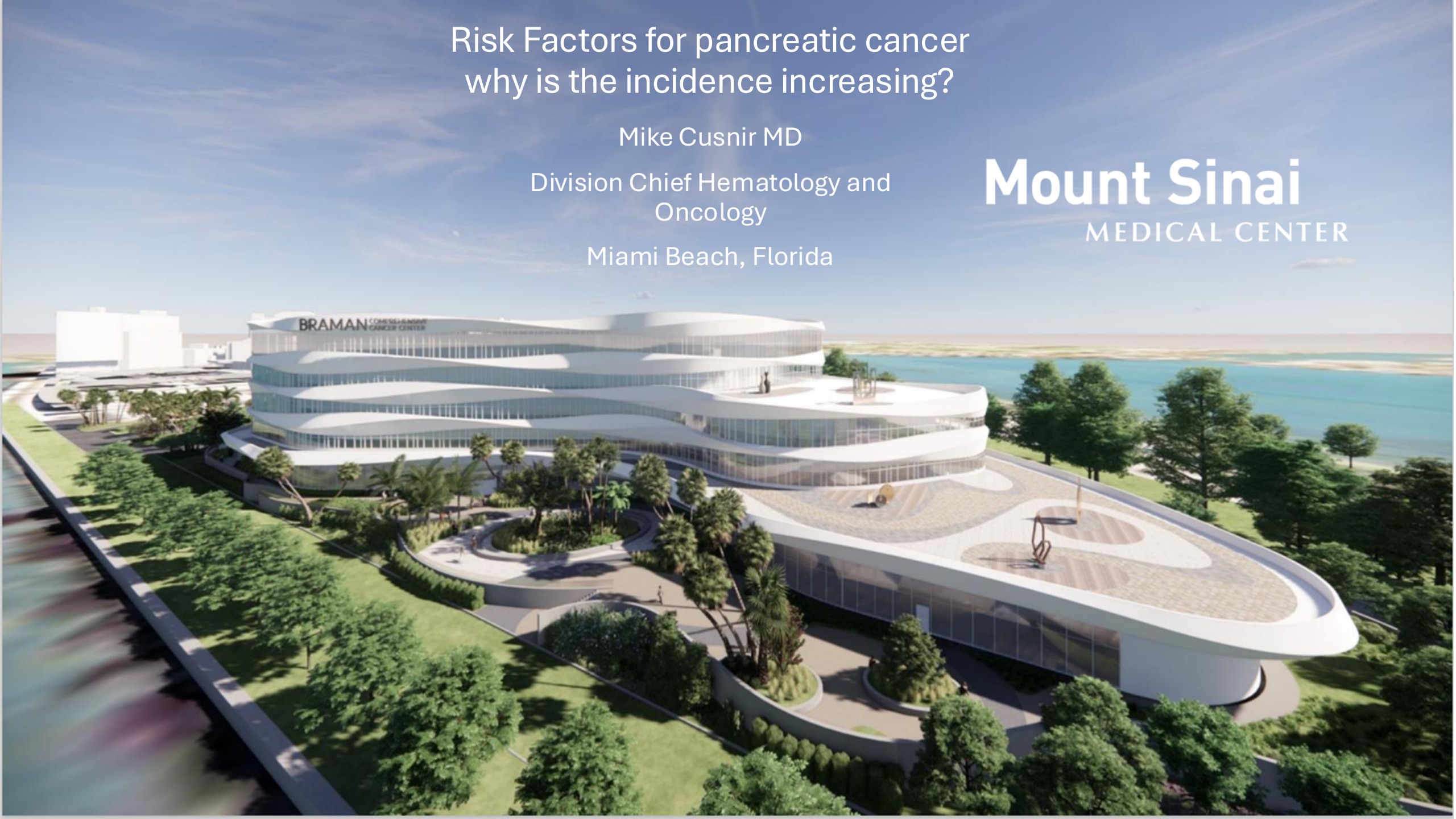
Risk Factors for pancreatic cancer why is the incidence increasing?

Mike Cusnir MD

Division Chief Hematology and Oncology

Mount Sinai MEDICAL CENTER

Miami Beach, Florida



Epidemiology is like a bikini; what is revealed is interesting;
What's hidden is crucial

Peter Duesberg

Epidemiology

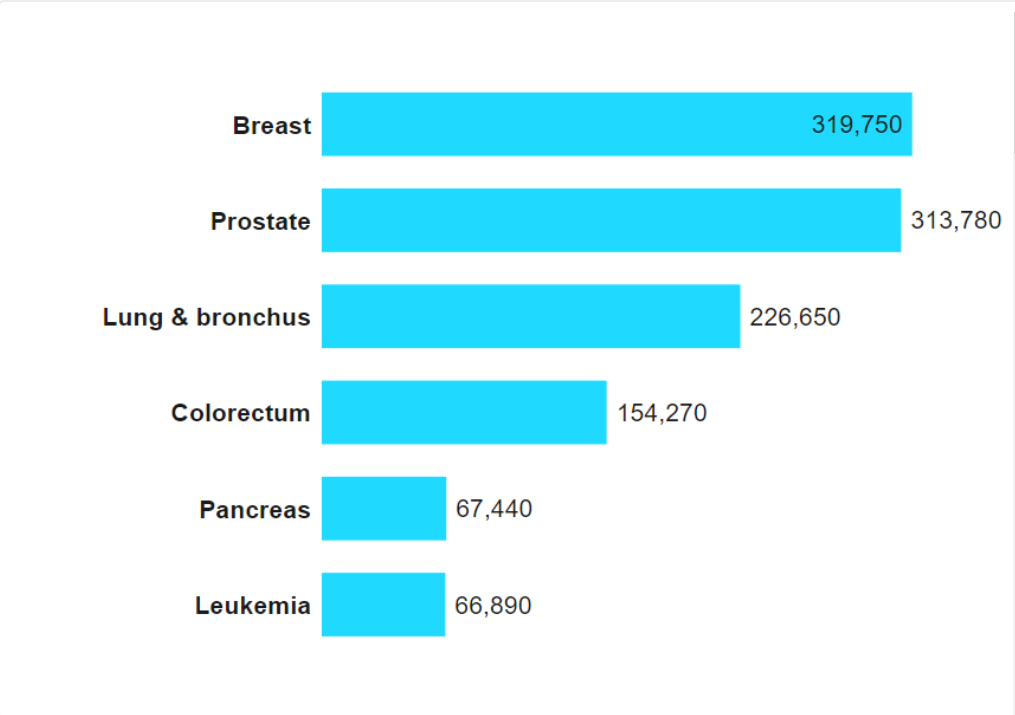
- 30,300 cases in U.S. in 2002 (14.700 Males, 15,600 Women)
- 29,700 Deaths
- 300 % increase since 1950
- More frequent than Gastric or Rectal Cancer.

2003

2025 Estimated New Cancer Cases

Cases by Cancer Type

View by: Sex: Sexes combined | Cancer Type: Multiple selections

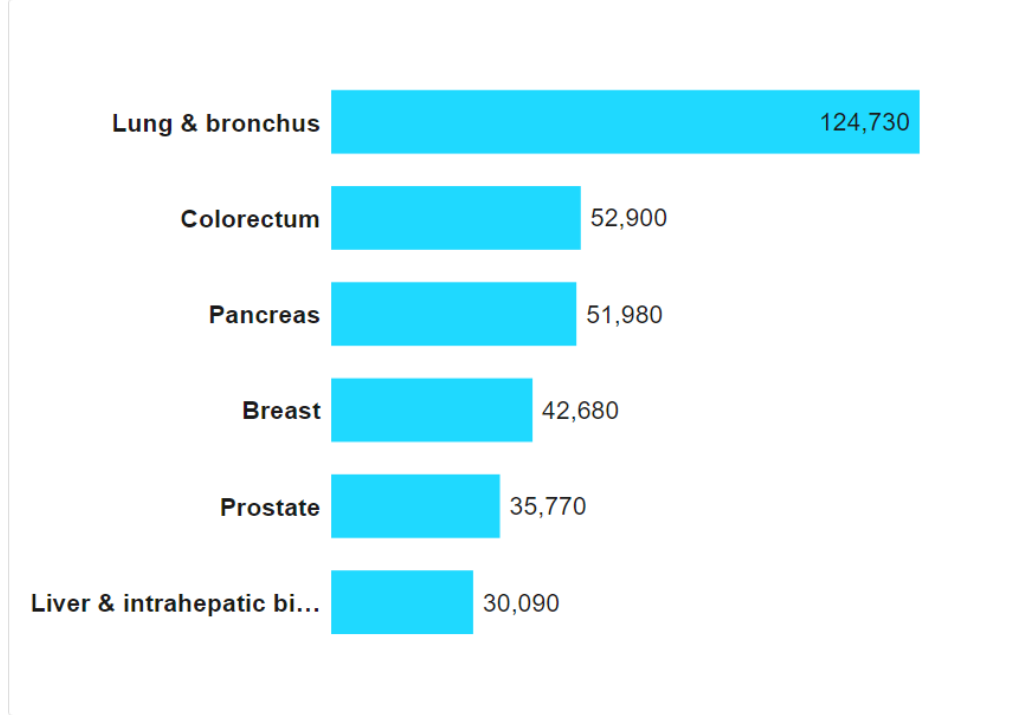


Colorectum includes appendix.
Male & female breast cancers combined for whole U.S.

2025 Estimated Cancer Deaths

Deaths by Cancer Type

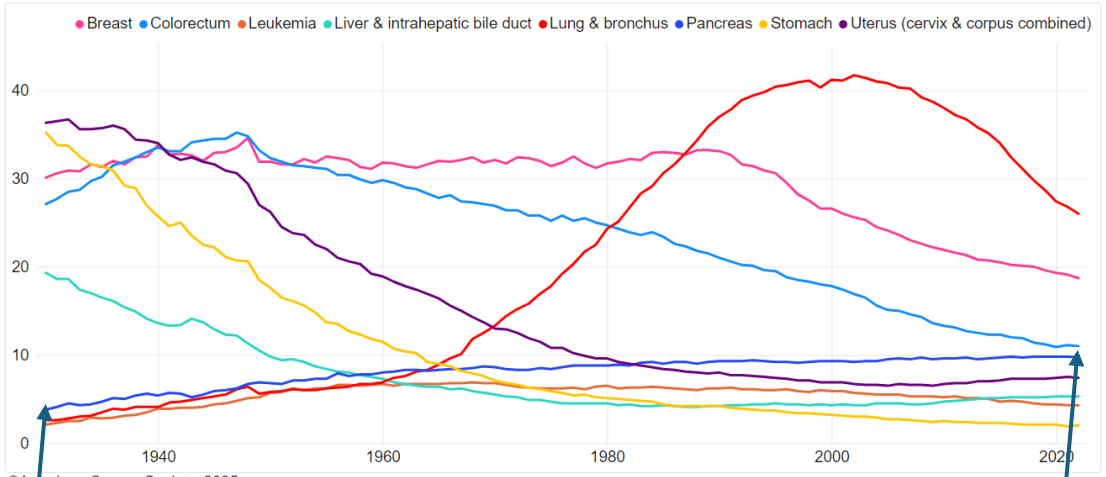
View by: Sex: Sexes combined | Cancer Type: All



Colorectum includes appendix.
Male & female breast cancers combined for whole U.S.
Urinary bladder includes in situ cases.

Death Rates | Incidence Rates

View by: Sex: Female | Type: Multiple selections



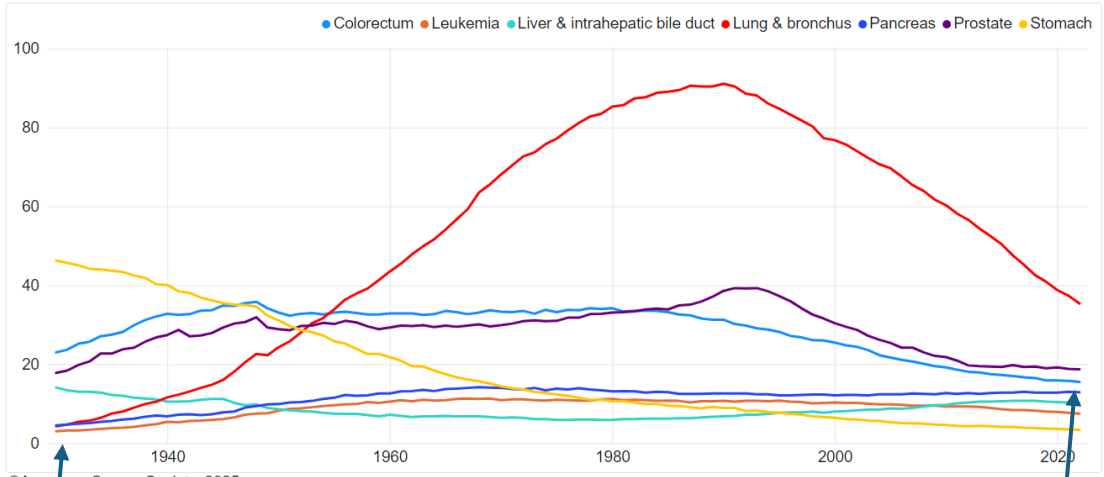
Data Souce: National Center for Health Statistics, Centers for Disease Contol and Prevention, 2024
Average annual rate per 100,000, age-adjusted to the 2000 US standard population.
Due to changes in disease classification over time, colorectum cancer trends include cancers of the anal canal and small intestine.
Due to changes in disease classification over time, liver cancer trends include cancers of the gallbladder and biliary tract.
Due to changes in disease classification over time, lung cancer trends include cancers of the trachea and pleura.
Due to changes in disease classification over time, ovarian cancer trends include cancers of the fallopian tube and broad ligament.

