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Supplemental Material

Case-Cohort Study of the Association between PFAS and Selected Cancers among Participants in the American Cancer Society's Cancer Prevention Study II LifeLink Cohort

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Table S1. Definitions used for cancer histologic subtypes using International Classification of Disease for Oncology (ICD-O) histology codes

Cancer site and histologic subtypes	ICD-O codes
Kidney-all	All
Renal cell carcinoma/adenocarcinoma (RCC)	8010, 8260, 8310, 8312, 8317, 8318, 8323
Bladder -all	All
Transitional cell carcinoma of the bladder (TCC-B)	8120, 8122, 8130
Transitional cell carcinoma of the bladder or kidney (TCC-BK)	8120, 8122, 8130
Breast (female only)	All
Prostate (male only)	All
Pancreas- all	All
Non-islet cell carcinoma/neuroendocrine tumors	Excluding 8150, 8246
Hematopoietic (lymphoma, leukemia or myeloma)- (Heme)	All
Myeloid malignancies (MYELO)	9840, 9860, 9861, 9863, 9867, 9871, 9872, 9873, 9874, 9875, 9876, 9891, 9895, 9920, 9945
Lymphoid malignancies (LYMPH)	9590, 9591, 9596, 9650, 9652, 9663, 9670, 9671, 9673, 9675, 9680, 9684, 9687, 9689, 9690, 9691, 9695, 9698, 9699, 9700, 9701, 9702, 9705, 9709, 9714, 9718, 9728, 9729, 9732, 9823, 9827, 9831, 9834, 9835, 9940
Non-Hodgkin Leukemia/Lymphoma (NHL) ^b	9591, 9670, 9671, 9673, 9675, 9680, 9684, 9687, 9689, 9690, 9691, 9695, 9698, 9699, 9700, 9701, 9702, 9705, 9709, 9714, 9718, 9728, 9729, 9732, 9823, 9827, 9831, 9834, 9835, 9940
NHL without Multiple Myeloma (NHL without MM)	9591, 9670, 9671, 9673, 9675, 9680, 9684, 9687, 9689, 9690, 9691, 9695, 9698, 9699, 9700, 9701, 9702, 9705, 9709, 9714, 9718, 9728, 9729, 9823, 9827, 9831, 9834, 9835, 9940
B-cell NHL (B-NHL)	9670, 9671, 9673, 9680, 9687, 9689, 9690, 9691, 9695, 9698, 9699, 9728, 9732, 9823, 9940
B-cell NHL without Multiple Myeloma (B-NHL without MM)	9670, 9671, 9673, 9680, 9687, 9689, 9690, 9691, 9695, 9698, 9699, 9728, 9823, 9940
Diffuse Large B-cell Lymphoma (DLBCL)	9680
Chronic lymphocytic leukemia/Small lymphocytic lymphoma/Mantle cell lymphoma (CLL/SLL)	9670, 9673, 9823
Multiple Myeloma (MM)	9732

Table S2. Comparison of characteristics of study participants for the Overall CPS-II^a LifeLink cohort (n=39,371), the CPS-II LifeLink Cohort Meeting Case-cohort Study Inclusion Criteria^b (n=29,985), and participants selected for the sub-cohort^c (n=1000 selected, 999 with PFAS^a serum measurements^d), Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015

	CPS-II ^a LifeLink	CPS-II ^a LifeLink Cohort Meeting Study Inclusion Criteria ^b	Participants selected for the sub- cohort ^c	Participants in the sub-cohort with PFAS measurements ^d
Overall number	39,371	29,985	1000	999
% women	56%	56%	50%	49.95%
% Non-Hispanic white race	98%	98%	98.2%	98.2%
% college graduate	46%	46%	44.8%	44.8%
% current cigarette smokers in 1997	4%	4%	3.9%	3.9%
Age range at blood collection (years)	47-94	49-94	54-86	54-86
Median age at blood collection (years)	70	69	69	69
Women-n	21,963	16,727	500	499
% Non-Hispanic white race	98%	98%	99.0%	99.0%
% college graduate	38%	37%	37%	37.07%
% current cigarette smokers in 1997	4%	4%	4.2%	4.2%
Age range at blood collection (years)	47-88	49-88	54-82	54-82
Median age at blood collection (years)	69	68	68	68
Men-n	17,408	13,258	500	500
% Non-Hispanic white race	98%	98%	97.4%	97.4%
% college graduate	57%	57%	52.6%	52.6%
% current cigarette smokers in 1997	4%	4%	3.6%	3.6%
Age range at blood collection (years)	51-94	51-94	57-86	57-86
Median age at blood collection (years)	71	70	70	70

^a CPS-II=Cancer Prevention Study II, PFAS=per- and polyfluoroalkyl substances

^b Study inclusion criteria for the sub-cohort included the following:

- 1) no previous cancer diagnosis (other than non-melanoma skin cancer) at the time of blood sample collection (1998-2001)
- 2) at least 500 µl of stored serum available for the study
- 3) For women, post-menopausal as of the time of the 1997 survey

^c The sub-cohort was a random sample stratified by sex (500 men and 500 women). The sub-cohort sample size was based on consideration of study power (including for sex-specific analyses) and cost.

^d After the sub-cohort was selected, it was determined that the available serum was insufficient for 1 person (female) selected for the sub-cohort.

Table S3. Characteristics of sub-cohort participants and participants with incident cancers, Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015

	Subcohort n (%)	Bladder cancer cases n (%)	Breast cancer cases n (%) ^a	Kidney cancer cases n (%)	Pancreatic cancer cases n (%)	Prostate cancer cases n (%) ^a	Hematologic malignancy cases n (%)
Sexes combined							
Year of serum collection							
1998	80 (8.0)	30 (7.5)		10 (6.3)	9 (5.2)		49 (7.7)
1999	308 (30.8)	115 (28.7)		51 (32.3)	52 (30.2)		173 (27.2)
2000	558 (55.9)	233 (58.1)		90 (57.0)	98 (57.0)		386 (60.8)
2001	53 (5.3)	23 (5.7)		7 (4.4)	13 (7.6)		27 (4.3)
Age at serum collection (years)							
<60	33 (3.3)	7 (1.7)		6 (3.8)	6 (3.5)		15 (2.4)
60-64	174 (17.4)	40 (10.0)		26 (16.5)	27 (15.7)		101 (15.9)
65-69	321 (32.1)	116 (28.9)		45 (28.5)	60 (34.9)		189 (29.8)
70-74	303 (30.3)	132 (32.9)		44 (27.8)	54 (31.4)		205 (32.3)
75-79	134 (13.4)	95 (23.7)		32 (20.3)	20 (11.6)		107 (16.9)
≥80	34 (3.4)	11 (2.7)		5 (3.2)	5 (2.9)		18 (2.8)
Sex							
Male	500 (50.1)	319 (79.6)		92 (58.2)	91 (52.9)		351 (55.3)
Female	499 (49.9)	82 (20.4)		66 (41.8)	81 (47.1)		284 (44.7)
Highest level of education							
Missing	5 (0.5)	5 (1.2)		1 (0.6)			7 (1.1)
High school or less	244 (24.4)	93 (23.2)		27 (17.1)	36 (20.9)		138 (21.7)
Some college or vocational/trade school	302 (30.2)	105 (26.2)		44 (27.8)	45 (26.2)		171 (26.9)
College graduate	252 (25.2)	101 (25.2)		47 (29.7)	57 (33.1)		160 (25.2)
Graduate school	196 (19.6)	97 (24.2)		39 (24.7)	34 (19.8)		159 (25.0)
Race/ ethnicity							
Missing	4 (0.4)				1 (0.6)		2 (0.3)
Hispanic or non-White race/ethnicity	14 (1.4)	4 (1.0)		3 (1.9)	4 (2.3)		7 (1.1)
Non-Hispanic White race/ethnicity	981 (98.2)	397 (99.0)		155 (98.1)	167 (97.1)		626 (98.6)
Smoking status in 1997							
Missing				1 (0.6)			
Nonsmoker	457 (45.7)	97 (24.2)		60 (38.0)	87 (50.6)		263 (41.4)
Current smoker	39 (3.9)	30 (7.5)		8 (5.1)	4 (2.3)		15 (2.4)
Former smoker	488 (48.8)	268 (66.8)		87 (55.1)	80 (46.5)		347 (54.6)
Ever smoker (unknown if current or former)	15 (1.5)	6 (1.5)		2 (1.3)	1 (0.6)		10 (1.6)
Alcohol consumption in 1997							
Missing	2 (0.2)	1 (0.2)					
Non-drinker	378 (37.8)	115 (28.7)		64 (40.5)	67 (39.0)		248 (39.1)

	Subcohort n (%)	Bladder cancer cases n (%)	Breast cancer cases n (%) ^a	Kidney cancer cases n (%)	Pancreatic cancer cases n (%)	Prostate cancer cases n (%) ^a	Hematologic malignancy cases n (%)
<1 drink per week	135 (13.5)	66 (16.5)		27 (17.1)	22 (12.8)		90 (14.2)
1-6 drinks per week	326 (32.6)	142 (35.4)		47 (29.7)	54 (31.4)		175 (27.6)
1 drink per day	110 (11.0)	53 (13.2)		11 (7.0)	20 (11.6)		94 (14.8)
≥2 drinks per day	48 (4.8)	24 (6.0)		9 (5.7)	9 (5.2)		28 (4.4)
Body mass index (kg/m ²)							
Missing	10 (1.0)	4(1.0)		1 (0.6)			2 (0.3)
<18.5	14 (1.4)	1 (0.2)		1 (0.6)	2 (1.2)		8 (1.3)
18.5-<25	426 (42.6)	150 (37.4)		55 (34.8)	55 (32.0)		261 (41.1)
25-<30	405 (40.5)	200 (49.9)		72 (45.6)	80 (46.5)		250 (39.4)
≥30	144 (14.4)	46 (11.5)		29 (18.4)	35 (20.3)		114 (18.0)
Physical activity							
Missing	1 (0.1)				1 (0.6)		
≥10 hours/week moderate to vigorous physical activity (metabolic equivalent)	522 (52.3)	213 (53.1)		85 (53.8)	84 (48.8)		333 (52.4)
<10 hours/week moderate to vigorous physical activity (metabolic equivalent)	476 (47.6)	188 (46.9)		73 (46.2)	87 (50.6)		302 (47.6)
Females							
Year of serum collection							
1998	37 (7.4)	6 (7.3)	58 (7.4)	4 (6.1)	2 (2.5)		25 (8.8)
1999	156 (31.3)	20 (24.4)	223 (28.4)	19 (28.8)	28 (34.6)		77 (27.1)
2000	278 (55.7)	52 (63.4)	470 (59.8)	40 (60.6)	48 (59.3)		168 (59.2)
2001	28 (5.6)	4 (4.9)	35 (4.5)	3 (4.5)	3 (3.7)		14 (4.9)
Age at serum collection (years)							
<60	28 (5.6)		46 (5.9)	5 (7.6)	5 (6.2)		12 (4.2)
60-64	96 (19.2)	12 (14.6)	203 (25.8)	13 (19.7)	18 (22.2)		62 (21.8)
65-69	165 (33.1)	21 (25.6)	262 (33.3)	18 (27.3)	21 (25.9)		89 (31.3)
70-74	145 (29.1)	32 (39.0)	185 (23.5)	14 (21.2)	25 (30.9)		75 (26.4)
75-79	51 (10.2)	17 (20.7)	78 (9.9)	15 (22.7)	10 (12.3)		38 (13.4)
≥80	14 (2.8)		12 (1.5)	1 (1.5)	2 (2.5)		8 (2.8)
Highest level of education							
Missing	1 (0.2)		4 (0.5)	1 (1.5)			3 (1.1)
Highschool or less	143 (28.7)	30 (36.6)	204 (26.0)	10 (15.2)	24 (29.6)		65 (22.9)
Vocational/trade school or some college	170 (34.1)	27 (32.9)	251 (31.9)	21 (31.8)	21 (25.9)		98 (34.5)
College graduate	128 (25.7)	17 (20.7)	186 (23.7)	20 (30.3)	27 (33.3)		64 (22.5)
Graduate school	57 (11.4)	8 (9.8)	141 (17.9)	14 (21.2)	9 (11.1)		54 (19.0)
Race/ ethnicity							
Missing			1 (0.1)				

	Subcohort n (%)	Bladder cancer cases n (%)	Breast cancer cases n (%) ^a	Kidney cancer cases n (%)	Pancreatic cancer cases n (%)	Prostate cancer cases n (%) ^a	Hematologic malignancy cases n (%)
Hispanic or non-White race	5 (1.0)		21 (2.7)	2 (3.0)			3 (1.1)
Non-Hispanic White	494 (99.0)	82 (100)	764 (97.2)	64 (97.0)	81 (100)		281 (98.9)
Smoking status in 1997							
Missing			1 (0.1)				
Nonsmoker	275 (55.1)	30 (36.6)	409 (52.0)	37 (56.1)	48 (59.3)		141 (49.6)
Current smoker	21 (4.2)	9 (11.0)	26 (3.3)	2 (3.0)	2 (2.5)		7 (2.5)
Former smoker	200 (40.1)	42 (51.2)	345 (43.9)	26 (39.4)	31 (38.3)		131 (46.1)
Ever smoker (unknown if current or former)	3 (0.6)	1 (1.2)	5 (0.6)	1 (1.5)			5 (1.8)
Alcohol consumption in 1997							
Missing	1 (0.2)						
Non-drinker	218 (43.7)	32 (39.0)	323 (41.1)	29 (43.9)	41 (50.6)		121 (42.6)
<1 drink per week	79 (15.8)	15 (18.3)	119 (15.1)	15 (22.7)	6 (7.4)		50 (17.6)
1-6 drinks per week	149 (29.9)	23 (28.0)	238 (30.3)	18 (27.3)	20 (24.7)		76 (26.8)
1 drink per day	37 (7.4)	10 (12.2)	83 (10.6)	3 (4.5)	12 (14.8)		32 (11.3)
≥2 drinks per day	15 (3.0)	2 (2.4)	23 (2.9)	1 (1.5)	2 (2.5)		5 (1.8)
Body mass index (kg/m ²)							
Missing	2 (0.4)		1 (0.1)	1 (1.5)			1 (0.4)
<18.5	12 (2.4)	1 (1.2)	15 (1.9)		2 (2.5)		4 (1.4)
18.5-<25	245 (49.1)	47 (57.3)	392 (49.9)	34 (51.5)	23 (28.4)		139 (48.9)
25-<30	168 (33.7)	27 (32.9)	252 (32.1)	18 (27.3)	38 (46.9)		83 (29.2)
≥30	72 (14.4)	7 (8.5)	126 (16.0)	13 (19.7)	18 (22.2)		57 (20.1)
Physical activity							
≥10 hours/week moderate to vigorous physical activity (metabolic equivalent)	255 (51.1)	41 (50.0)	398 (50.6)	38 (57.6)	36 (44.4)		138 (48.6)
<10 hours/week moderate to vigorous physical activity (metabolic equivalent)	244 (48.9)	41 (50.0)	388 (49.4)	28 (42.4)	45 (55.6)		146 (51.4)
Post-menopausal hormone use							
Never used post-menopausal hormones	141 (28.3)	30 (36.6)	149 (19.0)	15 (22.7)	27 (33.3)		76 (26.8)
Ever used post-menopausal hormones	358 (71.7)	52 (63.4)	637 (81.0)	51 (77.3)	54 (66.7)		208 (73.2)
Age at menarche (years)							
Missing	6 (1.2)	5 (6.1)	12 (1.5)	1 (1.5)	2 (2.5)		7 (2.5)
<12	103 (20.6)	19 (23.2)	142 (18.1)	6 (9.1)	16 (19.8)		49 (17.3)
12	120 (24.0)	18 (22.0)	184 (23.4)	19 (28.8)	22 (27.2)		61 (21.5)
13	164 (32.9)	18 (22.0)	254 (32.3)	25 (37.9)	24 (29.6)		93 (32.7)
≥14	106 (21.2)	22 (26.8)	194 (24.7)	15 (22.7)	17 (21.0)		74 (26.1)
Age at menopause (years)							
<45	103 (20.6)	18 (22.0)	166 (21.1)	13 (19.7)	17 (21.0)		54 (19.0)

