

Use of Exposomic Methods Incorporating Sensors in Environmental Epidemiology

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Exposomics is an emerging area within the environmental health sciences that concerns the measurement and characterization of the totality of exogenous and endogenous factors to which humans are exposed. As the concept of exposomics gathers interest and investment, the demand for technologies and methodologies that accommodate high-dimensional exposures (i.e., "exposomic sensors") has concomitantly increased.

Among the most promising of these technologies are silicone wristbands that enable measurement of >1500 chemical compounds, microneedle skin patches that non-invasively collect interstitial fluid and provide a practical alternative to venipuncture and serum collection, and passive wristbands that measure an array of airborne contaminants. Each of these technologies provide novel and practical means to measure many of the exogenous and endogenous factors that constitute the exposome. Although these technologies possess great promise for advancing our ability to measure the exposome, they are recent technological advancements and therefore remain unfamiliar to many environmental health researchers. Further, these technologies have been applied in only a small number of settings to date, and the full extent of their utility in supporting the goal of characterizing the exposome remains unclear. As such, introducing these technologies to a wide audience of environmental health researchers may help accelerate their adoption, refinement, and fruitful application.

Therefore, in this symposium, researchers that have developed or employed these technologies in epidemiologic research will introduce one of the aforementioned exposomic sensors, highlight the sensor's strengths and weaknesses with regards to epidemiologic research, and discuss possible research applications. We will conclude with an open discussion of the application of these technologies to environmental health research.

Exposomics is an ambitious but natural extension of exposure assessment towards the ultimate goal of measuring the totality of non-genetic factors that affect human health. Although the concept of exposomics was recently established, it is already recognized as a major conceptual advancement in environmental epidemiology. Our symposium relates to the Meeting Theme "On Airs, Waters, Places", which concerns the past and future of environmental epidemiology, in that interest and investment in technologies and methodologies that support characterization of the exposome will undoubtedly continue to grow and will likely become a major component of environmental epidemiology in the future.