3.8

9.7

Death Rates | Incidence Rates

View by: Sex: Male | Type: Multiple selections



Data Souce: National Center for Health Statistics, Centers for Disease Contol and Prevention, 2024
Average annual rate per 100,000, age-adjusted to the 2000 US standard population.
Due to changes in disease classification over time, colorectum cancer trends include cancers of the anal canal and small intestine.
Due to changes in disease classification over time, liver cancer trends include cancers of the gallbladder and biliary tract.
Due to changes in disease classification over time, lung cancer trends include cancers of the trachea and pleura.

4.5

12.9

Cancer Projected Market Volume

Broward & Miami-Dade Counties

Cancer Type	Incidence 2025	Projected 2025 MSMC Volume @5% Market Share	Incidence 2030	Projected 2030 MSMC Volume @7.5% Market Share	% Change 2025-2030
Bladder	992	50	1,060	80	6.9%
Brain	448	22	492	37	9.8%
Breast	3,227	161	3,549	266	10.0%
Colorectal	1,614	81	1,203	90	-25.5%
Kidney	798	40	888	67	11.3%
Leukemia	805	40	840	63	4.3%
Lung	2,226	111	2,121	159	-4.7%
Melanoma	1,232	62	1,369	103	11.1%
Non Hodgkins Lymphoma	955	48	1,062	80	11.2%
Oral Cavity	901	45	999	75	10.9%
Other	3,394	170	3,787	284	11.6%
Ovarian	300	15	318	24	5.8%
Pancreatic	1,040	52	1,175	88	13.0%
Prostate	2,292	115	2,562	192	11.8%
Stomach	419	21	446	33	6.5%
Thyroid	1,057	53	1,112	83	5.2%
Uterine Cervical	225	11	240	18	6.7%
Uterine Corpus	845	42	930	70	10.1%
Total	**22,769**	**1,138**	**24,152**	**1,811**	**6.1%**

IBM Watson Health Cancer Estimates 2020

Cancer Estimates By Cancer Type

Broward & Miami-Dade Counties

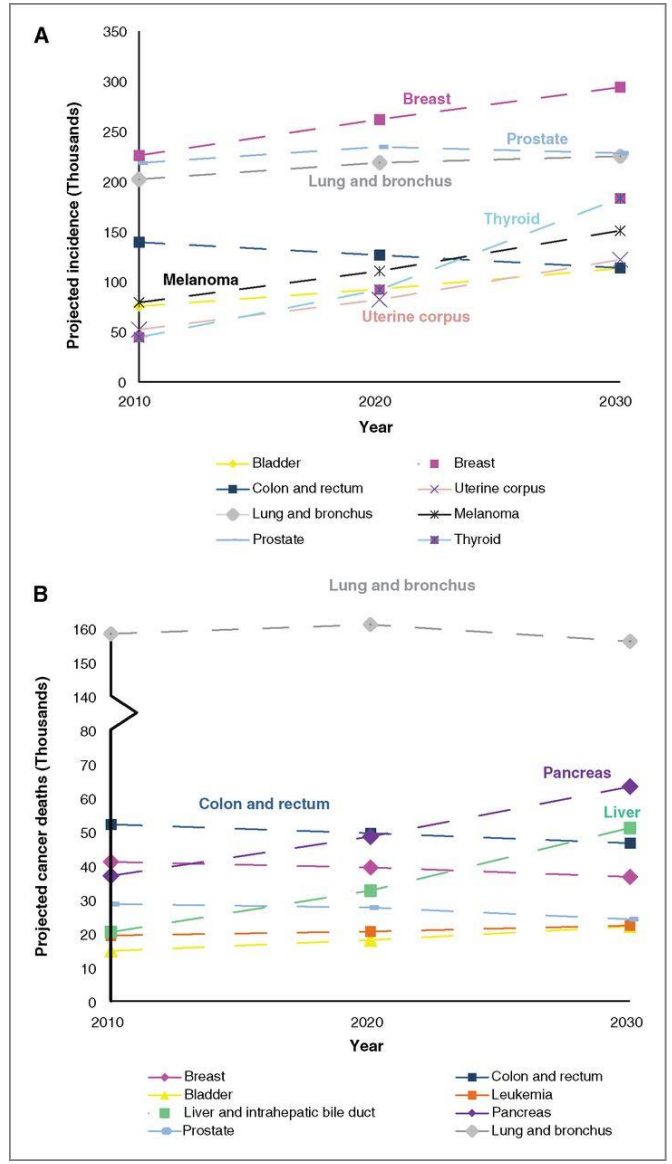
Cancer Type	Incidence 2020	Incidence 2025	% Change 2020-2025	Incidence 2030	% Change 2020-2030
Bladder	934	992	6.3%	1,060	13.6%
Brain	412	448	8.8%	492	19.5%
Breast	2,895	3,227	11.4%	3,549	22.6%
Colorectal	1,881	1,614	-14.2%	1,203	-36.0%
Kidney	709	798	12.5%	888	25.3%
Leukemia	766	805	5.0%	840	9.6%
Lung	2,262	2,226	-1.6%	2,121	-6.2%
Melanoma	1,089	1,232	13.1%	1,369	25.7%
Non Hodgkins Lymphoma	870	955	9.8%	1,062	22.1%
Oral Cavity	792	901	13.8%	999	26.2%
Other	3,005	3,394	12.9%	3,787	26.0%
Ovarian	300	300	0.1%	318	5.9%
Pancreatic	901	1,040	15.4%	1,175	30.4%
Prostate	2,448	2,292	-6.4%	2,562	4.7%
Stomach	397	419	5.3%	446	12.1%
Thyroid	991	1,057	6.6%	1,112	12.2%
Uterine Cervical	214	225	4.9%	240	11.9%
Uterine Corpus	747	845	13.0%	930	24.5%
Total	**21,614**	**22,769**	**5.3%**	**24,152**	**11.7%**

urce: IBM Watson Health Cancer Estimates, 2020

The future isn't what it used to be

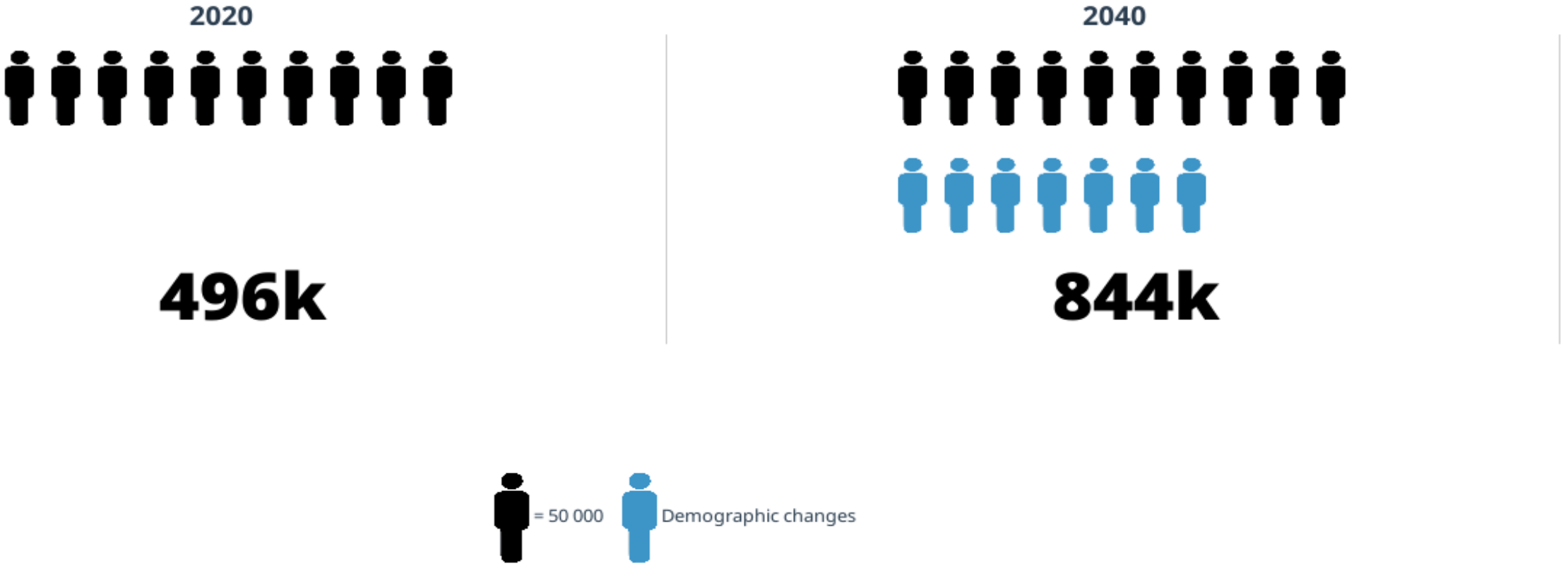
Yogi Berra

From: **Projecting Cancer Incidence and Deaths to 2030: The Unexpected Burden of Thyroid, Liver, and Pancreas Cancers in the United States**

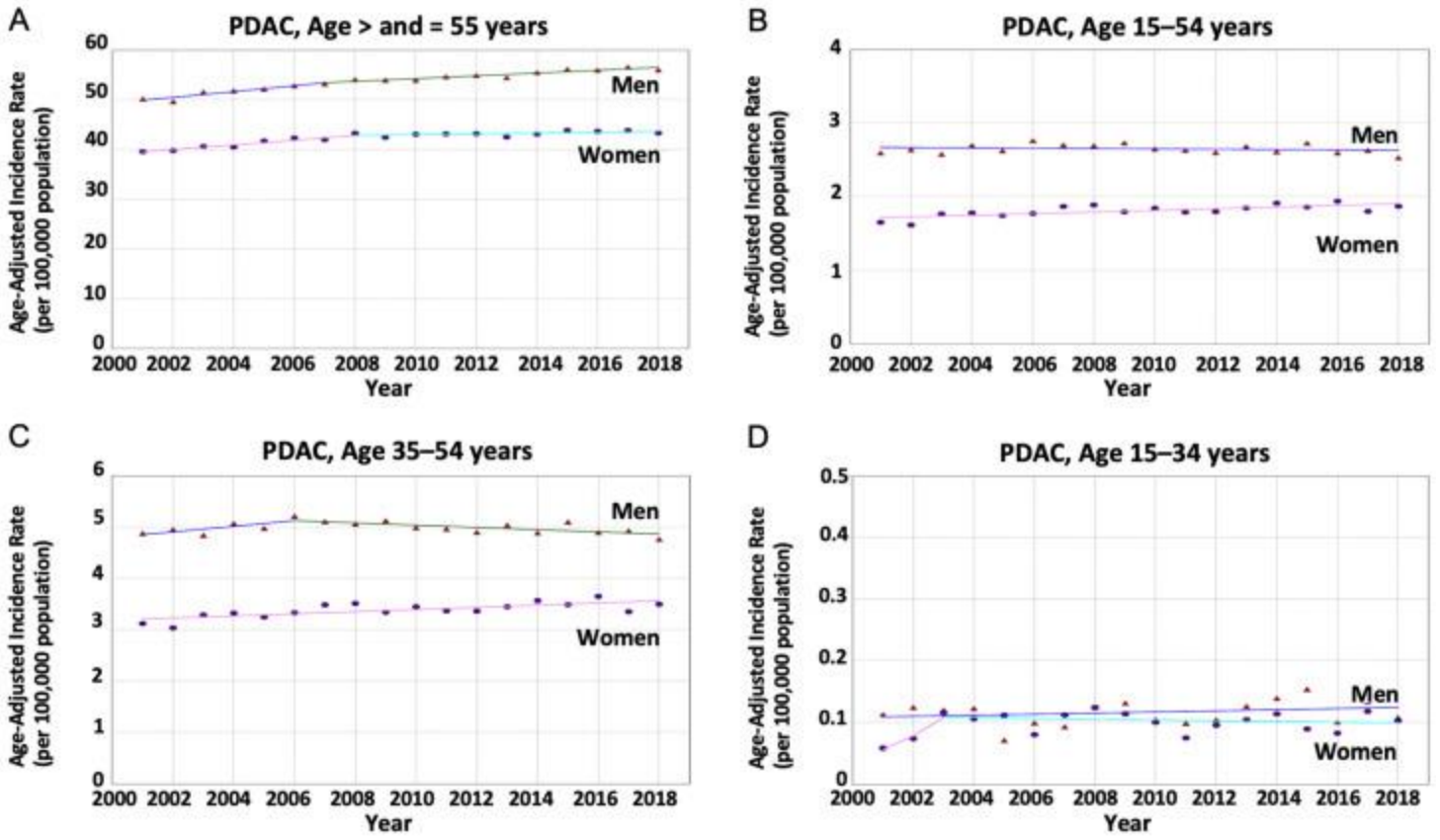


Cancer Res. 2014;74(11):2913-2921. doi:10.1158/0008-5472.CAN-14-0155

Estimated number of new cases from 2020 to 2040, Both sexes, age [0-85+]
Pancreas
World



International Agency for Research on Cancer
World Health Organization



. 2024 Feb 28;16(5):971. doi: 10.3390/cancers16050971

Table 3. Germ line diseases associated with pancreas cancer.