	Subcohort n (%)	Bladder cancer cases n (%)	Breast cancer cases n (%) ^a	Kidney cancer cases n (%)	Pancreatic cancer cases n (%)	Prostate cancer cases n (%) ^a	Hematologic malignancy cases n (%)
45-<50	123 (24.6)	20 (24.4)	156 (19.8)	22 (33.3)	26 (32.1)		82 (28.9)
50-<53	153 (30.7)	23 (28.0)	248 (31.6)	14 (21.2)	20 (24.7)		84 (29.6)
≥53	120 (24.0)	21 (25.6)	216 (27.5)	17 (25.8)	18 (22.2)		64 (22.5)
Number of live births							
Missing	6 (1.2)	4 (4.9)	19 (2.4)		3 (3.7)		6 (2.1)
0	45 (9.0)	10 (12.2)	67 (8.5)	8 (12.1)	6 (7.4)		23 (8.1)
1	28 (5.6)	5 (6.1)	48 (6.1)	1 (1.5)	6 (7.4)		17 (6.0)
2	138 (27.7)	18 (22.0)	214 (27.2)	17 (25.8)	15 (18.5)		67 (23.6)
3	119 (23.8)	23 (28.0)	198 (25.2)	19 (28.8)	28 (34.6)		85 (29.9)
4	87 (17.4)	12 (14.6)	131 (16.7)	12 (18.2)	10 (12.3)		49 (17.3)
≥5	76 (15.2)	10 (12.2)	109 (13.9)	9 (13.6)	13 (16.0)		37 (13.0)
Age at first birth (years)							
Missing	8 (1.6)	5 (6.1)	19 (2.4)	1 (1.5)	3 (3.7)		5 (1.8)
<25	269 (53.9)	40 (48.8)	385 (49.0)	26 (39.4)	45 (55.6)		154 (54.2)
25-<55	177 (35.5)	27 (32.9)	315 (40.1)	31 (47.0)	27 (33.3)		102 (35.9)
No live births or never pregnant	45 (9.0)	10 (12.2)	67 (8.5)	8 (12.1)	6 (7.4)		23 (8.1)
Oral contraceptive use							
Never used oral contraceptives	275 (55.1)	60 (73.2)	389 (49.5)	39 (59.1)	44 (54.3)		153 (53.9)
Ever used oral contraceptives	218 (43.7)	21 (25.6)	389 (49.5)	26 (39.4)	37 (45.7)		128 (45.1)
Missing	6 (1.2)	1 (1.2)	8 (1.0)	1 (1.5)			3 (1.1)
Males							
Year of serum collection							
1988	43 (8.6)	24 (7.5)		6 (6.5)	7 (7.7)	147 (9.1)	24 (6.8)
1999	152 (30.4)	95 (29.8)		32 (34.8)	24 (26.4)	477 (29.6)	96 (27.4)
2000	280 (56.0)	181 (56.7)		50 (54.3)	50 (54.9)	905 (56.2)	218 (62.1)
2001	25 (5.0)	19 (6.0)		4 (4.3)	10 (11.0)	81 (5.0)	13 (3.7)
Age at serum collection (years)							
<60	5 (1.0)	7 (2.2)		1 (1.1)	1 (1.1)	28 (1.7)	3 (0.9)
60-64	78 (15.6)	28 (8.8)		13 (14.1)	9 (9.9)	289 (18.0)	39 (11.1)
65-69	156 (31.2)	95 (29.8)		27 (29.3)	39 (42.9)	578 (35.9)	100 (28.5)
70-74	158 (31.6)	100 (31.3)		30 (32.6)	29 (31.9)	479 (29.8)	130 (37.0)
75-79	83 (16.6)	78 (24.5)		17 (18.5)	10 (11.0)	201 (12.5)	69 (19.7)
≥80	20 (4.0)	11 (3.4)		4 (4.3)	3 (3.3)	35 (2.2)	10 (2.8)
Highest level of education							
Missing	4 (0.8)	5 (1.6)				3 (0.2)	4 (1.1)
Highschool or less	101 (20.2)	63 (19.7)		17 (18.5)	12 (13.2)	252 (15.7)	73 (20.8)
Vocational/trade school or some college	132 (26.4)	78 (24.5)		23 (25.0)	24 (26.4)	379 (23.5)	73 (20.8)

	Subcohort n (%)	Bladder cancer cases n (%)	Breast cancer cases n (%) ^a	Kidney cancer cases n (%)	Pancreatic cancer cases n (%)	Prostate cancer cases n (%) ^a	Hematologic malignancy cases n (%)
College graduate	124 (24.8)	84 (26.3)		27 (29.3)	30 (33.0)	439 (27.3)	96 (27.4)
Graduate school	139 (27.8)	89 (27.9)		25 (27.2)	25 (27.5)	537 (33.4)	105 (29.9)
Race/ ethnicity							
Missing	4 (0.8)				1 (1.1)	6 (0.4)	2 (0.6)
Hispanic or non-White race	9 (1.8)	4 (1.3)		1 (1.1)	4 (4.4)	24 (1.5)	4 (1.1)
Non-Hispanic White	487 (97.4)	315 (98.7)		91 (98.9)	86 (94.5)	1580 (98.1)	345 (98.3)
Smoking status in 1997							
Missing				1 (1.1)		1 (0.1)	
Nonsmoker	182 (36.4)	67 (21.0)		23 (25.0)	39 (42.9)	635 (39.4)	122 (34.8)
Current smoker	18 (3.6)	21 (6.6)		6 (6.5)	2 (2.2)	64 (4.0)	8 (2.3)
Former smoker	288 (57.6)	226 (70.8)		61 (66.3)	49 (53.8)	894 (55.5)	216 (61.5)
Ever smoker (unknown if current or former)	12 (2.4)	5 (1.6)		1 (1.1)	1 (1.1)	16 (1.0)	5 (1.4)
Alcohol consumption in 1997							
Missing	1 (0.2)	1 (0.3)				1 (0.1)	
Non-drinker	160 (32.0)	83 (26.0)		35 (38.0)	26 (28.6)	507 (31.5)	127 (36.2)
<1 drink per week	56 (11.2)	51 (16.0)		12 (13.0)	16 (17.6)	193 (12.0)	40 (11.4)
1-6 drinks per week	177 (35.4)	119 (37.3)		29 (31.5)	34 (37.4)	535 (33.2)	99 (28.2)
1 drink per day	73 (14.6)	43 (13.5)		8 (8.7)	8 (8.8)	246 (15.3)	62 (17.7)
≥2 drinks per day	33 (6.6)	22 (6.9)		8 (8.7)	7 (7.7)	128 (8.0)	23 (6.6)
Body mass index (kg/m ²)							
Missing	8 (1.6)	4 (1.3)				11 (0.7)	1 (0.3)
<18.5	2 (0.4)			1 (1.1)		3 (0.2)	4 (1.1)
18.5-<25	181 (36.2)	103 (32.3)		21 (22.8)	32 (35.2)	624 (38.8)	122 (34.8)
25-<30	237 (47.4)	173 (54.2)		54 (58.7)	42 (46.2)	776 (48.2)	167 (47.6)
≥30	72 (14.4)	39 (12.2)		16 (17.4)	17 (18.7)	196 (12.2)	57 (16.2)
Physical activity							
Missing	1 (0.2)				1 (1.1)	1 (0.1)	
≥10 hours/week moderate to vigorous physical activity (metabolic equivalent)	267 (53.4)	172 (53.9)		47 (51.1)	48 (52.7)	919 (57.1)	195 (55.6)
<10 hours/week moderate to vigorous physical activity (metabolic equivalent)	232 (46.4)	147 (46.1)		45 (48.9)	42 (46.2)	690 (42.9)	156 (44.4)

^a Breast cancer was considered among females only and prostate cancer was considered among males only, so for these cancers, rows for “Sexes Combined” and for the sex in which the cancer was not considered are blank.

Table S4. Results of Quality Control analysis using samples run with study samples, Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015

Chemical ^a	Mean	Median	25 th Pctl ^b	75 th Pctl ^b	Within-sample variance	Batch Variance	Error Variance	Intra-batch CV ^b	Inter-batch CV ^b	Overall CV ^b	ICC ^b
PFBS	0.044	0.035	0.035	0.035	0.003	3.02E-13	0.0004	0.473	0.000	0.473	0.857
PFHpA	0.153	0.110	0.061	0.210	0.018	7.23E-06	0.0006	0.165	0.018	0.166	0.966
PFNA	0.843	0.660	0.490	0.940	0.459	3.58E-04	0.0030	0.065	0.022	0.069	0.993
PFOA	6.237	5.500	3.700	7.300	17.579	0.050	0.0894	0.048	0.036	0.06	0.992
FOSA	0.801	0.465	0.230	0.833	0.523	0.143	0.9627	1.225	0.472	1.312	0.321
FOSA ^c	0.753	0.465	0.230	0.830	0.582	0.173	0.2615	0.680	0.553	0.876	0.573
PFHxS	4.297	2.900	2.000	4.500	18.698	0.024	0.1396	0.087	0.036	0.094	0.991
PFOS	22.076	18.000	13.000	27.000	161.101	0.519	1.4414	0.054	0.033	0.063	0.988

^a PFBS=perfluorobutane sulfonic acid, PFHpA=perfluoroheptanoic acid, PFNA=perfluorononanoic acid, PFOA=perfluorooctanoic acid, FOSA=perfluorooctane sulfonamide, PFHxS=perfluorohexane sulfonic acid, PFOS=perfluorooctane sulfonate

^b Pctl=percentile, CV=coefficient of variation, ICC = intraclass correlation coefficient

^c Excluded observations for one ID that had a large outlier measurement

Table S5. Percentage of samples with PFAS detections in the subcohort, Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015

PFAS_Type^a	Sex	Lowest Lower Level of Quantitation	Number with Detections	Percent Detection
PFBS	Both	0.05	64	6.4
PFBS	Female	0.05	24	4.8
PFBS	Male	0.05	40	8.0
PFHpA	Both	0.05	819	82.0
PFHpA	Female	0.05	393	78.8
PFHpA	Male	0.05	426	85.2
PFHxS	Both	0.05	997	99.8
PFHxS	Female	0.05	498	99.8
PFHxS	Male	0.05	499	99.8
PFNA	Both	0.05	997	99.8
PFNA	Female	0.05	498	99.8
PFNA	Male	0.05	499	99.8
PFOA	Both	0.5	987	98.8
PFOA	Female	0.5	494	99.0
PFOA	Male	0.5	493	98.6
PFOS	Both	0.5	997	99.8
PFOS	Female	0.5	498	99.8
PFOS	Male	0.5	499	99.8

^a PFBS=perfluorobutane sulfonic acid, PFHpA=perfluoroheptanoic acid, PFHxS=perfluorohexane sulfonic acid, PFNA=perfluorononanoic acid, PFOA=perfluorooctanoic acid, PFOS=perfluorooctane sulfonate

Table S6. Distribution of PFAS serum concentrations among subcohort participants (ng/ml, values below the limit of detection were imputed as the limit of detection divided by the square root of 2), Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015

PFAS ^a	Sex	n ^b	mean	std ^b	min ^b	p25 ^b	p50 ^b	p75 ^b	max ^b	50 th Percentile and 95% CI among adults from NHANES 1999-2000 ^c
PFHpA	Both	999	0.17	0.27	0.04	0.06	0.10	0.20	6.90	<LOD ^b
PFHpA	Female	499	0.15	0.33	0.04	0.06	0.10	0.18	6.90	
PFHpA	Male	500	0.18	0.19	0.04	0.07	0.11	0.22	1.60	
PFHxS	Both	999	4.49	5.42	0.04	2.00	3.10	5.10	95.00	2.00 (1.80-2.30)
PFHxS	Female	499	4.33	5.07	0.04	1.80	2.80	5.00	57.00	
PFHxS	Male	500	4.65	5.75	0.31	2.10	3.30	5.30	95.00	
PFNA	Both	999	0.99	2.94	0.04	0.49	0.67	0.98	80.00	.600 (.500-.700)
PFNA	Female	499	0.93	1.89	0.04	0.49	0.67	0.96	40.00	
PFNA	Male	500	1.06	3.70	0.08	0.49	0.67	0.99	80.00	
PFOA	Both	999	6.10	4.54	0.35	3.90	5.20	6.90	54.00	5.20 (4.70-5.80) ^d
PFOA	Female	499	6.04	4.97	0.35	3.70	5.00	6.90	54.00	
PFOA	Male	500	6.16	4.08	0.35	4.00	5.20	6.95	43.00	
PFOS	Both	999	21.44	13.26	0.35	13.00	18.00	25.00	130.00	30.3 (27.9-33.9) ^d
PFOS	Female	499	21.22	13.46	0.35	13.00	18.00	25.00	130.00	
PFOS	Male	500	21.66	13.07	0.80	13.50	18.00	25.50	96.00	

^a PFHpA=perfluoroheptanoic acid, PFHxS=perfluorohexane sulfonic acid, PFNA=perfluorononanoic acid, PFOA=perfluorooctanoic acid, PFOS=perfluorooctane sulfonate

^b n=number, std=standard deviation, min=minimum, p25=25th percentile, p50=50th percentile, p75=75th percentile, max=maximum, LOD=limit of detection

^c Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. National Report on Human Exposure to Environmental Chemicals. Updated March 2022. Accessed 4/13/2023. <https://www.cdc.gov/exposurereport/>

^d Study measurements were for the linear isomer only. Separate values for the linear and branched isomers are not available in NHANES 1999-2000 but in NHANES 2013-2014 (the closest year for which separate measurements are available), the linear isomer median for PFOA was 97% of the median for the sum, and the linear isomer of PFOS was 66% of the median for the sum.

Table S7. Spearman correlation coefficients for correlations between PFAS serum concentrations among subcohort members, Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015

	PFHpA ^a	PFHxS ^a	PFNA ^a	PFOA ^a	PFOS ^a
Both Sexes					
PFHpA	1.000	0.172	0.207	0.512	0.291
PFHxS	0.172	1.000	0.432	0.488	0.431
PFNA	0.207	0.432	1.000	0.481	0.552
PFOA	0.512	0.488	0.481	1.000	0.671
PFOS	0.291	0.431	0.552	0.671	1.000
Females					
PFHpA	1.000	0.160	0.225	0.543	0.311
PFHxS	0.160	1.000	0.399	0.459	0.403
PFNA	0.225	0.399	1.000	0.483	0.542
PFOA	0.543	0.459	0.483	1.000	0.699
PFOS	0.311	0.403	0.542	0.699	1.000
Males					
PFHpA	1.000	0.166	0.191	0.470	0.269
PFHxS	0.166	1.000	0.476	0.517	0.462
PFNA	0.191	0.476	1.000	0.484	0.564
PFOA	0.470	0.517	0.484	1.000	0.642
PFOS	0.269	0.462	0.564	0.642	1.000

^a PFHpA=perfluoroheptanoic acid, PFHxS=perfluorohexane sulfonic acid, PFNA=perfluorononanoic acid, PFOA=perfluorooctanoic acid, PFOS=perfluorooctane sulfonate

Table S8. PFAS Distributions (ng/ml) in the subcohort by categories of covariates, using values with values below the limit of detection imputed as the limit of detection divided by the square root of 2, Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015

	Both				Females				Males			
	N ^b	P25 ^b	P50 ^b	P75 ^b	N ^b	P25 ^b	P50 ^b	P75 ^b	N ^b	P25 ^b	P50 ^b	P75 ^b
PFHpA^a												
Sex												
Female	499	0.06	0.10	0.18	499	0.06	0.10	0.18				
Male	500	0.07	0.11	0.22					500	0.07	0.11	0.22
Year of serum collection												
1998	80	0.07	0.14	0.23	37	0.06	0.10	0.18	43	0.09	0.16	0.34
1999	308	0.06	0.11	0.20	156	0.06	0.11	0.20	152	0.07	0.12	0.21
2000	558	0.06	0.10	0.18	278	0.05	0.10	0.17	280	0.06	0.11	0.21
2001	53	0.05	0.10	0.16	28	0.04	0.09	0.15	25	0.06	0.10	0.16
Age at serum collection (years)												
<60	33	0.07	0.12	0.20	28	0.07	0.11	0.22	5	0.11	0.14	0.17
60-64	174	0.07	0.13	0.26	96	0.06	0.12	0.25	78	0.08	0.15	0.27
65-69	321	0.06	0.11	0.19	165	0.06	0.10	0.16	156	0.07	0.13	0.25
70-74	303	0.06	0.10	0.18	145	0.05	0.09	0.17	158	0.06	0.10	0.19
75-79	134	0.05	0.09	0.16	51	0.04	0.08	0.16	83	0.06	0.09	0.16
≥80	34	0.08	0.11	0.29	14	0.08	0.10	0.17	20	0.08	0.12	0.34
Race/ethnicity												
Hispanic or non-white race	14	0.09	0.14	0.17	5	0.14	0.15	0.17	9	0.09	0.10	0.17
Non-Hispanic white	981	0.06	0.10	0.20	494	0.05	0.10	0.18	487	0.07	0.11	0.22
Highest level of education												
High school or less	244	0.06	0.10	0.19	143	0.05	0.09	0.17	101	0.07	0.12	0.24
Some college or vocational/trade school	302	0.06	0.10	0.19	170	0.05	0.10	0.18	132	0.06	0.11	0.20
College graduate	252	0.06	0.11	0.21	128	0.06	0.10	0.18	124	0.08	0.13	0.24
Graduate school	196	0.07	0.10	0.19	57	0.06	0.10	0.18	139	0.07	0.10	0.21
Smoking status in 1997												
Non-smoker	457	0.06	0.10	0.17	275	0.06	0.09	0.16	182	0.06	0.10	0.20
Current smoker	39	0.07	0.12	0.23	21	0.07	0.10	0.18	18	0.08	0.14	0.23
Former smoker	488	0.07	0.12	0.21	200	0.05	0.10	0.19	288	0.07	0.12	0.24
Ever smoker (unknown if current or former)	15	0.11	0.15	0.35	3	0.16	0.44	0.71	12	0.09	0.14	0.29
Alcohol consumption in 1997												
Non-drinker	378	0.05	0.10	0.18	218	0.05	0.09	0.17	160	0.07	0.11	0.22
<1 drink/week	135	0.06	0.11	0.20	79	0.04	0.10	0.18	56	0.07	0.13	0.25
1-6 drinks/week	326	0.07	0.10	0.18	149	0.06	0.10	0.15	177	0.07	0.11	0.22
1 drink/day	110	0.07	0.14	0.23	37	0.10	0.17	0.27	73	0.06	0.11	0.20
≥2 drinks/day	48	0.10	0.16	0.28	15	0.09	0.18	0.37	33	0.10	0.14	0.27
Body mass index (kg/m ²)												
<18.5	14	0.07	0.11	0.19	12	0.07	0.08	0.18	2	0.16	0.88	1.60
18.5-<25	426	0.06	0.10	0.18	245	0.05	0.09	0.16	181	0.06	0.10	0.21
25-<30	405	0.07	0.11	0.22	168	0.06	0.10	0.19	237	0.08	0.12	0.24
≥30	144	0.06	0.13	0.20	72	0.06	0.13	0.21	72	0.07	0.11	0.20
PFHxS^a												
Sex												
Female	499	1.80	2.80	5.00	499	1.80	2.80	5.00				
Male	500	2.10	3.30	5.30					500	2.10	3.30	5.30
Year of serum collection												
1998	80	2.00	3.20	4.50	37	1.80	2.50	4.20	43	2.30	3.60	5.30
1999	308	1.85	2.90	4.50	156	1.75	2.70	4.40	152	1.95	3.15	4.70
2000	558	2.00	3.10	5.40	278	1.90	3.00	5.60	280	2.10	3.30	5.35
2001	53	2.00	3.40	5.30	28	1.90	3.05	5.20	25	2.00	3.90	5.30
Age at serum collection (years)												
<60	33	2.00	2.60	4.60	28	1.90	2.60	4.20	5	2.50	5.80	24.00
60-64	174	2.10	3.05	4.60	96	1.95	2.95	4.50	78	2.20	3.25	4.90
65-69	321	2.00	3.30	5.00	165	1.70	2.80	5.20	156	2.30	3.60	4.90
70-74	303	1.80	2.90	5.30	145	1.90	2.90	5.60	158	1.80	3.10	4.90

