THE POTENTIAL ROLE OF EPIGENETICS IN MEDIATING AIR POLLUTION EFFECTS

Andrea Baccarelli, *Harvard School of Public Health, Exposure, Epidemiology & Risk Program*

Background and Aims: Epigenetics investigates heritable changes in gene expression that occur without changes in DNA sequence. Several epigenetic mechanisms, including DNA methylation and histone modifications, can change genome function under exogenous influence. Results obtained from animal models indicate that in utero or early-life environmental exposures produce effects that can be inherited transgenerationally and are accompanied by epigenetic alterations. The search for human equivalents of the epigenetic mechanisms identified in animal models is in progress.
Results: Published evidence from human studies of air pollution indicating that epigenetic alterations mediate effects caused by exposure to environmental toxicants will be presented. In these investigations, our own results have shown that air pollution exposure is associated with altered methylation of human repetitive elements or genes. In recent preliminary studies, we have shown alterations of histone modifications in subjects exposed to metal-rich airborne particles. Original data will be presented demonstrating that altered DNA methylation in blood and other tissues is associated with environmentally-induced disease, such as cardiovascular disease and asthma.
Conclusions: On the basis of current evidence, possible models for the interplay between air pollution exposure and the human epigenome will be proposed and discussed.