Supporting information

Biomonitoring, exposure routes and risk assessment of chlorinated paraffins in humans: a mini-review

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Table S1 Homologue profiles in human samples from different countries

Location	Sample	Homologue profiles/congener groups	Ref.
Northern Norway	Serum	SCCP: C_{11}; MCCP: C_{14}; SCCP: Cl_{5-6}; MCCP: Cl_{7-8}	1
Australia	Serum	SCCP: 2012/13: $C_{10}/C_{11}/C_{12}/C_{13}$(20%/44%/17%/18%) 2014/15: $C_{10}/C_{11}/C_{12}/C_{13}$ (3%/26%/38%/33%) 2012/13: Cl_{4-8}; 2014/15: Cl_{3-10} MCCP: 2004/05: $C_{14}/C_{15}/C_{16}/C_{17}$(14%/33%/29%/23%) 2010/11: $C_{14}/C_{15}/C_{16}/C_{17}$(34%/34%/19%/13%) 2014/15: $C_{14}/C_{15}/C_{16}/C_{17}$(71%/20%/6%/3%); 2004/05: Cl_{4-8}; 2010/11: Cl_{4-7}; 2014/15: Cl_{3-8}	2
Czech	Serum	SCCP: C_{10}; MCCP: C_{14}	3
Guangzhou, China	Serum	SCCP: $C_{10}/C_{11}/C_{12}/C_{13}$ (0.47% /21.1% /13.5 %/64.5 %) $Cl_7/Cl_8/Cl_9$(20.3 %/ 39.2 %/27.9 %) MCCP: C_{14} (95.7%);	4
Jinan, China	Serum	SCCP: $C_{10}/C_{11}/C_{12}/C_{13}$ (14.4%/20.9%/17.1%/47.6%) $Cl_5/Cl_6/Cl_7/Cl_8/Cl_9/Cl_{10}/Cl_{11}/Cl_{12}/Cl_{13}$(5.5%/14.4%/35.8%/26.7%/11.6%/4.1%/1%/0.6%/0.3%) MCCP: $C_{14}/C_{15}/C_{16}/C_{17}$(53%/20.1%/18.5%/8.4%); $Cl_5/Cl_6/Cl_7/Cl_8/Cl_9/Cl_{10}/Cl_{11}/Cl_{12}/Cl_{13}$(5.2%/14.1%/23.3%/28.5%/21.7%/2.1%/1.4%/0.7%)	5
Jinan, China	Serum	SCCP: C_{13}(41.2%), followed by C_{10}, C_{11}, and C_{12}. MCCP: C_{14} (40.4%), followed by C_{15}, C_{16}, and C_{17}; Cl-homologues: SCCPs and MCCPs: Cl_{7-8}	6
Jinan, China	Serum	SCCP: C_{13} (39.4%); Cl_7/Cl_8(36.9%/27.8%) MCCP: C_{14}/C_{15}(41.6%/24.9%); Cl_7/Cl_8(26.4%/27.5%)	7
Hangzhou, China	Serum	SCCP: $C_{10}/C_{11}/C_{12}/C_{13}$ (81.7%/2.6%/11.2%/4.5%) MCCP: $C_{14}/C_{15}/C_{16}/C_{17}$ (54.1%/1.1%/39.8%/5%); CPs: $Cl_5/Cl_6/Cl_7/Cl_8/Cl_9/Cl_{10}$(18.3%/29.3%/20.1%/8.1%/20.8%/3.4%)	8
Dalian, China	Plasma	C-homologues: SCCPs: C_{10} and C_{11}; Cl-homologues: SCCP: Cl_{5-8}	9
Shenzhen, China	Whole blood	C-homologues: SCCP: $C_{10}/C_{11}/C_{12}/C_{13}$ (7%/16%/17%/59%) MCCP: $C_{14}/C_{15}/C_{16}$(42%/23%/18%) LCCP: $C_{18}/C_{19}/C_{20}$(28%/15%/11%); Cl-homologues: SCCP: Cl_{7-9}; MCCP: Cl_{8-10}; LCCP: Cl_{8-9}	10
Beijing, China	Maternal serum Cord Serum	SCCP: C_{10} (77.3%–85.6%); Cl_6/Cl_7(37.1%–45.5%/28.9%–34.8%) MCCP:C_{14}(54.1%−62.4%) ; Cl_{7-8}(58.5%-67.6%)	11
Wuhan, China	Maternal serum Placenta Cord serum	SCCP: $C_{10}/C_{11}/C_{12}/C_{13}$ (32%/27%/18%/23%) MCCP: $C_{14}/C_{15}/C_{16}/C_{17}$ (42%/27%/18%/13%; SCCP: Cl_{5-7} (67%);MCCP: Cl_{5-7} (72%) SCCP: $C_{10}/C_{11}/C_{12}/C_{13}$ (34%/28%/18%/20%) MCCP: $C_{14}/C_{15}/C_{16}/C_{17}$ (35%/29%/21%/15%); SCCP: Cl_{5-7} (77%) MCCP: Cl_{5-7} (76%) SCCP: $C_{10}/C_{11}/C_{12}/C_{13}$ (37%/31%/13%/19%) MCCP: $C_{14}/C_{15}/C_{16}/C_{17}$ (49%/31%/13%/8%; SCCP: Cl_{5-7} (77%); MCCP: Cl_{5-7} (70%)	12

