

Temporal trends in microplastic accumulation in placentas from pregnancies in Hawaii

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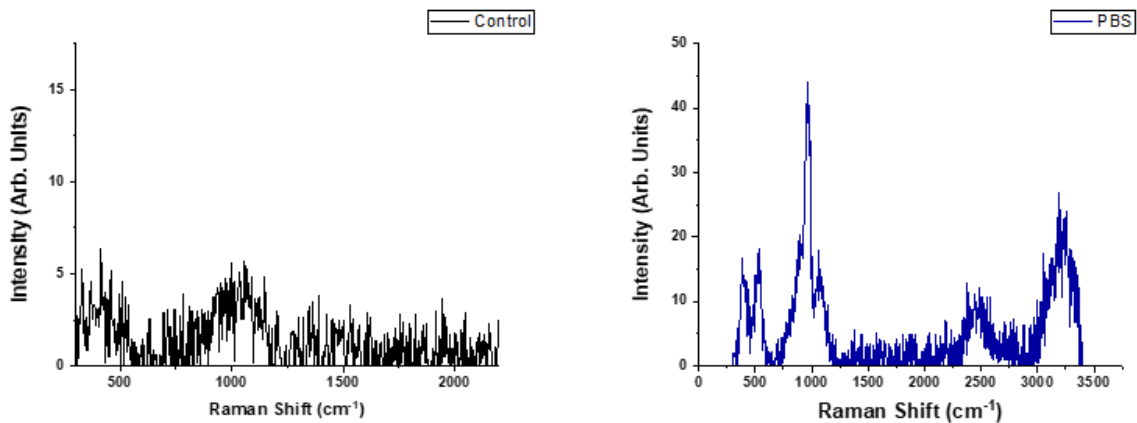
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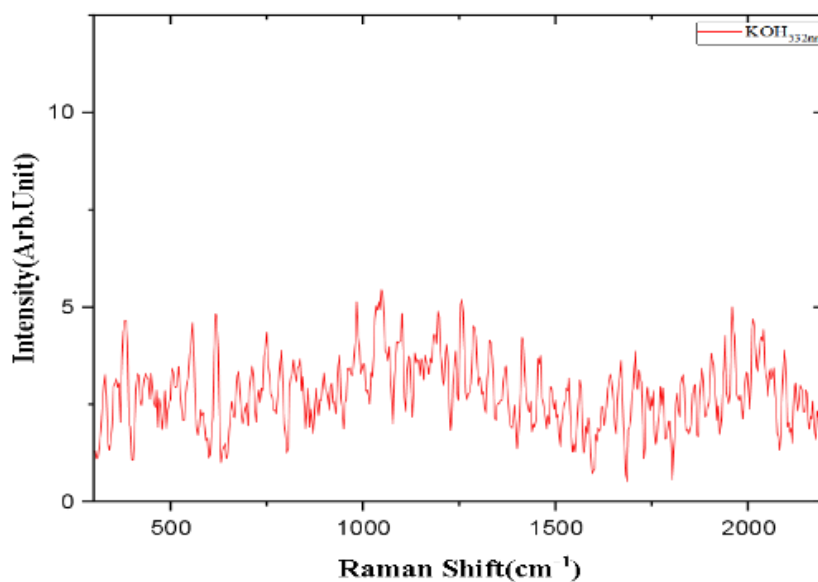
Supplementary Material:

