SUPPORTING INFORMATION

Metabolism and Excretion Rates of Parent and Hydroxy-PAHs in Urine Collected after Consumption of Traditionally Smoked Salmon in Native Americans

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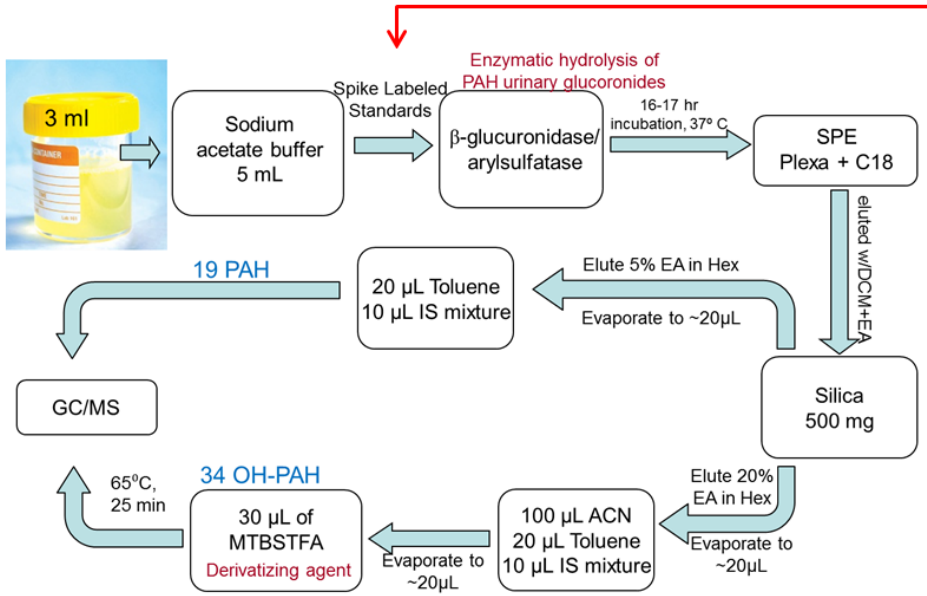
Table S1. The list of OH-PAH and PAH, and their labeled surrogates, their abbreviations and estimated detection limits (EDL) (Motorykin et al., 2015).

