

# Neurotoxicants, the Developing Brain, and Mental Health

## *Supplementary Information*

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**Table S1: Neurotoxicant Sources and Exposure Routes**

<b>Neurotoxin</b>	<b>Sources</b>	<b>External Exposure Route(s)</b>	<b>Notes</b>	<b>Reference(s)</b>
Bisphenol A (BPA)	Reusable plastic bottles, baby bottles, food storage containers, microwave ovenware, internal coating for food and beverage containers, paper currencies, thermal paper	Ingestion, Inhalation, Dermal Absorption	Used in manufacturing of polymers, including polycarbonate, epoxy resin, polysulfone, and polyacrylate. Migration of Bisphenol A occurs from cans, plastic containers, and beverage cans into liquid and food.	(1,2)
Phthalates (Low Molecular Weight)	Pharmaceuticals, Cosmetics, Personal care products, Packaging	Ingestion; Dermal Absorption; Inhalation	Phthalate metabolites of molecular weights < 250 Da	(3,4)
Phthalates (High Molecular Weight)	Polyvinyl chloride plastics	Ingestion; Dermal Absorption; Inhalation	Phthalate metabolites with molecular weights >250 Da	(4)
Polychlorinated Biphenyls (PCBs)	Capacitor and transformer oils, Hydraulic fluids, Lubricating oils, Plasticizers	Ingestion; Dermal Absorption; Inhalation	Synthetic organochlorine compounds were banned in the 1970s but are still ubiquitous and persistent in the environment.	(5–8)
Particulate Matter with aerodynamic diameter $\leq 2.5$ $\mu\text{m}$ (PM <sub>2.5</sub> )	Primary sources: Road dust, industrial and commercial processes, agricultural processes, wildfires, vehicle emissions; Secondary sources: Interactions between gas-phase chemical compounds in the ambient atmosphere	Inhalation	Comprised of a mixture of small liquid and solid particles suspended in the air; can include elemental carbon, sulfate, nitrate, ammonium, hydrogen ions, low and moderate volatility organic compounds, metal mixtures	(9)
Lead	Lead-based paint in buildings, Lead-contaminated drinking water pipes, Dust, Soil deposits	Ingestion and Inhalation		(10)

**Table S2: Helpful Resources and Databases**

Resource	Link
Known Chemical Brain Drainers	<a href="https://braindrain.dk/known-chemical-brain-drainers/">https://braindrain.dk/known-chemical-brain-drainers/</a>
Integrated Science Assessment (ISA) for Particulate Matter (Final Report, Dec 2019)	<a href="https://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=539935">https://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=539935</a>
“EDC-2: The Endocrine Society's Second Scientific Statement on Endocrine-Disrupting Chemicals”	<a href="https://doi.org/10.1210/er.2015-1010">https://doi.org/10.1210/er.2015-1010</a>
Agency for Toxic Substances and Disease Registry's Substance Priority List	<a href="https://www.atsdr.cdc.gov/spl/index.html#2019spl">https://www.atsdr.cdc.gov/spl/index.html#2019spl</a>
Ambient Air Pollution: A global assessment of exposure and burden of disease	<a href="https://apps.who.int/iris/handle/10665/250141">https://apps.who.int/iris/handle/10665/250141</a>
Gore A, Chappell V, Fenton S, Flaws J, Nadal A, Prins G. <b>EDC-2: the Endocrine Society's second scientific statement on endocrine-disrupting chemicals.</b> <i>Endocr Rev.</i> 2015;36:E1-150 (13)	<a href="https://doi.org/10.1210/er.2015-1010">https://doi.org/10.1210/er.2015-1010</a>
Braithwaite I, Zhang S, Kirkbride JB, Osborn DPJ, Hayes JF. <b>Air Pollution (Particulate Matter) Exposure and Associations with Depression, Anxiety, Bipolar, Psychosis and Suicide Risk: A Systematic Review and Meta-Analysis.</b> <i>Environ Health Perspect.</i> 127(12):126002.	<a href="https://doi.org/10.1289/EHP4595">https://doi.org/10.1289/EHP4595</a>
Theron LC, Abreu-Villaça Y, Augusto-Oliveira M, Brennan C, Crespo-Lopez ME, de Paula Arrifano G, et al. <b>A systematic review of the mental health risks and resilience among pollution-exposed adolescents.</b> <i>J Psychiatr Res.</i> 2022 Feb;146:55–66.	10.1016/j.jpsychires.2021.12.012

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