	Both				Females				Males			
	N ^b	P25 ^b	P50 ^b	P75 ^b	N ^b	P25 ^b	P50 ^b	P75 ^b	N ^b	P25 ^b	P50 ^b	P75 ^b
75-79	134	2.00	3.05	4.70	51	1.70	2.40	4.60	83	2.20	3.30	5.20
≥80	34	2.60	4.10	7.60	14	2.60	3.75	6.90	20	2.45	4.45	8.60
Race/ethnicity												
Hispanic or non-white race	14	2.20	3.60	6.10	5	2.20	4.40	7.40	9	2.50	3.00	4.50
Non-Hispanic white	981	1.90	3.10	5.10	494	1.80	2.80	5.00	487	2.10	3.30	5.30
Highest level of education												
High school or less	244	1.90	2.85	4.75	143	1.80	2.80	4.40	101	2.00	2.90	5.30
Some college or vocational/trade school	302	2.00	3.10	5.30	170	1.90	2.85	5.00	132	2.20	3.35	5.90
College graduate	252	2.00	3.30	5.25	128	1.90	3.20	5.30	124	2.15	3.30	5.10
Graduate school	196	1.90	3.20	4.70	57	1.60	2.30	5.00	139	2.10	3.40	4.60
Smoking status in 1997												
Non-smoker	457	1.80	2.90	4.80	275	1.70	2.60	4.90	182	2.10	3.25	4.80
Current smoker	39	1.90	3.00	4.00	21	1.50	2.80	3.80	18	2.20	3.30	5.00
Former smoker	488	2.00	3.25	5.30	200	2.05	3.00	5.10	288	2.00	3.40	5.40
Ever smoker (unknown if current or former)	15	2.30	3.20	6.50	3	6.30	6.50	57.00	12	2.30	2.90	5.95
Alcohol consumption in 1997												
Non-drinker	378	1.70	2.60	4.20	218	1.60	2.45	4.30	160	1.85	2.70	4.05
<1 drink/week	135	1.90	3.20	5.40	79	1.80	2.70	5.20	56	2.25	3.55	7.00
1-6 drinks/week	326	2.20	3.40	5.50	149	2.10	3.40	5.60	177	2.30	3.40	5.40
1 drink/day	110	2.20	3.90	6.10	37	2.20	3.60	5.80	73	2.30	3.90	6.10
≥2 drinks/day	48	1.95	3.20	5.00	15	1.60	2.60	5.20	33	2.00	3.40	4.80
Body mass index (kg/m ²)												
<18.5	14	1.70	2.20	5.60	12	1.75	3.55	5.80	2	1.70	2.00	2.30
18.5-<25	426	2.00	3.20	5.30	245	1.90	2.90	4.90	181	2.20	3.60	5.60
25-<30	405	2.00	3.00	4.60	168	1.95	2.70	4.85	237	2.00	3.20	4.50
≥30	144	1.90	3.00	5.35	72	1.70	2.60	4.60	72	2.10	3.65	5.90
PFNA^a												
Sex												
Female	499	0.49	0.67	0.96	499	0.49	0.67	0.96				
Male	500	0.49	0.67	0.99					500	0.49	0.67	0.99
Year of serum collection												
1998	80	0.52	0.65	1.00	37	0.47	0.64	0.91	43	0.52	0.66	1.00
1999	308	0.45	0.65	1.00	156	0.45	0.64	0.98	152	0.47	0.66	1.00
2000	558	0.51	0.69	0.95	278	0.53	0.72	0.97	280	0.50	0.67	0.95
2001	53	0.47	0.65	1.00	28	0.45	0.57	0.90	25	0.49	0.78	1.20
Age at serum collection (years)												
<60	33	0.52	0.81	0.96	28	0.53	0.83	1.20	5	0.45	0.59	0.90
60-64	174	0.52	0.68	1.00	96	0.53	0.69	0.99	78	0.49	0.68	1.00
65-69	321	0.50	0.71	0.96	165	0.46	0.68	0.96	156	0.52	0.72	0.97
70-74	303	0.46	0.63	0.92	145	0.47	0.66	0.98	158	0.46	0.62	0.86
75-79	134	0.47	0.67	1.00	51	0.42	0.61	0.91	83	0.53	0.79	1.20
≥80	34	0.56	0.76	0.95	14	0.64	0.76	0.93	20	0.49	0.75	1.03
Race/ethnicity												
Hispanic or non-white race	14	0.52	0.88	2.20	5	0.65	1.20	2.50	9	0.46	0.86	1.80
Non-Hispanic white	981	0.49	0.67	0.98	494	0.48	0.67	0.96	487	0.49	0.67	0.99
Highest level of education												
High school or less	244	0.46	0.62	0.90	143	0.45	0.62	0.88	101	0.47	0.62	0.90
Some college or vocational/trade school	302	0.50	0.67	0.98	170	0.49	0.65	0.95	132	0.51	0.71	1.00
College graduate	252	0.54	0.71	1.00	128	0.56	0.76	1.10	124	0.53	0.67	0.93
Graduate school	196	0.49	0.71	1.10	57	0.55	0.66	0.95	139	0.47	0.72	1.10
Smoking status in 1997												
Non-smoker	457	0.46	0.65	0.95	275	0.45	0.63	0.91	182	0.51	0.70	1.00
Current smoker	39	0.47	0.60	0.96	21	0.48	0.58	0.78	18	0.45	0.65	1.00
Former smoker	488	0.52	0.71	1.00	200	0.56	0.78	1.00	288	0.49	0.66	0.97
Ever smoker (unknown if current or former)	15	0.56	0.78	0.97	3	0.55	0.92	1.10	12	0.58	0.77	0.95
Alcohol consumption in 1997												
Non-drinker	378	0.44	0.61	0.89	218	0.45	0.61	0.91	160	0.44	0.61	0.89
<1 drink/week	135	0.47	0.66	0.95	79	0.45	0.61	0.86	56	0.51	0.78	1.05
1-6 drinks/week	326	0.53	0.76	1.00	149	0.60	0.82	1.10	177	0.50	0.66	1.00
1 drink/day	110	0.58	0.81	1.10	37	0.63	0.90	1.00	73	0.54	0.77	1.20

	Both				Females				Males			
	N ^b	P25 ^b	P50 ^b	P75 ^b	N ^b	P25 ^b	P50 ^b	P75 ^b	N ^b	P25 ^b	P50 ^b	P75 ^b
≥2 drinks/day	48	0.52	0.77	1.15	15	0.44	0.77	1.20	33	0.53	0.76	0.97
Body mass index (kg/m ²)												
<18.5	14	0.56	0.62	0.67	12	0.53	0.62	0.79	2	0.56	0.61	0.65
18.5-<25	426	0.50	0.71	1.00	245	0.52	0.72	1.00	181	0.49	0.68	1.00
25-<30	405	0.48	0.65	0.95	168	0.46	0.65	0.93	237	0.49	0.66	0.98
≥30	144	0.49	0.64	0.92	72	0.49	0.64	0.89	72	0.50	0.66	0.94
PFOA^a												
Sex												
Female	499	3.70	5.00	6.90	499	3.70	5.00	6.90				
Male	500	4.00	5.20	6.95					500	4.00	5.20	6.95
Year of serum collection												
1998	80	4.10	5.00	6.70	37	4.00	4.80	6.70	43	4.30	5.10	6.60
1999	308	3.60	5.10	7.05	156	3.40	4.75	6.70	152	3.90	5.30	7.20
2000	558	3.90	5.20	6.90	278	3.80	5.20	7.10	280	4.00	5.10	6.80
2001	53	4.50	5.50	6.90	28	4.05	5.20	5.70	25	4.70	6.20	9.00
Age at serum collection (years)												
<60	33	4.30	5.20	6.60	28	4.30	5.35	6.65	5	5.00	5.20	6.60
60-64	174	4.30	5.70	7.40	96	4.05	5.70	7.20	78	4.50	5.75	7.90
65-69	321	3.80	5.50	7.10	165	3.54	5.20	7.10	156	4.20	5.60	7.25
70-74	303	3.70	4.80	6.50	145	3.54	4.70	6.40	158	3.90	4.85	6.70
75-79	134	3.70	4.80	6.20	51	3.20	4.20	6.20	83	4.10	5.00	6.20
≥80	34	3.80	5.40	7.30	14	4.30	6.15	7.30	20	3.52	4.60	7.90
Race/ethnicity												
Hispanic or non-white race	14	4.40	5.70	6.40	5	4.70	6.00	6.40	9	4.40	5.60	6.20
Non-Hispanic white	981	3.90	5.20	6.90	494	3.70	5.00	6.90	487	4.00	5.20	7.00
Highest level of education												
High school or less	244	3.85	5.20	7.20	143	3.60	5.10	7.20	101	4.10	5.20	7.20
Some college or vocational/trade school	302	3.80	5.10	7.20	170	3.80	5.10	7.10	132	3.90	5.40	7.20
College graduate	252	4.00	5.30	6.90	128	3.85	5.15	6.90	124	4.20	5.40	6.90
Graduate school	196	3.80	4.90	6.55	57	3.54	4.40	6.50	139	3.90	5.00	6.70
Smoking status in 1997												
Non-smoker	457	3.70	4.90	6.70	275	3.70	4.80	6.70	182	3.80	5.10	6.70
Current smoker	39	3.50	4.50	6.50	21	3.40	4.50	7.00	18	3.60	4.85	5.90
Former smoker	488	4.10	5.40	7.15	200	3.85	5.30	7.10	288	4.10	5.40	7.20
Ever smoker (unknown if current or former)	15	4.20	6.20	8.70	3	8.40	8.70	9.40	12	4.05	4.95	7.10
Alcohol consumption in 1997												
Non-drinker	378	3.54	4.80	6.90	218	3.40	4.60	6.90	160	3.95	5.00	7.05
<1 drink/week	135	4.00	5.30	6.90	79	3.80	4.80	6.40	56	4.60	5.75	7.35
1-6 drinks/week	326	4.00	5.30	6.80	149	4.00	5.60	7.00	177	4.00	5.20	6.70
1 drink/day	110	3.90	5.65	7.40	37	4.60	6.30	7.40	73	3.70	5.30	7.20
≥2 drinks/day	48	4.30	5.25	7.15	15	3.80	4.80	5.80	33	4.40	5.90	7.40
Body mass index (kg/m ²)												
<18.5	14	3.00	3.95	6.50	12	2.85	3.85	5.45	2	3.90	6.10	8.30
18.5-<25	426	3.80	5.05	6.90	245	3.70	4.90	6.80	181	3.90	5.10	6.90
25-<30	405	3.90	5.20	6.90	168	3.90	5.10	7.00	237	4.00	5.30	6.80
≥30	144	4.15	5.70	7.30	72	3.70	5.60	7.45	72	4.55	5.70	7.20
PFOS^a												
Sex												
Female	499	13.00	18.00	25.00	499	13.00	18.00	25.00				
Male	500	13.50	18.00	25.50					500	13.50	18.00	25.50
Year of serum collection												
1998	80	14.00	21.00	35.50	37	14.00	22.00	37.00	43	15.00	21.00	28.00
1999	308	14.00	19.00	26.00	156	13.00	19.00	25.50	152	14.50	19.00	26.00
2000	558	13.00	17.00	24.00	278	13.00	18.00	25.00	280	13.00	17.00	24.00
2001	53	14.00	21.00	27.00	28	12.50	16.50	23.00	25	15.00	24.00	32.00
Age at serum collection (years)												
<60	33	16.00	20.00	26.00	28	16.00	20.50	26.00	5	18.00	19.00	27.00
60-64	174	15.00	19.00	26.00	96	15.00	20.00	27.50	78	14.00	19.00	26.00
65-69	321	13.00	19.00	28.00	165	13.00	18.00	28.00	156	14.00	20.00	27.50
70-74	303	12.00	17.00	24.00	145	12.00	16.00	23.00	158	12.00	17.00	24.00

	Both				Females				Males			
	N ^b	P25 ^b	P50 ^b	P75 ^b	N ^b	P25 ^b	P50 ^b	P75 ^b	N ^b	P25 ^b	P50 ^b	P75 ^b
75-79	134	12.00	16.00	25.00	51	10.00	15.00	24.00	83	14.00	17.00	26.00
≥80	34	15.00	17.50	21.00	14	15.00	17.00	25.00	20	14.00	18.50	21.00
Race/ethnicity												
Hispanic or non-white race	14	15.00	19.50	33.00	5	16.00	33.00	40.00	9	12.00	18.00	26.00
Non-Hispanic white	981	13.00	18.00	25.00	494	13.00	18.00	25.00	487	13.00	18.00	25.00
Highest level of education												
High school or less	244	12.00	18.00	26.00	143	12.00	18.00	25.00	101	14.00	19.00	28.00
Some college or vocational/trade school	302	13.00	19.00	26.00	170	13.00	18.00	25.00	132	13.50	19.00	27.50
College graduate	252	14.00	18.00	26.00	128	14.50	19.00	27.50	124	13.00	17.00	24.00
Graduate school	196	13.00	18.00	24.00	57	13.00	16.00	23.00	139	14.00	18.00	24.00
Smoking status in 1997												
Non-smoker	457	13.00	18.00	24.00	275	12.00	17.00	25.00	182	14.00	18.50	24.00
Current smoker	39	11.00	16.00	22.00	21	12.00	18.00	23.00	18	10.00	15.00	19.00
Former smoker	488	14.00	18.50	26.00	200	14.00	19.00	26.00	288	14.00	18.00	26.50
Ever smoker (unknown if current or former)	15	14.00	20.00	28.00	3	17.00	34.00	40.00	12	13.00	17.50	24.00
Alcohol consumption in 1997												
Non-drinker	378	12.00	18.00	26.00	218	12.00	19.00	25.00	160	12.00	18.00	26.00
<1 drink/week	135	14.00	17.00	25.00	79	14.00	17.00	25.00	56	13.50	17.50	26.00
1-6 drinks/week	326	14.00	18.00	25.00	149	13.00	18.00	24.00	177	14.00	18.00	25.00
1 drink/day	110	14.00	19.50	28.00	37	15.00	20.00	28.00	73	13.00	19.00	27.00
≥2 drinks/day	48	14.00	18.00	26.00	15	13.00	16.00	23.00	33	15.00	21.00	26.00
Body mass index (kg/m ²)												
<18.5	14	10.00	13.50	23.00	12	10.00	13.50	20.50	2	13.00	18.50	24.00
18.5-<25	426	13.00	18.00	25.00	245	13.00	17.00	25.00	181	14.00	18.00	25.00
25-<30	405	13.00	18.00	26.00	168	13.00	19.00	26.00	237	13.00	18.00	26.00
≥30	144	14.00	19.00	27.00	72	15.00	19.50	27.50	72	14.00	18.50	26.50

^a PFHpA=perfluoroheptanoic acid, PFHxS=perfluorohexane sulfonic acid, PFNA=perfluorononanoic acid, PFOA=perfluorooctanoic acid, PFOS=perfluorooctane sulfonate

^b N=number, P25=25th percentile, p50=50th percentile, P75=75th percentile

Table S9. Results from primary models for overall cancer sites, Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015. Continuous results are for log₂ transformed concentrations.