Class	#	Analyte	Abbreviation	Surrogate	EDL pg/ml in urine
OH-PAHs	1	1-Hydroxynaphthalene	1-OH-Nap	1-Hydroxy[$^{2}H_{7}$]naphthalene	14.6
	2	2-Hydroxynaphthalene	2-OH-Nap	1-Hydroxy[$^{2}H_{7}$]naphthalene	18.0
	3	2,3-Dihydroxynaphthalene	2,3-OH-Nap	1-Hydroxy[$^{2}H_{7}$]naphthalene	181.4
	4	1,3-Dihydroxynaphthalene	1,3-OH-Nap	1-Hydroxy[$^{2}H_{7}$]naphthalene	141.7
	5	1,5-Dihydroxynaphthalene	1,5-OH-Nap	1-Hydroxy[$^{2}H_{7}$]naphthalene	48.7
	6	1,6-Dihydroxynaphthalene	1,6-OH-Nap	1-Hydroxy[$^{2}H_{7}$]naphthalene	25.1
	7	2,7-Dihydroxynaphthalene	2,7-OH-Nap	1-Hydroxy[$^{2}H_{7}$]naphthalene	19.9
	8	2,6-Dihydroxynaphthalene	2,6-OH-Nap	1-Hydroxy[$^{2}H_{7}$]naphthalene	37.5
	9	4-Hydroxyphenanthrene	4-OH-Phen	4-Hydroxy[$^{13}C_{6}$]phenanthrene	6.0
	10	3-Hydroxyphenanthrene	3-OH-Phen	4-Hydroxy[$^{13}C_{6}$]phenanthrene	30.1
	11	1-Hydroxyphenanthrene	1-OH-Phen	4-Hydroxy[$^{13}C_{6}$]phenanthrene	31.8
	12	2-Hydroxyphenanthrene	2-OH-Phen	4-Hydroxy[$^{13}C_{6}$]phenanthrene	24.9
	13	2-Hydroxyanthraquinone	2-OH-AntQn	4-Hydroxy[$^{13}C_{6}$]phenanthrene	93.4
	14	9-Hydroxyfluorene	9-OH-Flo	2-Hydroxy[$^{2}H_{9}$]fluorene	160.8
	15	3-Hydroxyfluorene	3-OH-Flo	2-Hydroxy[$^{2}H_{9}$]fluorene	39.4
	16	2-Hydroxyfluorene	2-OH-Flo	2-Hydroxy[$^{2}H_{9}$]fluorene	41.4
	17	1-Hydroxy-9-fluorenone	1-OH-Flon	2-Hydroxy[$^{2}H_{9}$]fluorene	26.2
	18	2-Hydroxy-9-fluorenone	2-OH-Flon	2-Hydroxy[$^{2}H_{9}$]fluorene	82.1
	19	3-Hydroxyfluoranthene	3-OH-Flt	3-Hydroxy[$^{13}C_{6}$]fluoranthene	15.9
	20	1-Hydroxypyrene	1-OH-Pyr	1-Hydroxy[$^{13}C_{6}$]pyrene	19.4
	21+ 22	2-OH-B(a)anthracen+3-OH-B(c)pnenanthren	2-OH-BaA+3-OH-BcPh	1-Hydroxy[$^{13}C_{6}$]benzo(a)anthracene	19.3
	23	10-Hydroxybenzo(a)pyrene	10-OH-BaP	3-Hydroxy[$^{13}C_{6}$]benzo(c)phenanthrene	44.3
	24	12-Hydroxybenzo(a)pyrene	12-OH-BaP	3-Hydroxy[$^{13}C_{6}$]benzo(c)phenanthrene	52.1
	25	7-Hydroxybenzo(a)pyrene	7-OH-BaP	3-Hydroxy[$^{13}C_{6}$]benzo(c)phenanthrene	43.7
	26	9-Hydroxybenzo(a)pyrene	9-OH-BaP	3-Hydroxy[$^{13}C_{6}$]benzo(c)phenanthrene	29.6
	27	3-Hydroxybenzo(a)pyrene	3-OH-BaP	3-Hydroxy[$^{13}C_{6}$]benzo(c)phenanthrene	36.5
	28	4-Hydroxychrysene	4-OH-Chr	3-Hydroxy[$^{13}C_{6}$]chrysene	13.9
	29	6-Hydroxychrysene	6-OH-Chr	3-Hydroxy[$^{13}C_{6}$]chrysene	43.9