Disease	Affected chromosome	Remarks
Familial pancreas cancer (USA National familial pancreatic tumor registry)	?	5–10-fold risk for first degree relatives[44]
Familial pancreas cancer. (Seattle Cohort)	4q 32–34	High risk of pancreas cancer, pancreatitis and diabetes. Smokers develop early onset pancreas cancer[45]
Hereditary non-polyposis colon cancer (HNPCC)	2, 3	Some persons may develop pancreas cancer[46]
Von Hippel-Lindau syndrome	3p25	Neuro-endocrine tumors of pancreas are frequent[47]
Familial adenomatous polyposis	5q12–21	Mutation found in pancreas and in ampullary cancers[48]
Hereditary pancreatitis	7q35	Cumulative risk pancreas cancer at least 30%[24]
Familial atypical malignant melanoma syndrome	9p21	Patients carrying the p16 Leiden mutation have a 17% cumulative risk of pancreas cancer[49]
BRCA2	13	Most common inherited mutation leading to pancreas cancer[50,51]
Peutz-Jeghers syndrome	19p	Mutation may contribute to both sporadic and inherited disease[52]
Cystic fibrosis	7q31	Increased risk of digestive cancer, including pancreas tumors[53,54]
Ataxia-telangiectasia	11q	Breast cancer is most common tumor; a few patients with pancreas cancer[55]
Li-Fraumeni syndrome	17p13.1	Defect in p53. Moderate increased risk of pancreas cancer
Fanconi anemia	Multiple chromosomes including 3p22–26, 9p13, 9q22.3, 16q24.3	A few patients < 50 years with pancreas cancer carry FANCC or FANCG genes[56]

Reprinted with permission from [57].

Caucasian: About 1 in 25 Caucasians are carriers.
Hispanic: About 1 in 46 Hispanic Americans are carriers.
African American: About 1 in 65 African Americans are carriers.
Asian American: About 1 in 90 Asian Americans are carriers.

From: **Pancreatic Cancer Surveillance and Survival of High-Risk Individuals**

JAMA Oncol. 2024;10(8):1087-1096. doi:10.1001/jamaoncol.2024.1930

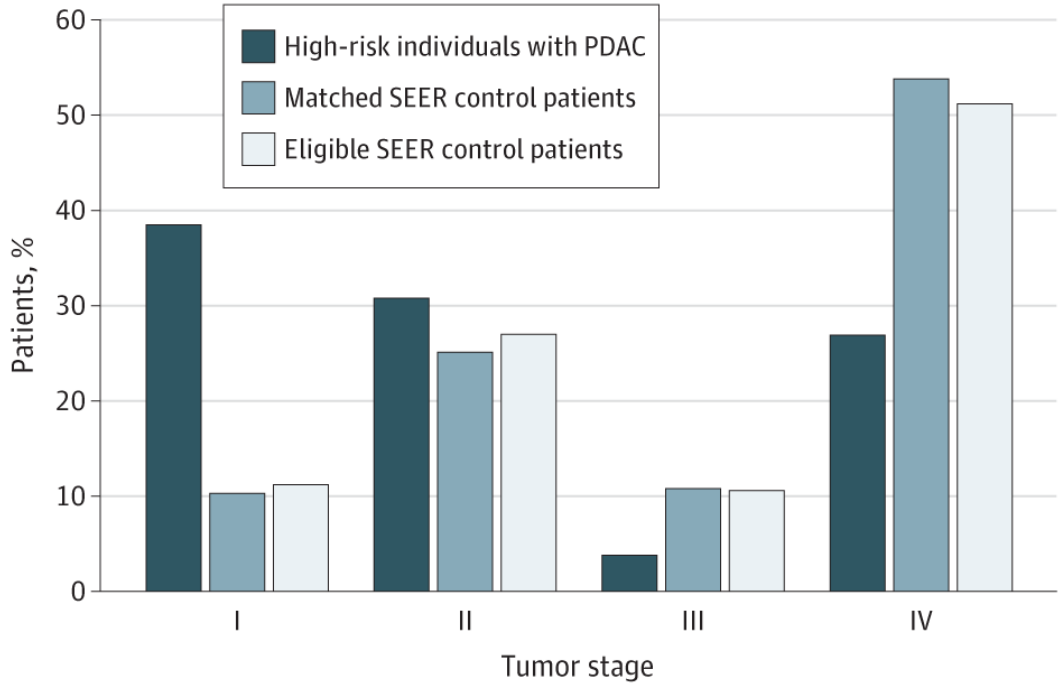


Figure Legend:

Tumor Stage at Diagnosis Frequency distribution of tumor stage at diagnosis for 26 high-risk individuals with pancreatic ductal adenocarcinoma (PDAC); 1504 matched Surveillance, Epidemiology, and End Results (SEER) control patients with PDAC; and the pool of 66 987 eligible SEER patients with PDAC from which the matched case patients were drawn. $P < .001$ for high-risk individuals with PDAC vs matched SEER control patients.

From: **Pancreatic Cancer Surveillance and Survival of High-Risk Individuals**

JAMA Oncol. 2024;10(8):1087-1096. doi:10.1001/jamaoncol.2024.1930

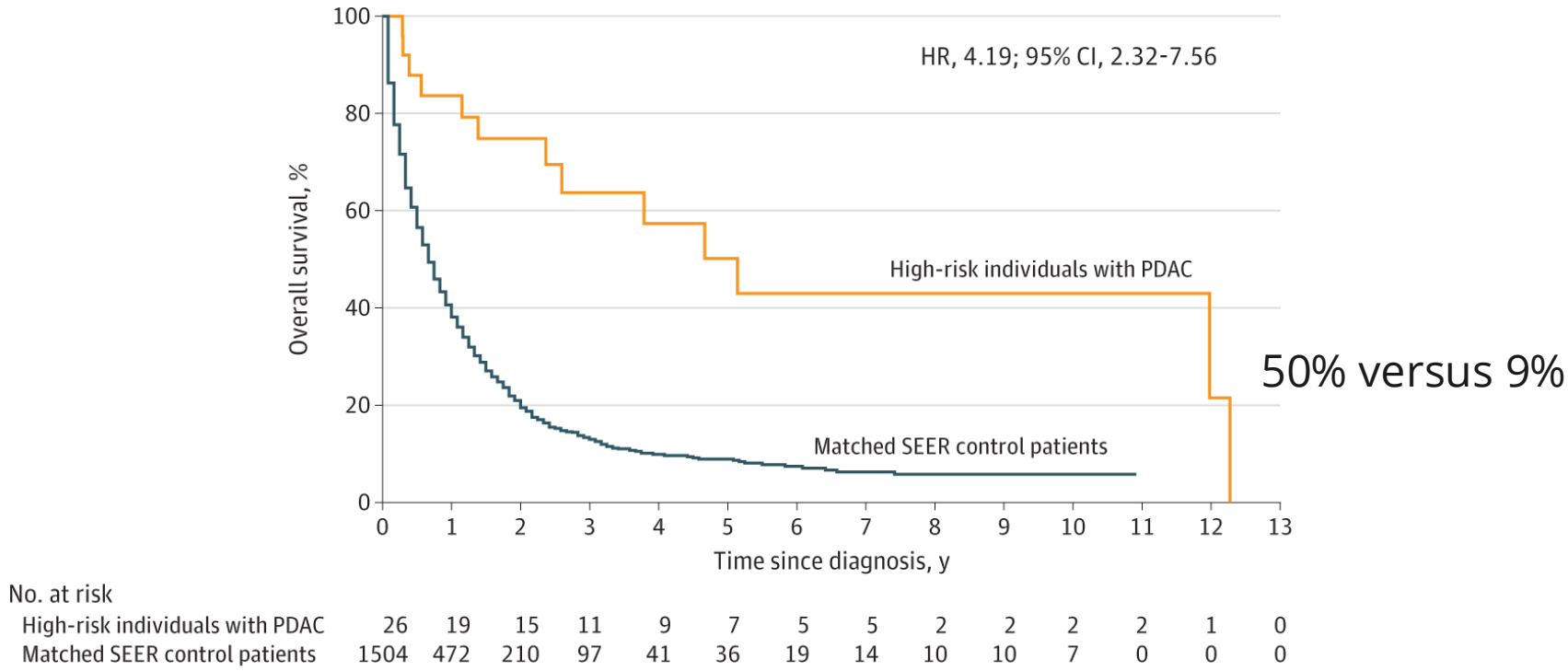


Figure Legend:

Overall Survival for Pancreatic Ductal Adenocarcinoma (PDAC) in High-Risk Individuals and Matched Surveillance, Epidemiology, and End Results (SEER) Control PatientsHR indicates hazard ratio.

Table 1. Epidemiology of Pancreatic cancer: 1970s versus 2005.

1975 data[a]	Current data
Common in Western countries	Still true; rates are rising in other countries such as China
High rates in New Zealand Maoris	Still true
Increasing frequency in males (USA)	Rates have stabilised, probably because of changes in smoking habits
Clustering in southern Louisiana	High rates have been reported in Cajuns[39]
Two-fold increased risk for smokers	Confirmed by numerous studies
Two-fold increased risk for diabetics	Confirmed for type II but not type I diabetes
Alcohol consumption unproven risk factor	Nearly all studies show no association
Dietary fat suspected but unproven risk factor	Conflicting data, most large studies negative
Occupational factors suspected but unproven	Occupation not a major risk factor for pancreas cancer
Hereditary pancreatitis only known genetic link	High risk of pancreas cancer in patients with hereditary pancreatitis. Other inherited genetic disorders cause about 10% of all pancreatic cancer.

[a] DFrom [4,5].