Cancer Type	Type of PFAS ^a	Exposure Measure	Concentration Range (ng/ml)	Both Sexes				Females				Males			
				Number in Model ^b		HR (95% CI) ^c	p-value	Number in Model ^b		HR (95% CI) ^c	p-value	Number in Model ^b		HR (95% CI) ^c	p-value
				Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases		
Bladder	PFHxS	Quartile 1	<2.100	277	99			157	30			120	69		
Bladder	PFHxS	Quartile 2	2.100-<3.000	191	91	1.40 (0.91, 2.16)	0.122	102	15	0.74 (0.36, 1.54)	0.422	89	76	1.62 (0.94, 2.79)	0.081
Bladder	PFHxS	Quartile 3	3.000-<4.900	260	105	0.99 (0.68, 1.45)	0.972	110	22	0.89 (0.46, 1.72)	0.728	150	83	0.99 (0.63, 1.57)	0.982
Bladder	PFHxS	Quartile 4	>=4.900	260	101	1.05 (0.71, 1.53)	0.816	128	15	0.50 (0.23, 1.08)	0.079	132	86	1.17 (0.74, 1.86)	0.505
Bladder	PFHxS	Continuous				0.95 (0.84, 1.08)	0.463			0.77 (0.58, 1.02)	0.072			0.97 (0.84, 1.13)	0.701
Bladder	PFNA	Quartile 1	<0.470	220	95			117	22			103	73		
Bladder	PFNA	Quartile 2	0.470-<0.680	279	101	0.79 (0.54, 1.15)	0.221	135	21	0.69 (0.31, 1.52)	0.359	144	80	0.84 (0.53, 1.33)	0.464
Bladder	PFNA	Quartile 3	0.680-<1.000	250	90	0.92 (0.62, 1.36)	0.679	130	16	0.59 (0.26, 1.31)	0.194	120	74	1.05 (0.66, 1.68)	0.825
Bladder	PFNA	Quartile 4	>=1.000	239	110	1.01 (0.68, 1.51)	0.959	115	23	0.98 (0.47, 2.02)	0.954	124	87	1.06 (0.65, 1.72)	0.809
Bladder	PFNA	Continuous				0.96 (0.82, 1.11)	0.559			0.90 (0.65, 1.23)	0.502			0.98 (0.83, 1.17)	0.834
Bladder	PFOA	Quartile 1	<3.800	222	95			127	25			95	70		
Bladder	PFOA	Quartile 2	3.800-<5.100	253	97	0.84 (0.56, 1.26)	0.394	123	25	1.23 (0.60, 2.52)	0.581	130	72	0.80 (0.49, 1.32)	0.378
Bladder	PFOA	Quartile 3	5.100-<6.700	227	99	0.87 (0.58, 1.30)	0.494	103	12	0.68 (0.27, 1.70)	0.410	124	87	0.92 (0.57, 1.49)	0.734
Bladder	PFOA	Quartile 4	>=6.700	286	105	0.86 (0.58, 1.27)	0.446	144	20	0.81 (0.37, 1.78)	0.600	142	85	0.87 (0.54, 1.40)	0.574
Bladder	PFOA	Continuous				0.93 (0.77, 1.13)	0.478			0.91 (0.63, 1.31)	0.619			0.93 (0.74, 1.17)	0.520
Bladder	PFOS	Quartile 1	<13.000	217	95			113	27			104	68		
Bladder	PFOS	Quartile 2	13.000-<18.000	252	92	0.81 (0.54, 1.21)	0.310	130	17	0.51 (0.24, 1.05)	0.068	122	75	0.92 (0.57, 1.49)	0.748
Bladder	PFOS	Quartile 3	18.000-<25.000	248	106	1.07 (0.72, 1.60)	0.723	119	20	0.65 (0.33, 1.30)	0.227	129	86	1.20 (0.75, 1.94)	0.446
Bladder	PFOS	Quartile 4	>=25.000	271	103	0.96 (0.64, 1.44)	0.855	135	18	0.63 (0.29, 1.35)	0.233	136	85	1.10 (0.68, 1.78)	0.699
Bladder	PFOS	Continuous				1.01 (0.86, 1.20)	0.890			0.82 (0.58, 1.16)	0.255			1.06 (0.87, 1.28)	0.574
Kidney	PFHxS	Quartile 1	<2.100	277	38			157	15			120	23		
Kidney	PFHxS	Quartile 2	2.100-<3.300	244	39	1.13 (0.67, 1.93)	0.643	125	19	1.60 (0.70, 3.67)	0.264	119	20	0.93 (0.42, 2.10)	0.870
Kidney	PFHxS	Quartile 3	3.300-<4.900	207	40	1.35 (0.80, 2.27)	0.255	87	13	1.90 (0.76, 4.71)	0.169	120	27	1.20 (0.60, 2.40)	0.607
Kidney	PFHxS	Quartile 4	>=4.900	260	39	1.12 (0.66, 1.89)	0.676	128	18	1.46 (0.62, 3.41)	0.383	132	21	0.91 (0.43, 1.92)	0.807
Kidney	PFHxS	Continuous				1.06 (0.91, 1.24)	0.451			1.18 (0.89, 1.57)	0.249			0.98 (0.81, 1.19)	0.859
Kidney	PFNA	Quartile 1	<0.510	264	39			133	16			131	23		
Kidney	PFNA	Quartile 2	0.510-<0.680	235	40	1.15 (0.69, 1.92)	0.601	119	18	0.95 (0.39, 2.34)	0.918	116	22	1.16 (0.57, 2.36)	0.677
Kidney	PFNA	Quartile 3	0.680-<1.000	250	35	1.01 (0.60, 1.69)	0.980	130	16	0.89 (0.38, 2.07)	0.783	120	19	1.04 (0.51, 2.12)	0.914
Kidney	PFNA	Quartile 4	>=1.000	239	42	1.25 (0.74, 2.11)	0.397	115	15	1.02 (0.39, 2.67)	0.968	124	27	1.60 (0.78, 3.28)	0.202
Kidney	PFNA	Continuous				1.07 (0.90, 1.28)	0.428			0.95 (0.70, 1.29)	0.731			1.20 (0.95, 1.52)	0.124
Kidney	PFOA	Quartile 1	<3.900	244	39			143	17			101	22		
Kidney	PFOA	Quartile 2	3.900-<5.200	247	39	0.93 (0.56, 1.56)	0.784	115	13	0.80 (0.34, 1.87)	0.604	132	26	0.87 (0.43, 1.75)	0.702
Kidney	PFOA	Quartile 3	5.200-<7.300	285	39	0.83 (0.49, 1.40)	0.476	136	17	1.04 (0.45, 2.44)	0.919	149	22	0.65 (0.31, 1.35)	0.249
Kidney	PFOA	Quartile 4	>=7.300	212	39	1.20 (0.71, 2.04)	0.494	103	18	1.94 (0.87, 4.35)	0.106	109	21	0.81 (0.39, 1.68)	0.566
Kidney	PFOA	Continuous				1.08 (0.88, 1.33)	0.450			1.33 (0.97, 1.83)	0.076			0.89 (0.66, 1.20)	0.460
Kidney	PFOS	Quartile 1	<13.000	217	35			113	19			104	16		
Kidney	PFOS	Quartile 2	13.000-<18.000	252	39	0.92 (0.54, 1.57)	0.767	130	10	0.37 (0.14, 0.94)	0.037	122	29	1.72 (0.82, 3.61)	0.150
Kidney	PFOS	Quartile 3	18.000-<26.000	275	42	0.97 (0.58, 1.63)	0.918	134	17	0.76 (0.35, 1.66)	0.497	141	25	1.39 (0.66, 2.93)	0.392
Kidney	PFOS	Quartile 4	>=26.000	244	40	1.14 (0.67, 1.92)	0.632	120	19	0.93 (0.40, 2.15)	0.869	124	21	1.33 (0.62, 2.85)	0.468
Kidney	PFOS	Continuous				1.03 (0.84, 1.26)	0.796			1.06 (0.70, 1.59)	0.788			1.00 (0.79, 1.28)	0.978
Pancreatic	PFHxS	Quartile 1	<1.800	187	41			112	24			75	17		
Pancreatic	PFHxS	Quartile 2	1.800-<2.950	281	45	0.81 (0.49, 1.34)	0.412	147	22	0.64 (0.33, 1.28)	0.207	134	23	0.91 (0.42, 1.97)	0.810

Cancer Type	Type of PFAS ^a	Exposure Measure	Concentration Range (ng/ml)	Both Sexes				Females				Males			
				Number in Model ^b		HR (95% CI) ^c	p-value	Number in Model ^b		HR (95% CI) ^c	p-value	Number in Model ^b		HR (95% CI) ^c	p-value
				Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases		
Pancreatic	PFHxS	Quartile 3	2.950-<4.850	260	42	0.75 (0.45, 1.24)	0.258	110	14	0.53 (0.23, 1.20)	0.126	150	28	0.80 (0.39, 1.67)	0.555
Pancreatic	PFHxS	Quartile 4	>=4.850	260	43	0.80 (0.48, 1.34)	0.400	128	21	0.70 (0.34, 1.43)	0.323	132	22	0.85 (0.39, 1.88)	0.695
Pancreatic	PFHxS	Continuous				0.96 (0.81, 1.14)	0.643			0.98 (0.75, 1.29)	0.908			0.93 (0.74, 1.18)	0.560
Pancreatic	PFNA	Quartile 1	<0.450	192	42			96	23			96	19		
Pancreatic	PFNA	Quartile 2	0.450-<0.630	244	43	0.78 (0.47, 1.28)	0.321	124	18	0.53 (0.25, 1.10)	0.088	120	25	1.12 (0.54, 2.29)	0.766
Pancreatic	PFNA	Quartile 3	0.630-<1.000	313	41	0.59 (0.36, 0.97)	0.036	162	20	0.44 (0.20, 0.96)	0.039	151	21	0.70 (0.34, 1.45)	0.337
Pancreatic	PFNA	Quartile 4	>=1.000	239	45	0.85 (0.51, 1.42)	0.539	115	20	0.58 (0.26, 1.28)	0.177	124	25	1.06 (0.50, 2.25)	0.873
Pancreatic	PFNA	Continuous				0.89 (0.72, 1.10)	0.286			0.83 (0.62, 1.12)	0.228			0.90 (0.66, 1.23)	0.520
Pancreatic	PFOA	Quartile 1	<3.850	244	43			143	21			101	22		
Pancreatic	PFOA	Quartile 2	3.850-<5.100	231	42	1.03 (0.63, 1.68)	0.895	107	21	1.30 (0.65, 2.58)	0.462	124	21	0.82 (0.39, 1.72)	0.595
Pancreatic	PFOA	Quartile 3	5.100-<6.300	175	41	1.25 (0.75, 2.06)	0.392	76	14	1.29 (0.54, 3.07)	0.571	99	27	1.05 (0.51, 2.17)	0.899
Pancreatic	PFOA	Quartile 4	>=6.300	338	45	0.75 (0.46, 1.23)	0.251	171	25	0.93 (0.44, 1.97)	0.852	167	20	0.52 (0.25, 1.08)	0.079
Pancreatic	PFOA	Continuous				0.94 (0.74, 1.21)	0.650			1.14 (0.78, 1.67)	0.492			0.71 (0.52, 0.96)	0.025
Pancreatic	PFOS	Quartile 1	<12.000	170	39			90	22			80	17		
Pancreatic	PFOS	Quartile 2	12.000-<18.000	299	44	0.64 (0.39, 1.06)	0.083	153	18	0.48 (0.22, 1.02)	0.055	146	26	0.85 (0.39, 1.84)	0.679
Pancreatic	PFOS	Quartile 3	18.000-<25.000	248	42	0.75 (0.45, 1.24)	0.263	119	18	0.61 (0.28, 1.30)	0.199	129	24	0.87 (0.40, 1.90)	0.735
Pancreatic	PFOS	Quartile 4	>=25.000	271	46	0.75 (0.45, 1.25)	0.269	135	23	0.66 (0.31, 1.44)	0.299	136	23	0.83 (0.38, 1.81)	0.637
Pancreatic	PFOS	Continuous				0.87 (0.70, 1.10)	0.242			0.89 (0.63, 1.25)	0.494			0.87 (0.63, 1.21)	0.411
Hematologic	PFHxS	Quartile 1	<2.000	245	151			141	86			104	65		
Hematologic	PFHxS	Quartile 2	2.000-<3.000	223	156	1.17 (0.85, 1.60)	0.335	118	69	0.88 (0.57, 1.37)	0.583	105	87	1.73 (1.05, 2.85)	0.033
Hematologic	PFHxS	Quartile 3	3.000-<5.200	274	159	0.91 (0.67, 1.24)	0.548	119	58	0.73 (0.46, 1.16)	0.183	155	101	1.19 (0.76, 1.86)	0.453
Hematologic	PFHxS	Quartile 4	>=5.200	246	160	1.05 (0.77, 1.43)	0.763	119	68	0.80 (0.50, 1.28)	0.347	127	92	1.43 (0.90, 2.28)	0.134
Hematologic	PFHxS	Continuous				1.03 (0.93, 1.13)	0.617			0.97 (0.83, 1.13)	0.661			1.07 (0.92, 1.23)	0.381
Hematologic	PFNA	Quartile 1	<0.450	192	153			96	70			96	83		
Hematologic	PFNA	Quartile 2	0.450-<0.650	270	159	0.71 (0.52, 0.96)	0.028	136	76	0.64 (0.41, 1.01)	0.056	134	83	0.73 (0.47, 1.13)	0.159
Hematologic	PFNA	Quartile 3	0.650-<1.000	287	153	0.66 (0.48, 0.90)	0.009	150	66	0.45 (0.28, 0.73)	0.001	137	87	0.80 (0.51, 1.24)	0.320
Hematologic	PFNA	Quartile 4	>=1.000	239	161	0.83 (0.60, 1.14)	0.245	115	69	0.66 (0.40, 1.10)	0.109	124	92	1.00 (0.63, 1.58)	0.995
Hematologic	PFNA	Continuous				0.94 (0.83, 1.06)	0.312			0.84 (0.69, 1.01)	0.066			1.02 (0.86, 1.21)	0.817
Hematologic	PFOA	Quartile 1	<3.800	222	148			127	73			95	75		
Hematologic	PFOA	Quartile 2	3.800-<5.000	237	162	1.01 (0.74, 1.38)	0.965	116	70	0.90 (0.57, 1.44)	0.670	121	92	1.08 (0.68, 1.71)	0.751
Hematologic	PFOA	Quartile 3	5.000-<6.700	243	158	0.99 (0.72, 1.36)	0.937	110	75	1.08 (0.67, 1.74)	0.759	133	83	0.89 (0.56, 1.40)	0.611
Hematologic	PFOA	Quartile 4	>=6.700	286	158	0.84 (0.62, 1.15)	0.287	144	63	0.66 (0.40, 1.07)	0.094	142	95	0.96 (0.61, 1.51)	0.857
Hematologic	PFOA	Continuous				0.92 (0.80, 1.06)	0.248			0.88 (0.73, 1.06)	0.172			0.94 (0.75, 1.17)	0.566
Hematologic	PFOS	Quartile 1	<12.000	170	130			90	63			80	67		
Hematologic	PFOS	Quartile 2	12.000-<17.000	262	159	0.82 (0.59, 1.13)	0.220	135	83	0.73 (0.45, 1.18)	0.203	127	76	0.81 (0.50, 1.32)	0.402
Hematologic	PFOS	Quartile 3	17.000-<24.000	251	170	0.95 (0.69, 1.31)	0.746	123	68	0.71 (0.44, 1.16)	0.169	128	102	1.17 (0.74, 1.85)	0.505
Hematologic	PFOS	Quartile 4	>=24.000	305	167	0.79 (0.57, 1.09)	0.148	149	67	0.56 (0.34, 0.91)	0.019	156	100	1.01 (0.63, 1.61)	0.965
Hematologic	PFOS	Continuous				0.92 (0.81, 1.04)	0.161			0.79 (0.66, 0.95)	0.013			1.00 (0.84, 1.20)	0.977
Breast	PFHxS	Quartile 1	<1.700					99	164						
Breast	PFHxS	Quartile 2	1.700-<2.800					142	222	0.90 (0.62, 1.28)	0.547				
Breast	PFHxS	Quartile 3	2.800-<5.200					137	195	0.80 (0.56, 1.16)	0.238				
Breast	PFHxS	Quartile 4	>=5.200					119	199	0.94 (0.64, 1.38)	0.742				
Breast	PFHxS	Continuous								1.01 (0.90, 1.13)	0.894				
Breast	PFNA	Quartile 1	<0.460					104	183						
Breast	PFNA	Quartile 2	0.460-<0.670					141	202	0.66 (0.46, 0.94)	0.022				

Cancer Type	Type of PFAS ^a	Exposure Measure	Concentration Range (ng/ml)	Both Sexes			Females			Males					
				Number in Model ^b		HR (95% CI) ^c	p-value	Number in Model ^b		HR (95% CI) ^c	p-value	Number in Model ^b		HR (95% CI) ^c	p-value
				Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases		
Breast	PFNA	Quartile 3	0.670-<1.000				137	181	0.57 (0.39, 0.82)	0.003					
Breast	PFNA	Quartile 4	>=1.000				115	214	0.81 (0.55, 1.19)	0.282					
Breast	PFNA	Continuous							0.92 (0.80, 1.05)	0.223					
Breast	PFOA	Quartile 1	<3.700				118	193							
Breast	PFOA	Quartile 2	3.700-<5.000				125	196	0.80 (0.56, 1.15)	0.226					
Breast	PFOA	Quartile 3	5.000-<6.900				121	189	0.75 (0.52, 1.09)	0.135					
Breast	PFOA	Quartile 4	>=6.900				133	202	0.82 (0.57, 1.17)	0.269					
Breast	PFOA	Continuous							0.96 (0.82, 1.12)	0.582					
Breast	PFOS	Quartile 1	<12.000				90	160							
Breast	PFOS	Quartile 2	12.000-<17.000				135	195	0.66 (0.45, 0.97)	0.034					
Breast	PFOS	Quartile 3	17.000-<24.000				123	211	0.84 (0.57, 1.23)	0.367					
Breast	PFOS	Quartile 4	>=24.000				149	214	0.70 (0.48, 1.01)	0.056					
Breast	PFOS	Continuous							0.87 (0.75, 1.01)	0.074					
Prostate	PFHxS	Quartile 1	<2.200								128	386			
Prostate	PFHxS	Quartile 2	2.200-<3.300								111	401	1.27 (0.93, 1.75)	0.135	
Prostate	PFHxS	Quartile 3	3.300-<5.100								124	396	0.99 (0.73, 1.34)	0.930	
Prostate	PFHxS	Quartile 4	>=5.100								128	416	1.13 (0.84, 1.53)	0.409	
Prostate	PFHxS	Continuous											1.02 (0.93, 1.13)	0.657	
Prostate	PFNA	Quartile 1	<0.490								115	389			
Prostate	PFNA	Quartile 2	0.490-<0.700								138	392	0.81 (0.60, 1.09)	0.161	
Prostate	PFNA	Quartile 3	0.700-<1.000								114	388	1.04 (0.76, 1.41)	0.820	
Prostate	PFNA	Quartile 4	>=1.000								124	430	1.03 (0.76, 1.41)	0.835	
Prostate	PFNA	Continuous											1.02 (0.91, 1.15)	0.686	
Prostate	PFOA	Quartile 1	<4.000								112	398			
Prostate	PFOA	Quartile 2	4.000-<5.300								133	391	0.82 (0.60, 1.11)	0.203	
Prostate	PFOA	Quartile 3	5.300-<6.900								117	405	0.93 (0.68, 1.27)	0.629	
Prostate	PFOA	Quartile 4	>=6.900								129	405	0.83 (0.61, 1.14)	0.252	
Prostate	PFOA	Continuous											0.93 (0.79, 1.08)	0.321	
Prostate	PFOS	Quartile 1	<14.000								123	389			
Prostate	PFOS	Quartile 2	14.000-<19.000								129	392	0.94 (0.70, 1.26)	0.658	
Prostate	PFOS	Quartile 3	19.000-<26.000								115	410	1.11 (0.81, 1.50)	0.518	
Prostate	PFOS	Quartile 4	>=26.000								124	408	1.08 (0.80, 1.46)	0.623	
Prostate	PFOS	Continuous											1.00 (0.88, 1.14)	0.986	

^a PFHxS=perfluorohexane sulfonic acid, PFNA=perfluorononanoic acid, PFOA=perfluorooctanoic acid, PFOS=perfluorooctane sulfonate

^b All models had separate baseline hazards by sex or were restricted to one sex. The primary models controlled for year of serum sample collection (single-year categories), age at serum collection (<60, 60–64, 65–69, 70–74, 75–79, ≥80 years), race (non-Hispanic white, other), education (high school graduate or less, vocational/trade school or some college, college graduate, graduate school), smoking status (current smoker, former smoker, ever smoked but unknown if current or former, never smoked), and alcohol consumption (non-drinker, <1 drink/week, 1–6 drinks/week, 1 drink/day, ≥2 drinks/day).

