

## SUPPLEMENTARY DATA

### POPs analyses

POPs were measured in stored serum samples collected at baseline. Briefly, 1 mL of formic acid was added to 0.5 mL plasma sample and sonicated. Labeled  $^{13}\text{C}$  internal standards and 1 mL of 3% isopropanol in water was added after 60 minutes, followed by another sonication. Solid phase extraction was performed by loading the sample on an Oasis® HLB SPE (Waters, Milford, MA, USA) single use cartridge (6 cm<sup>3</sup>/150 mg), previously conditioned with 3 mL of methanol followed by 3 mL of dichloromethane, 6 mL of methanol/ dichloromethane (1:1), 4.5 mL of methanol and finally 4.5 mL of water. The cartridge was then rinsed by eluting 6 mL of 3% isopropanol in water and 6 mL of 40% methanol in water (all discarded). The cartridge was dried under vacuum and nitrogen for 40 minutes. To collect target compounds the cartridge was eluted with 6 mL of dichloromethane/ hexane (1:1) into glass vials spiked with 25  $\mu\text{L}$  of tetradecane. After elution the sample was dried under nitrogen and reconstituted in hexane (500  $\mu\text{L}$ ). Further clean up was performed using a small activated silica gel column (2 mL, 1.5 g), pre-washed with 6 mL of hexane. The elution of analytes was achieved by passing 7.5 mL of hexane through the column. This fraction was evaporated and transferred to GC vials together with the  $^{13}\text{C}$  labeled recovery standard and the final volume was adjusted to 25  $\mu\text{L}$  tetradecane. Of the final volume, 2  $\mu\text{L}$  was injected on a HRGC/HRMS system and measurements were performed on a Micromass Autospec Ultima (Waters, Mildford, MA, USA) mass spectrometer (MS), monitoring the two most abundant ions of the chlorine or bromine cluster of the most abundant fragments in addition to one ion for the  $^{13}\text{C}$  labeled internal and recovery standard. The MS was coupled to a 6890N gas chromatograph (GC) (Agilent Technologies, Atlanta, GA, USA). The injector was programmed to 275 °C. Extracts were separated on a 30m x 0.25 i.d. x 0.25  $\mu\text{m}$  DB-5 capillary column (SGE Analytical Science, Victoria, AUS) with the GC oven programmed from 180 °C (2 min) to 260 °C (3.5 °C/ min) and to 300 °C (6.5 °C/min, 2min).

### QA/QC

Quality control plasma samples and procedural blank samples were incorporated in each batch of 10 samples and treated identically as the plasma samples. Blank samples did not contain any target compounds at levels below 5% of the levels in the samples, except for cis-chlordane and trans-chlordane. Both chlordanes were present at very low concentrations or below limit of detection in 95% of the samples. The recoveries of the internal standards were in general satisfactory and ranging from 60-110%. The relative standard deviation (RSD) of the 100 QA/QC samples was below 25% for all compounds except for the compounds present at low levels just above the detection limit. The RSD for OCDD, cis and trans- chlordane and PCB126 was around 50%. The laboratory routinely takes part in international laboratory comparison studies with good results (z-scores < 2).

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**Supplementary Table 1. Target analytes with detection rate and abbreviations used**

Target analytes	Detection rate	Abbreviations
Polychlorinated Biphenyl	100%	PCB
2,4,4',5-tetrachlorobiphenyl	100%	PCB74
2,2',4,4',5-pentachlorobiphenyl	99.5%	PCB99
2,3,3',4,4'-pentachlorobiphenyl	100%	PCB105
2,3',4,4',5-pentachlorobiphenyl	100%	PCB118
2,2',3,4,4',5'-hexachlorobiphenyl	99.6%	PCB138
2,2',3,4',5,5'-hexachlorobiphenyl	100%	PCB146
2,2',4,4',5,5'-hexachlorobiphenyl	100%	PCB153
2,3,3',4,4',5-hexachlorobiphenyl	100%	PCB156
2,3,3',4,4',5'-hexachlorobiphenyl	100%	PCB157
2,2',3,3',4,4',5-heptachlorobiphenyl	100%	PCB170
2,2',3,4,4',5,5'-heptachlorobiphenyl	100%	PCB180
2,3,3',4,4',5,5'-heptachlorobiphenyl	100%	PCB189
2,2',3,3',4,4',5,5'-octachlorobiphenyl	98.6%	PCB194
2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	100%	PCB206
2,2',3,3',4,4',5,5',6,6'-decachlorobiphenyl	100%	PCB209
Polychlorinated dibenzo- <i>p</i> -dioxins		PCDD
Octachlorodibenzo- <i>p</i> -dioxin,	80.6%	OCDD
Organochlorine Pesticides		OC pesticides
Hexachlorobenzene	98.6%	HCB
Trans-chlordane	9.6%	
Cis-chlordane	3.4%	
Trans-Nonachlor	100%	
2,2-Bis(4-chlorophenyl)-1,1-dichloroethene	100%	<i>p,p'</i> -DDE
Brominated flame retardants (Brominated Diphenyl Ether)		BDE
2,2',4,4'-tetrabromodiphenyl ether	72.2%	BDE47