	30	3-Hydroxychrysene	3-OH-Chr	3-Hydroxy[$^{13}C_6$]chrysene	35.6
	31	2-Hydroxychrysene	2-OH-Chr	3-Hydroxy[$^{13}C_6$]chrysene	20.3
	32	1-Hydroxychrysene	1-OH-Chr	3-Hydroxy[$^{13}C_6$]chrysene	9.5
	33	2,6-Hydroxyanthraquinone	2.6-OH-AntQn	3-Hydroxy[$^{13}C_6$]chrysene	6.8
	34	11-Hydroxybenzo(b)fluoranthene	11-OH-BbFlt	3-Hydroxy[$^{13}C_6$]chrysene	38.6
PAHs	35	Naphthalene	Nap	[$^{2}H_{10}$]-Fluorene	9.2
	36	Acenaphtylene	Acy	[$^{2}H_{10}$]-Fluorene	31.6
	37	Acenaphthene	Ace	[$^{2}H_{10}$]-Fluorene	18.5
	38	Fluorene	Flo	[$^{2}H_{10}$]-Fluorene	23.1
	39	Phenanthrene	Phen	[$^{2}H_{10}$]-Phenanthrene	3.0
	40	Anthracene	Ant	[$^{2}H_{10}$]-Phenanthrene	19.6
	41	Fluoranthene	Flt	[$^{2}H_{10}$]-Pyrene	15.2
	42	Pyrene	Pyr	[$^{2}H_{10}$]-Pyrene	22.6
	43	Retene	Ret	[$^{2}H_{10}$]-Pyrene	60.5
	44	Benzo(a)anthracene	BaA	[$^{2}H_{12}$]-Triphenylene	27.9
	45	Chrysene	Chr	[$^{2}H_{12}$]-Triphenylene	19.7
	46	Triphenylene	TriPh	[$^{2}H_{12}$]-Triphenylene	19.7
	47	Benzo(b)fluoranthene	BbFlt	[$^{2}H_{12}$]-Benzo(a)pyrene	52.1
	48	Benzo(k)fluoranthene	BkFlt	[$^{2}H_{12}$]-Benzo(a)pyrene	56.9
	49	Benzo(e)pyrene	BeP	[$^{2}H_{12}$]-Benzo(a)pyrene	72.5
	50	Benzo(a)pyrene	BaP	[$^{2}H_{12}$]-Benzo(a)pyrene	89.7
	51	Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)Pyr	[$^{2}H_{12}$]-Benzo(ghi)perylene	36.1
	52	Dibenz(a,h)anthracene	BahA	[$^{2}H_{12}$]-Benzo(ghi)perylene	43.7
	53	Benzo(ghi)perylene	BghiPer	[$^{2}H_{12}$]-Benzo(ghi)perylene	29.7

Figure S1. Flow diagram of the entire analytical method for the measurement of 19 PAHs and 34 OH-PAH in urine (Motorykin et al., 2015)



Hydroxy-PAHs surrogates	Parent PAHs surrogates
1-[$^{2}H_{7}$]hydroxynaphthalene	[$^{2}H_{10}$]-Fluorene
2-[$^{2}H_{7}$]hydroxynaphthalene	[$^{2}H_{10}$]-Phenanthrene
2-[$^{2}H_{9}$]hydroxyfluorene	[$^{2}H_{10}$]-Pyrene
4-[$^{13}C_{6}$]hydroxyphenanthrene	[$^{2}H_{12}$]-Triphenylene
3-[$^{13}C_{6}$]hydroxyfluoranthene	[$^{2}H_{12}$]-Benzo(a)pyrene
1-[$^{13}C_{6}$]hydroxypyrene	[$^{2}H_{12}$]-Benzo(ghi)perylene
1-[$^{13}C_{6}$]hydroxybenzo(a)anthracene	
3-[$^{13}C_{6}$]hydroxybenzo(c)phenanthrene	
3-[$^{13}C_{6}$]hydroxychrysene	

Figure S2. Creatinine concentration for all participants. Fish consumption occurred at time zero

