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Toxic Threads: Public Health Implications of Environmental Chemicals in Textiles

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Current research suggests endocrine disrupting chemicals (EDCs) are used extensively in textiles like clothing, but further studies are needed to elucidate the potential for human exposure and health effects.

Background

- Textiles are one of the largest global industries, with predictions to grow in coming decades
- Endocrine disrupting chemicals (EDCs) are used in the production of clothing as constituents in raw materials or additives
- Studies have consistently detected a multitude of chemicals in clothing samples, with potential implications for human exposure and health

Methods

Assessed available peer-review literature on:



Environmental chemical concentrations in textiles

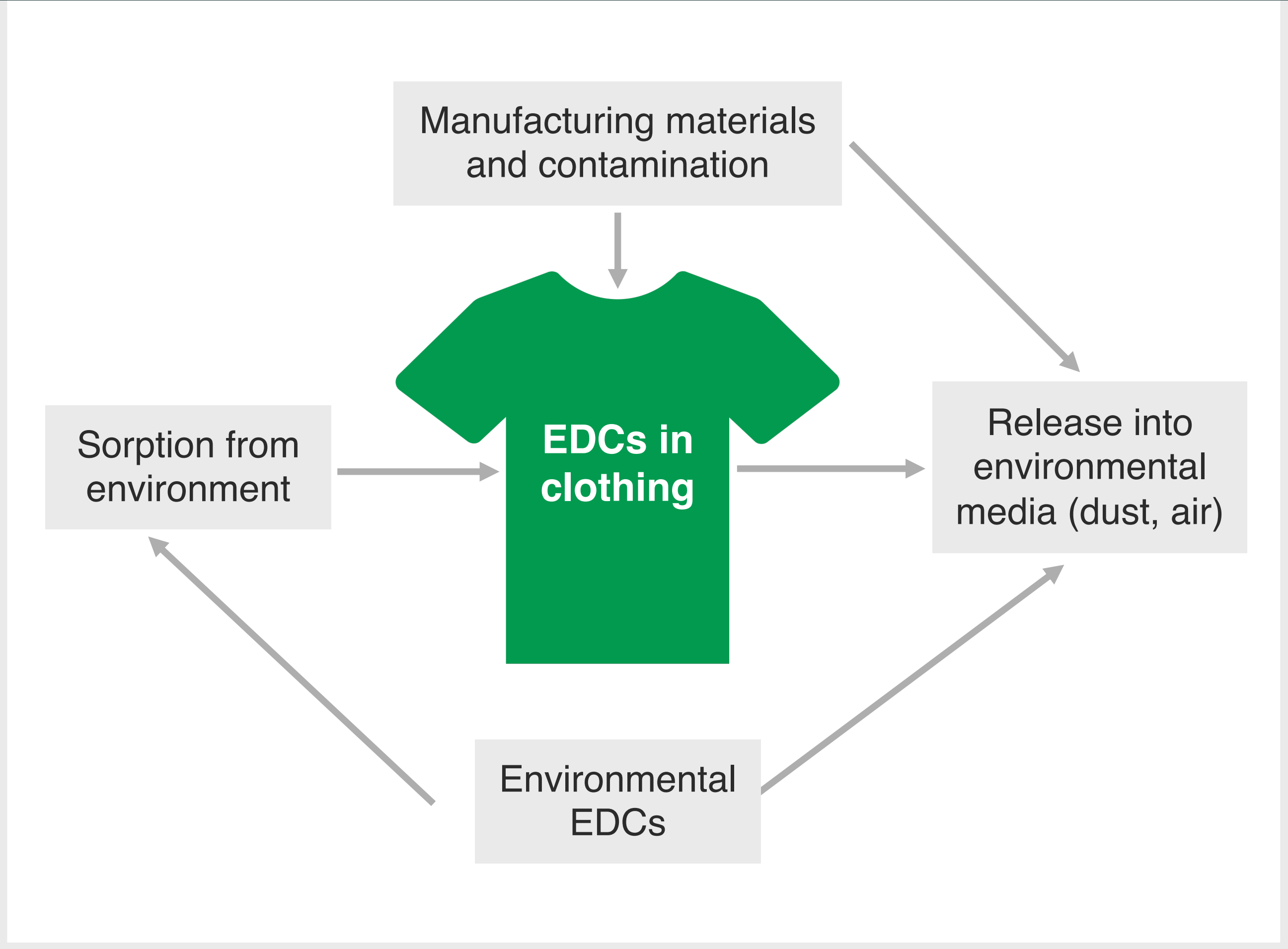


Biomarker concentrations of environmental chemicals following textile wear or use



Health effects from textile (e.g., uniforms) use in occupational and epidemiological studies

Results



Types of EDCs in textiles

Characteristic of textile	Potential exposures
Dyes	ADs, phenols, metals, PCBs
Fibers (synthetic and cotton)*	Synthetic fibers: ADs, phthalates, phenols, FRs, PCBs, parabens, Polychlorinated dibenzo-p-dioxins and dibenzofurans, Benzothiazole & benzotriazole, metals Cotton: Phthalates, pesticides, FRs, phenols, formaldehyde, metals
High-performance finishes	PFAS, pesticides, formaldehyde
Plastics & graphic designs*	Phthalates, phenols
Origin country & brands	ADs, phthalates, phenols, parabens

*Also may be from contamination of raw materials
AD = azo dyes, FRs = flame retardants, PCBs = Polychlorinated Biphenyls

Flight Attendant Uniforms: A Case Study



- New flight attendants' uniforms resulted in skin rashes, allergic reactions, respiratory difficulties
- Testing reported detectable levels of nearly 100 chemicals, including heavy metals (lead, arsenic and hexavalent chromium), toluene, and azo disperse dyes in airline uniforms
- Prevalence of multiple cancers, fatigue, sleep disorders, depression, bronchitis, and cardiac disease were increased in flight attendants compared to adults from NHANES

Public Health Implications

- Clothing and textiles use multiple types of chemicals resulting in exposure to complex mixtures of EDCs
- Health effects of EDCs are vast: hormone disruption, cardiometabolic problems, adverse birth outcomes and developmental outcomes, infertility and pregnancy complications
- Chemicals in clothing may be a modifiable source of EDC exposure

Literature Gaps and Research Needs

- Estimate human exposure to EDCs from clothing use
- Investigate health effects of EDC exposure from clothing use in epidemiological studies.
- Develop and validate metrics, such as questionnaires, to measure clothing use

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