Report 23: Interactions of Chemical and Non-Chemical Stressors

Convener: Deborah Cory-Slechta

Brief History: Human diseases and disorders typically reflect the interactions of multiple risk factors, yet our toxicology models continue to study single chemicals in isolation from other risk factors and epidemiological studies focus on main effects. To truly understand the relationship of environmental exposures to human disease and dysfunction, we need to understand the role of the interactions of chemical exposures with other risk factors. This may result in understanding communities/individuals at greater vulnerabilities as well as interactions (factors) which may lead to mitigation of chemical effects (e.g., omega 3 fatty acids and methylmercury neurotoxicity).

Discussion Highlights: NIEHS has already begun to focus on interaction effects of multiple chemicals, but it is critical to include non-chemical stressors (e.g., stress, nutritional status, co-morbidity). This is the nexus of environmental health, as it includes vulnerability/susceptibility, mechanisms and ultimately defines a key area to apply translation strategies. Difficulties include quantification and benchmarking for some types of non-chemical stressors, but other institutes and scientific groups work on many of these problems already suggesting the need for partnership.

Recommendations: At the end of the day, this overarching need requires the resources for commitment. Begin by at least requiring assessment of sex differences not only in clinical studies but in toxicological studies as well. Consider additional NIH partnerships that include social/psychological sciences to bring these efforts into toxicological studies. Consider the transcriptome model as a mechanism to think about the intersections of chemicals and non-chemical stressors that may interact relative to any given disease/disorder.

Discussion Participants: Deborah Cory-Slechta, John Graedon, Marie-Francoise Chesselet, Mike Waalkes, Hal Zenick, Bob Wright, Nigel Walker, Dale Sandler.