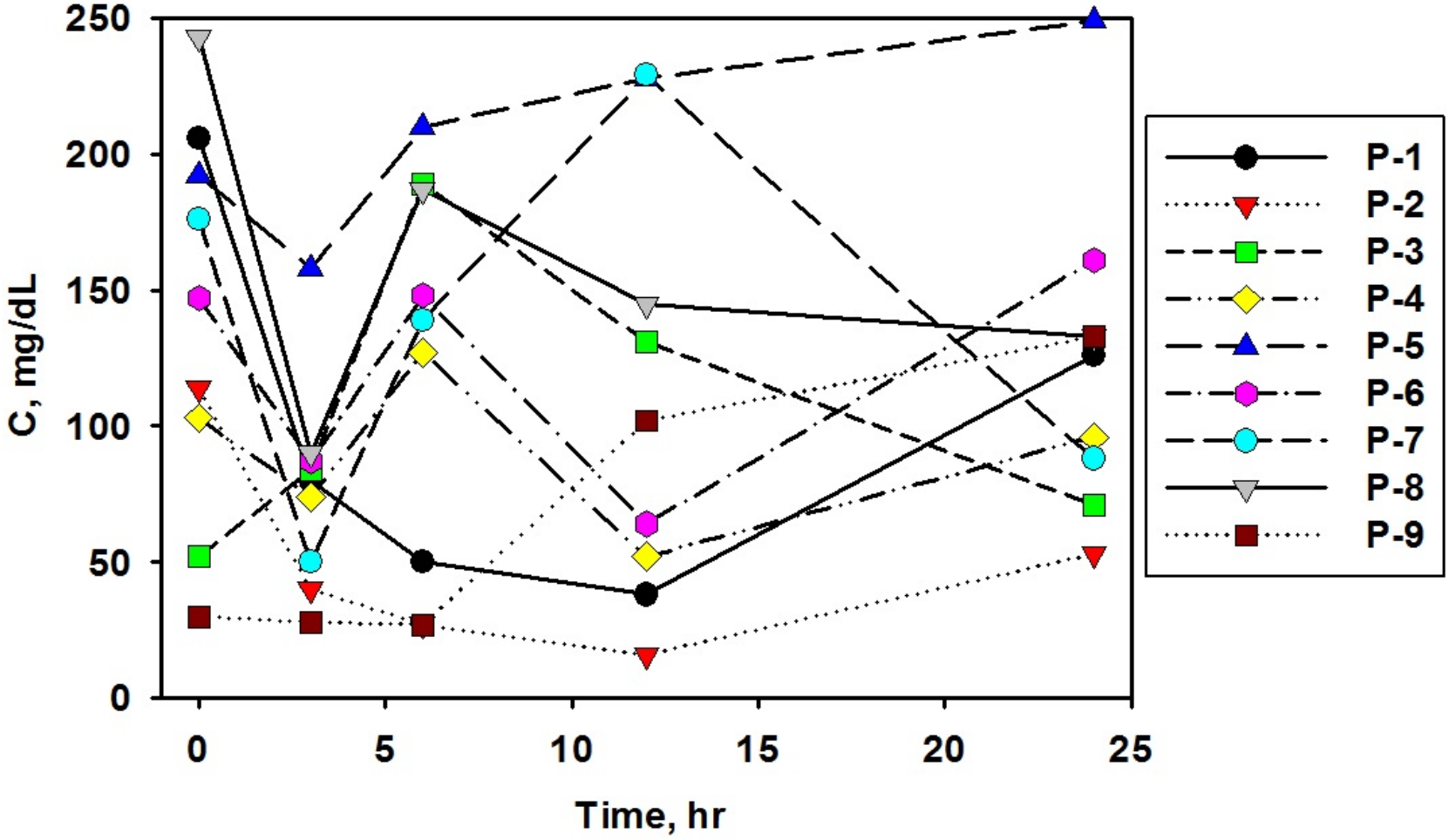


Figure S3. The mean creatinine adjusted PAH and OH-PAH concentrations over 24 hr time period (N=3, the error bars represent standard deviation). The consumption of fish occurred right at time zero. A) P-4, B) P-5, C) P-6.

