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Supplemental Material

Hypertension in Relation to Dioxins and Polychlorinated Biphenyls from the Anniston Community Health Survey Follow-Up

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Table S1. Logistic regression models of dioxin TEQs, PCB Groups (lipid adjusted) and hypertension.

TEQ (pg/g lipid)	n*	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
PCDD	262/337	6.08 (2.40, 15.42)	1.66 (0.43, 6.37)
PCDF	261/336	5.66 (1.98, 16.20)	1.81 (0.47, 6.94)
Mono-ortho PCB	263/338	4.14 (2.42, 7.07)	1.90 (0.81, 4.48)
Non-ortho PCB	251/313	2.98 (1.66, 5.35)	1.99 (0.94, 4.24)
Total Dioxin	263/338	5.78 (2.62, 12.74)	1.60 (0.53, 4.88)
PCB Groups			
Sum 35 PCBs	263/338	4.71 (2.67, 8.32)	2.23 (0.91, 5.46)
Mono-ortho	263/338	4.77 (2.68, 8.48)	2.23 (0.96, 5.20)
Di-ortho	263/338	4.76 (2.68, 8.43)	1.86 (0.76, 4.55)
Tri, Tetra-ortho	263/338	3.79 (2.23, 6.42)	1.77 (0.75, 4.16)
Estrogenic I	263/338	4.65 (2.63, 8.23)	2.34 (1.06, 5.17)
Estrogenic II	263/338	4.90 (2.80, 8.57)	2.47 (1.10, 5.53)
Anti-estrogenic	263/338	4.41 (2.55, 7.65)	2.03 (0.89, 4.64)
Thyroid-like	263/338	4.14 (2.45, 7.01)	2.25 (1.07, 4.74)
Ryanodine	263/338	4.42 (2.53, 7.74)	2.14 (0.87, 5.27)

Note: PCB, polychlorinated biphenyl; PCDD, polychlorinated dibenzodioxin; PCDF, polychlorinated diobenzofuran; TEQ, toxic equivalency

*number of hypertensive individuals/total

Adjusted models include log10 transformed total lipids, age, sex, race, BMI, smoking status, and family history of high blood pressure

Table S2. Logistic regression models of summary lipid adjusted substituted TEQ quartiles and hypertension.

Dioxin TEQ Group (cutpoint)	n (hypertension/total)	Adjusted OR (95% CI)
PCDD TEQ	263/338	
Q1 (<0.92)	58/84	1.0 (referent)
Q2 (0.92-1.06)	71/85	1.58 (0.70, 3.56)
Q3 (1.06-1.22)	67/85	1.47 (0.66, 3.27)
Q4 (\geq 1.22)	67/84	0.84 (0.37, 1.92)
PCDF TEQ	263/338	
Q1 (<0.56)	63/85	1.0 (referent)
Q2 (0.56-0.65)	56/84	0.43 (0.20, 0.92)
Q3 (0.65-0.77)	70/84	0.96 (0.41, 2.28)
Q4 (\geq 0.77)	74/85	1.02 (0.40, 2.28)
Mono-Ortho PCB TEQ	263/338	
Q1 (<0.06)	54/84	1.0 (referent)
Q2 (0.06-0.27)	65/85	1.90 (0.91, 3.95)
Q3 (0.27-0.58)	70/85	1.98 (0.87, 4.50)
Q4 (\geq 0.58)	74/84	1.62 (0.62, 4.25)
Non-Ortho PCB TEQ	263/338	
Q1 (<0.57)	49/85	1.0 (referent)
Q2 (0.57-0.72)	63/84	1.76 (0.87, 3.55)
Q3 (0.72-1.03)	76/84	4.81 (1.89, 12.21)
Q4 (\geq 1.03)	75/85	2.48 (0.95, 6.43)
Total Dioxin TEQ	263/338	
Q1 (<1.26)	53/84	1.0 (referent)
Q2 (1.26-1.39)	65/85	1.69 (0.82, 3.49)
Q3 (1.39-1.57)	71/85	2.07 (0.93, 4.63)
Q4 (\geq 1.57)	74/84	1.78 (0.70, 4.53)

Note: TEQ, toxic equivalency; OR, odds ratio; PCB, polychlorinated biphenyl; PCDD, polychlorinated dibenzodioxin; PCDF, polychlorinated dibenzofuran; Q, quartile

Table S3. Linear Regression models assessing independent effects of wet weight total dioxin TEQ and Σ non-dioxin-like PCBs on selected cytokines among individuals with hypertension in ACHS II (n=263).