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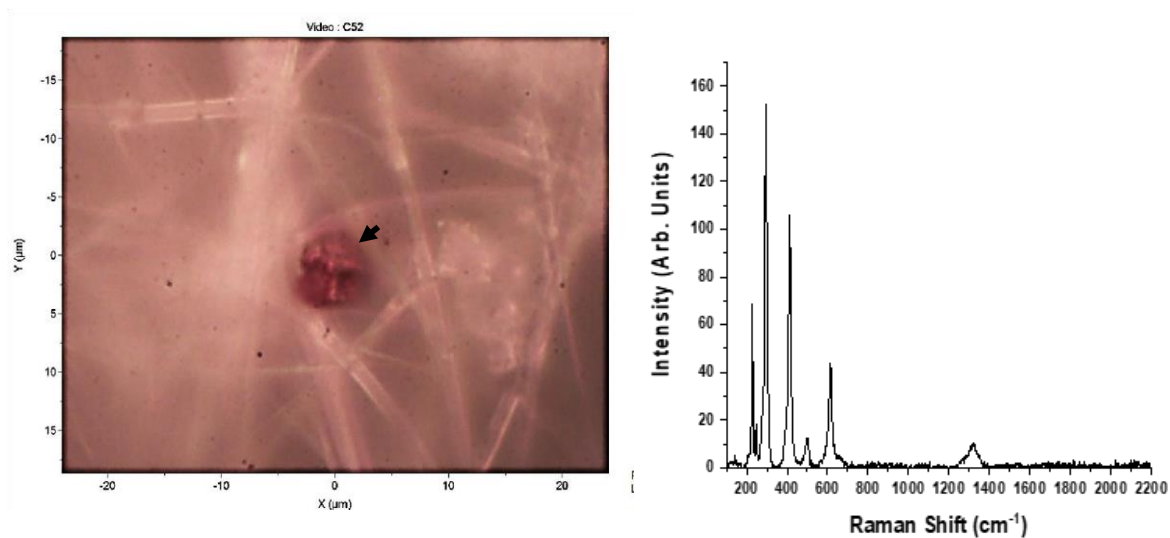
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Supplementary Figure 1: Control glass fiber filter membranes (47mm; Whatman GF/A, Sigma-Aldrich, St. Louis, MO, USA). **(A)** environment (air) control; **(B)** Phosphate Buffer Saline (PBS) (XploRA Raman spectrometry (spectral range 300–2200 cm^{-1} , 532 and 785 nm laser diodes, 600 lines per mm grating, Horiba, Japan).



Supplementary Figure 2: Control glass fiber filter membranes (47mm; Whatman GF/A, Sigma-Aldrich, St. Louis, MO, USA). KOH solution control (XploRA Raman spectrometry (spectral range 300–2200 cm^{-1} , 532 and 785 nm laser diodes, 600 lines per mm grating, Horiba, Japan).



Supplementary Figure 3: (A) Arrow indicates a PVA red-colored MP particle trapped in glass fiber filter visualized under light microscopy (100 x objective (Olympus PlanFL N 100x/0.95) (47mm; Whatman GF/A, Sigma-Aldrich, St. Louis, MO, USA);(B) Corresponding Raman Spectra for PVA XploRA Raman spectrometry (spectral range 300–2200 cm⁻¹, 532 and 785 nm laser diodes, 600 lines per mm grating, Horiba, Japan).

Year	Placenta	N° of MP Particles	Length	Color	Shape	Polymer	Additives
2006	1	1	4 µm	Red	Irregular	Polypropylene	Mercuric oxide red, titanium dioxide
		2	4 µm	Transparent	Irregular	Unable to Identify	
		3	4 µm	Blue	Irregular	Polypropylene	Titanium dioxide
		4	8 µm	Blue	Irregular	Polyamide	Titanium dioxide
2006	2	1	3 µm	Transparent	Irregular	Polyurethane	
		2	2 µm	Transparent	Sphere	Polyester	
2006	3	1	3 µm	Transparent	Irregular	Polyethylene Vinyl Acetate	
		2	3 µm	Transparent	Irregular	Polyethylene Terephthalate	
		3	2 µm	Transparent	Sphere	Polyurethane	
		4	3 µm	Transparent	Irregular	Polyethylene Vinyl Acetate	
2006	4	1	1 µm	Transparent	Sphere	Polyurethane	
		2	2 µm	Transparent	Sphere	Polypropylene	
2006	5	1	2 µm	Transparent	Irregular	Polyvinyl Chloride	
		2	2 µm	Transparent	Irregular	Polyvinyl Chloride	
		3	2 µm	Transparent	Sphere	Polyvinyl Chloride	
		4	2 µm	Transparent	Sphere	Polyethylene	
		5	1 µm	Transparent	Sphere	Polyester	
		6	2 µm	Transparent	Sphere	Polyester	
2006	6	1	3 µm	Transparent	Irregular	Polyester	
		2	4 µm	Transparent	Sphere	Polyester	Titanium dioxide
		3	3 µm	Transparent	Sphere	Polypropylene	Titanium dioxide
		4	3 µm	Transparent	Sphere	Polypropylene	Titanium dioxide

