Endocrine Disrupting Compounds in Paired Residential Indoor and Outdoor Air Samples from Two Northern California Communities: Comparisons and Relationships

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A suite of 106 endocrine disrupting compounds (EDCs) were measured in paired residential indoor and outdoor air samples from 50 homes in California: 40 homes in the urban area of Richmond and 10 homes in the more rural town of Bolinas. Compounds of interest include phthalates, alkylphenols, flame retardants, polyaromatic hydrocarbons (PAHs), pesticides, and phenols. Many of these compounds were measured for the first time in outdoor air. Overall, we detected 66 target analytes in indoor and 42 in outdoor air. Wilcoxon rank sum test was used to compare concentrations. Levels of 12 chemicals were significantly higher in Richmond than Bolinas outdoor air, including 9 PAHs, 2 phthalates, and o-phenyl phenol. Diethyl phthalate (DEP) had higher concentrations in Bolinas outdoor air compared to Richmond. Levels of 5 chemicals were significantly higher in Richmond than Bolinas indoor air, including DEP and PAHs. Indoor air concentrations were generally higher than outdoors across all chemical classes, indicating primarily indoor or mixed indoor and outdoor sources. Twenty-one chemicals were significantly higher indoors, and none were significantly higher outdoors. Indoor-outdoor differences were also used to evaluate the relative importance of indoor versus outdoor sources of EDCs. Overall, the differences were mostly positive across all chemical groups, with many significantly positive differences and no significantly negative differences. Indoor and outdoor concentrations of PAHs are most correlated, indicating that indoor concentrations are due to a mix of indoor and outdoor sources. Most other compounds (e.g. phthalates) do not show correlation between indoor and outdoor levels, suggesting indoor concentrations are primarily due to indoor sources. Residents are exposed to a mix of EDCs, resulting primarily from indoor sources. Identifying co-occurring chemicals can provide insight into common exposure mixtures and key sources of exposure.