Baseline characteristics and risk of pancreatic cancer

	Cases (n=256)	Person-years	Incidence rate[a]	HR[b] (95% CI)	p[c]
Age (mean ± SD)					
< 60	74 (28.9%)	215,407	34.4	1.0	< 0.0001
60 – < 65	91 (35.6%)	199,979	45.5	1.4 (1.0 – 1.8)	
≥ 65	91 (35.6%)	147,910	61.5	1.9 (1.4 – 2.6)	
BMI (mean ± SD)					
< 25	123 (48.0%)	271,774	45.3	1.0	0.35
25 – < 30	78 (30.5%)	191,675	40.7	0.9 (0.7 – 1.2)	
≥ 30	55 (21.5%)	99,847	55.1	1.1 (1.0 – 1.2)	
Race					
White	250 (99.6%)	552,869	45.2	1.0	0.52
Others	1 (0.4%)	4,457	22.4	0.5 (0.1 – 3.7)	
Education					
< High school	47 (18.4%)	101,635	46.2	1.0	0.81
High school	106 (41.4%)	239,376	44.3	1.0 (0.7 – 1.4)	
> High school	103 (40.2%)	222,285	46.3	1.0 (0.7 – 1.5)	
Cigarette smoking					
Never smoker	161 (63.9%)	377,586	42.6	1.0	0.001
Former smoker	40 (15.9%)	103,947	38.5	1.0 (0.7 – 1.4)	
Current smoker	51 (20.2%)	74,271	68.7	1.9 (1.4 – 2.5)	
Alcohol intake					
No	136 (53.1%)	309,944	43.9	1.0	0.36
Yes	120 (48.9%)	253,352	47.4	(0.9 – 1.4)	
Physical activity					
Low	130 (51.0%)	259,284	50.1	1.0	0.17
Moderate	64 (25.1%)	154,389	41.5	0.8 (0.6 – 1.1)	
High	61 (23.4%)	141,059	43.2	0.9 (0.6 – 1.2)	
History of diabetes					
No	232 (91.3%)	531,889	43.6	1.0	0.007
Yes	22 (8.7%)	27,667	79.5	1.9 (1.2 – 3.0)	

[a] Per 100,000 person-years

[b] Age-adjusted hazard ratio and 95% confidence interval

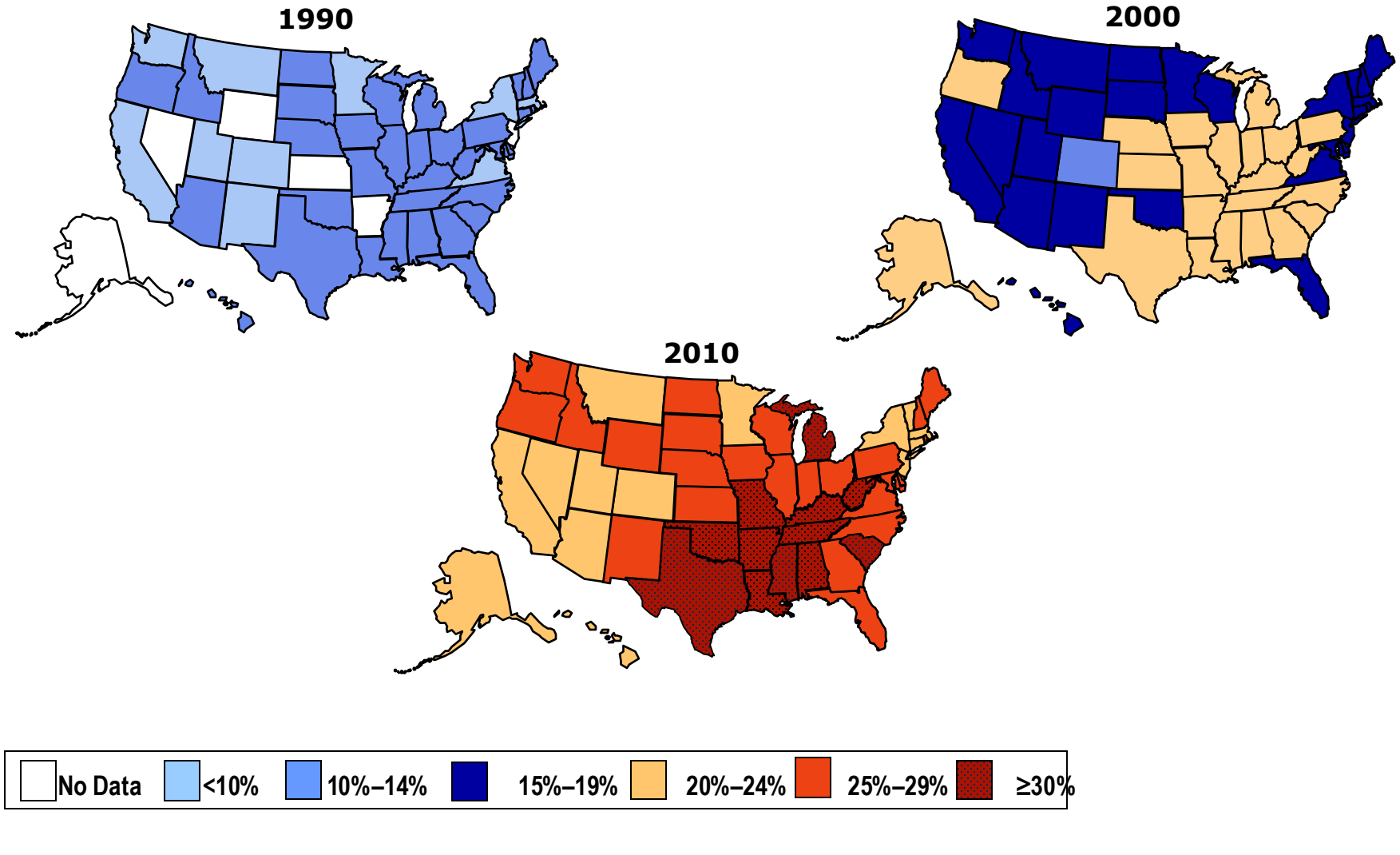
[c] Wald chi-square test


Total Fat 61g 94%
Saturated Fat 21.5g 108%
Trans Fat 2.5g
Cholesterol 155mg 52%
Sodium 1665mg 69%
Total Carbohydrate 146g 49%
Dietary Fiber 8g 32%
Sugars 67g
Protein 52g 104%
CHEMICAL ADDITIVES:
ethylenediaminetetraacetic acid, datem, ethoxylated monoglycerides, enzymes, tertiary butylhydroquinone, sodium acid pyrophosphate, dimethylpolysiloxane, azodicarbonamide, sodium stearoyl lactylate, monocalcium phosphate, thiamin mononitrate, mono/ diglycerides, potassium benzoate, ammonium chloride, ammonium sulfate, aspartame, sodium erythorbate, annatto, artificial color, high fructose corn syrup, ascorbic acid, autolyzed yeast extract, sodium phosphate, sodium propionate, calcium carbonate, calcium chloride, calcium peroxide, calcium propionate, calcium silicate, calcium sulfate, caramel color, citric acid, dextrose, dried beef extract, guar gum, lactic acid, maltodextrin, polysorbate 80, sodium benzoate, sodium citrate, sodium nitrite, caffeine, phosphoric acid, sorbic acid, soy lecithin, wheat gluten, yeast extract
35% of all cancers in the United States may be related to diet
Both what we eat and what we don't
ModeRN KITCHEN...
Kikor.com
COMMERCIAL PHOTOGRAPHY

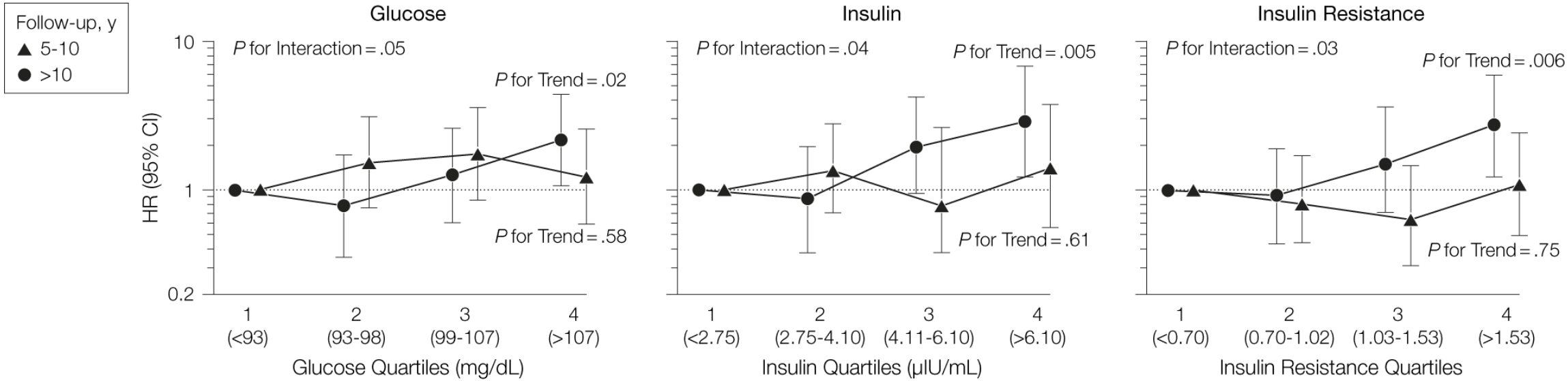
Obesity Trends* Among U.S. Adults

BRFSS, 1990, 2000, 2010

(*BMI ≥30, or about 30 lbs. overweight for 5’4” person)

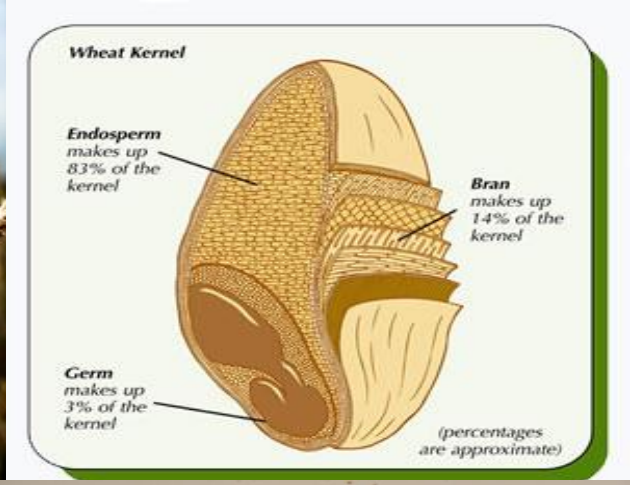


Obesity, diabetes mellitus, and glucose intolerance have been associated with increased pancreatic cancer risk; however, prediagnostic serum insulin concentration has not been evaluated as a predictor of this malignancy.



Follow-up													
5-10 y	No. of Cases	17	24	27	18	21	28	15	22	27	21	15	23
	No. of Controls	99	100	102	99	100	101	103	96	100	100	100	100
	HR (95% CI)	1.00	1.54 (0.76-3.12)	1.75 (0.86-3.59)	1.23 (0.59-2.57)	1.00	1.35 (0.71-2.56)	0.78 (0.38-1.61)	1.37 (0.56-3.38)	1.00	0.82 (0.43-1.57)	0.65 (0.31-1.37)	1.09 (0.50-2.37)
>10 y	No. of Cases	17	13	21	32	16	13	26	28	17	15	22	29
	No. of Controls	89	88	89	79	89	89	91	76	89	88	90	78
	HR (95% CI)	1.00	0.79 (0.35-1.74)	1.26 (0.60-2.63)	2.16 (1.05-4.42)	1.00	0.87 (0.38-1.96)	1.95 (0.92-4.14)	2.90 (1.22-6.92)	1.00	0.91 (0.42-1.98)	1.50 (0.71-3.17)	2.71 (1.19-6.18)

JAMA. 2005;294(22):2872-2878. doi:10.1001/jama.294.22.2872



↑ Processing =

↑ Surface area =

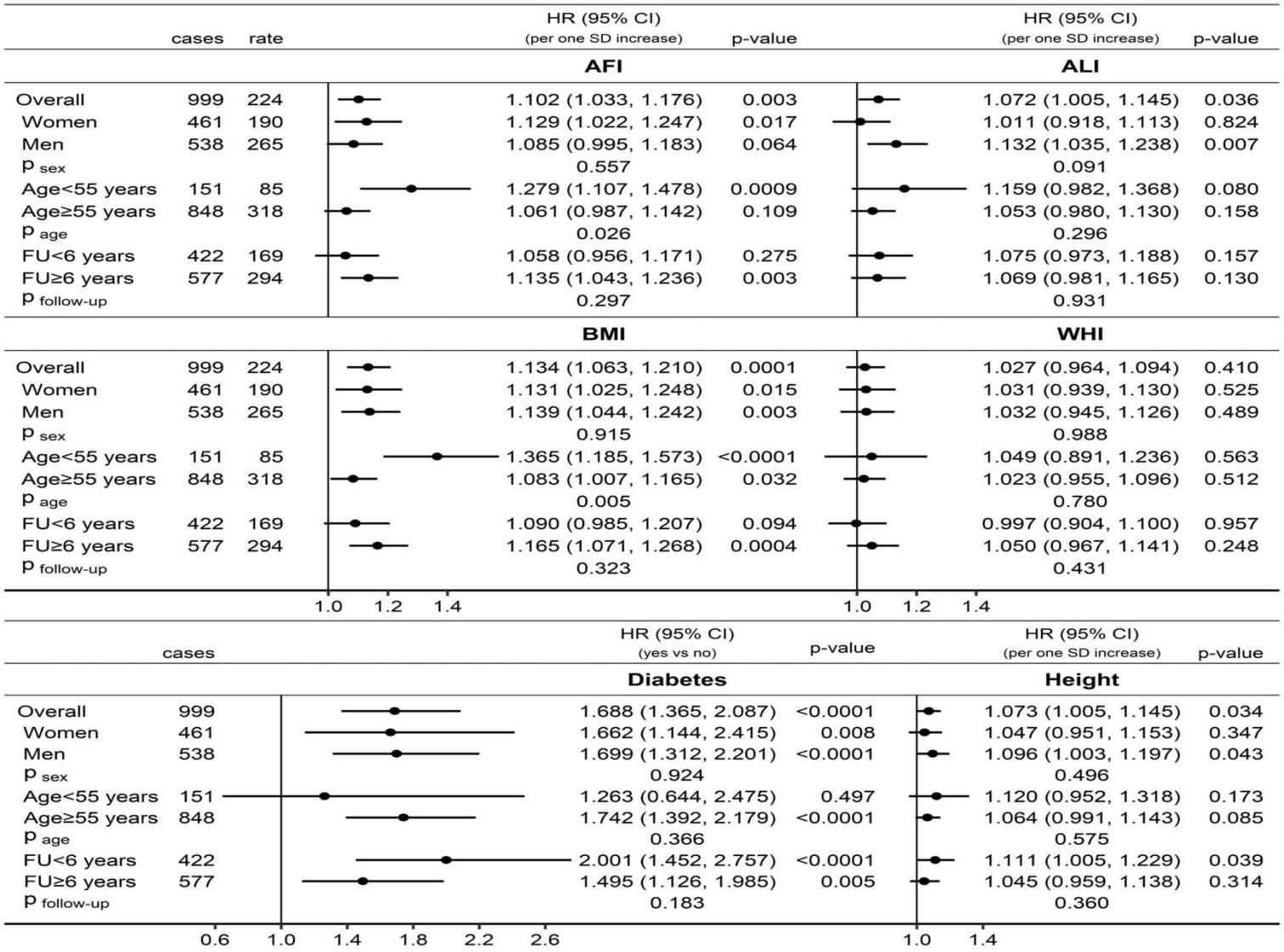
↑ Glycemic Index/Load =

↑ Blood glucose =

↑ Insulin (Insulin like GF)=

↑ Storage / Inflammation / Tumor initiation & Promotion

Prospective Associations of Body Composition and Body Shape With the Risk of Developing Pancreatic Cancer in the UK Biobank Cohort