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**Supplementary Table 2. Distribution of serum concentrations (pg/mL) by quintile of individual persistent organic pollutants**

	Q1	Q2	Q3	Q4	Q5
PCB74	8.6~57.4	57.5~78.6	78.7~105	106~138	139~418
PCB99	9.0~55.8	55.9~78.2	78.3~104	105~143	144~882
PCB105	5.5~18.8	18.9~27.4	27.5~37.0	37.1~52.2	52.3~376
PCB118	25.0~125	126~174	175~228	229~308	309~1637
PCB138	107~563	564~740	741~922	923~1205	1206~2739
PCB153	117~1007	1008~1290	1291~1557	1558~1956	1957~4672
PCB156	12.2~111	112~140	141~171	172~212	213~536
PCB157	5.0~19.6	19.7~25.0	25.1~31.0	31.1~39.6	39.7~239
PCB170	62.8~363	364~454	455~541	542~669	670~1852
PCB180	153~858	859~1066	1067~1278	1279~1584	1585~7865
PCB189	2.0~13.4	13.5~17.2	17.3~21.6	21.7~27.4	27.5~1060
PCB194	4.0~80.6	80.7~107	108~133	134~172	173~676
PCB206	2.3~19.0	19.1~24.2	24.3~30.0	30.1~37.2	37.3~141
PCB209	1.8~17.8	17.9~23.6	23.7~29.2	29.3~37.2	37.3~161
OCDD	Non-detectable	1.4~2.0	2.1~3.1	3.2~4.6	4.7~21.6
HCB	88.0~173	174~225	226~283	284~369	370~4252
Trans-nonachlor	13.6~82.8	83.4~118	119~165	166~228	229~852
<i>p,p'</i> -DDE	11.0~902	903~1486	1487~2304	2305~4039	4040~23271
BDE47	Non-detectable	9.2~10.9	11.0~14.2	14.3~22.0	22.1~3294

Note: For most variables, Q1-Q5 are quintiles. For OCDD and BDE47, all nondetectables were placed in Q1 and the remaining values were placed in quartiles, labeled Q2-Q5.

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**Supplementary Table 3. Adjusted\* odds ratios (OR) of prevalent diabetes according to quintiles of serum concentrations of polychlorinated biphenyl (PCBs), organochlorine (OC) pesticides, and summary measures of PCBs or OC pesticides.**

		Quintiles of serum concentrations or summary measure					
		Q1	Q2	Q3	Q4	Q5	P <sub>trend</sub>
PCBs congener (number of chlorine atoms)							
PCB74 (4)	Cases/N at risk	23/196	22/198	17/199	22/200	28/196	
	Adjusted OR	Reference	1.1 (0.6-2.1)	0.8 (0.4-1.7)	1.1 (0.6-2.3)	1.8 (0.9-3.7)	0.10
PCB99 (5)	Cases/N at risk	22/198	17/197	19/198	23/198	31/198	
	Adjusted OR	Reference	0.9 (0.4-1.7)	0.9 (0.4-1.8)	1.1 (0.6-2.1)	1.7 (0.9-3.2)	0.10
PCB105 (5)	Cases/N at risk	19/198	18/198	20/198	17/200	38/198	
	Adjusted OR	Reference	1.0 (0.5-2.1)	1.3 (0.6-2.6)	1.0 (0.5-2.2)	2.5 (1.3-5.0)	0.01
PCB118 (5)	Cases/N at risk	15/197	21/198	25/198	16/198	35/197	
	Adjusted OR	Reference	1.5 (0.7-3.1)	1.9 (0.9-4.0)	1.2 (0.6-2.7)	2.9 (1.4-6.0)	0.01
PCB138 (6)	Cases/N at risk	17/198	24/198	16/198	24/198	31/198	