Supplementary Table 1: Description of microplastic polymers detected in human placentas from 2006(6/10). (XploRA Raman spectrometry (spectral range 300–2200 cm⁻¹, 532 and 785 nm laser diodes, 600 lines per mm grating, library (KnowItAll - Wiley Science Solutions, Hoboken, NJ, USA; Horiba, Japan; Spectral SLOPP/SLOPpe libraries).

Year	Placenta	N° of MP Particles	Length	Color	Shape	Polymer	Additives
2013	1	1	4 µm	Transparent	Sphere	Polyethylene Terephthalate	
		2	4 µm	Transparent	Sphere	Unable to Identify	Acidic blue 113
		3	4 µm	Transparent	Sphere	Acrylonitrile Butadiene Styrene	Titanium dioxide
		4	4 µm	Transparent	Sphere	Polyethylene Terephthalate	
		5	11 µm	Transparent	Irregular	Polyamide	
		6	5 µm	Blue	Irregular	Polyacrylonitrile	Titanium dioxide
2013	2	1	5 µm	Transparent	Sphere	Polyurethane	
		2	3 µm	Transparent	Irregular	Polyethylene	
		3	3 µm	Transparent	Sphere	Polyamide	
		4	10 µm	Transparent	Irregular	Polyurethane	N,N-Dimethyl-4-Nitroaniline
2013	3	1	6 µm	Transparent	Irregular	Polyethylene Vinyl Acetate	
		2	6 µm	Transparent	Sphere	Polypropylene	
		3	4 µm	Transparent	Sphere	Unable to Identify	4,4'-Methylenebis (N,N-Diglycidylaniline)
		4	4 µm	Transparent	Sphere	Polyethylene Terephthalate	
2013	4	1	6 µm	Green	Irregular	Polyester	
		2	4 µm	Transparent	Irregular	Polyvinyl Alcohol	
		3	4 µm	Transparent	Sphere	Polypropylene	
		4	12 µm	White	Sphere	Polyester	
2013	5	1	6 µm	Red	Sphere	Polyethylene Vinyl Acetate	Indigo
		2	9 µm	Transparent	Irregular	Polyethylene Vinyl Acetate	
		3	9 µm	Transparent	Irregular	Acrylonitrile Butadiene Styrene	
		4	4 µm	Orange	Sphere	Polyethylene Vinyl Acetate	
		5	14 µm	Transparent	Sphere	Polypropylene	
2013	6	1	6 µm	Blue	Sphere	Unable to Identify	Indigo
		2	6 µm	White	Irregular	Polycarbonate	
		3	6 µm	Blue	Sphere	Polycarbonate	Victoria Blue B (C.I. 44045), Bisphenol A
		4	7 µm	Red	Sphere	Unable to Identify	
2013	7	1	4 µm	Transparent	Sphere	Polyethylene	