Cytokines	Total Dioxin TEQ		Σ NDL PCB	
	$\beta \pm SE$	p-value*	$\beta \pm SE$	p-value*
TNF- α	0.090 \pm 0.075	0.23	-0.012 \pm 0.059	0.84
IL-1 β	0.015 \pm 0.131	0.91	0.018 \pm 0.103	0.86
IL-6	0.020 \pm 0.103	0.85	-0.004 \pm 0.081	0.96
IL-8	0.049 \pm 0.106	0.65	-0.038 \pm 0.083	0.65
IL-17	0.029 \pm 0.106	0.79	-0.021 \pm 0.082	0.80

Note: ACHS-Anniston Community Health Survey; TNF- α -tumor necrosis factor alpha; IL-interleukin

Chemical groups and cytokines are both log₁₀ transformed

* $\alpha < 0.05$

Adjusted models include log₁₀ transformed total lipids, age, sex, race, BMI, smoking status, and family history of high blood pressure

Table S4. Linear Regression Parameter Estimates of Cytokines vs. Chemical Groups (Whole Weight TEQs) among individuals without hypertension (n=75).

Cytokines	Total Dioxin TEQ		Σ NDL PCB	
	$\beta \pm SE$	p*	$\beta \pm SE$	p*
TNF- α	0.07 \pm 0.18	0.70	-0.05 \pm 0.13	0.71
IL-1 β	0.25 \pm 0.24	0.30	-0.10 \pm 0.17	0.57
IL-6	0.10 \pm 0.20	0.64	-0.10 \pm 0.14	0.47
IL-8	-0.05 \pm 0.24	0.84	-0.16 \pm 0.17	0.34
IL-17	0.28 \pm 0.20	0.16	0.11 \pm 0.15	0.46

Note: ACHS-Anniston Community Health Survey; TNF- α -tumor necrosis factor alpha; IL-interleukin

Chemical groups and cytokines are both log₁₀ transformed

* $\alpha < 0.05$

Adjusted models include log₁₀ transformed total lipids, age, sex, race, BMI, smoking status, and family history of high blood pressure

Table S5. Linear regression models of dioxin TEQs, PCB groups, and systolic and diastolic blood pressure.

TEQ	Blood Pressure	n	Unadjusted β	Adjusted β	p-value*
PCDD	Systolic	124	0.036	-0.0079	0.73
	Diastolic	124	-0.015	-0.040	0.073
PCDF	Systolic	123	0.044	0.0081	0.69
	Diastolic	123	-0.0027	-0.0066	0.73
Mono-ortho PCB	Systolic	124	0.032	0.0091	0.47
	Diastolic	124	0.0088	-0.0010	0.93
Non-ortho PCB	Systolic	108	0.028	0.022	0.079
	Diastolic	108	0.016	0.011	0.39
Total Dioxin	Systolic	124	0.040	0.0035	0.85
	Diastolic	124	0.00048	-0.020	0.26
PCB Groups					
Sum	Systolic	124	0.036	0.013	0.31
	Diastolic	124	0.0087	0.00055	0.97
Mono-ortho	Systolic	124	0.032	0.0080	0.54
	Diastolic	124	0.0088	-0.0012	0.92
Di-ortho	Systolic	124	0.035	0.012	0.37
	Diastolic	124	0.0083	-0.0014	0.91
Tri, Tetra-ortho	Systolic	123	0.039	0.021	0.11
	Diastolic	123	0.012	0.0077	0.54
Estrogenic I	Systolic	123	0.025	0.0028	0.81
	Diastolic	123	0.010	-0.0021	0.86
Estrogenic II	Systolic	124	0.030	0.0059	0.62
	Diastolic	124	0.0083	-0.0029	0.80
Anti-estrogenic	Systolic	124	0.032	0.0091	0.47
	Diastolic	124	0.0088	-0.0010	0.93
Thyroid-like	Systolic	124	0.024	0.0016	0.89
	Diastolic	124	0.0081	-0.0024	0.83

Note: TEQ, toxic equivalency; PCB, polychlorinated biphenyl; PCDD-polychlorinated dibenzodioxin; PCDF-polychlorinated dibenzofuran; BMI-body mass index

*p-value, $\alpha < 0.05$

Chemical groups are log₁₀ transformed.

Adjusted models are adjusted for log₁₀ transformed total lipids, age, race, sex, BMI, family history of high blood pressure, smoking status.

Table S6. Hazard Ratios (95% CIs) of Hypertension and TEQ tertiles (whole weight).

Dioxin TEQ Groups (cutpoint)	n*	Adjusted HR (95% CI)
PCDD TEQ	80/145	
Q1 (<1.88)	33/65	1.0 (referent)
Q2 (1.88-1.99)	18/41	0.84 (0.44, 1.59)
Q3 (\geq 1.99)	29/39	1.14 (0.57, 2.28)
PCDF TEQ	80/145	
Q1 (<1.21)	31/62	1.0 (referent)
Q2 (1.21-1.33)	25/47	1.07 (0.59, 1.93)
Q3 (\geq 1.33)	24/36	1.06 (0.56, 2.02)
Mono-Ortho PCB TEQ	80/145	
Q1 (<0.82)	27/64	1.0 (referent)
Q2 (0.82-1.21)	27/43	2.00 (1.11, 3.62)
Q3 (\geq 1.21)	26/38	1.47 (0.74, 2.92)
Non-Ortho PCB TEQ	80/145	
Q1 (<1.27)	34/77	1.0 (referent)
Q2 (1.27-1.72)	23/37	1.67 (0.92, 3.04)
Q3 (\geq 1.72)	23/31	1.70 (0.84, 3.44)
Total Dioxin TEQ	80/145	
Q1 (2.07)	28/67	1.0 (referent)
Q2 (2.07-2.26)	29/47	1.35 (0.75, 2.41)
Q3 (\geq 2.26)	22/31	1.29 (0.62, 2.68)