. (*Continued*)

Table S1 . (*Continued*)

Location	Sample	Homologue profiles/congener groups	Ref.
Mianyang, China	Maternal serum, cord serum, placenta and breast milk	C-homologues: SCCP: maternal serum: $C_{10}/C_{11}/C_{12}/C_{13}$ (40%/31%/13%/16%); cord serum: $C_{10}/C_{11}/C_{12}/C_{13}$ (42%/30%/13%/15%); Placenta: $C_{10}/C_{11}/C_{12}/C_{13}$ (39%/33%/15%/14%); breast milk: $C_{10}/C_{11}/C_{12}/C_{13}$ (39%/32%/13%/16%); MCCP: Maternal serum: $C_{14}/C_{15}/C_{16}/C_{17}$ (44%/29%/17%/10%); cord serum: $C_{14}/C_{15}/C_{16}/C_{17}$ (44%/29%/17%/10%); Placenta: $C_{14}/C_{15}/C_{16}/C_{17}$ (36%/30%/21%/12%); breast milk: $C_{14}/C_{15}/C_{16}/C_{17}$ (46%/27%/17%/9%); Cl-homologues: SCCP: maternal serum: $Cl_5/Cl_6/Cl_7/Cl_8$(43%/26%/18%/9%); cord serum: $Cl_5/Cl_6/Cl_7/Cl_8$(42%/29%/18%/9%); Placenta: $Cl_5/Cl_6/Cl_7/Cl_8$(31%/35%/22%/9%); breast milk: $Cl_5/Cl_6/Cl_7/Cl_8$(43%/26%/18%/9%) MCCP: maternal serum: $Cl_5/Cl_6/Cl_7/Cl_8$(49%/24%/17%/7%); cord serum: $Cl_5/Cl_6/Cl_7/Cl_8$(57%/22%/14%/5%); Placenta: $Cl_5/Cl_6/Cl_7/Cl_8$(49%/28%/14%/6%); breast milk: $Cl_5/Cl_6/Cl_7/Cl_8$(57%/22%/13%/6%)	13
Henan, China	Placenta	C-homologues: SCCP: $C_{10}/C_{11}/C_{12}/C_{13}$ (58.7%/35.59%/2.04%/3.67%) MCCP: $C_{14}/C_{15}/C_{16}/C_{17}$ (15.62%/83.44%/0.83%/0.11%); Cl-homologues: SCCP:$Cl_5/Cl_6/Cl_7/Cl_8/Cl_9/Cl_{10}$(0.74%/38.99%/52.21%/5.82%/0.74%/1.5%) MCCP: Cl_7/Cl_8(86.713%/12.473%)	14
Kyoto and Sendai in Japan, Beijing in China, and Seoul and Busan in Korea	Breast milk	C-homologues: SCCP: $C_{10;}$ Cl-homologues: SCCP: Cl_{6-9}	15
UK	Breast milk	C-homologues: SCCP: C_{10-13}; MCCP:$C_{14-16;}$ Cl-homologues: Cl_{5-10}	16
Shanghai, Jiaxing, and Shaoxing (China), Stockholm (Sweden), and Bodø (Norway)	Breast milk	C-homologues: in total: SCCP and MCCP:C_{14}, followed by C_{11} and C_{15}; LCCPs: C_{18}. Scandinavian: C_{11} for SCCPs and C_{14} for MCCPs. Cl-homologues: China: Cl_{2-14}(53.3% -54.1%); Scandinavian: Cl_{2-14}(52.1% - 53.0%)	17
Shijiazhuang, China	Breast milk	C-homologues: SCCP: $C_{10}/C_{11}/C_{12}$ (29.1%/28.8%/34.9%); Cl-homologues: SCCP: $Cl_6/Cl_7/Cl_8$(39.1%/27.6%/33.3%)	18
China	Breast milk	C-homologues: SCCP: C_{10}/C_{11} (51%/28%) MCCP: C_{14} (82%); Cl-homologues: SCCP: Cl_{6-7}; MCCP: Cl_{7-8}	19
China	Breast milk	C-homologues: SCCP: C_{10}/C_{11} (47%/31%) MCCP: C_{14} (70%); Cl-homologues: SCCP: Cl_{6-7}(31%/43) MCCP: Cl_{7-8}(34%/40%)	20
Northern China	Hair Nails	C-homologues: SCCP: $C_{10}/C_{11}/C_{13}$ (36.2%/27.7%/19.4%); Cl-homologues: SCCP: Cl_{6-7} MCCP: Cl_{7-8} C-homologues: SCCP: $C_{10}/C_{11}/C_{13}$ (39.2%/29.7%/17.0%); Cl-homologues: SCCP: Cl_{6-7}; MCCP: Cl_{7-8}	21

