Hormone Potency in Cell Assays of Chemical Mixtures on Wristbands Worn by Office Workers

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Abstract

Building materials contain many hormone-disrupting chemicals, including flame retardants, per- and polyfluoroalkyl stain-repellants, plasticizers, pesticides, and polychlorinated biphenyls. These chemicals migrate out of products and into the dust and air in buildings, causing widespread indoor exposures. This proposed project will leverage findings of two separate studies on chemicals in offices to test a novel and important technique. In the first study, we successfully measured over 100 chemicals using silicone wristband passive samplers worn for four days at work by 251 office workers in 36 buildings across the US, UK, China, and India. We found stark differences in chemical exposures by country. In a second study, we found that office dust interfered with human hormone receptors in novel cell assays as a result of its chemical components. Now, we propose to combine these two findings and test a new approach for the first time: human cell assays on the silicone wristbands to understand the total hormone-disrupting potencies of chemical mixtures to which office workers are directly exposed. We will measure disruption of estrogen, androgen, and thyroid hormone receptors. Thus, we will assess the 'health' of buildings, identify chemicals driving the hormonal potencies of personal samples, and evaluate behavioral and building predictors of the hormonal potencies. We analyzed the first set of 121 wristbands as a pilot and now we propose to use Catalyst grant support to be able to evaluate the hormone-disrupting potential of personal chemical exposures collected on 243 of the wristbands across all four countries.