^c HR=hazard ratio, CI=confidence interval

Table S10. Results from primary models for histologic subtypes, Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015. Continuous results are for log2 transformed concentrations.

Cancer Type ^a	Type of PFAS ^b	Exposure Measure	Concentration Range (ng/ml)	Both Sexes				Females				Males				
				Number in Model ^c		HR (95% CI) ^d	p-value	Number in Model ^c		HR (95% CI) ^d	p-value	Number in Model ^c		HR (95% CI) ^d	p-value	
				Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases			
Bladder																
TCC-B	PFHxS	Quartile 1	<2.100	277	96			157	29			120	67			
TCC-B	PFHxS	Quartile 2	2.100-<3.100	213	96	1.40 (0.92, 2.14)	0.117	115	17	0.73 (0.36, 1.47)	0.377	98	79	1.63 (0.95, 2.79)	0.077	
TCC-B	PFHxS	Quartile 3	3.100-<4.900	238	93	0.97 (0.65, 1.43)	0.871	97	19	0.96 (0.48, 1.89)	0.895	141	74	0.96 (0.60, 1.54)	0.880	
TCC-B	PFHxS	Quartile 4	>=4.900	260	100	1.07 (0.73, 1.57)	0.735	128	15	0.53 (0.25, 1.13)	0.100	132	85	1.19 (0.75, 1.90)	0.463	
TCC-B	PFHxS	Continuous				0.95 (0.84, 1.09)	0.479			0.78 (0.59, 1.03)	0.084			0.97 (0.84, 1.13)	0.697	
TCC-B	PFNA	Quartile 1	<0.470	220	92			117	21			103	71			
TCC-B	PFNA	Quartile 2	0.470-<0.680	279	97	0.78 (0.53, 1.15)	0.218	135	20	0.71 (0.32, 1.58)	0.398	144	77	0.84 (0.53, 1.33)	0.449	
TCC-B	PFNA	Quartile 3	0.680-<1.000	250	89	0.94 (0.63, 1.39)	0.759	130	16	0.63 (0.28, 1.40)	0.255	120	73	1.07 (0.67, 1.70)	0.781	
TCC-B	PFNA	Quartile 4	>=1.000	239	107	1.02 (0.68, 1.53)	0.911	115	23	1.05 (0.50, 2.17)	0.903	124	84	1.06 (0.65, 1.72)	0.823	
TCC-B	PFNA	Continuous				0.96 (0.83, 1.12)	0.644			0.92 (0.67, 1.26)	0.582			0.99 (0.83, 1.17)	0.877	
TCC-B	PFOA	Quartile 1	<3.800	222	92			127	25			95	67			
TCC-B	PFOA	Quartile 2	3.800-<5.200	269	99	0.82 (0.55, 1.23)	0.345	131	24	1.07 (0.52, 2.17)	0.860	138	75	0.81 (0.49, 1.32)	0.393	
TCC-B	PFOA	Quartile 3	5.200-<6.800	226	95	0.86 (0.57, 1.29)	0.463	102	13	0.73 (0.30, 1.78)	0.493	124	82	0.90 (0.55, 1.47)	0.666	
TCC-B	PFOA	Quartile 4	>=6.800	271	99	0.88 (0.59, 1.32)	0.543	137	18	0.74 (0.34, 1.64)	0.464	134	81	0.93 (0.57, 1.50)	0.761	
TCC-B	PFOA	Continuous				0.94 (0.78, 1.14)	0.521			0.92 (0.64, 1.34)	0.676			0.93 (0.74, 1.17)	0.550	
TCC-B	PFOS	Quartile 1	<13.000	217	92			113	26			104	66			
TCC-B	PFOS	Quartile 2	13.000-<18.000	252	88	0.80 (0.53, 1.20)	0.280	130	16	0.49 (0.24, 1.03)	0.060	122	72	0.91 (0.56, 1.48)	0.698	
TCC-B	PFOS	Quartile 3	18.000-<25.000	248	104	1.09 (0.73, 1.62)	0.687	119	20	0.68 (0.34, 1.36)	0.277	129	84	1.21 (0.75, 1.96)	0.431	
TCC-B	PFOS	Quartile 4	>=25.000	271	101	0.97 (0.65, 1.45)	0.874	135	18	0.64 (0.30, 1.39)	0.263	136	83	1.10 (0.67, 1.78)	0.711	
TCC-B	PFOS	Continuous				1.02 (0.86, 1.21)	0.823			0.83 (0.58, 1.18)	0.293			1.06 (0.88, 1.29)	0.535	
Bladder or Kidney																
TCC-BK	PFHxS	Quartile 1	<2.100	277	101			157	32			120	69			
TCC-BK	PFHxS	Quartile 2	2.100-<3.200	227	114	1.49 (1.01, 2.21)	0.045	122	25	0.96 (0.51, 1.81)	0.904	105	89	1.68 (1.00, 2.81)	0.050	
TCC-BK	PFHxS	Quartile 3	3.200-<5.000	229	107	1.13 (0.77, 1.64)	0.539	93	23	1.24 (0.65, 2.40)	0.514	136	84	1.12 (0.70, 1.77)	0.641	
TCC-BK	PFHxS	Quartile 4	>=5.000	255	110	1.15 (0.79, 1.66)	0.472	125	22	0.79 (0.40, 1.55)	0.486	130	88	1.22 (0.77, 1.94)	0.397	
TCC-BK	PFHxS	Continuous				0.98 (0.87, 1.11)	0.798			0.89 (0.70, 1.13)	0.328			0.99 (0.86, 1.15)	0.909	
TCC-BK	PFNA	Quartile 1	<0.470	220	101			117	25			103	76			
TCC-BK	PFNA	Quartile 2	0.470-<0.690	286	114	0.84 (0.58, 1.22)	0.358	139	30	0.92 (0.46, 1.85)	0.817	147	84	0.85 (0.54, 1.33)	0.471	
TCC-BK	PFNA	Quartile 3	0.690-<1.000	243	97	0.96 (0.65, 1.40)	0.821	126	19	0.65 (0.32, 1.35)	0.253	117	78	1.09 (0.69, 1.72)	0.721	
TCC-BK	PFNA	Quartile 4	>=1.000	239	120	1.05 (0.72, 1.55)	0.791	115	28	1.13 (0.57, 2.24)	0.734	124	92	1.08 (0.67, 1.73)	0.761	
TCC-BK	PFNA	Continuous				0.98 (0.85, 1.12)	0.731			0.93 (0.71, 1.22)	0.596			1.00 (0.84, 1.18)	0.981	
TCC-BK	PFOA	Quartile 1	<3.800	222	103			127	33			95	70			
TCC-BK	PFOA	Quartile 2	3.800-<5.200	269	109	0.82 (0.56, 1.20)	0.311	131	29	0.88 (0.47, 1.66)	0.693	138	80	0.82 (0.50, 1.33)	0.424	
TCC-BK	PFOA	Quartile 3	5.200-<6.700	211	107	0.95 (0.64, 1.40)	0.780	95	17	0.74 (0.34, 1.59)	0.436	116	90	1.02 (0.63, 1.66)	0.943	
TCC-BK	PFOA	Quartile 4	>=6.700	286	113	0.86 (0.59, 1.25)	0.435	144	23	0.71 (0.35, 1.45)	0.347	142	90	0.92 (0.57, 1.47)	0.715	
TCC-BK	PFOA	Continuous				0.95 (0.80, 1.14)	0.608			0.93 (0.68, 1.28)	0.673			0.95 (0.76, 1.19)	0.646	
TCC-BK	PFOS	Quartile 1	<13.000	217	102			113	34			104	68			
TCC-BK	PFOS	Quartile 2	13.000-<18.000	252	101	0.83 (0.56, 1.22)	0.334	130	20	0.45 (0.23, 0.88)	0.020	122	81	1.00 (0.62, 1.62)	0.989	
TCC-BK	PFOS	Quartile 3	18.000-<25.000	248	118	1.10 (0.75, 1.60)	0.635	119	26	0.70 (0.38, 1.30)	0.259	129	92	1.29 (0.81, 2.07)	0.285	
TCC-BK	PFOS	Quartile 4	>=25.000	271	111	0.96 (0.65, 1.41)	0.835	135	22	0.60 (0.29, 1.20)	0.148	136	89	1.14 (0.71, 1.84)	0.589	

Cancer Type ^a	Type of PFAS ^b	Exposure Measure	Concentration Range (ng/ml)	Both Sexes				Females				Males			
				Number in Model ^c		HR (95% CI) ^d	p-value	Number in Model ^e		HR (95% CI) ^d	p-value	Number in Model ^c		HR (95% CI) ^d	p-value
				Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases		
TCC-BK Kidney	PFOS	Continuous				1.01 (0.86, 1.18)	0.936			0.82 (0.60, 1.11)	0.201			1.06 (0.88, 1.28)	0.544
RCC	PFHxS	Quartile 1	<2.000	245	26			141	11			104	15		
RCC	PFHxS	Quartile 2	2.000-<2.900	207	27	1.08 (0.58, 2.01)	0.811	110	11	1.16 (0.44, 3.02)	0.763	97	16	1.15 (0.46, 2.86)	0.761
RCC	PFHxS	Quartile 3	2.900-<4.400	230	26	0.99 (0.53, 1.85)	0.982	98	6	0.95 (0.30, 2.98)	0.927	132	20	1.15 (0.50, 2.65)	0.739
RCC	PFHxS	Quartile 4	>=4.400	306	28	0.81 (0.43, 1.52)	0.508	148	14	1.17 (0.43, 3.16)	0.752	158	14	0.65 (0.26, 1.60)	0.348
RCC	PFHxS	Continuous				0.97 (0.80, 1.16)	0.717			1.16 (0.80, 1.69)	0.426			0.86 (0.69, 1.06)	0.160
RCC	PFNA	Quartile 1	<0.500	253	25			128	11			125	14		
RCC	PFNA	Quartile 2	0.500-<0.670	234	29	1.25 (0.67, 2.33)	0.478	117	9	0.56 (0.17, 1.82)	0.333	117	20	1.75 (0.77, 4.00)	0.184
RCC	PFNA	Quartile 3	0.670-<1.000	262	25	0.97 (0.52, 1.80)	0.915	137	13	0.89 (0.31, 2.55)	0.834	125	12	0.93 (0.39, 2.23)	0.869
RCC	PFNA	Quartile 4	>=1.000	239	28	1.27 (0.67, 2.42)	0.465	115	9	0.72 (0.21, 2.50)	0.610	124	19	2.02 (0.85, 4.81)	0.114
RCC	PFNA	Continuous				1.06 (0.85, 1.32)	0.598			0.90 (0.61, 1.33)	0.612			1.21 (0.92, 1.59)	0.168
RCC	PFOA	Quartile 1	<3.900	244	27			143	8			101	19		
RCC	PFOA	Quartile 2	3.900-<5.000	215	25	1.00 (0.54, 1.87)	0.993	100	8	1.33 (0.42, 4.19)	0.624	115	17	0.79 (0.36, 1.74)	0.554
RCC	PFOA	Quartile 3	5.000-<7.400	323	28	0.74 (0.40, 1.36)	0.331	155	13	1.66 (0.54, 5.12)	0.380	168	15	0.45 (0.20, 1.01)	0.054
RCC	PFOA	Quartile 4	>=7.400	206	27	1.21 (0.65, 2.27)	0.545	99	13	3.14 (1.04, 9.54)	0.043	107	14	0.64 (0.28, 1.46)	0.293
RCC	PFOA	Continuous				1.06 (0.83, 1.35)	0.648			1.54 (1.05, 2.26)	0.027			0.80 (0.57, 1.11)	0.178
RCC	PFOS	Quartile 1	<13.000	217	25			113	11			104	14		
RCC	PFOS	Quartile 2	13.000-<19.000	291	29	0.82 (0.45, 1.49)	0.508	143	6	0.40 (0.12, 1.35)	0.139	148	23	1.25 (0.57, 2.74)	0.579
RCC	PFOS	Quartile 3	19.000-<26.000	236	24	0.96 (0.51, 1.80)	0.892	121	10	0.89 (0.32, 2.46)	0.819	115	14	1.10 (0.46, 2.60)	0.836
RCC	PFOS	Quartile 4	>=26.000	244	29	1.13 (0.61, 2.07)	0.696	120	15	1.29 (0.45, 3.74)	0.637	124	14	0.98 (0.42, 2.29)	0.956
RCC	PFOS	Continuous				1.08 (0.84, 1.38)	0.555			1.30 (0.77, 2.20)	0.328			0.97 (0.73, 1.29)	0.817
Hematologic															
MYELO	PFHxS	Quartile 1	<1.900	214	17			127	7			87	10		
MYELO	PFHxS	Quartile 2	1.900-<3.150	290	23	0.98 (0.46, 2.05)	0.949	152	11	1.36 (0.43, 4.24)	0.599	138	12	0.85 (0.30, 2.43)	0.761
MYELO	PFHxS	Quartile 3	3.150-<4.900	224	19	0.93 (0.45, 1.93)	0.851	90	4	0.77 (0.19, 3.04)	0.708	134	15	0.94 (0.33, 2.64)	0.900
MYELO	PFHxS	Quartile 4	>=4.900	260	21	0.93 (0.44, 1.95)	0.840	128	10	1.34 (0.37, 4.91)	0.658	132	11	0.81 (0.29, 2.22)	0.679
MYELO	PFHxS	Continuous				1.02 (0.80, 1.30)	0.882			1.13 (0.74, 1.71)	0.571			0.96 (0.68, 1.35)	0.803
MYELO	PFNA	Quartile 1	<0.455	204	20			104	11			100	9		
MYELO	PFNA	Quartile 2	0.455-<0.690	302	19	0.56 (0.28, 1.10)	0.090	152	8	0.36 (0.12, 1.07)	0.066	150	11	0.74 (0.28, 1.99)	0.554
MYELO	PFNA	Quartile 3	0.690-<1.200	310	20	0.59 (0.30, 1.19)	0.143	157	8	0.32 (0.10, 1.04)	0.058	153	12	0.88 (0.33, 2.36)	0.804
MYELO	PFNA	Quartile 4	>=1.200	172	21	1.11 (0.55, 2.27)	0.765	84	5	0.41 (0.11, 1.54)	0.187	88	16	2.30 (0.82, 6.47)	0.115
MYELO	PFNA	Continuous				1.02 (0.76, 1.36)	0.905			0.62 (0.39, 0.98)	0.043			1.33 (0.95, 1.87)	0.093
MYELO	PFOA	Quartile 1	<3.500	169	19			101	11			68	8		
MYELO	PFOA	Quartile 2	3.500-<4.600	216	19	0.68 (0.33, 1.39)	0.286	110	6	0.43 (0.13, 1.43)	0.169	106	13	0.98 (0.36, 2.68)	0.963
MYELO	PFOA	Quartile 3	4.600-<6.200	249	21	0.68 (0.34, 1.36)	0.281	109	10	0.68 (0.21, 2.13)	0.503	140	11	0.73 (0.26, 2.06)	0.546
MYELO	PFOA	Quartile 4	>=6.200	354	21	0.51 (0.25, 1.03)	0.062	177	5	0.17 (0.04, 0.76)	0.020	177	16	0.83 (0.31, 2.25)	0.719
MYELO	PFOA	Continuous				0.74 (0.54, 1.02)	0.063			0.60 (0.39, 0.90)	0.013			0.79 (0.45, 1.41)	0.431
MYELO	PFOS	Quartile 1	<12.000	170	16			90	8			80	8		
MYELO	PFOS	Quartile 2	12.000-<18.000	299	22	0.77 (0.37, 1.61)	0.487	153	10	0.48 (0.13, 1.79)	0.275	146	12	0.95 (0.34, 2.66)	0.921
MYELO	PFOS	Quartile 3	18.000-<24.000	214	21	1.13 (0.54, 2.38)	0.748	105	9	0.84 (0.27, 2.67)	0.771	109	12	1.39 (0.49, 3.97)	0.541
MYELO	PFOS	Quartile 4	>=24.000	305	21	0.85 (0.41, 1.77)	0.673	149	5	0.30 (0.08, 1.09)	0.068	156	16	1.57 (0.58, 4.26)	0.378
MYELO	PFOS	Continuous				0.90 (0.67, 1.23)	0.514			0.72 (0.49, 1.05)	0.084			1.02 (0.63, 1.65)	0.929
LYMPH	PFHxS	Quartile 1	<2.000	245	124			141	72			104	52		
LYMPH	PFHxS	Quartile 2	2.000-<3.000	223	140	1.29 (0.93, 1.79)	0.127	118	62	0.95 (0.60, 1.51)	0.839	105	78	1.98 (1.17, 3.35)	0.011