Cancer Medicine, Volume: 14, Issue: 6, First published: 25 March 2025, DOI: (10.1002/cam4.70809)

Dietary intake of nutrients, food groups and dietary patterns and risk of pancreatic cancer

	Quintiles of dietary intake or dietary pattern scores					*p* for trend
	1 (lowest)	2	3	4	5 (highest)	
Nutrient intake						
Total calorie						
Median (kcal/d)	1,107	1,449	1,718	2,027	2,567	
Cases	56	50	51	44	55	
Age-adjusted HR	1.0	0.88 (0.60–1.28)	0.89 (0.61–1.30)	0.77 (0.52–1.15)	0.96 (0.66–1.39)	0.77
Multivariate HR[a]	1.0	0.90 (0.61–1.32)	0.86 (0.58–1.27)	0.81 (0.54–1.21)	0.97 (0.66–1.42)	0.81
Carbohydrate						
Median (g/d)	141.0	182.0	203.3	222.0	252.7	
Cases	53	74	43	44	42	
Age-adjusted HR	1.0	1.32 (0.93–1.88)	0.75 (0.50–1.12)	0.75 (0.50–1.12)	0.71 (0.47–1.07)	0.008
Multivariate HR[a]	1.0	1.38 (0.96–1.99)	0.83 (0.55–1.25)	0.84 (0.56–1.27)	0.81 (0.53–1.23)	0.06
Vitamin C						
Median (mg/d)	82.40	137.50	184.25	271.80	678.55	
Cases	53	55	47	54	47	
Age-adjusted HR	1.0	0.99 (0.68–1.45)	0.84 (0.57–1.25)	0.98 (0.67–1.44)	0.87 (0.59–1.29)	0.53
Multivariate HR[a]	1.0	1.09 (0.73–1.62)	0.97 (0.65–1.46)	1.16 (0.78–1.72)	0.99 (0.66–1.49)	0.84
Vitamin E						
Median (mg/d)	5.2	6.9	8.7	22.1	241.0	
Cases	56	51	59	51	39	
Age-adjusted HR	1.0	0.88 (0.60–1.29)	1.03 (0.71–1.48)	0.89 (0.61–1.30)	0.68 (0.45–1.02)	0.05
Multivariate HR[a]	1.0	0.93 (0.63–1.38)	1.07 (0.73–1.57)	0.95 (0.65–1.41)	0.76 (0.50–1.16)	0.13
Food group intake						
Total vegetables						
Median (servings/wk)	11.5	17.5	22.0	28.0	40.0	
Cases	48	43	53	56	56	
Age-adjusted HR	1.0	0.89 (0.59–1.35)	1.09 (0.74–1.61)	1.14 (0.78–1.68)	1.16 (0.79–1.70)	0.26
Multivariate HR[a]	1.0	0.82 (0.53–1.26)	1.13 (0.76–1.68)	1.15 (0.77–1.71)	1.21 (0.81–1.80)	0.14
Total fruits						
Median (servings/wk)	6.5	12.5	16.5	21.0	29.5	
Cases	51	53	61	48	43	
Age-adjusted HR	1.0	0.96 (0.65–1.41)	1.10 (0.75–1.59)	0.85 (0.57–1.27)	0.77 (0.51–1.15)	0.15
Multivariate HR[a]	1.0	1.12 (0.75–1.67)	1.27 (0.86–1.88)	1.02 (0.67–1.55)	0.98 (0.64–1.50)	0.71
Total vegetables and fruits						
Median (servings/wk)	22.0	32.0	4.0	48.0	64.5	
Cases	51	46	58	47	54	
Age-adjusted HR	1.0	0.85 (0.57–1.27)	1.07 (0.73–1.55)	0.85 (0.57–1.27)	1.00 (0.68–1.46)	0.97
Multivariate HR[a]	1.0	0.95 (0.63–1.43)	1.15 (0.77–1.71)	1.00 (0.66–1.51)	1.18 (0.79–1.77)	0.38
Red meat						
Median (servings/wk)	2.0	3.5	5.0	7.0	9.0	
Cases	54	43	52	55	52	
Age-adjusted HR	1.0	0.79 (0.53–1.18)	0.95 (0.65–1.39)	1.00 (0.69–1.46)	0.96 (0.65–1.40)	0.78
Multivariate HR[a]	1.0	0.85 (0.57–1.28)	0.99 (0.67–1.47)	1.06 (0.72–1.55)	0.97 (0.65–1.44)	0.79
Dietary pattern scores						
High vegetable						
Cases	49	43	58	50	56	
Age-adjusted HR	1.0	0.89 (0.59–1.34)	1.20 (0.82–1.76)	1.05 (0.71–1.56)	1.23 (0.84–1.81)	0.06
Multivariate HR[a]	1.0	0.83 (0.54–1.26)	1.19 (0.81–1.75)	1.04 (0.69–1.56)	1.25 (0.84–1.87)	0.03
Low fat						
Cases	56	50	48	52	50	
Age-adjusted HR	1.050	0.82 (0.56–1.20)	0.76 (0.52–1.12)	0.80 (0.54–1.17)	0.76 (0.52–1.12)	0.23
Multivariate HRa	1.0	0.93 (0.62–1.38)	0.90 (0.60–1.36)	0.95 (0.63–1.42)	0.97 (0.64–1.47)	0.99
Mediterranean						
Cases	54	50	39	53	60	
Age-adjusted HR	1.0	0.96 (0.65–1.41)	0.77 (0.51–1.16)	1.09 (0.75–1.59)	1.32 (0.91–1.92)	0.07
Multivariate HR[a]	1.0	0.92 (0.62–1.36)	0.69 (0.44–1.06)	1.00 (0.67–1.49)	1.27 (0.84–1.90)	0.14
High fiber						

Cancer Epidemiol Biomarkers Prev . 2011 Apr;20(4):711-4. doi: 10.1158/1055-9965.EPI-11-0026. Epub 2011 Jan 28.

Table 1. Summary of the associations between risk factors and pancreatic cancer reported in published 86 meta- and 34 pooled-analyses

Degree of association	Risk factors	Number of published meta/ pooled-analyses[a]	Number of reports showing			Strength of association (or lack of association)				
			Inverse association	Null association	Positive association	Grade[b]	Association confirmed in several reports	Association confirmed in cohort studies	Association confirmed in pooled analyses	*Note*
High risk (RR ≥2.0)	History of chronic pancreatitis	1/1	–	–	2	++	Yes		Yes	
	History of idiopathic thrombosis	1/0	–	–	1	0	No			
Moderate risk (RR 1.5-1.9)	Tobacco smoking	3/5	–	–	8	++	Yes	Yes	Yes	
	Diabetes mellitus	7/7	–	–	14	++	Yes	Yes	Yes	
	Use of antidiabetic drugs other than metformin	4/1	–	1	4	++	Yes	Yes	Yes	
	Family history	1/1	–	–	2	++	Yes	Yes	Yes	
	Metabolic syndrome	2/0	–	–	2	0	No			The 2 reports are very similar
Low risk (RR 1.1-1.4)	Obesity (high body mass index)	5/5	–	2	8	++	Yes	Yes	Yes	No association in Asians, stronger in women
	Hepatitis B virus infection	5/0	–	1	4	++	Yes	Yes		
	Non-O blood group	2/1	–	–	3	++	Yes	Yes	Yes	
	Heavy alcohol intake	1/3	–	1	3	++	Yes	Yes	Yes	
	Tallness (height)	1/3	–	2	2	++	Yes		Yes	
	High waist-to-hip ratio	1/1	–	–	2	++	Yes		Yes	
	Helicobacter pylori infection	4/0	–	–	3	+	Yes			Heterogeneous definitions
	History of gastrectomy	1/1	–	–	2	++	Yes	Yes	Yes	
	History of cholecystectomy	1/0	–	–	1	+	No	Yes		
	High waist circumference	1/1	–	1	1	0	No		No	Only cohort studies included
	Hepatitis C virus infection	2/0	–	1	1	0	No			
	Red meat	2/0	–	1	1	0	No	No		
	Processed meat	1/0	–	–	1	0	No			
	Elevated sugars intake	1/0	–	–	1	0	No			
No association (RR = 1.0)	Aspirin / NSAIDS use	4/1	–	5	–	++	Yes	Yes	Short-term use	Possible association with long-term use
	Statins use	2/0	–	2	–	++	Yes	Yes		

Int J Epidemiol, Volume 44, Issue 1, February 2015, Pages 186–198, https://doi.org/10.1093/ije/dyu240