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	risk						
	Adjusted OR	Referenc e	1.8 (0.9- 3.6)	1.0 (0.5- 2.2)	1.5 (0.7- 3.0)	2.3 (1.2- 4.7)	0.06
PCB153 (6)	Cases/N at risk	21/197	18/198	17/198	27/198	29/198	
	Adjusted OR	Referenc e	1.0 (0.5- 1.9)	1.0 (0.5- 1.9)	1.5 (0.8- 2.8)	2.0 (1.0- 3.9)	0.03
PCB156 (6)	Cases/N at risk	21/197	23/199	24/197	21/197	23/199	
	Adjusted OR	Referenc e	1.6 (0.8- 3.2)	1.8 (0.9- 3.5)	1.4 (0.7- 2.8)	2.0 (1.0- 4.2)	0.15
PCB157(6)	Cases/N at risk	18/201	26/195	29/197	14/199	25/197	
	Adjusted OR	Referenc e	1.8 (0.9- 3.6)	2.1 (1.0- 4.0)	1.1 (0.5- 2.3)	2.3 (1.1- 4.8)	0.16
PCB170 (7)	Cases/N at risk	18/197	26/198	23/198	22/198	23/198	
	Adjusted OR	Referenc e	1.9 (1.0- 3.8)	2.1 (1.0- 4.3)	1.6 (0.7- 3.2)	2.4 (1.1- 5.2)	0.09
PCB180 (7)	Cases/N at risk	18/197	28/198	21/198	19/198	26/198	
	Adjusted OR	Referenc e	2.4 (1.2- 4.7)	1.9 (0.9- 4.0)	1.5 (0.7- 3.2)	2.8 (1.3- 5.9)	0.08

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PCB189 (7)	Cases/N at risk	23/195	28/202	19/193	16/199	26/200	
	Adjusted OR	Reference	1.7 (0.9-3.3)	1.1 (0.6-2.2)	1.0 (0.5-2.1)	1.9 (1.0-3.9)	0.34
PCB194 (8)	Cases/N at risk	24/198	25/198	19/198	18/198	26/197	
	Adjusted OR	Reference	1.2 (0.6-2.2)	1.0 (0.5-2.0)	0.9 (0.4-1.9)	1.9 (0.9-3.8)	0.21
PCB206 (9)	Cases/N at risk	27/199	19/196	20/201	20/194	26/199	
	Adjusted OR	Reference	0.8 (0.4-1.6)	0.9 (0.5-1.7)	1.0 (0.5-2.0)	1.5 (0.8-3.0)	0.21
PCB209 (10)	Cases/N at risk	27/198	17/198	26/197	18/195	24/201	
	Adjusted OR	Reference	0.6 (0.3-1.3)	1.2 (0.7-2.3)	0.8 (0.4-1.7)	1.4 (0.7-2.8)	0.26
OC pesticides							
<i>p,p'</i> -DDE	Cases/N at risk	18/197	13/198	18/198	29/198	34/198	
	Adjusted OR	Reference	0.7 (0.3-1.4)	0.9 (0.5-1.9)	1.4 (0.7-2.8)	1.6 (0.8-3.2)	0.02
Trans-nonachlor	Cases/N at risk	18/197	18/196	23/200	21/198	32/198	

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	Adjusted OR	Referenc e	1.1 (0.5- 2.2)	1.4 (0.7- 2.9)	1.2 (0.6- 2.5)	2.1 (1.0- 4.3)	0.04
HCB	Cases/N at risk	22/197	22/199	20/197	26/198	22/198	
	Adjusted OR	Referenc e	1.3 (0.7- 2.5)	1.2 (0.6- 2.4)	1.8 (0.9- 3.6)	1.5 (0.7- 3.1)	0.16
Summary measures							
All 14 PCBs	Cases/N at risk	22/197	25/198	20/198	17/198	28/198	
	Adjusted OR	Referenc e	1.6 (0.8- 3.0)	1.3 (0.7- 2.6)	0.9 (0.5- 2.0)	2.1 (1.1- 4.4)	0.20
All 3 OC pesticides	Cases/N at risk	16/197	14/198	27/198	23/198	32/198	
	Adjusted OR	Referenc e	0.9 (0.4- 2.0)	1.8 (0.9- 3.6)	1.7 (0.8- 3.6)	2.5 (1.2- 5.2)	<0.0 1

\* : Adjusted for gender, BMI, cigarette smoking, exercise, alcohol consumption, triglycerides, and total cholesterol