Note: TEQ, toxic equivalency; PCB, polychlorinated biphenyl; PCDD-polychlorinated dibenzodioxin; PCDF-polychlorinated diobenzofuran;

BMI-body mass index; HR-hazard ratio

*number of hypertensive individuals/total

TEQs imputed (Yang et al. 2018)

Adjusted for log10 total lipids, age, BMI, race, sex, and family history of high blood pressure

Figure S1. Linear regression of systolic and diastolic blood pressure on log10 sum of 35 PCBs' concentration without adjustment of hypertension risk factors. The participants in the model are not on antihypertensive medication (n=124).

β (95% CI) Systolic: 0.035 (0.017, 0.052) Diastolic: 0.0079 (-0.0091, 0.025)

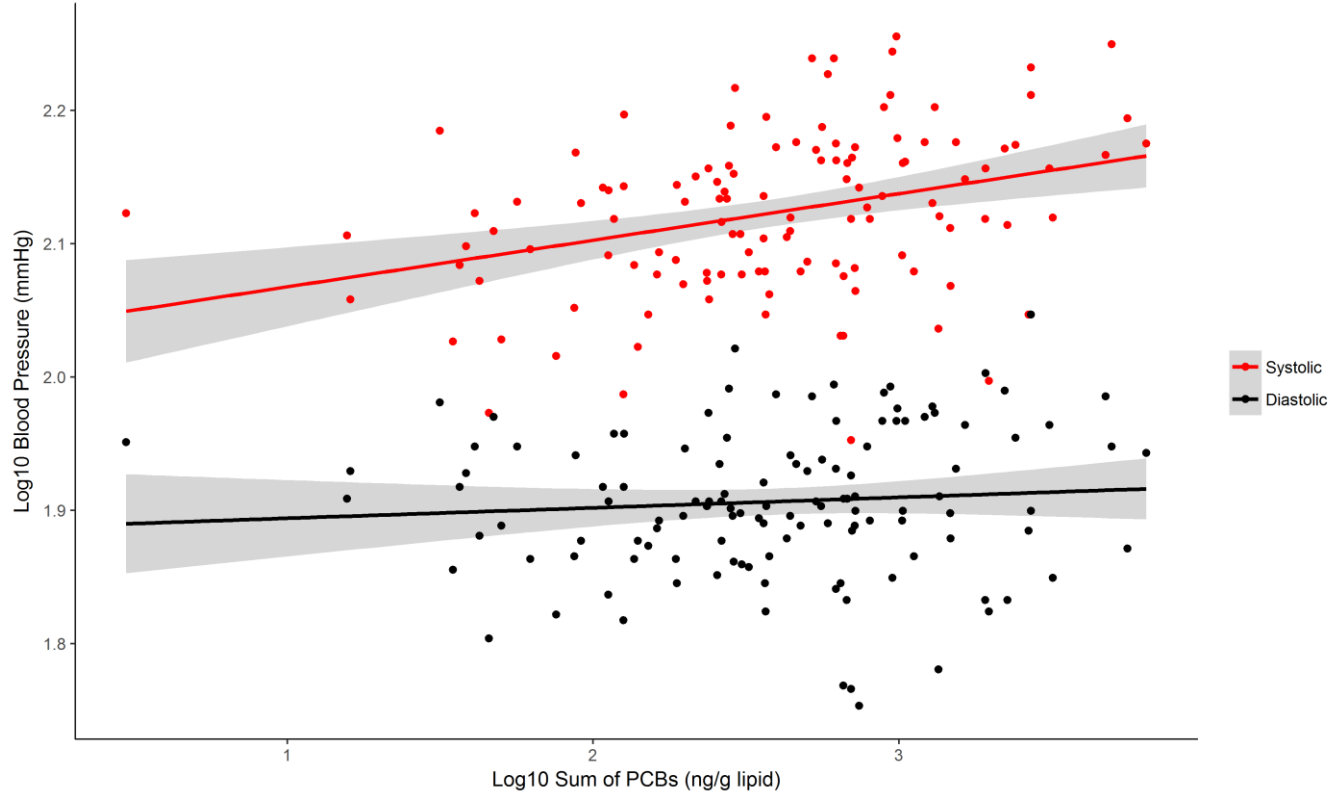


Figure S2. Linear regression of systolic and diastolic blood pressure on log10 total dioxin TEQ concentration without adjustment of hypertension risk factors. The participants in the model are not on antihypertensive medication (n=124).

β (95% CI) Systolic: 0.040 (0.012, 0.069) Diastolic: -0.00053 (-0.027, 0.026)