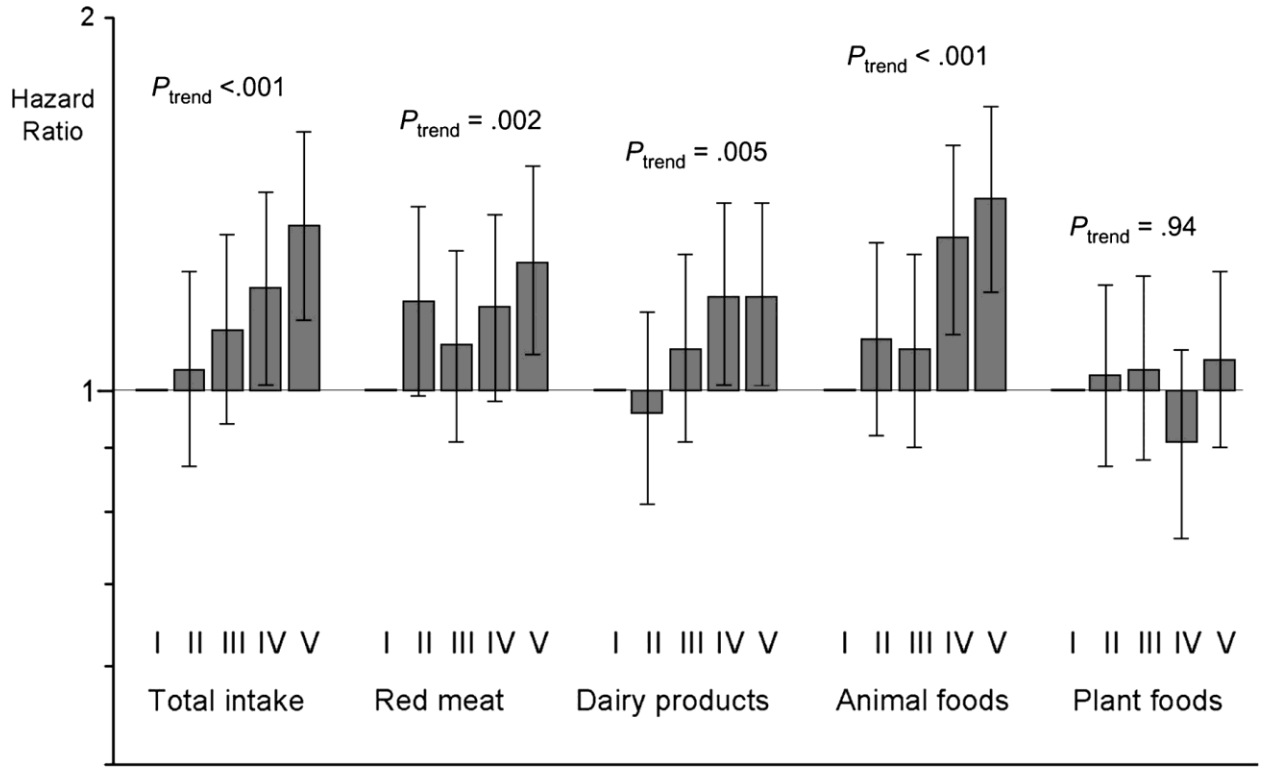
Table 1. Continued

Degree of association	Risk factors	Number of published meta/pooled-analyses[a]	Number of reports showing			Strength of association (or lack of association)				
			Inverse association	Null association	Positive association	Grade[b]	Association confirmed in several reports	Association confirmed in cohort studies	Association confirmed in pooled analyses	*Note*
	Fish consumption	2/0	–	2	–	++	Yes	Yes		
	Soft drinks consumption	1/1	–	2	–	++	Yes		Yes	
	Coffee consumption	2/1	1	2	–	++	Yes	Yes	Yes	Discordant results
	Tea consumption	1/1	–	2	–	++	Yes	Yes	Yes	Possible association in China
	Smokeless tobacco use	3/0	–	2	1	+	Yes			
	Glycaemic index	5/0	–	5	–	+	Yes			
	Glycaemic load	5/0	–	5	–	+	Yes			
	Plasma 25(OH)D level	1/2	1	1	1	0				Discordant results
	Environmental tobacco smoke exposure	1/0	–	1	–	0	No			
Low to moderate protection (RR 0.5-0.9)	Allergy	1/1	2	–	–	++	Yes		Yes	
	Metformin use (for diabetics)	4/0	2	2	–	+	Yes			
	High adiponectin level	0/1	1	–	–	+	No		Yes	
	Intense occupational physical activity	2/0	2	–	–	+	Yes			
	High dietary folate intake	3/1	3	1	–	+	Yes	No	No	
	High fruit consumption	2/1	2	1	–	+	Yes	No	No	
	High vegetables consumption	1/1	1	1	–	0	No	No	No	

[a]Number of published meta-analyses and pooled analyses by 31 October 2014; study details are available in Supplementary Tables 1a–h, available as Supplementary data at *IJE* online.
[b]'Strong' evidence (++); 'moderate' evidence (+); 'poor' evidence (0).

Int J Epidemiol, Volume 44, Issue 1, February 2015, Pages 186–198, https://doi.org/10.1093/ije/dyu240

Figure 1 Multivariable-adjusted hazard ratios (vertical bars) and 95% confidence intervals (vertical lines) for ...

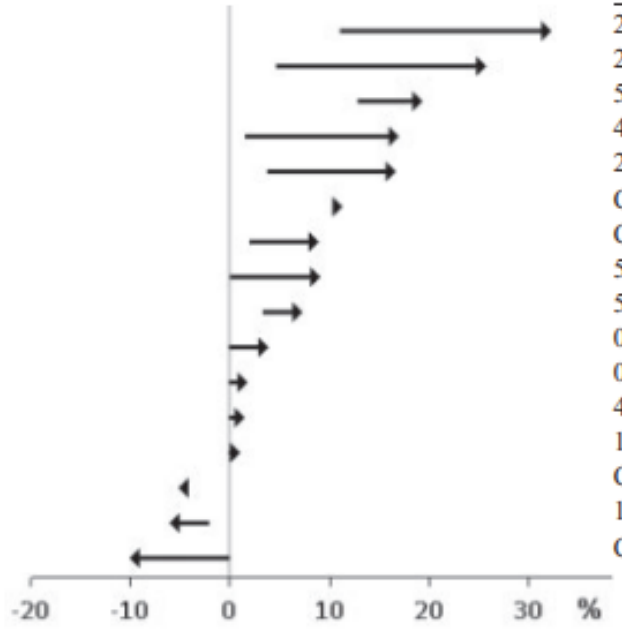


J Natl Cancer Inst, Volume 101, Issue 14, 15 July 2009, Pages 1001–1011, https://doi.org/10.1093/jnci/djp168

Multivariable-adjusted hazard ratios and 95% confidence intervals for pancreatic cancer risk in association with individual fatty acid intakes among 308 736 men and 216 737 women in the National Institutes of Health–AARP Diet and Health Study *

Dietary variable	Quintile I	Quintile II	Quintile III	Quintile IV	Quintile V	P_{trend} †	Continuous ‡
Saturated fatty acids							
Palmitic acid, 16:0, HR (95% CI)	1.00 (reference)	1.06 (0.88 to 1.27)	1.08 (0.91 to 1.30)	1.21 (1.02 to 1.44)	1.33 (1.11 to 1.58)	<.001	1.27 (1.10 to 1.46)
Stearic acid, 18:0, HR (95% CI)	1.00 (reference)	1.08 (0.91 to 1.30)	1.18 (0.99 to 1.41)	1.06 (0.89 to 1.27)	1.31 (1.10 to 1.56)	.008	1.22 (1.07 to 1.38)
Monounsaturated fatty acids							
Palmitoleic acid, 16:1, HR (95% CI)	1.00 (reference)	1.07 (0.89 to 1.28)	1.20 (1.00 to 1.43)	1.29 (1.08 to 1.54)	1.34 (1.12 to 1.59)	<.001	1.26 (1.13 to 1.41)
Oleic acid, 18:1, HR (95% CI)	1.00 (reference)	1.15 (0.97 to 1.38)	1.16 (0.97 to 1.39)	1.15 (0.96 to 1.37)	1.16 (0.97 to 1.39)	.12	1.09 (0.96 to 1.25)
n-6 Polyunsaturated fatty acids							
Linoleic acid, 18:2, HR (95% CI)	1.00 (reference)	1.00 (0.84 to 1.19)	0.96 (0.81 to 1.14)	1.04 (0.88 to 1.23)	0.99 (0.83 to 1.17)	.98	1.04 (0.92 to 1.16)
Arachidonic acid, 20:4, HR (95% CI)	1.00 (reference)	1.16 (0.98 to 1.38)	1.07 (0.90 to 1.28)	1.20 (1.01 to 1.43)	1.33 (1.12 to 1.58)	.002	1.10 (1.02 to 1.18)
Total, HR (95% CI)	1.00 (reference)	1.01 (0.85 to 1.20)	0.97 (0.82 to 1.16)	1.05 (0.89 to 1.25)	0.99 (0.84 to 1.18)	.91	1.04 (0.92 to 1.17)
n-3 Polyunsaturated fatty acids							
Linolenic acid, 18:3, HR (95% CI)	1.00 (reference)	1.13 (0.95 to 1.34)	0.99 (0.83 to 1.19)	1.17 (0.98 to 1.39)	1.13 (0.95 to 1.34)	.15	1.11 (0.98 to 1.25)
Eicosapentaenoic acid, 20:5, HR (95% CI)	1.00 (reference)	1.05 (0.88 to 1.25)	1.14 (0.96 to 1.36)	1.03 (0.86 to 1.22)	1.19 (1.00 to 1.41)	.35	1.00 (0.98 to 1.02)
Docosahexaenoic acid, 22:6, HR (95% CI)	1.00 (reference)	1.10 (0.92 to 1.31)	1.13 (0.95 to 1.35)	1.17 (0.98 to 1.39)	1.25 (1.05 to 1.49)	.009	1.02 (0.98 to 1.06)
Total n-3, HR (95% CI)	1.00 (reference)	1.13 (0.95 to 1.35)	1.10 (0.92 to 1.31)	1.29 (1.09 to 1.53)	1.21 (1.02 to 1.44)	.01	1.14 (1.01 to 1.29)
Ratio of n-3 to n-6 fatty acids, HR (95% CI)	1.00 (reference)	0.91 (0.76 to 1.08)	1.12 (0.95 to 1.32)	1.02 (0.86 to 1.21)	1.06 (0.89 to 1.25)	.28	1.20 (1.00 to 1.43)
Trans unsaturated fatty acids							
trans 16:1, HR (95% CI)	1.00 (reference)	1.02 (0.85 to 1.23)	1.15 (0.96 to 1.38)	1.17 (0.98 to 1.40)	1.38 (1.17 to 1.64)	<.001	1.06 (1.01 to 1.10)
trans 18:1, HR (95% CI)	1.00 (reference)	0.99 (0.83 to 1.17)	1.08 (0.91 to 1.28)	0.97 (0.82 to 1.16)	1.01 (0.85 to 1.20)	.98	1.02 (0.93 to 1.12)
trans 18:2, HR (95% CI)	1.00 (reference)	0.98 (0.82 to 1.17)	1.06 (0.89 to 1.26)	1.09 (0.92 to 1.30)	1.00 (0.84 to 1.19)	.69	1.06 (0.96 to 1.17)
Total, HR (95% CI)	1.00 (reference)	0.93 (0.78 to 1.10)	1.05 (0.89 to 1.25)	0.97 (0.81 to 1.15)	0.99 (0.83 to 1.17)	>.99	1.03 (0.94 to 1.13)

Population attributable fraction of major risk factors for pancreatic cancer.



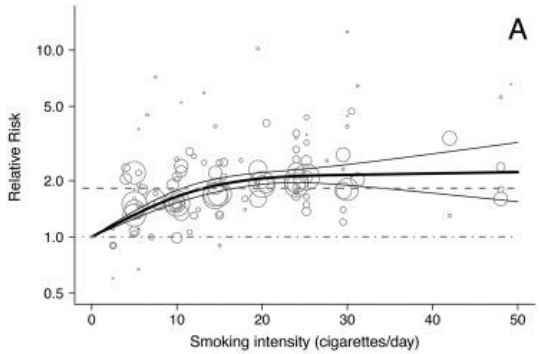
Risk factor	Population Exposed	Relative Risk	Attributable Fraction
Tobacco smoking	25-40%	1.5-2.2	PAF 11-32%
Helicobacter pylori infection	25-50%	1.2-1.7	PAF 4-25%
Non-O blood group	50-60%	1.3-1.4	PAF 13-19%
Diabetes mellitus	4-17%	1.4-2.2	PAF 1-16%
Obesity	20-40%	1.2-1.5	PAF 3-16%
Reducing adiponectin level	Continuous	1.6*	PIF 11%
Increasing red or processed meat	Continuous	1.1-1.5*	PIF 2-9%
Heavy alcohol intake	5-20%	1.1-1.5	PAF <9%
Family history	5-10%	1.7-1.8	PAF 3-7%
History of chronic pancreatitis	0-1%	2.7-5.1	PAF <3%
Hepatitis B infection	0-5%	1.2-1.4	PAF <1%
History of cholecystectomy	4-8%	1.2	PAF <1%
History of gastrectomy	1-2%	1.5	PAF <1%
Increasing physical activity	Continuous	0.75*	PIF (5%)
History of allergy	10-20%	0.7-0.8	PPF (3-7%)
Increasing fruit or folate intake	Continuous	0.5-1.0*	PIF (<12%)

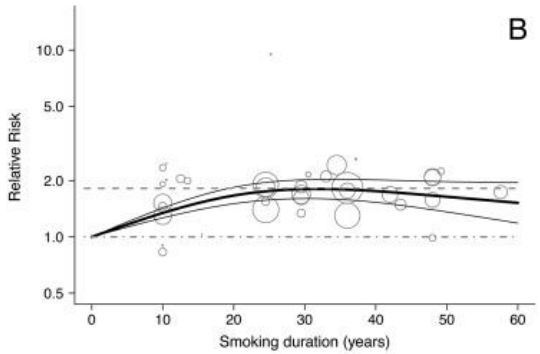
* for continuous variables the relative risk is expressed for the highest versus lowest quintile

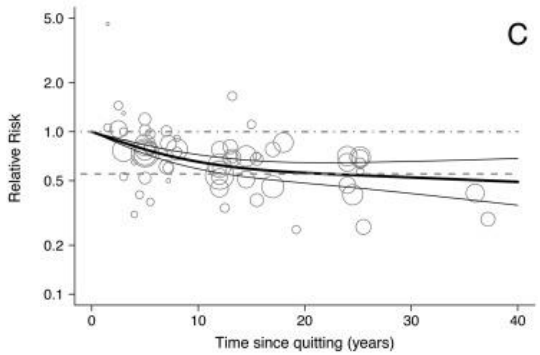
Population attributable fraction (PAF) = $P_e (RR_e-1) / [1 + P_e (RR_e-1)]$
Population preventable fraction (PPF) = $P_e (1-RR_e)$
Potential impact fraction (PIF) = $(P_e - P^*) (RR_e-1) / [1 + P_e (RR_e-1)]$