		2	6 μm	White	Sphere	Acrylonitrile Butadiene Styrene	
		3	4 μm	Orange	Irregular	Polyethylene Terephthalate	
		4	5 μm	Transparent	Irregular	Unable to Identify	
2013	8	1	3 μm	Transparent	Irregular	Polypropylene	
		2	3 μm	Transparent	Irregular	Polypropylene	
		3	2 μm	Transparent	Sphere	Polypropylene	
		4	17 μm	Transparent	Irregular	Polyester	
2013	9	1	15 μm	Transparent	Irregular	Polyvinyl Chloride	
		2	7 μm	Transparent	Irregular	Unable to Identify	
		3	5 μm	Transparent	Irregular	Polyester	

Supplementary Table 2: Description of microplastic polymers detected in human placentas from 2013(9/10). (XploRA Raman spectrometry (spectral range 300–2200 cm^{-1} , 532 and 785 nm laser diodes, 600 lines per mm grating, library (KnowItAll - Wiley Science Solutions, Hoboken, NJ, USA; Horiba, Japan; Spectral SLOPP/SLOPPe libraries).

Year	Placenta	N° of MP Particles	Length	Color	Shape	Polymer	Additives
2021	1	1	22 µm	Transparent	Sphere	Polyethylene Terephthalate	
		2	37 µm	Transparent	Sphere	Polystyrene	
		3	44 µm	Transparent	Irregular	Polystyrene	
		4	10 µm	Red	Sphere	Polyethylene Vinyl Acetate	Indigo Blue
		5	6 µm	Blue	Sphere	Polypropylene	Patent Blue VF (C.I. 42045)
2021	2	1	20 µm	White	Irregular	Polyester	Bisphenol A
		2	6 µm	Red	Sphere	Polypropylene	Diisooctyl Adipate
		3	4 µm	Transparent	Sphere	Polycarbonate	
		4	5 µm	Transparent	Irregular	Polyethylene Terephthalate	
		5	3 µm	Transparent	Irregular	Unable to Identify	
		6	5 µm	Transparent	Sphere	Polypropylene	Acid Red 37 (C.I. 17045)
		7	3 µm	Transparent	Irregular	Polyurethane	
		8	4 µm	Blue	Irregular	Polycarbonate	Cyclohexane-d12
2021	3	1	2 µm	Transparent	Irregular	Polyvinyl Chloride	Diocetyl phtalate
		2	3 µm	Transparent	Irregular	Polyethylene Vinyl Acetate	
		3	3 µm	Transparent	Irregular	Polyester	Bisphenol A
		4	7 µm	Red	Irregular	Polyethylene Terephthalate	
2021	4	1	2 µm	Transparent	Irregular	Poly (Isoprene), Trans	Brilliant Yellow
		2	3 µm	Transparent	Irregular	Polyurethane	
		3	3 µm	Transparent	Irregular	Polyethylene Terephthalate	
		4	3 µm	Orange	Sphere	Unable to Identify	
		5	4 µm	Transparent	Irregular	Unable to Identify	
		6	3 µm	White	Irregular	Polyvinyl Chloride	
		7	5 µm	Transparent	Irregular	Polycarbonate	
		8	2 µm	White	Irregular	Polyester	
		9	7 µm	White	Sphere	Polyethylene Vinyl Acetate	
		10	3 µm	White	Irregular	Polyethylene Terephthalate	

2021	5	1	2 μm	Transparent	Irregular	Polyethylene	
		2	3 μm	Transparent	Irregular	Polyester	Bisphenol A
		3	5 μm	White	Sphere	Polyethylene	
		4	3 μm	Transparent	Irregular	Polyethylene Vinyl Acetate	
		5	2 μm	Transparent	Irregular	Polyethylene	
		6	1 μm	Transparent	Irregular	Polyvinyl Chloride	