Cancer Type ^a	Type of PFAS ^b	Exposure Measure	Concentration Range (ng/ml)	Both Sexes				Females				Males			
				Number in Model ^c		HR (95% CI) ^d	p-value	Number in Model ^c		HR (95% CI) ^d	p-value	Number in Model ^c		HR (95% CI) ^d	p-value
				Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases		
LYMPH	PFHxS	Quartile 3	3.000-<5.200	274	136	0.96 (0.70, 1.32)	0.805	119	52	0.79 (0.49, 1.29)	0.348	155	84	1.26 (0.78, 2.03)	0.338
LYMPH	PFHxS	Quartile 4	>=5.200	246	140	1.14 (0.82, 1.58)	0.440	119	59	0.84 (0.52, 1.38)	0.501	127	81	1.59 (0.97, 2.60)	0.063
LYMPH	PFHxS	Continuous				1.04 (0.93, 1.15)	0.505			0.97 (0.83, 1.14)	0.751			1.07 (0.93, 1.25)	0.342
LYMPH	PFNA	Quartile 1	<0.450	192	131			96	57			96	74		
LYMPH	PFNA	Quartile 2	0.450-<0.650	270	139	0.73 (0.53, 1.01)	0.055	136	68	0.72 (0.45, 1.16)	0.182	134	71	0.70 (0.45, 1.11)	0.131
LYMPH	PFNA	Quartile 3	0.650-<0.970	268	132	0.73 (0.52, 1.01)	0.056	142	57	0.54 (0.32, 0.89)	0.016	126	75	0.85 (0.53, 1.34)	0.484
LYMPH	PFNA	Quartile 4	>=0.970	258	138	0.76 (0.55, 1.07)	0.115	123	63	0.68 (0.39, 1.16)	0.153	135	75	0.82 (0.51, 1.32)	0.417
LYMPH	PFNA	Continuous				0.93 (0.82, 1.06)	0.292			0.88 (0.73, 1.07)	0.209			0.96 (0.81, 1.15)	0.684
LYMPH	PFOA	Quartile 1	<3.900	244	135			143	62			101	73		
LYMPH	PFOA	Quartile 2	3.900-<5.000	215	130	1.05 (0.75, 1.45)	0.782	100	60	1.22 (0.75, 1.97)	0.422	115	70	0.93 (0.58, 1.51)	0.776
LYMPH	PFOA	Quartile 3	5.000-<6.700	243	136	1.01 (0.73, 1.40)	0.943	110	65	1.30 (0.79, 2.14)	0.303	133	71	0.81 (0.51, 1.29)	0.373
LYMPH	PFOA	Quartile 4	>=6.700	286	139	0.88 (0.64, 1.22)	0.441	144	58	0.83 (0.50, 1.37)	0.474	142	81	0.87 (0.54, 1.38)	0.542
LYMPH	PFOA	Continuous				0.96 (0.83, 1.11)	0.564			0.94 (0.77, 1.13)	0.495			0.95 (0.76, 1.20)	0.695
LYMPH	PFOS	Quartile 1	<13.000	217	132			113	66			104	66		
LYMPH	PFOS	Quartile 2	13.000-<17.000	215	120	0.89 (0.64, 1.25)	0.505	112	61	0.81 (0.49, 1.33)	0.401	103	59	0.93 (0.57, 1.52)	0.786
LYMPH	PFOS	Quartile 3	17.000-<24.000	251	143	0.97 (0.70, 1.33)	0.841	123	56	0.73 (0.45, 1.18)	0.196	128	87	1.22 (0.78, 1.90)	0.391
LYMPH	PFOS	Quartile 4	>=24.000	305	145	0.82 (0.60, 1.13)	0.227	149	62	0.63 (0.39, 1.02)	0.063	156	83	1.00 (0.64, 1.58)	0.986
LYMPH	PFOS	Continuous				0.93 (0.82, 1.06)	0.265			0.83 (0.69, 1.00)	0.049			1.00 (0.83, 1.19)	0.956
BNHL	PFHxS	Quartile 1	<2.100	277	118			157	65			120	53		
BNHL	PFHxS	Quartile 2	2.100-<3.000	191	120	1.51 (1.08, 2.11)	0.017	102	56	1.21 (0.75, 1.96)	0.440	89	64	2.06 (1.21, 3.51)	0.008
BNHL	PFHxS	Quartile 3	3.000-<5.100	271	122	1.02 (0.73, 1.40)	0.927	117	45	0.86 (0.52, 1.41)	0.545	154	77	1.25 (0.78, 2.00)	0.349
BNHL	PFHxS	Quartile 4		249	123	1.15 (0.83, 1.60)	0.401	121	50	0.84 (0.50, 1.41)	0.510	128	73	1.54 (0.95, 2.50)	0.080
BNHL	PFHxS	Continuous				1.02 (0.92, 1.13)	0.729			0.94 (0.80, 1.11)	0.481			1.07 (0.91, 1.25)	0.420
BNHL	PFNA	Quartile 1	<0.450	192	119			96	51			96	68		
BNHL	PFNA	Quartile 2	0.450-<0.630	244	118	0.76 (0.54, 1.06)	0.102	124	58	0.72 (0.44, 1.20)	0.208	120	60	0.74 (0.46, 1.18)	0.207
BNHL	PFNA	Quartile 3	0.630-<0.970	294	124	0.67 (0.48, 0.94)	0.020	154	54	0.50 (0.30, 0.85)	0.010	140	70	0.74 (0.46, 1.17)	0.197
BNHL	PFNA	Quartile 4	>=0.970	258	122	0.74 (0.52, 1.04)	0.085	123	53	0.60 (0.34, 1.06)	0.076	135	69	0.83 (0.51, 1.34)	0.441
BNHL	PFNA	Continuous				0.91 (0.80, 1.04)	0.164			0.82 (0.67, 1.01)	0.058			0.97 (0.80, 1.16)	0.703
BNHL	PFOA	Quartile 1	<3.800	222	108			127	52			95	56		
BNHL	PFOA	Quartile 2	3.800-<5.000	237	126	1.06 (0.75, 1.49)	0.745	116	57	1.00 (0.60, 1.67)	0.995	121	69	1.10 (0.67, 1.82)	0.699
BNHL	PFOA	Quartile 3	5.000-<6.700	243	128	1.08 (0.76, 1.52)	0.668	110	60	1.20 (0.70, 2.04)	0.509	133	68	0.97 (0.59, 1.58)	0.890
BNHL	PFOA	Quartile 4	>=6.700	286	121	0.87 (0.62, 1.23)	0.443	144	47	0.66 (0.38, 1.15)	0.145	142	74	1.00 (0.61, 1.63)	0.996
BNHL	PFOA	Continuous				0.92 (0.80, 1.07)	0.280			0.87 (0.71, 1.05)	0.147			0.95 (0.75, 1.20)	0.658
BNHL	PFOS	Quartile 1	<13.000	217	120			113	60			104	60		
BNHL	PFOS	Quartile 2	13.000-<17.000	215	107	0.87 (0.61, 1.23)	0.425	112	52	0.71 (0.42, 1.22)	0.218	103	55	0.96 (0.58, 1.58)	0.860
BNHL	PFOS	Quartile 3	17.000-<24.000	251	129	0.95 (0.69, 1.32)	0.776	123	52	0.71 (0.43, 1.18)	0.187	128	77	1.18 (0.75, 1.87)	0.477
BNHL	PFOS	Quartile 4	>=24.000	305	127	0.78 (0.57, 1.09)	0.144	149	52	0.55 (0.33, 0.93)	0.025	156	75	0.99 (0.62, 1.58)	0.964
BNHL	PFOS	Continuous				0.91 (0.80, 1.03)	0.124			0.79 (0.65, 0.96)	0.016			0.97 (0.81, 1.16)	0.733
DLBCL	PFHxS	Quartile 1	<2.100	277	27			157	18			120	9		
DLBCL	PFHxS	Quartile 2	2.100-<2.900	175	34	1.93 (1.07, 3.48)	0.029	94	15	1.38 (0.58, 3.28)	0.472	81	19	3.66 (1.33, 10.09)	0.012
DLBCL	PFHxS	Quartile 3	2.900-<4.500	237	31	1.27 (0.72, 2.25)	0.406	102	10	0.89 (0.35, 2.26)	0.806	135	21	2.36 (1.00, 5.61)	0.051
DLBCL	PFHxS	Quartile 4	>=4.500	299	31	1.01 (0.57, 1.81)	0.962	144	12	0.64 (0.24, 1.65)	0.353	155	19	1.80 (0.72, 4.50)	0.208
DLBCL	PFHxS	Continuous				0.95 (0.80, 1.12)	0.535			0.88 (0.64, 1.20)	0.413			1.00 (0.81, 1.24)	0.985
DLBCL	PFNA	Quartile 1	<0.430	168	30			84	13			84	17		
DLBCL	PFNA	Quartile 2	0.430-<0.610	237	29	0.78 (0.44, 1.40)	0.410	117	11	0.68 (0.26, 1.72)	0.411	120	18	0.83 (0.37, 1.85)	0.654

Cancer Type ^a	Type of PFAS ^b	Exposure Measure	Concentration Range (ng/ml)	Both Sexes				Females				Males			
				Number in Model ^c		HR (95% CI) ^d	p-value	Number in Model ^e		HR (95% CI) ^d	p-value	Number in Model ^c		HR (95% CI) ^d	p-value
				Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases		
DLBCL	PFNA	Quartile 3	0.610-<0.960	318	33	0.66 (0.38, 1.13)	0.129	169	18	0.67 (0.28, 1.61)	0.368	149	15	0.59 (0.26, 1.34)	0.207
DLBCL	PFNA	Quartile 4	>=0.960	265	31	0.70 (0.39, 1.25)	0.227	127	13	0.76 (0.28, 2.10)	0.599	138	18	0.69 (0.30, 1.58)	0.382
DLBCL	PFNA	Continuous				0.86 (0.70, 1.05)	0.144			0.89 (0.64, 1.26)	0.519			0.83 (0.62, 1.12)	0.221
DLBCL	PFOA	Quartile 1	<3.800	222	28			127	11			95	17		
DLBCL	PFOA	Quartile 2	3.800-<5.000	237	33	1.07 (0.59, 1.96)	0.815	116	15	1.27 (0.47, 3.44)	0.634	121	18	0.99 (0.42, 2.35)	0.990
DLBCL	PFOA	Quartile 3	5.000-<6.300	191	31	1.29 (0.70, 2.37)	0.408	83	15	2.03 (0.72, 5.75)	0.180	108	16	0.94 (0.41, 2.15)	0.884
DLBCL	PFOA	Quartile 4	>=6.300	338	31	0.74 (0.41, 1.34)	0.325	171	14	0.92 (0.34, 2.47)	0.864	167	17	0.68 (0.30, 1.53)	0.346
DLBCL	PFOA	Continuous				0.86 (0.71, 1.05)	0.142			0.94 (0.69, 1.29)	0.713			0.80 (0.58, 1.10)	0.166
DLBCL	PFOS	Quartile 1	<13.000	217	29			113	13			104	16		
DLBCL	PFOS	Quartile 2	13.000-<17.000	215	30	1.03 (0.57, 1.85)	0.919	112	20	1.45 (0.53, 3.97)	0.476	103	10	0.69 (0.28, 1.68)	0.414
DLBCL	PFOS	Quartile 3	17.000-<24.000	251	27	0.84 (0.47, 1.51)	0.561	123	8	0.57 (0.18, 1.79)	0.335	128	19	1.16 (0.55, 2.45)	0.691
DLBCL	PFOS	Quartile 4	>=24.000	305	37	0.96 (0.56, 1.66)	0.884	149	14	0.75 (0.28, 2.02)	0.573	156	23	1.24 (0.59, 2.62)	0.569
DLBCL	PFOS	Continuous				0.90 (0.74, 1.10)	0.304			0.77 (0.56, 1.06)	0.114			1.03 (0.78, 1.36)	0.853
CLL/SLL	PFHxS	Quartile 1	<2.000	245	32			141	22			104	10		
CLL/SLL	PFHxS	Quartile 2	2.000-<3.200	259	35	1.07 (0.62, 1.84)	0.806	138	17	0.72 (0.34, 1.53)	0.393	121	18	2.10 (0.83, 5.36)	0.119
CLL/SLL	PFHxS	Quartile 3	3.200-<6.200	302	37	0.95 (0.55, 1.64)	0.848	130	12	0.53 (0.22, 1.26)	0.151	172	25	1.85 (0.75, 4.56)	0.184
CLL/SLL	PFHxS	Quartile 4	>=6.200	182	36	1.55 (0.89, 2.71)	0.125	88	15	0.91 (0.36, 2.32)	0.848	94	21	3.01 (1.21, 7.48)	0.018
CLL/SLL	PFHxS	Continuous				1.11 (0.93, 1.31)	0.243			0.89 (0.69, 1.16)	0.398			1.34 (1.02, 1.75)	0.033
CLL/SLL	PFNA	Quartile 1	<0.460	204	35			104	19			100	16		
CLL/SLL	PFNA	Quartile 2	0.460-<0.660	270	35	0.67 (0.39, 1.13)	0.134	136	18	0.47 (0.21, 1.05)	0.065	134	17	0.76 (0.35, 1.65)	0.490
CLL/SLL	PFNA	Quartile 3	0.660-<1.000	275	33	0.62 (0.36, 1.08)	0.092	142	15	0.33 (0.14, 0.79)	0.013	133	18	0.89 (0.40, 1.97)	0.774
CLL/SLL	PFNA	Quartile 4	>=1.000	239	37	0.84 (0.47, 1.49)	0.546	115	14	0.40 (0.15, 1.06)	0.065	124	23	1.34 (0.58, 3.10)	0.490
CLL/SLL	PFNA	Continuous				0.95 (0.75, 1.20)	0.644			0.73 (0.53, 1.02)	0.062			1.13 (0.82, 1.56)	0.441
CLL/SLL	PFOA	Quartile 1	<4.000	264	34			152	19			112	15		
CLL/SLL	PFOA	Quartile 2	4.000-<5.600	295	36	0.93 (0.55, 1.59)	0.791	134	22	1.32 (0.62, 2.81)	0.472	161	14	0.66 (0.28, 1.57)	0.346
CLL/SLL	PFOA	Quartile 3	5.600-<7.300	217	31	1.08 (0.60, 1.95)	0.785	108	10	0.64 (0.24, 1.70)	0.369	109	21	1.67 (0.70, 3.97)	0.244
CLL/SLL	PFOA	Quartile 4	>=7.300	212	39	1.40 (0.82, 2.41)	0.221	103	15	0.97 (0.39, 2.41)	0.943	109	24	1.71 (0.76, 3.82)	0.194
CLL/SLL	PFOA	Continuous				1.03 (0.82, 1.29)	0.797			0.83 (0.62, 1.10)	0.192			1.29 (0.89, 1.89)	0.183
CLL/SLL	PFOS	Quartile 1	<13.000	217	31			113	16			104	15		
CLL/SLL	PFOS	Quartile 2	13.000-<19.000	291	38	0.82 (0.48, 1.42)	0.485	143	20	0.70 (0.30, 1.62)	0.402	148	18	0.85 (0.38, 1.87)	0.680
CLL/SLL	PFOS	Quartile 3	19.000-<25.000	209	34	1.18 (0.68, 2.07)	0.557	106	17	1.08 (0.49, 2.39)	0.856	103	17	1.35 (0.59, 3.05)	0.477
CLL/SLL	PFOS	Quartile 4	>=25.000	271	37	0.96 (0.55, 1.66)	0.875	135	13	0.45 (0.17, 1.16)	0.099	136	24	1.48 (0.67, 3.26)	0.330
CLL/SLL	PFOS	Continuous				1.00 (0.81, 1.24)	0.999			0.78 (0.59, 1.04)	0.096			1.17 (0.84, 1.63)	0.342
MM	PFHxS	Quartile 1	<2.000	245	24			141	8			104	16		
MM	PFHxS	Quartile 2	2.000-<3.100	245	24	1.08 (0.58, 2.00)	0.813	131	10	1.23 (0.44, 3.37)	0.694	114	14	1.08 (0.43, 2.69)	0.873
MM	PFHxS	Quartile 3	3.100-<5.000	243	25	1.02 (0.55, 1.90)	0.951	100	13	2.11 (0.83, 5.36)	0.115	143	12	0.58 (0.26, 1.31)	0.191
MM	PFHxS	Quartile 4	>=5.000	255	26	1.07 (0.58, 1.98)	0.831	125	12	1.51 (0.57, 4.01)	0.409	130	14	0.82 (0.34, 1.96)	0.654
MM	PFHxS	Continuous				0.97 (0.77, 1.21)	0.772			1.16 (0.83, 1.64)	0.388			0.82 (0.61, 1.12)	0.209
MM	PFNA	Quartile 1	<0.460	204	25			104	7			100	18		
MM	PFNA	Quartile 2	0.460-<0.590	171	25	1.24 (0.68, 2.25)	0.486	82	12	1.95 (0.71, 5.37)	0.196	89	13	1.12 (0.46, 2.71)	0.802
MM	PFNA	Quartile 3	0.590-<0.920	312	23	0.60 (0.33, 1.11)	0.106	160	12	0.88 (0.30, 2.52)	0.805	152	11	0.44 (0.19, 1.03)	0.060
MM	PFNA	Quartile 4	>=0.920	301	26	0.70 (0.38, 1.28)	0.244	151	12	0.86 (0.29, 2.56)	0.788	150	14	0.69 (0.28, 1.66)	0.403
MM	PFNA	Continuous				0.81 (0.66, 0.99)	0.039			0.81 (0.59, 1.12)	0.199			0.76 (0.56, 1.05)	0.096
MM	PFOA	Quartile 1	<3.700	206	25			118	10			88	15		
MM	PFOA	Quartile 2	3.700-<4.800	220	21	0.73 (0.39, 1.38)	0.337	110	9	0.78 (0.26, 2.31)	0.650	110	12	0.71 (0.29, 1.76)	0.458