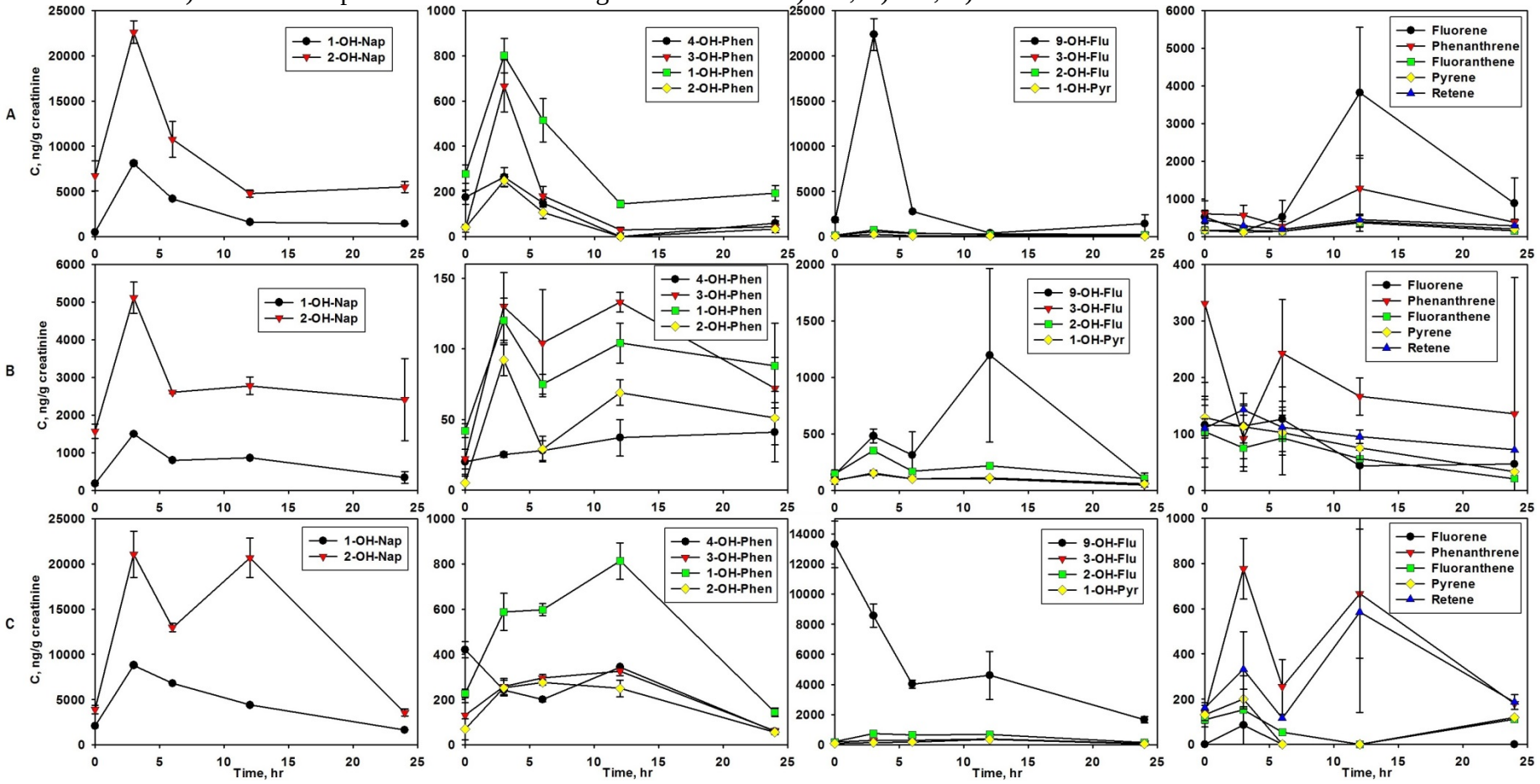


Figure S4. The mean creatinine adjusted PAH and OH-PAH concentrations over 24 hr time period (N=3, the error bars represent standard deviation). The consumption of fish occurred right at time zero. A) P-7, B) P-8, C) P-9.