Int J Epidemiol, Volume 44, Issue 1, February 2015, Pages 186–198, https://doi.org/10.1093/ije/dyu240

Smoking







European Journal of Cancer Volume 104, November 2018, Pages 117-126

Age-Adjusted and Multivariable-Adjusted Relative Risks for the Association of Alcohol Intake With Pancreatic Cancer Mortality[a]

Table 2. Age-Adjusted and Multivariable-Adjusted Relative Risks for the Association of Alcohol Intake With Pancreatic Cancer Mortality[a]

Alcohol Intake, Drinks per Day	No. of Deaths	Total Person-Years	Age-Adjusted Relative Risk (95% CI)[b]	Multivariable-Adjusted Without Smoking Relative Risk (95% CI)[c]	Multivariable-Adjusted With Smoking Relative Risk (95% CI)[d]
			Men		
Nondrinker	1498	3 870 330	1.00 [Reference]	1.00 [Reference]	1.00 [Reference]
Occasional	737	1 943 555	1.04 (0.95-1.13)	1.05 (0.96-1.15)	1.03 (0.94-1.13)
1	321	833 180	1.02 (0.90-1.15)	1.05 (0.93-1.18)	1.03 (0.91-1.16)
2	311	786 741	1.06 (0.94-1.20)	1.09 (0.96-1.23)	1.04 (0.92-1.18)
3	216	438 416	1.37 (1.19-1.58)	1.41 (1.22-1.63)	1.31 (1.14-1.52)
≥4	360	849 924	1.22 (1.09-1.37)	1.24 (1.11-1.40)	1.14 (1.01-1.28)
P for trend	...	...	<.001	<.001	.002
			Women		
Nondrinker	2083	7 479 594	1.00 [Reference]	1.00 [Reference]	1.00 [Reference]
Occasional	716	2 582 559	1.10 (1.01-1.19)	1.13 (1.04-1.23)	1.08 (0.99-1.18)
1	189	775 475	0.93 (0.80-1.08)	0.98 (0.85-1.14)	0.92 (0.79-1.07)
2	202	659 397	1.18 (1.02-1.36)	1.24 (1.07-1.43)	1.10 (0.95-1.28)
3	80	264 350	1.24 (0.99-1.55)	1.30 (1.04-1.62)	1.11 (0.89-1.39)
≥4	134	390 330	1.39 (1.17-1.66)	1.45 (1.21-1.73)	1.25 (1.05-1.50)
P for trend	...	...	<.001	<.001	.02
			Total Cohort		
Nondrinker	**3581**	**11 349 924**	1.00 [Reference]	1.00 [Reference]	1.00 [Reference]
Occasional	**1453**	**4 526 114**	1.07 (1.00-1.13)	1.09 (1.03-1.16)	1.06 (0.99-1.13)
1	**510**	**1 608 655**	0.99 (0.90-1.08)	1.03 (0.94-1.13)	0.99 (0.90-1.08)
2	**513**	**1 446 138**	1.11 (1.01-1.22)	1.15 (1.05-1.26)	1.06 (0.97-1.17)
3	**296**	**702 766**	1.34 (1.19-1.51)	1.39 (1.23-1.56)	1.25 (1.11-1.42)
≥4	**494**	**1 240 254**	1.27 (1.16-1.40)	1.31 (1.19-1.44)	1.17 (1.06-1.29)
P for trend	...	...	<.001	<.001	<.001

Abbreviations: CI, confidence interval; ellipsis, not applicable.
[a] Data are from the Cancer Prevention Study, 1982 to 2006. *P* for trend was computed using a score variable for each level of alcohol intake.
[b] Adjusted for age and sex.
[c] Adjusted for age, sex, race/ethnicity, education, marital status, body mass index, family history of pancreatic cancer, and personal history of gallstones or diabetes mellitus.
[d] Adjusted for age, sex, race/ethnicity, education, marital status, body mass index, family history of pancreatic cancer, and personal history of gallstones, diabetes mellitus, or smoking.

Arch Intern Med. 2011;171(5):444-451. doi:10.1001/archinternmed.2010.536

Smoking-Stratified Multivariable-Adjusted Relative Risks for the Association of Alcohol Intake With Pancreatic Cancer Mortality[a]

Table 3. Smoking-Stratified Multivariable-Adjusted Relative Risks for the Association of Alcohol Intake With Pancreatic Cancer Mortality[a]

	Never Smokers		Ever Smokers		
Alcohol Intake, Drinks per Day	No. of Deaths	Relative Risk (95% CI)[b]	No. of Deaths	Relative Risk (95% CI)[b]	Relative Risk (95% CI)[c]
			Men		
Nondrinker	489	1.00 [Reference]	1009	1.00 [Reference]	1.00 [Reference]
Occasional	155	0.98 (0.82-1.18)	582	1.05 (0.95-1.16)	1.05 (0.95-1.16)
1	64	1.06 (0.82-1.38)	257	1.02 (0.89-1.17)	1.02 (0.89-1.17)
2	39	0.91 (0.66-1.27)	272	1.08 (0.94-1.24)	1.06 (0.93-1.22)
≥3	76	1.36 (1.07-1.73)	500	1.24 (1.11-1.38)	1.18 (1.06-1.31)
P for trend	. . .	.08	. . .	<.001	.007
			Women		
Nondrinker	1303	1.00 [Reference]	780	1.00 [Reference]	1.00 [Reference]
Occasional	314	1.13 (1.00-1.28)	402	1.01 (0.90-1.15)	1.03 (0.91-1.16)
1	77	1.05 (0.84-1.33)	112	0.82 (0.67-1.01)	0.83 (0.68-1.01)
2	53	1.10 (0.84-1.45)	149	1.10 (0.92-1.32)	1.07 (0.90-1.28)
≥3	55	1.33 (1.01-1.74)	159	1.18 (1.00-1.41)	1.12 (0.94-1.33)
P for trend	. . .	.02	. . .	.13	.38
			Total Cohort		
Nondrinker	**1792**	1.00 [Reference]	**1789**	1.00 [Reference]	1.00 [Reference]
Occasional	**469**	1.08 (0.97-1.20)	**984**	1.04 (0.96-1.12)	1.04 (0.96-1.13)
1	**141**	1.06 (0.90-1.27)	**369**	0.95 (0.85-1.06)	0.95 (0.85-1.07)
2	**92**	1.02 (0.83-1.26)	**421**	1.09 (0.98-1.21)	1.07 (0.96-1.19)
≥3	**131**	1.36 (1.13-1.62)	**659**	1.22 (1.12-1.34)	1.16 (1.06-1.27)
P for trend	. . .	.004	. . .	<.001	.006

Abbreviations: CI, confidence interval; ellipsis, not applicable.
[a] Data are from the Cancer Prevention Study, 1982 to 2006. *P* for trend was computed using a score variable for each level of alcohol intake.
[b] Adjusted for age, sex, race/ethnicity, education, marital status, body mass index, family history of pancreatic cancer, and personal history of gallstones or diabetes mellitus.
[c] Adjusted for age, sex, race/ethnicity, education, marital status, body mass index, family history of pancreatic cancer, and personal history of gallstones, diabetes mellitus, or smoking.

Arch Intern Med. 2011;171(5):444-451. doi:10.1001/archinternmed.2010.536

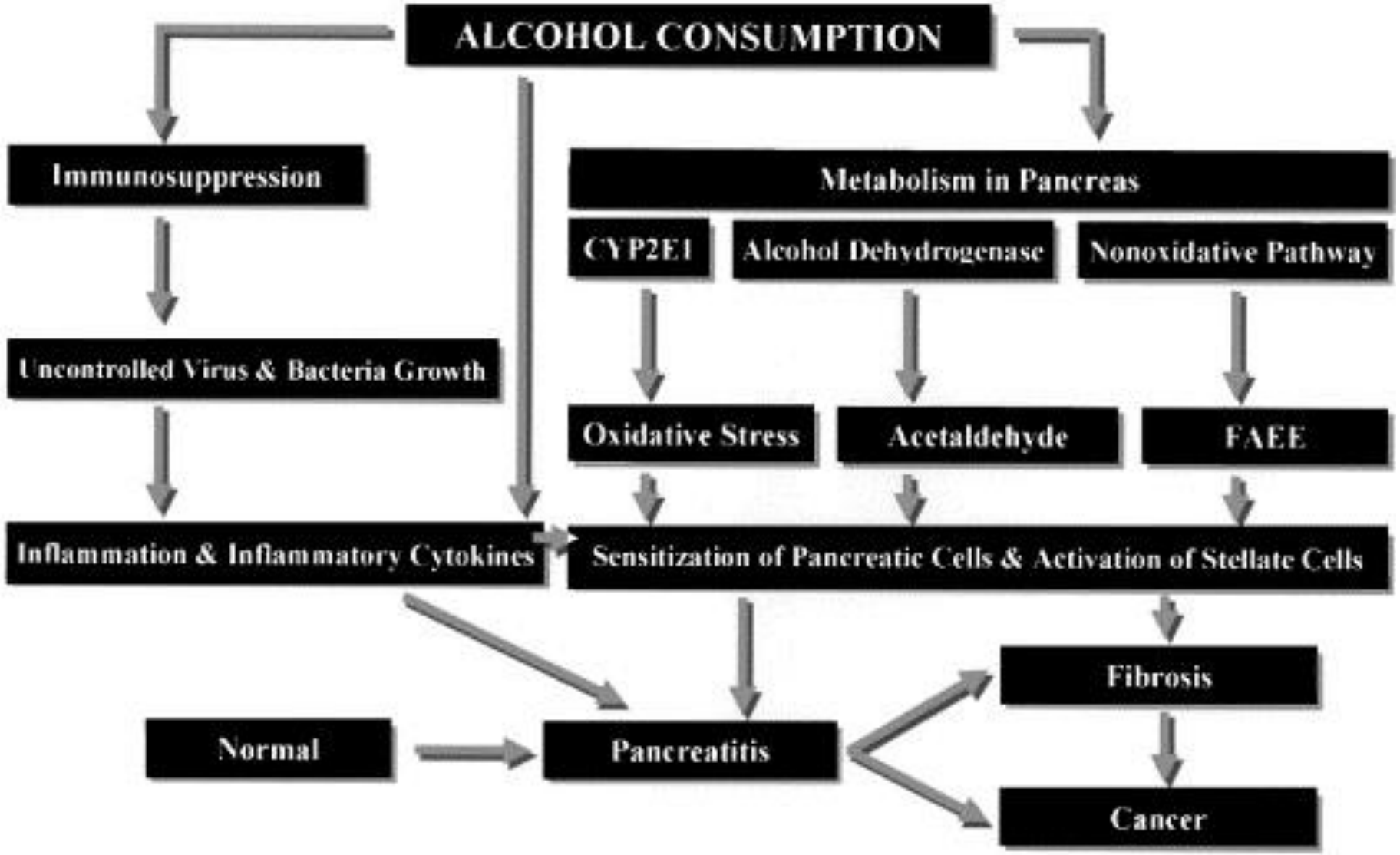
Multivariable-Adjusted Relative Risks for the Association of Beer-Only, Wine-Only, or Liquor-Only Alcohol Intake With Pancreatic Cancer Mortality[a]

Table 4. Multivariable-Adjusted Relative Risks for the Association of Beer-Only, Wine-Only, or Liquor-Only Alcohol Intake With Pancreatic Cancer Mortality[a]

	Beer Only		Wine Only		Liquor Only	
Alcohol Intake, Drinks per day	No. of Deaths	Relative Risk (95% CI)	No. of Deaths	Relative Risk (95% CI)	No. of Deaths	Relative Risk (95% CI)
Never Smokers[b]						
Nondrinker	1792	1.00 [Reference]	1792	1.00 [Reference]	1792	1.00 [Reference]
Occasional	59	1.03 (0.79-1.33)	131	1.01 (0.84-1.21)	76	1.20 (0.96-1.52)
1	19	0.91 (0.58-1.44)	41	1.05 (0.77-1.44)	23	0.87 (0.58-1.32)
≥2	25	1.09 (0.73-1.63)	24	0.94 (0.63-1.40)	41	1.47 (1.08-2.01)
P for trend	. . .	.82	. . .	.99	. . .	.03
Ever Smokers[c]						
Nondrinker	1789	1.00 [Reference]	1789	1.00 [Reference]	1789	1.00 [Reference]
Occasional	172	1.02 (0.87-1.20)	155	1.03 (0.87-1.22)	191	0.97 (0.84-1.13)
1	60	0.86 (0.66-1.11)	58	0.90 (0.69-1.18)	104	0.94 (0.77-1.15)
≥2	177	1.08 (0.92-1.26)	65	0.98 (0.76-1.26)	247	1.18 (1.03-1.35)
P for trend	. . .	.65	. . .	.71	. . .	.07
Total Cohort[c]						
Nondrinker	**3581**	1.00 [Reference]	**3581**	1.00 [Reference]	**3581**	1.00 [Reference]
Occasional	**231**	1.02 (0.89-1.17)	**286**	1.02 (0.90-1.15)	**267**	1.03 (0.91-1.17)
1	**79**	0.87 (0.70-1.09)	**99**	0.96 (0.79-1.18)	**127**	0.94 (0.78-1.12)
2	77	1.08 (0.86-1.35)	50	0.91 (0.68-1.20)	156	1.15 (0.98-1.35)
≥3	125	1.08 (0.90-1.30)	39	1.09 (0.79-1.49)	132	1.32 (1.10-1.57)
P for trend	. . .	.54	. . .	.91	. . .	.006

Abbreviations: CI, confidence interval; ellipsis, not applicable.
[a] Data are from the Cancer Prevention Study, 1982 to 2006. *P* for trend was computed using a score variable for each level of alcohol intake.
[b] Relative risks adjusted for age, sex, race/ethnicity, education, marital status, body mass index, family history of pancreatic cancer, and personal history of gallstones or diabetes mellitus.
[c] Relative risks adjusted for age, sex, race/ethnicity, education, marital status, body mass index, family history of pancreatic cancer, and personal history of gallstones, diabetes mellitus, or smoking.