Cancer Type ^a	Type of PFAS ^b	Exposure Measure	Concentration Range (ng/ml)	Both Sexes				Females				Males			
				Number in Model ^c		HR (95% CI) ^d	p-value	Number in Model ^c		HR (95% CI) ^d	p-value	Number in Model ^c		HR (95% CI) ^d	p-value
				Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases			Sub-cohort	Cancer Cases		
MM	PFOA	Quartile 3	4.800-<5.800	164	28	1.33 (0.72, 2.43)	0.364	75	13	1.59 (0.56, 4.54)	0.384	89	15	1.07 (0.46, 2.48)	0.883
MM	PFOA	Quartile 4	>=5.800	398	25	0.54 (0.28, 1.02)	0.059	194	11	0.60 (0.21, 1.69)	0.335	204	14	0.46 (0.19, 1.16)	0.102
MM	PFOA	Continuous				0.75 (0.58, 0.97)	0.028			0.80 (0.55, 1.16)	0.233			0.64 (0.41, 0.99)	0.046
MM	PFOS	Quartile 1	<11.000	140	20			74	9			66	11		
MM	PFOS	Quartile 2	11.000-<16.000	228	27	0.79 (0.42, 1.49)	0.471	122	13	0.71 (0.27, 1.90)	0.494	106	14	0.85 (0.36, 2.04)	0.723
MM	PFOS	Quartile 3	16.000-<20.000	179	24	0.92 (0.48, 1.77)	0.803	79	7	0.59 (0.18, 1.96)	0.391	100	17	1.10 (0.47, 2.59)	0.820
MM	PFOS	Quartile 4	>=20.000	441	28	0.46 (0.25, 0.85)	0.014	222	14	0.42 (0.16, 1.14)	0.088	219	14	0.43 (0.18, 1.04)	0.060
MM	PFOS	Continuous				0.74 (0.61, 0.90)	0.002			0.69 (0.49, 0.98)	0.036			0.71 (0.54, 0.95)	0.020

^aTCC-B=transitional cell carcinoma of the bladder, TCC-BK=transitional cell carcinoma of the bladder or kidney, RCC=Renal cell carcinoma/adenocarcinoma, MYELO=myeloid malignancies, LYMPH=lymphoid malignancies, BNHL=B-cell non-Hodgkin leukemia/lymphoma, DLBCL=diffuse large B-cell lymphoma, CLL/SLL=chronic lymphocytic leukemia/small lymphocytic lymphoma/mantle cell lymphoma, MM=multiple myeloma

^bPFHxS=perfluorohexane sulfonic acid, PFNA=perfluorononanoic acid, PFOA=perfluorooctanoic acid, PFOS=perfluorooctane sulfonate

^cAll models had separate baseline hazards by sex or were restricted to one sex. The primary models controlled for year of serum sample collection (single-year categories), age at serum collection (<60, 60–64, 65–69, 70–74, 75–79, ≥80 years), race (non-Hispanic white, other), education (high school graduate or less, vocational/trade school or some college, college graduate, graduate school), smoking status (current smoker, former smoker, ever smoked but unknown if current or former, never smoked), and alcohol consumption (non-drinker, <1 drink/week, 1–6 drinks/week, 1 drink/day, ≥2 drinks/day).

^dHR=hazard ratio, CI=confidence interval

Table S11. Ratio of the number of cases to the number of parameters in various models, Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015

Cancer type ^a	Case counts			Ratio of cases to parameters in primary models with log2 PFAS (20 parameters)			Ratio of cases to parameters in primary models with PFAS quartiles (22 parameters)			Ratio of cases to parameters in collapsed models with log2 PFAS (13 parameters)			Ratio of cases to parameters in collapsed models with PFAS quartiles (15 parameters)		
	Both	Women	Men	Both	Women	Men	Both	Women	Men	Both	Women	Men	Both	Women	Men
Kidney	156	65	91	7.8	3.3	4.6	7.1	3.0	4.1	12.0	5.0	7.0	10.4	4.3	6.1
RCC	107	42	65	5.4	2.1	3.3	4.9	1.9	3.0	8.2	3.2	5.0	7.1	2.8	4.3
Bladder	396	82	314	19.8	4.1	15.7	18.0	3.7	14.3	30.5	6.3	24.2	26.4	5.5	20.9
TCC-B	385	80	305	19.3	4.0	15.3	17.5	3.6	13.9	29.6	6.2	23.5	25.7	5.3	20.3
TCC-BK	432	102	330	21.6	5.1	16.5	19.6	4.6	15.0	33.2	7.8	25.4	28.8	6.8	22.0
Breast		780			39.0			35.5			60.0			52.0	
Prostate			1599			80.0			72.7			123.0			106.6
Pancreas	171	81	90	8.6	4.1	4.5	7.8	3.7	4.1	13.2	6.2	6.9	11.4	5.4	6.0
Heme	626	281	345	31.3	14.1	17.3	28.5	12.8	15.7	48.2	21.6	26.5	41.7	18.7	23.0
MYELO	80	32	48	4.0	1.6	2.4	3.6	1.5	2.2	6.2	2.5	3.7	5.3	2.1	3.2
LYMPH	540	245	295	27.0	12.3	14.8	24.5	11.1	13.4	41.5	18.8	22.7	36.0	16.3	19.7
B-NHL	483	216	267	24.2	10.8	13.4	22.0	9.8	12.1	37.2	16.6	20.5	32.2	14.4	17.8
DLBCL	123	55	68	6.2	2.8	3.4	5.6	2.5	3.1	9.5	4.2	5.2	8.2	3.7	4.5
CLL/SLL	140	66	74	7.0	3.3	3.7	6.4	3.0	3.4	10.8	5.1	5.7	9.3	4.4	4.9
MM	99	43	56	5.0	2.2	2.8	4.5	2.0	2.5	7.6	3.3	4.3	6.6	2.9	3.7

^a TCC-B=transitional cell carcinoma of the bladder, TCC-BK=transitional cell carcinoma of the bladder or kidney, RCC=Renal cell carcinoma/adenocarcinoma, MYELO=myeloid malignancies, LYMPH=lymphoid malignancies, BNHL=B-cell non-Hodgkin leukemia/lymphoma, DLBCL=diffuse large B-cell lymphoma, CLL/SLL=chronic lymphocytic leukemia/small lymphocytic lymphoma/mantle cell lymphoma, MM=multiple myeloma

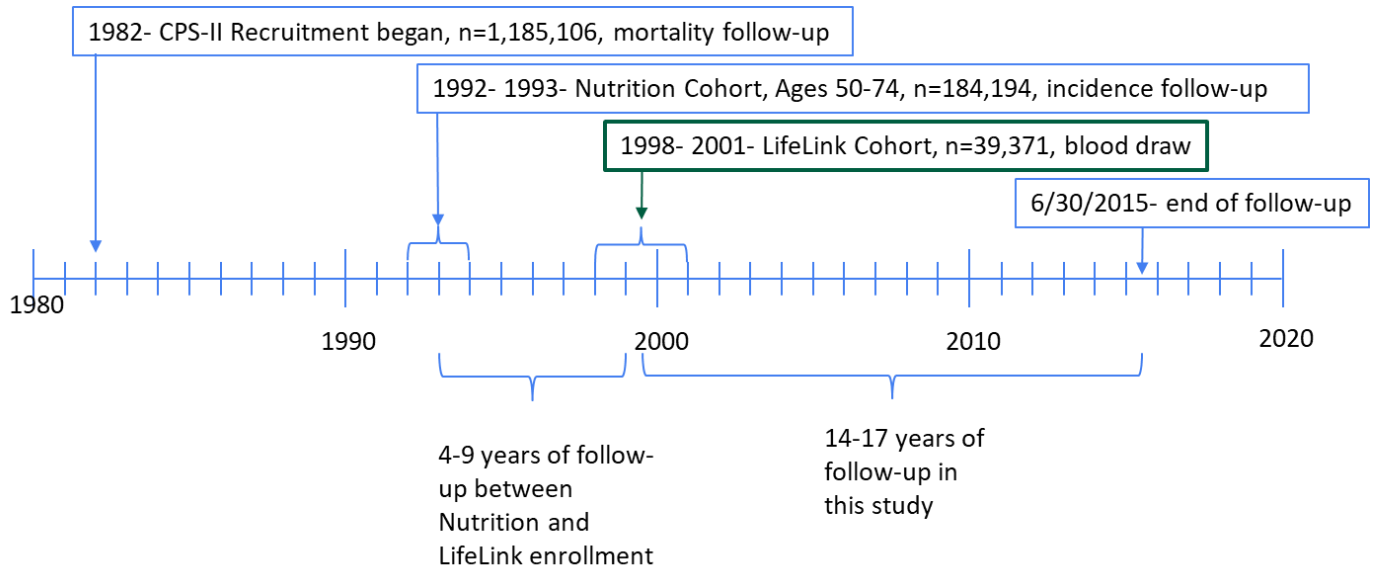


Figure S1. Timeline of study participant recruitment, Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015

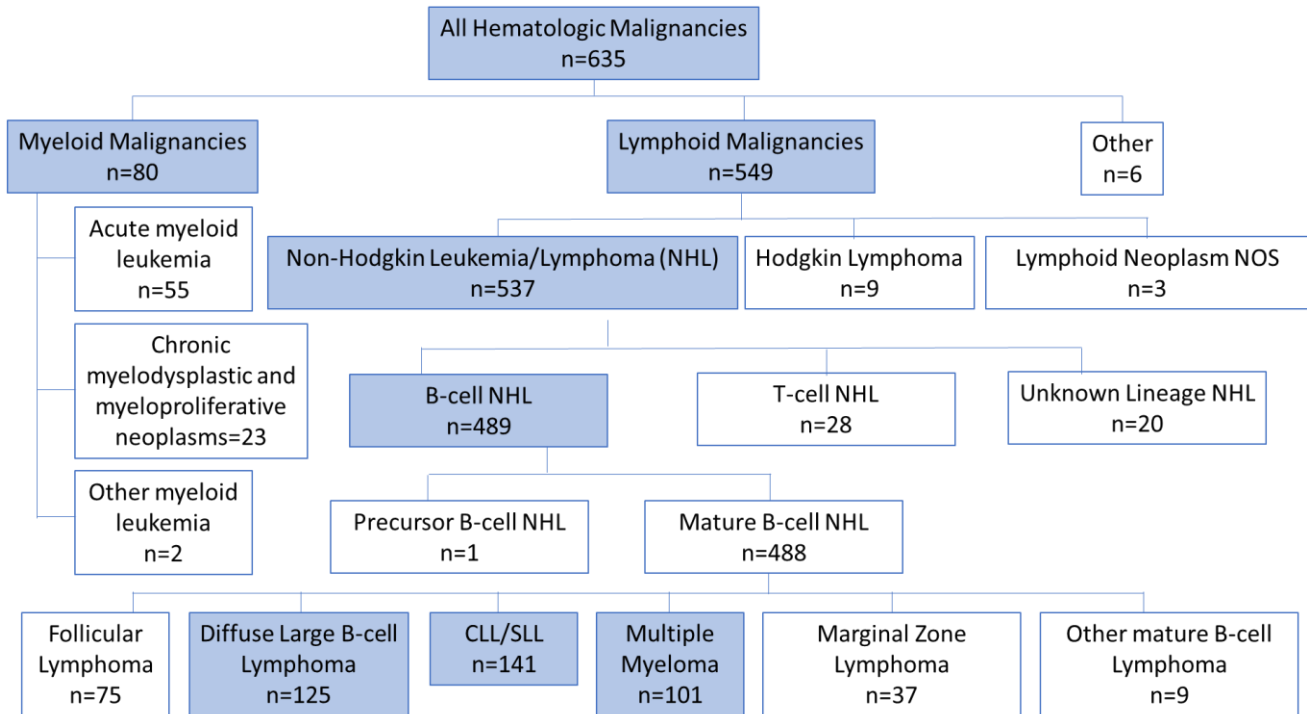


Figure S2. Hematologic sub-groups considered, Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015. NHL=Non-Hodgkin Leukemia/Lymphoma, CLL/SLL= chronic lymphocytic leukemia/small lymphocytic lymphoma/mantle cell lymphoma.

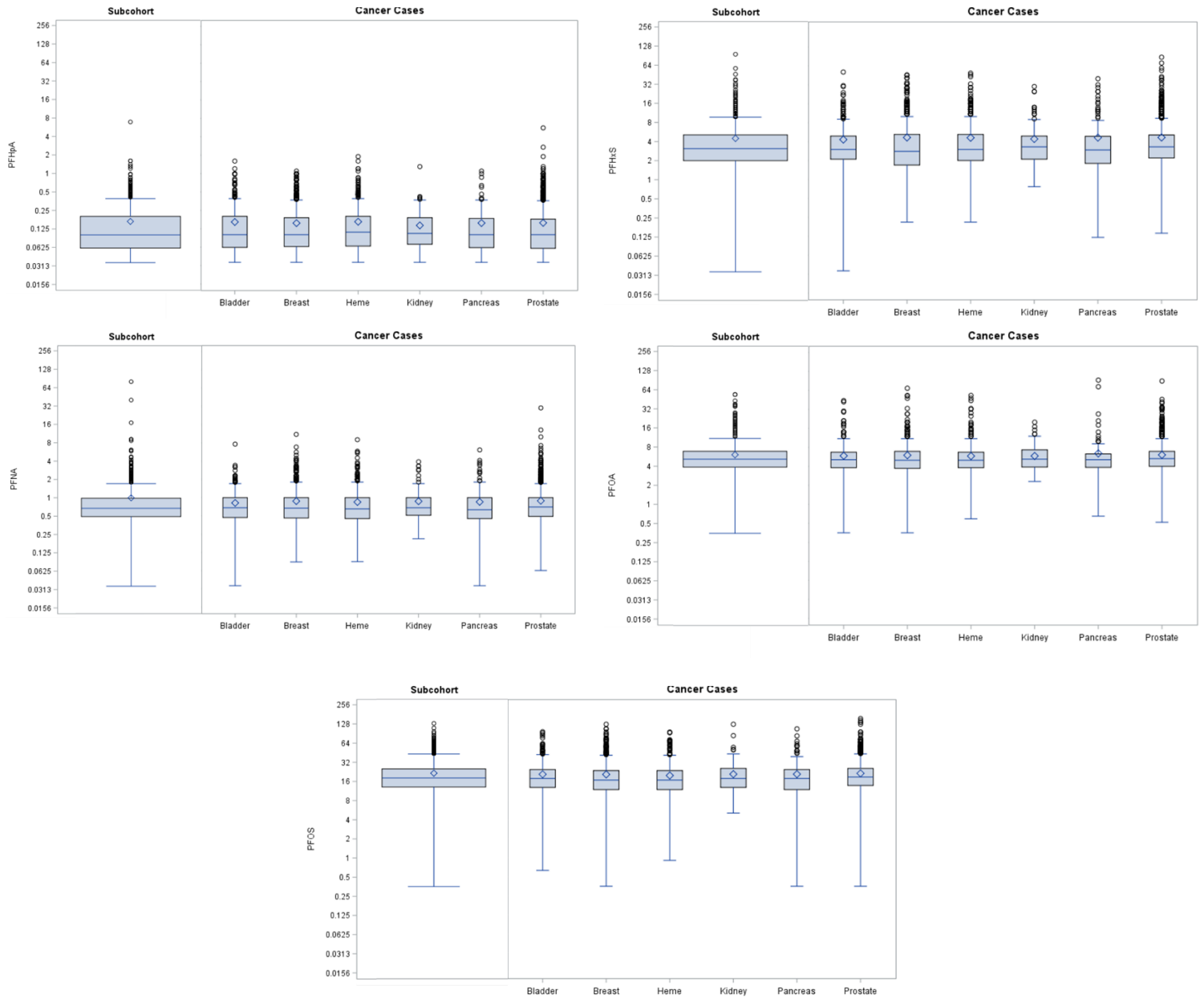


Figure S3. Box plots of PFAS serum concentrations among subcohort participants and participants with incident cancers (ng/ml), Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015. Values below the limit of detection were imputed as the limit of detection divided by the square root of 2, values are displayed on a log₂ scale. Heme=hematologic malignancies, PFHpA=perfluoroheptanoic acid, PFHxS=perfluorohexane sulfonic acid, PFNA=perfluorononanoic acid, PFOA=perfluorooctanoic acid, PFOS=perfluorooctane sulfonate

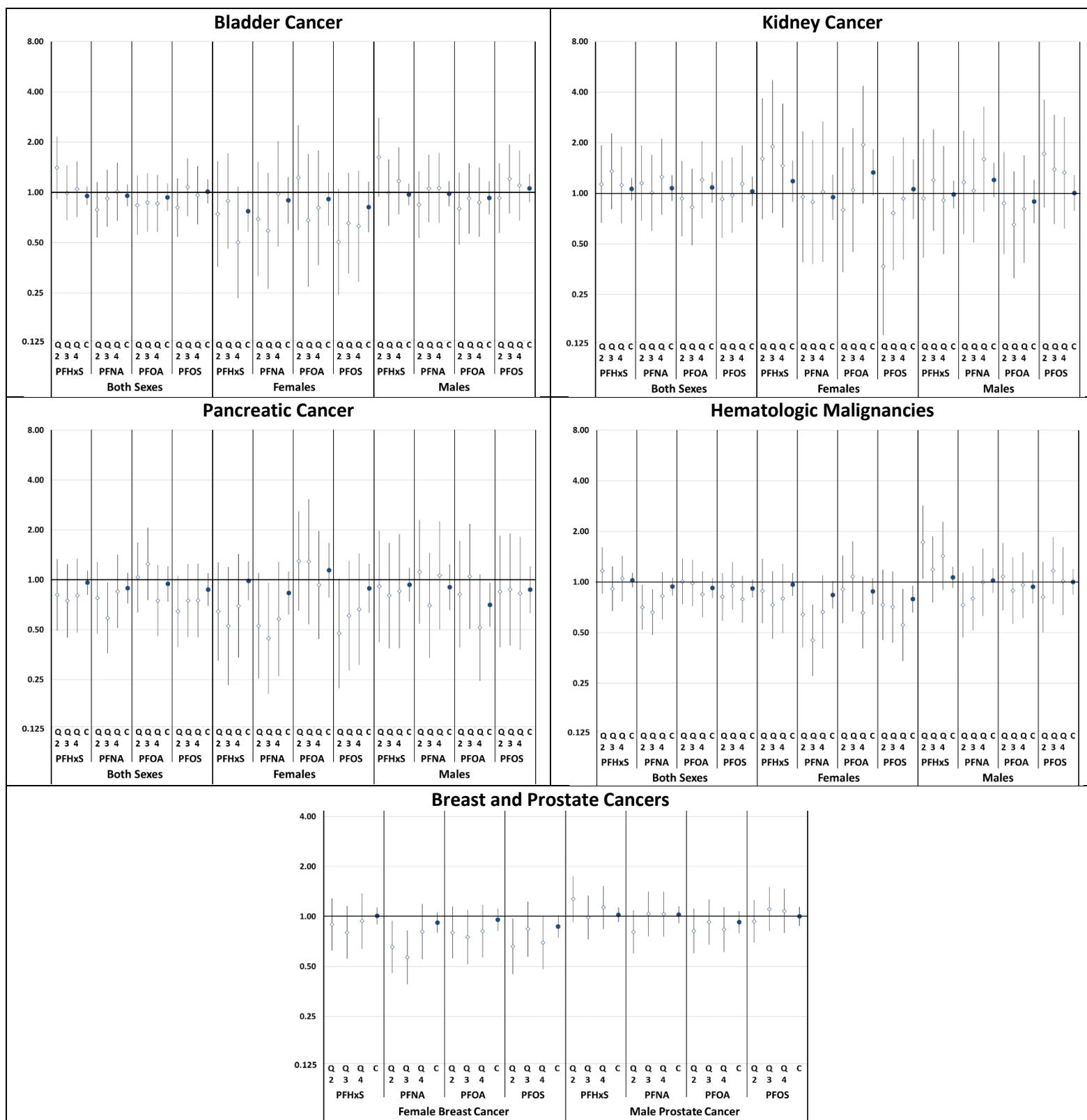


Figure S4. Hazard ratios and 95% confidence intervals from primary models for overall cancer site groups per doubling of PFAS concentrations (using log₂-transformed measures) [solid circles] and for quartiles defined among cases relative to quartile 1 [open circles], Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015. All models had separate baseline hazards by sex or were restricted to one sex. Models controlled for year of serum sample collection, age at serum collection, race, education, smoking status, and alcohol consumption. Q2=quartile 2, Q3=quartile3, Q4=quartile 4, C=continuous log₂-transformed measure, PFHxS=perfluorohexane sulfonic acid, PFNA=perfluorononanoic acid, PFOA=perfluorooctanoic acid, PFOS=perfluorooctane sulfonate. See Table S9 for numerical data.