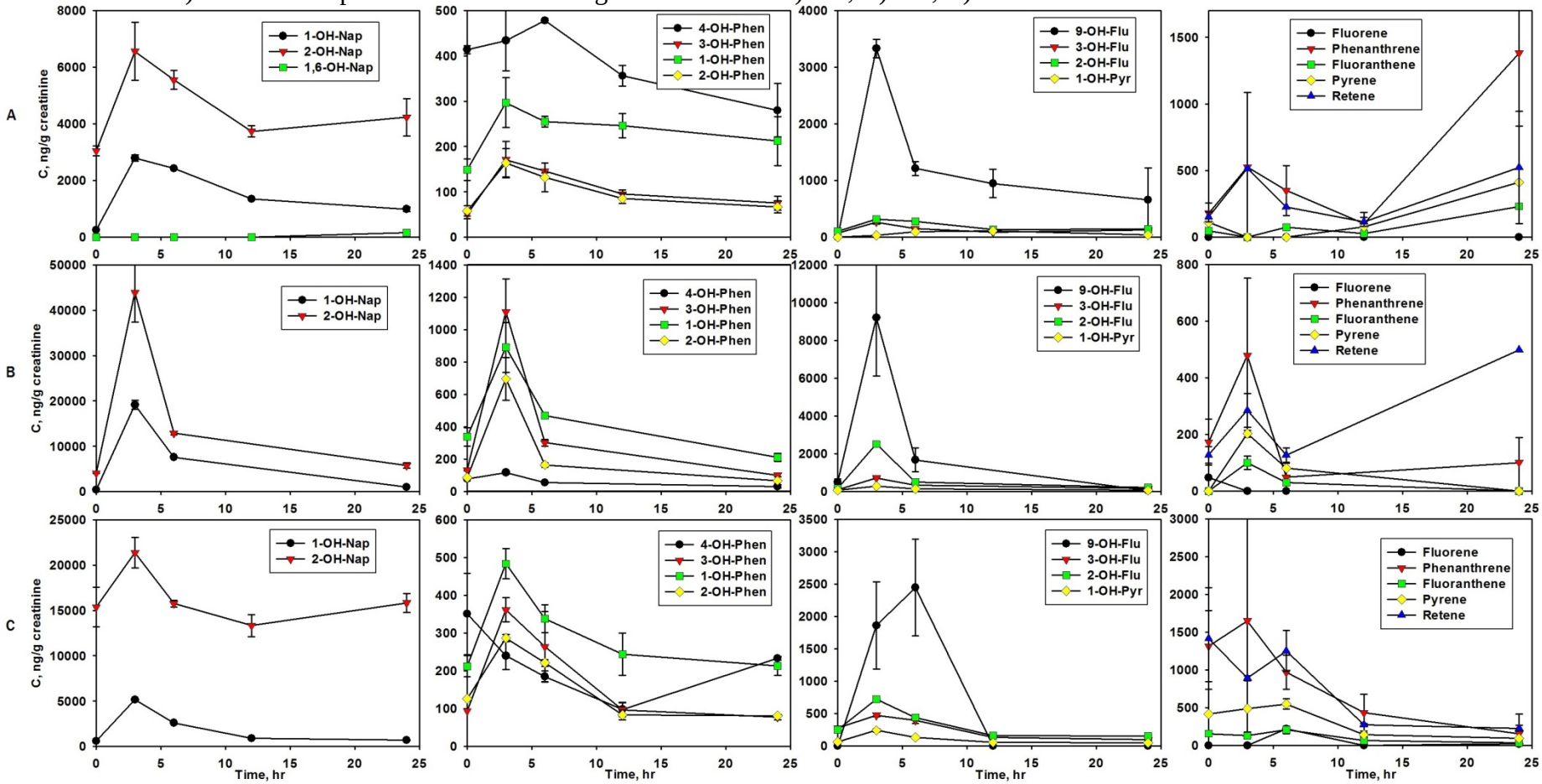


Table S3. Median (minimum and maximum) urinary concentrations of PAHs and OH-PAHs (N=5 for all participants)