		7	1 μm	Transparent	Irregular	Polyethylene Terephthalate	
		8	2 μm	Transparent	Sphere	Polyethylene Vinyl Acetate	Victoria Blue B (C.I. 44045)
		9	4 μm	White	Sphere	Polyester	Direct Yellow 62
		10	12 μm	Transparent	Irregular	Polypropylene	Titanium dioxide
		11	8 μm	White	Irregular	Polyurethane	Titanium dioxide
2021	6	1	7 μm	Transparent	Irregular	Unable to Identify	Bisphenol A
		2	2 μm	White	Sphere	Unable to Identify	Acid Red 151 (C.I. 26900)
		3	4 μm	White	Sphere	Unable to Identify	
		4	3 μm	Transparent	Irregular	Polypropylene	Orange II
2021	7	1	2 μm	Transparent	Irregular	Polyamide	
		2	2 μm	Transparent	Irregular	Polypropylene	
		3	1 μm	Transparent	Irregular	Polyester	
		4	1 μm	Transparent	Sphere	Polyester	
		5	4 μm	Transparent	Sphere	Polyvinyl Chloride	
		6	3 μm	Transparent	Sphere	Polypropylene	
		7	4 μm	Transparent	Irregular	Polyethylene Vinyl Acetate	Acid Red 4 (C.I. 14710)
		8	5 μm	Transparent	Irregular	Unable to Identify	
2021	8	1	2 μm	Transparent	Irregular	Polyethylene Vinyl Acetate	
		2	3 μm	Blue	Sphere	Unable to Identify	Victoria Blue B (C.I. 44045)
		3	3 μm	Transparent	Sphere	PMMA	
		4	2 μm	Red	Sphere	Polyethylene Vinyl Acetate	
		5	1 μm	Transparent	Sphere	Polyethylene Terephthalate	Titanium dioxide
		6	5 μm	Transparent	Sphere	Polyethylene Vinyl Acetate	

		7	2 µm	Transparent	Sphere	Polyester	
		8	4 µm	White	Sphere	Polyester	
		9	5 µm	Transparent	Irregular	Unable to Identify	
		10	3 µm	White	Sphere	Polyacrylonitrile	
		11	2 µm	Transparent	Irregular	Unable to Identify	
		12	6 µm	Transparent	Irregular	Unable to Identify	
		13	4 µm	Transparent	Irregular	Unable to Identify	
		14	4 µm	Transparent	Irregular	Unable to Identify	
		15	6 µm	Transparent	Irregular	Polycarbonate	
		16	3 µm	Transparent	Sphere	Polyethylene	
		17	3 µm	Transparent	Sphere	Polyethylene Terephthalate	
		18	2 µm	Transparent	Irregular	Polyethylene Adipate	
		19	4 µm	Transparent	Irregular	Polyethylene Terephthalate	
		20	7 µm	Transparent	Sphere	Polypropylene	Acid 151 (C.I. 26900)
		21	5 µm	Transparent	Irregular	Polyethylene Vinyl Acetate	
2021	9	1	8 µm	Transparent	Sphere	Polypropylene	SL 5
		2	7 µm	Transparent	Irregular	Polyester	
		3	3 µm	Transparent	Irregular	Polyethylene	
		4	3 µm	Transparent	Irregular	Polyethylene	
		5	2 µm	Transparent	Irregular	Polyethylene	AC-316A
		6	3 µm	Transparent	Irregular	Polyester	
2021	10	1	4 µm	Transparent	Irregular	Unable to Identify	
		2	2 µm	Transparent	Irregular	Polyethylene Terephthalate	
		3	4 µm	Transparent	Irregular	Polyurethane	
		4	5 µm	Transparent	Irregular	Acrylonitrile Butadiene Styrene	Direct Red 81
		5	3 µm	Transparent	Irregular	Polyvinyl Chloride	

Supplementary Table 3: Description of microplastic polymers detected in human placentas from 2021(10/10). (XploRA Raman spectrometry (spectral range 300–2200 cm⁻¹, 532 and 785 nm laser diodes, 600 lines per mm grating, library (KnowItAll - Wiley Science Solutions, Hoboken, NJ, USA; Horiba, Japan; Spectral SLOPP/SLOPPE libraries).