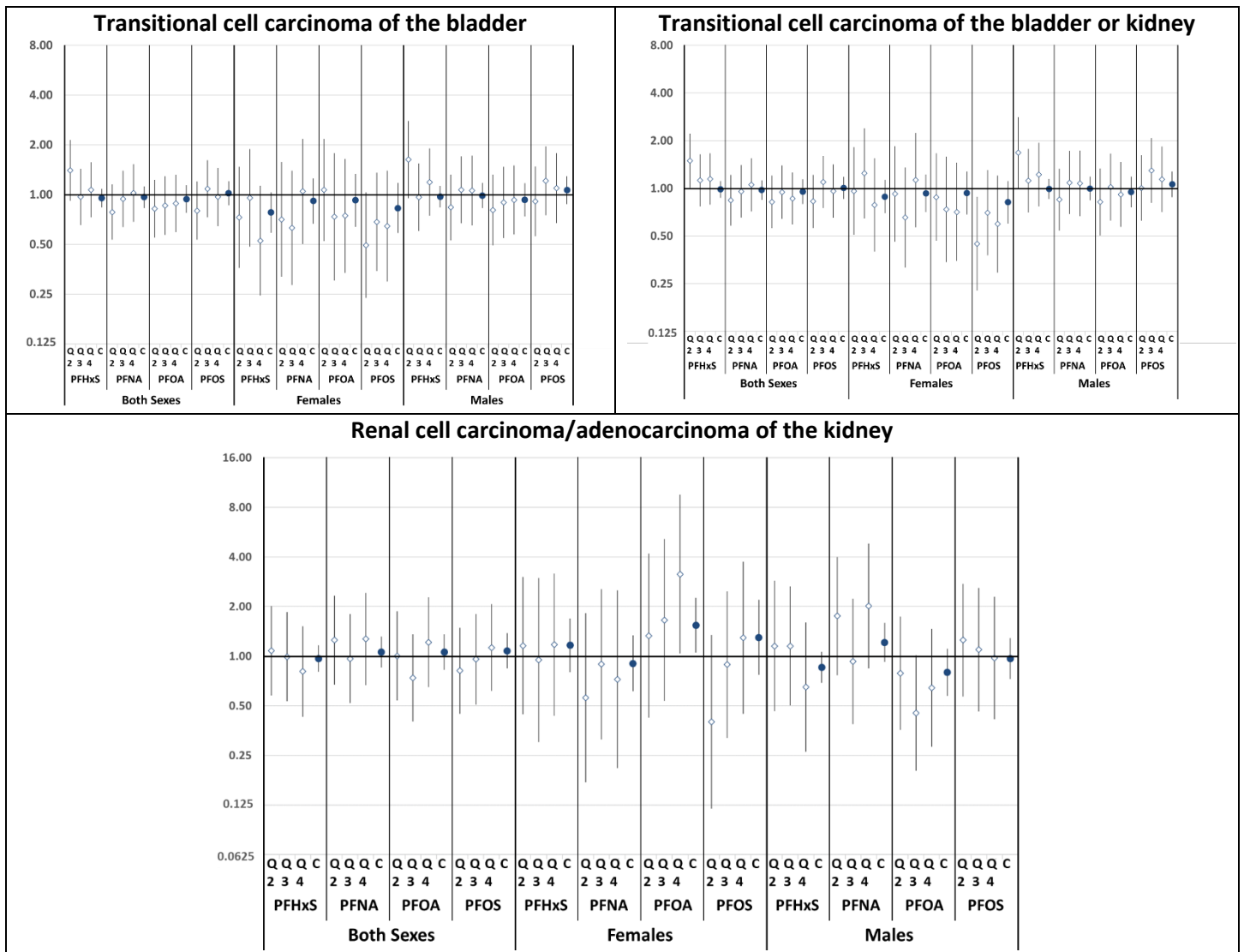
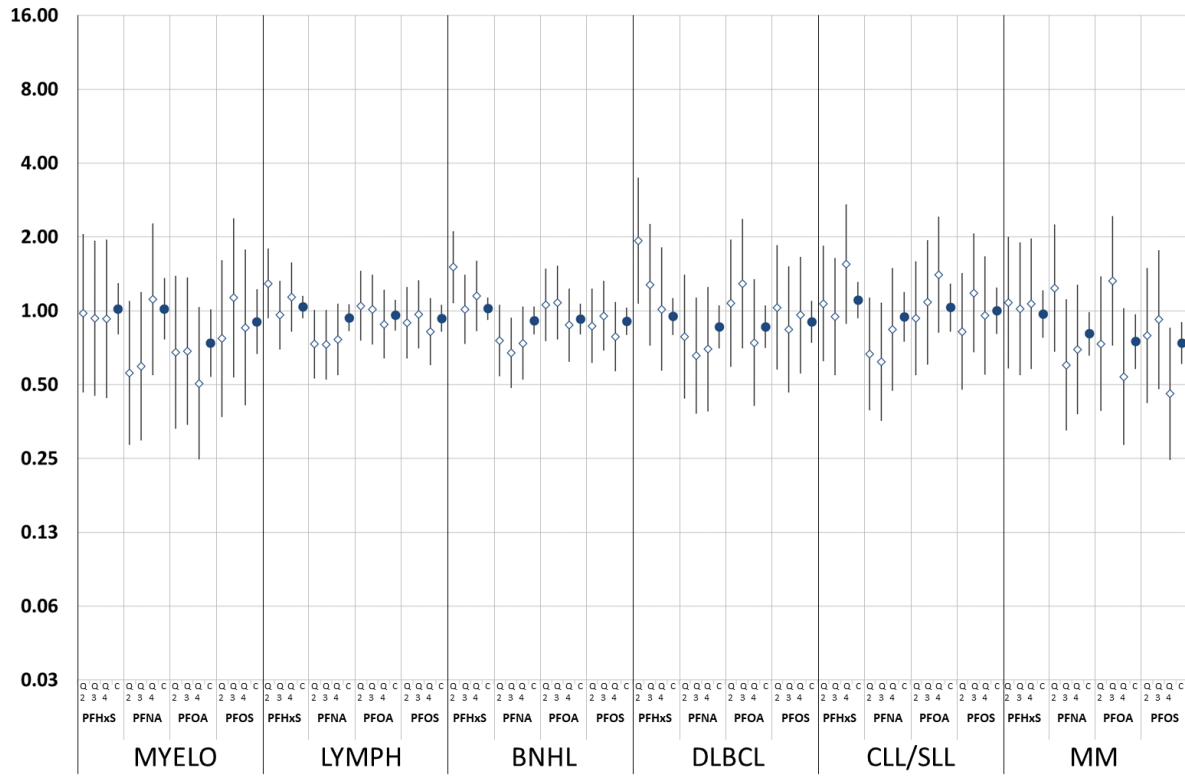
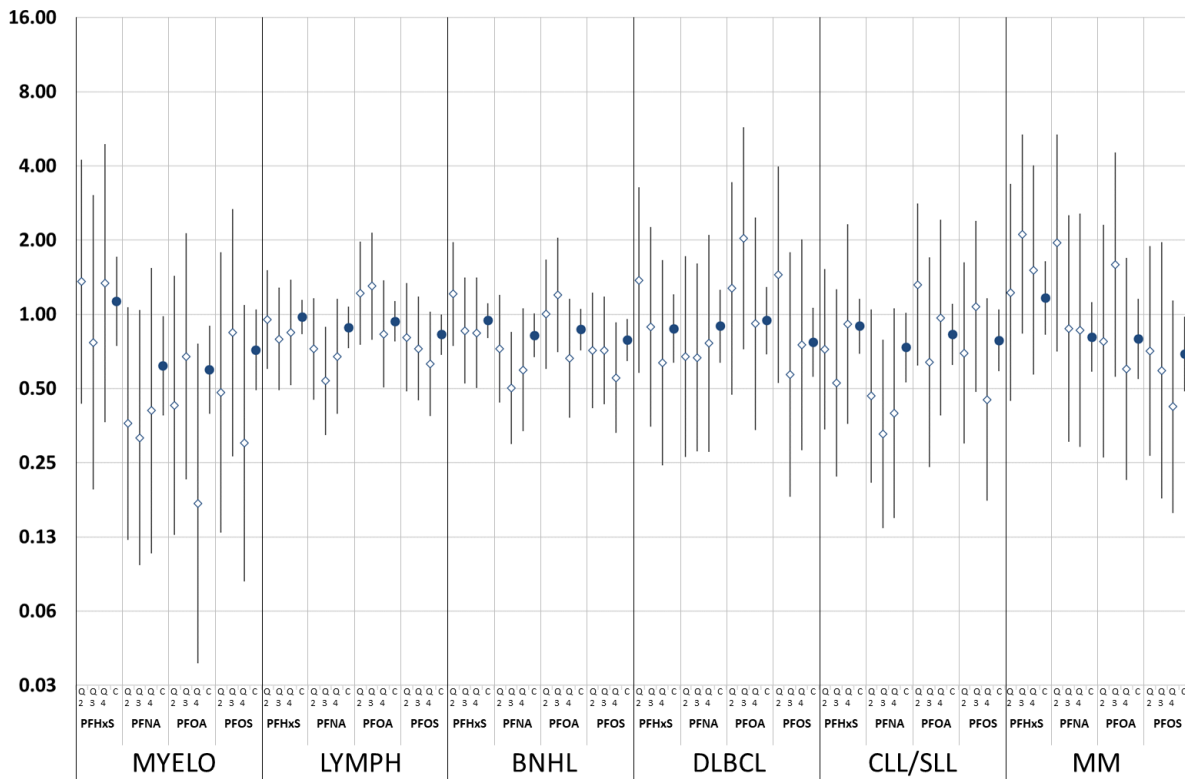


Figure S5. Hazard ratios and 95% confidence intervals from primary models for histologic sub-groups for bladder and kidney cancer per doubling of PFAS concentrations (using log₂-transformed measures) [solid circles] and for quartiles defined among cases relative to quartile 1 [open circles], Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015. All models had separate baseline hazards by sex or were restricted to one sex. Models controlled for year of serum sample collection, age at serum collection, race, education, smoking status, and alcohol consumption. Q2=quartile 2, Q3=quartile3, Q4=quartile 4, C=continuous log₂-transformed measure, PFHxS=perfluorohexane sulfonic acid, PFNA=perfluorononanoic acid, PFOA=perfluorooctanoic acid, PFOS=perfluorooctane sulfonate. See Table S10 for numerical data.

Both Sexes



Females



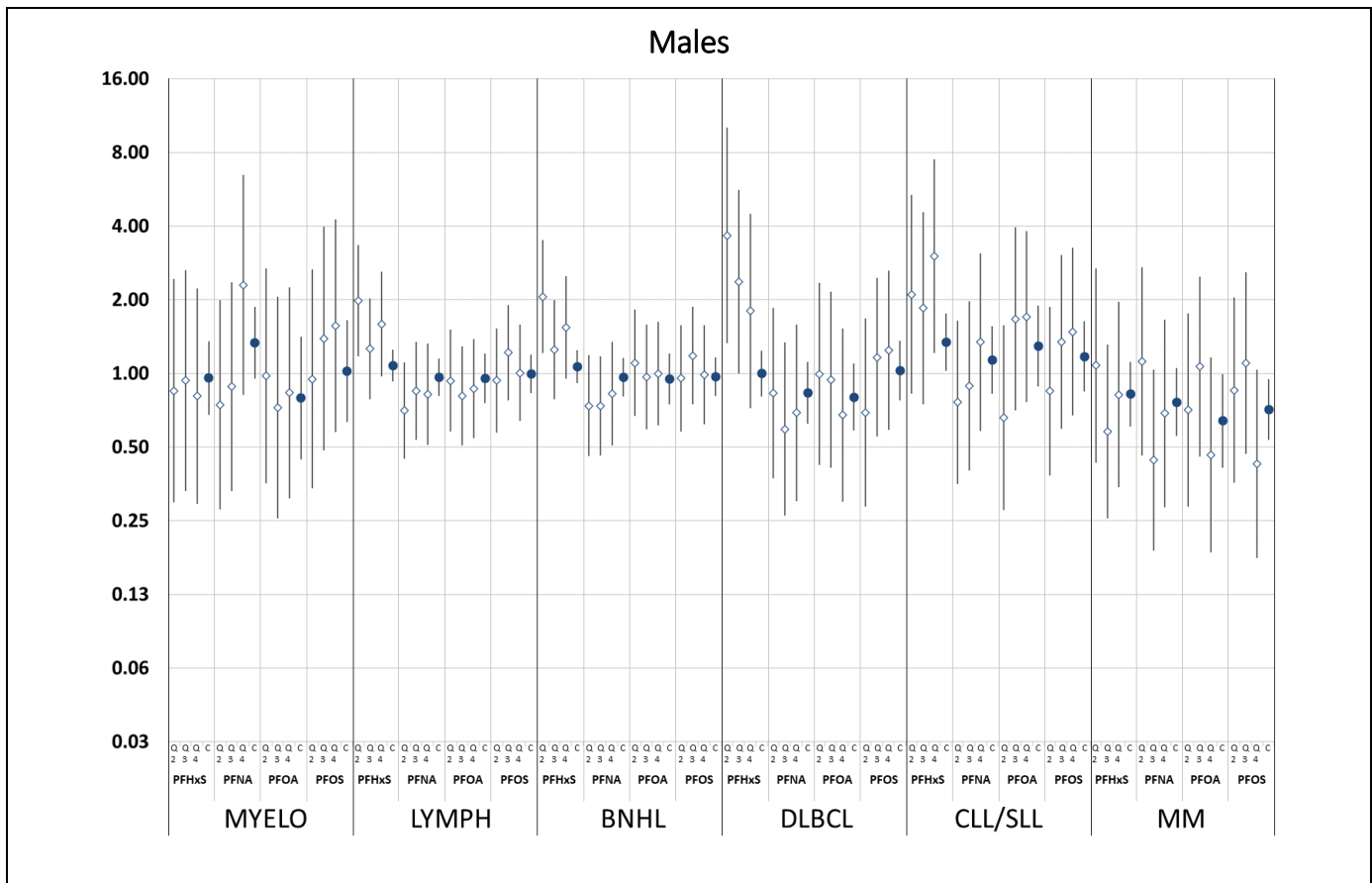


Figure S6. Hazard ratios and 95% confidence intervals from primary models for histologic sub-groups for hematologic malignancies per doubling of PFAS concentrations (using log₂-transformed measures) [solid circles] and for quartiles defined among cases relative to quartile 1 [open circles], Case-cohort study of association between PFAS and selected cancers among participants in the Cancer Prevention II LifeLink cohort, 1998-2015. All models had separate baseline hazards by sex or were restricted to one sex. Models controlled for year of serum sample collection, age at serum collection, race, education, smoking status, and alcohol consumption. Q2=quartile 2, Q3=quartile3, Q4=quartile 4, C=continuous log₂-transformed measure, PFHxS=perfluorohexane sulfonic acid, PFNA=perfluorononanoic acid, PFOA=perfluorooctanoic acid, PFOS=perfluorooctane sulfonate, MYELO=myeloid malignancies, LYMPH=lymphoid malignancies, BNHL=B-cell non-Hodgkin leukemia/lymphoma, DLBCL=diffuse large B-cell lymphoma, CLL/SLL=chronic lymphocytic leukemia/small lymphocytic lymphoma/mantle cell lymphoma, MM=multiple myeloma. See Table S10 for numerical data.