Table S2 The calculation equation for the EDI of CPs

Exposure route	Equation
Dietary intake:	$EDI_{diet} = \sum \frac{C_i \times CR_i}{BW}$ EDI_{diet} is the estimated dietary intake of CPs, C_i is CPs concentration in each food group, CR_i is the daily consumption rate of each food, BW is body weight.
Dust ingestion	$EDI_{dust} = \frac{C_{dust} \times IR \times T}{BW}$ C_{dust} is the concentration of CPs in dust; IR is the ingestion rate of dust (60 mg/d for toddlers and 30 mg/d for adults); T is the exposure time; BW is the body weight.
Inhalation	$EDI_{inhalation} = \frac{C_{air} \times IR \times ED \times AF_{inhalation}}{BW}$ C_{air} is the concentration of CPs in air (ng/m^3); IR is the inhalation rate (m^3/d) that adjusted by body weight, gender and age; ED is the exposure duration; $AF_{inhalation}$ are the absorption fraction of inhalation.
Dermal absorption (Dust)	$EDI_{dermal} = \frac{C_{dust} \times SA \times AS \times AF \times T}{BW}$ C_{dust} is the concentration of CPs in dust (ng/g); SA is skin exposure surface area (cm^2); AS is the dust adhered to the skin; AF is the dermal absorption factor; T is the exposure time.
Dermal absorption (Wristbands)	$EDI_{dermal} = \frac{C_{wb} \times SA \times AF}{BW \times AT}$ C_{wb} is the concentration of CPs in the wristbands (ng/cm^2); SA is skin exposure surface area (cm^2); AF is the fraction of analyte absorbed by skin; BW is the body weight; AT is the exposure time.

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