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**Supplementary Table 4. Adjusted\* odds ratios (OR) of prevalent diabetes according to quintiles of serum concentrations of octachlorodibenzo-p-dioxin (OCDD) or 2,2',4,4'-tetrabromodiphenyl ether (BDE47)**

		Quintiles of serum concentrations of OCDD or BDE47					
		Q1	Q2	Q3	Q4	Q5	P <sub>trend</sub>
OCDD	Cases/N at risk	25/191	21/209	22/185	22/198	22/201	
	Adjusted OR	Reference	0.8 (0.4-1.6)	0.9 (0.5-1.7)	0.8 (0.4-1.6)	1.0 (0.5-1.8)	0.84
BDE47	Cases/N at risk	28/275	10/116	22/205	25/194	27/199	
	Adjusted OR	Reference	0.7 (0.3-1.5)	1.1 (0.6-2.0)	1.2 (0.7-2.3)	1.3 (0.7-2.3)	0.24

\* : Adjusted for gender, BMI, cigarette smoking, exercise, alcohol consumption, triglycerides, and total cholesterol

**Supplementary Table 5. Adjusted\* odds ratios (OR) of incident diabetes according to quintiles of serum concentrations of octachlorodibenzo-p-dioxin (OCDD) or 2,2',4,4'-tetrabromodiphenyl ether (BDE47)**

		Quintiles of serum concentrations of OCDD or BDE47					
		Q1	Q2	Q3	Q4	Q5	P <sub>trend</sub>
OCDD	Cases/N at risk	5/132	4/159	11/138	10/145	6/146	
	Adjusted OR	Reference	0.7 (0.2-2.7)	2.4 (0.8-7.3)	1.8 (0.6-5.5)	1.2 (0.3-4.2)	0.35
BDE47	Cases/N at risk	7/199	5/91	8/151	9/143	7/141	
	Adjusted OR	Reference	1.5 (0.4-4.9)	1.6 (0.6-4.7)	1.8 (0.6-5.0)	1.3 (0.4-3.8)	0.54

\* : Adjusted for gender, BMI, cigarette smoking, exercise, alcohol consumption, triglycerides, and total cholesterol



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**Supplementary Table 6. Comparison of adjusted odds ratios (ORs)\* and 95% confidence interval between the summary measure of polychlorinated biphenyls (PCBs) or organochlorine (OC) pesticides and waist circumference on the risk of future type 2 diabetes.**

	Comparison between PCBs and waist circumference		Comparison between OC pesticides and waist circumference	
	PCBs	Waist circumference	OC Pesticides	Waist circumference
Quintile-based results				
Q1	Reference	Reference	Reference	Reference
Q2	4.6 (0.9-23.9)	1.0 (0.2-5.3)	1.2 (0.3-4.7)	1.0 (0.2-4.9)
Q3	4.8 (0.9-24.0)	2.6 (0.7-10.5)	1.7 (0.5-6.1)	2.1 (0.7-8.5)
Q4	8.8 (1.8-42.2)	4.8 (1.2-19.0)	1.5 (0.4-5.6)	3.6 (0.9-14.0)
Q5	7.7 (1.5-39.7)	5.6 (1.4-23.0)	3.5 (1.0-12.0)	3.7 (0.9-14.9)
1 standard deviation (SD)-based results				
OR per 1SD	1.7 (1.1-2.5)	2.0 (1.4-2.9)	1.5 (1.0-2.2)	1.7 (1.2-2.5)

\*Adjusted ORs were from a single regression model that includes the sum of either PCBs or OC pesticides and waist circumference, adjusted for gender, cigarette smoking, exercise, alcohol consumption, total cholesterol, and triglycerides.

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**Supplementary Table 7. Reclassification of 5-year predicted risk of type 2 diabetes**

Model with conventional risk factors	Model with conventional risk factors and PCBs			Total	N lower risk	N higher risk	Differential reclassification	Net reclassification index
	<3%	3% to <6%	≥6%					
<b>Cases (n=36)</b>								
<3%	2	3	0	5	0	3	0.60	
3% to <6%	1	9	7	17	1	7	0.35	
≥6%	0	4	10	14	4	0	-0.28	
<b>Total</b>	3	16	17	36	5	10	0.14	
<b>Noncases (n=689)</b>								
<3%	150	49	0	199	0	49	0.25	0.35
3% to <6%	124	190	61	375	124	61	-0.17	0.52
≥6%	1	41	73	115	42	0	-0.37	0.08
<b>Average over strata</b>								0.32
<b>Total</b>	275	280	134	689	166	110	-0.08	0.22