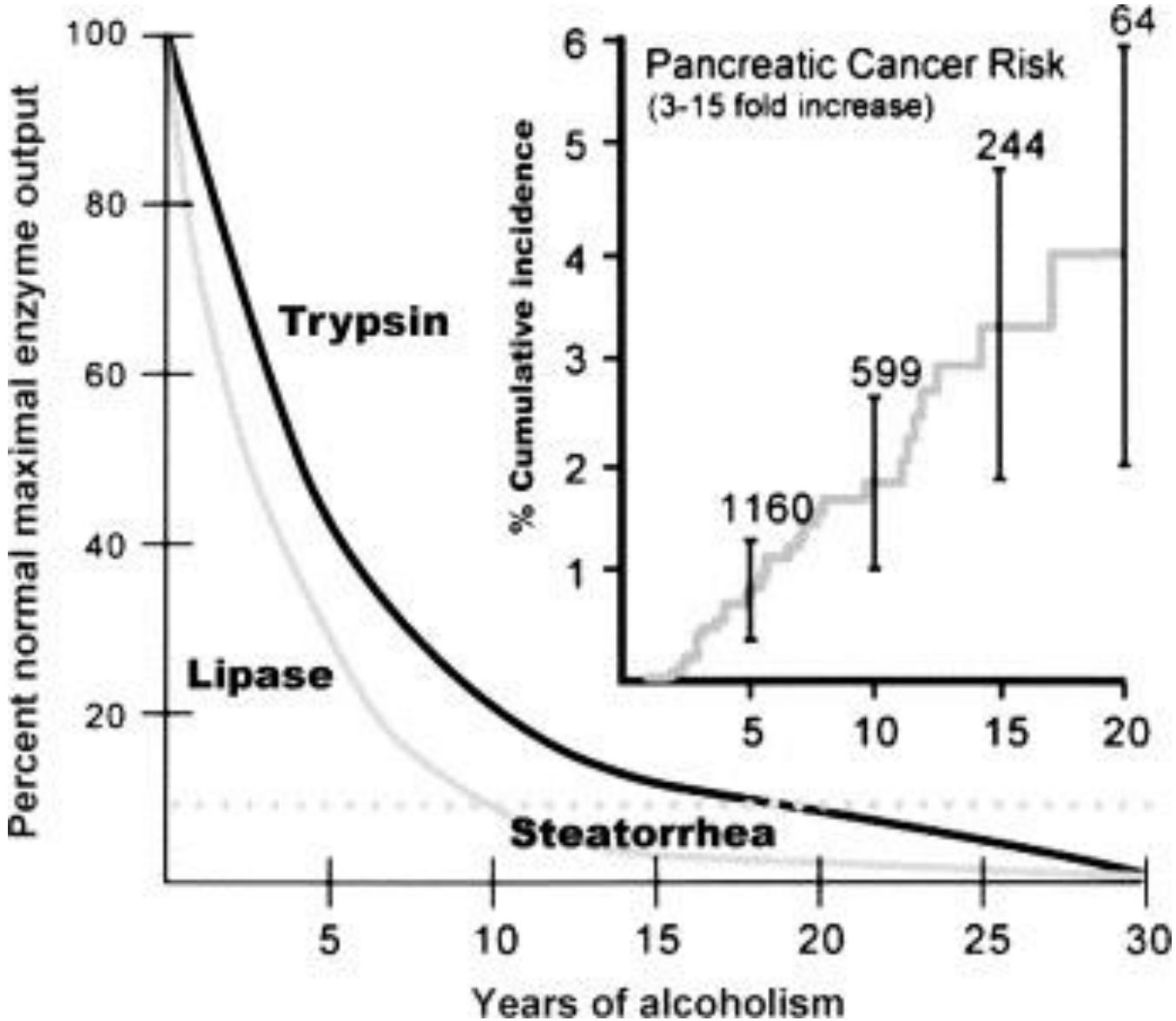
Arch Intern Med. 2011;171(5):444-451. doi:10.1001/archinternmed.2010.536



Alcohol Volume 35, Issue 3, April 2005, Pages 205-211

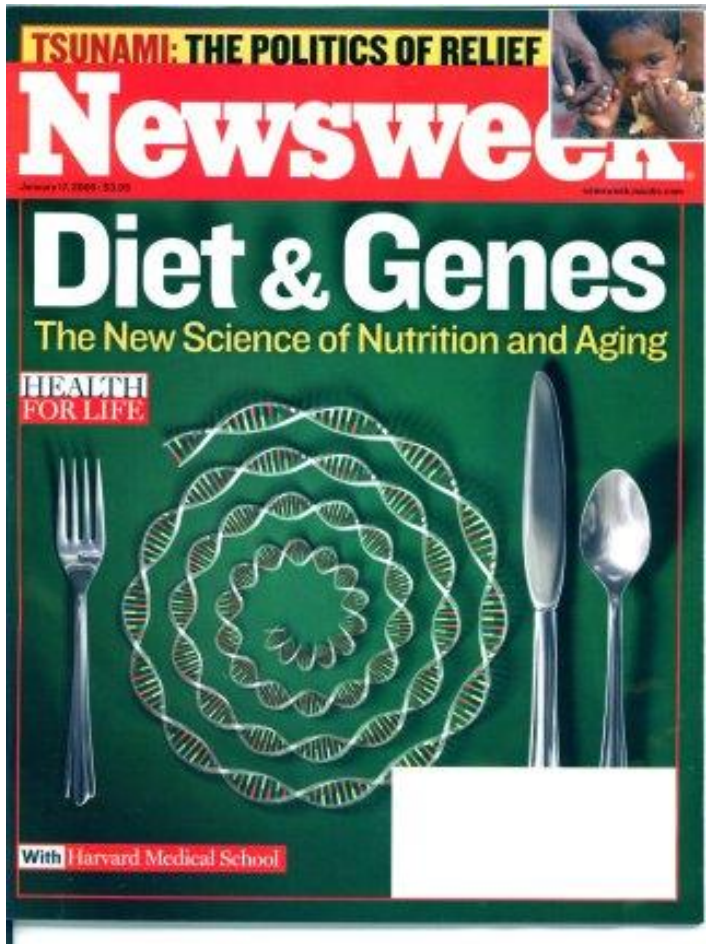

There is no safe level
of alcohol consumption.
The risk of cancer increases even with
low levels of alcohol consumption.
International Agency for Research on Cancer
World Health Organization
World Health Organization
REGIONAL OFFICE FOR Europe


SALUD ES VIDA
DR. MIKE CUSNIR
'MOUNT SINAI' COMP. CANCER CTR.
23
UNIVISION23.COM

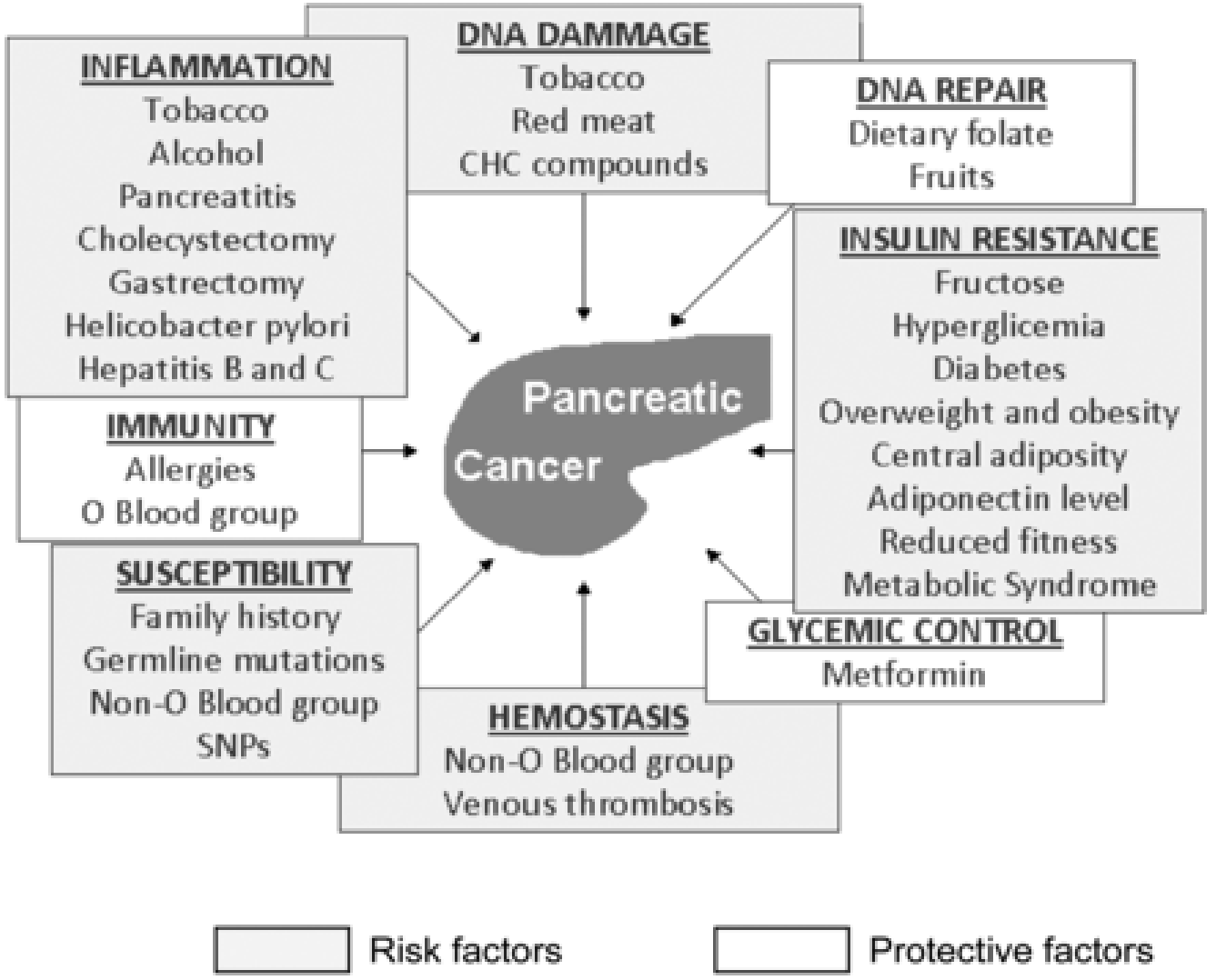


Alcohol Volume 35, Issue 3, April 2005, Pages 205-211


JANUARY 18, 2010
Joe Klein: The CIA's Afghan Disaster
Yemen: The New Center Of Terror
Why the Recession Hasn't Been Cool To Teens
TIME
WHY YOUR DNA ISN'T YOUR DESTINY
The new science of epigenetics reveals how the choices you make can change your genes —and those of your kids
BY JOHN CLOUD
www.time.com


TSUNAMI: THE POLITICS OF RELIEF
Newsweek
Diet & Genes
The New Science of Nutrition and Aging
HEALTH FOR LIFE
With Harvard Medical School

Aetiological factors and general pathways in pancreatic cancer.



Int J Epidemiol, Volume 44, Issue 1, February 2015, Pages 186–198, https://doi.org/10.1093/ije/dyu240

Statistics are used much like a drunk uses a streetlight: for support, not illumination.

Vin Scully