	Urinary concentration, ng/g creatine								
	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9
1-OH-Nap	2859 (1457-7257)	2620 (415-3934)	1839 (417-4119)	1613 (483-8106)	801 (182-1495)	4391 (1623-8793)	1345 (247-2790)	4282 (399-19113)	898 (595-5150)
2-OH-Nap	8492 (4676-19638)	12709 (12192-19435)	10828 (6045-21597)	6724 (4777-22604)	2606 (1572-5116)	12976 (3560-21068)	4231 (3044-6563)	9309 (4077-43952)	15768 (13324-21381)
4-OH-Phen	112 (44-212)	360 (111-584)	13 (2-24)	162 (60-264)	28 (20-41)	242 (59-420)	414 (280-478)	67 (32-118)	233 (98-351)
3-OH-Phen	109 (26-289)	56 (17-171)	105 (24-407)	43 (29-667)	104 (22-133)	258 (62-326)	95 (51-171)	217 (101-1110)	97 (77-362)
1-OH-Phen	237 (153-423)	297 (164-485)	198 (117-378)	277 (145-801)	88 (42-120)	588 (144-813)	246 (149-297)	404 (211-891)	244 (212-484)
2-OH-Phen	33 (16-175)	38 (24-95)	124 (95-236)	74 (34-248)	51 (5-92)	249 (56-275)	85 (58-164)	125 (68-696)	126 (81-287)
9-OH-Flu	188 (2-3643)	904 (522-2332)	1508 (22-3401)	1852 (386-22356)	314 (103-1197)	4608 (1672-13311)	1079 (658-3334)	1089 (57-9208)	2155 (1863-2447)
3-OH-Flu	357 (97-401)	312 (125-618)	190 (165-221)	305 (152-533)	102 (47-147)	298 (96-380)	124 (75-265)	250 (89-719)	279 (96-474)
2-OH-Flu	302 (107-678)	393 (178-547)	236 (207-441)	240 (141-727)	169 (109-354)	663 (143-742)	142 (104-321)	364 (176-2511)	253 (152-724)
1-OH-Pyr	137 (42-190)	48 (13-72)	107 (40-205)	83 (54-270)	102 (58-156)	146 (61-349)	67 (31-109)	105 (65-291)	63 (48-240)
Flu	704 (74-1309)	1179 (318-2082)	493 (409-649)	524 (138-3823)	114 (44-126)	85 (85-85)	ND	48 (48-48)	119 (21-218)
Phen	2045 (503-6145)	2795 (1020-5985)	974 (588-1849)	1258 (799-2558)	514 (403-678)	705 (592-1708)	829 (393-2139)	525 (406-1220)	3439 (658-4031)
Flt	719 (99-3233)	358 (215-1036)	152 (73-306)	162 (139-366)	75 (21-104)	110 (54-152)	61 (28-231)	65 (30-100)	128 (35-206)
Pyr	965 (108-1758)	314 (212-1258)	150 (69-262)	170 (119-402)	102 (33-129)	131 (119-200)	112 (76-412)	142 (81-203)	416 (94-550)
Ret	719 (147-2366)	1248 (510-3583)	332 (153-496)	290 (192-446)	110 (72-143)	187 (116-585)	226 (115-523)	207 (127-499)	892 (228-1418)

Figure S5. The ratio of the sum of four hydroxy-phenanthrenes to phenanthrene concentrations (first row) for 9 participants and the ratio of 1-hydroxypyrene to pyrene concentrations (second row) for 6 participants. The fish consumption occurred at time zero.

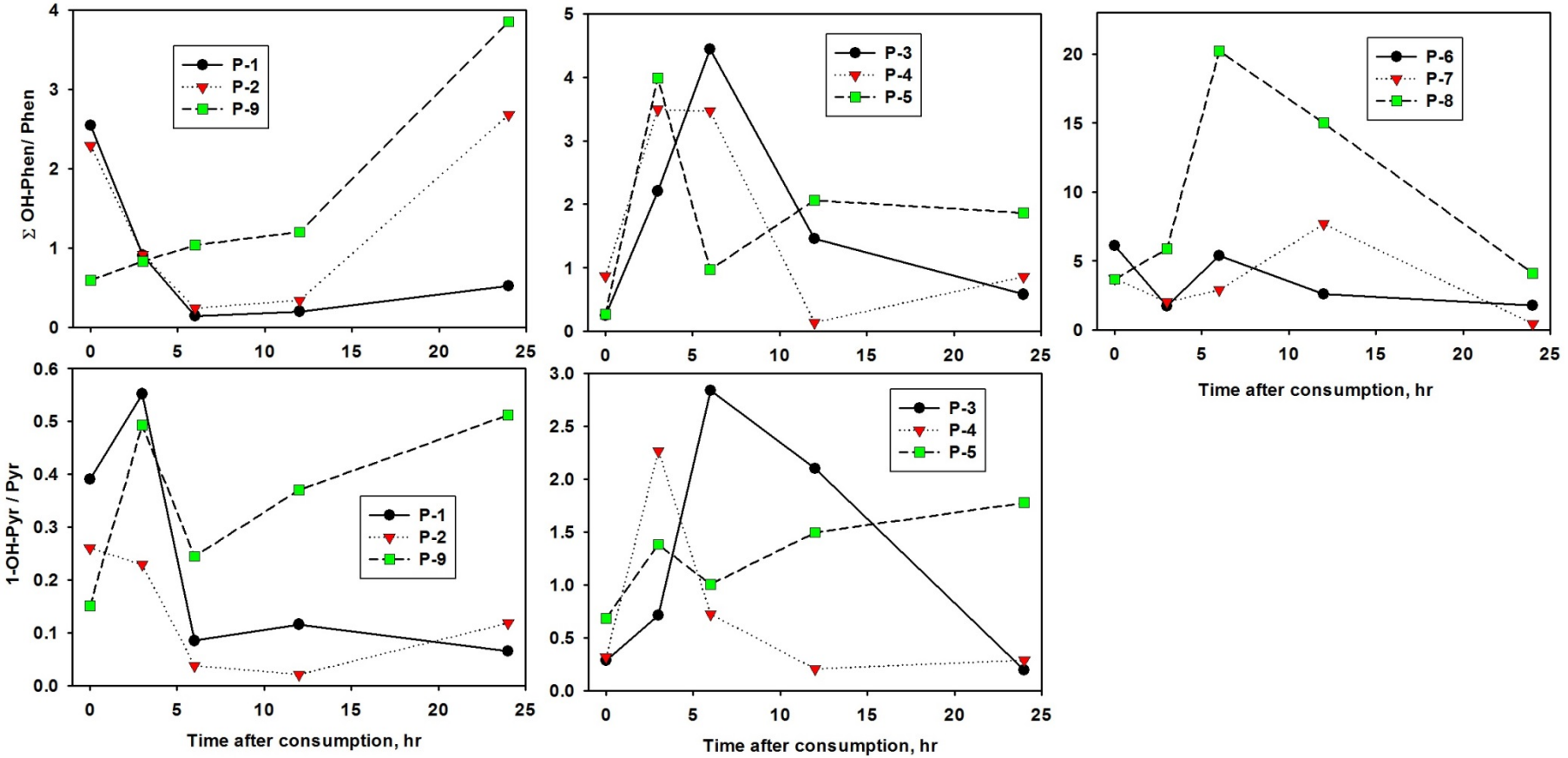


Table S4. PAH concentration in smoked salmon.

Name	Concentration, ng/g	SE, ng/g
Naphthalene	75	2
2-Methylnaphthalene	43	2
1-Methylnaphthalene	36	2
2-Ethylnaphthalene	12	1
2,6-Dimethylnaphthalene	46	2
1,6-Dimethylnaphthalene	19	1
1,5-Dimethylnaphthalene	3	1
Acenaphtylene	72	2
Acenaphtene	11	1
Fluorene	43	3
Phenanthrene	102	5
2-Methylphenanthrene	13	1
1-Methylphenanthrene	6	1
Anthracene	22	1
2-Metylanthracene	11	1
Fluoranthene	25	1
Pyrene	29	3
Benzo[ghi]perylene	8	1

Motorykin O, Schrlau J, Jia Y, Harper B, Harris S, Harding A, et al. Determination of parent and hydroxy PAHs in personal PM2.5 and urine samples collected during Native American fish smoking activities. Science of The Total Environment 2015; 505: 694-703.