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The role of gene–environment interactions in lung disease: the urgent need for the exposome

Craig E. Wheelock [1] and Stephen M. Rappaport[2]

Affiliations: [1]Division of Physiological Chemistry 2, Dept of Medical Biochemistry and Biophysics, Karolinska Institute, Stockholm, Sweden. [2]Division of Environmental Health Sciences, School of Public Health, University of California, Berkeley, CA, USA.

Correspondence: Craig E. Wheelock, Division of Physiological Chemistry 2, Dept of Medical Biochemistry and Biophysics, Karolinska Institute, Stockholm, Sweden. E-mail: craig.wheelock@ki.se

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Since the human genome was sequenced, extensive effort has been placed into mapping the role of genes in the onset of disease. It was expected that we would be able to explain the cause of disease and understand the genetic basis of health. However, we have found that while the genetic contribution to individual diseases varies, non-genetic factors have far greater attributable risks, often in the range of 80–90%. The dominance of non-genetic components highlights the importance of the environment to chronic disease risks and has led to the advent of the nascent field of exposome science. In its broadest sense, the exposome can be defined as the totality of all exposures from conception onwards [1]. This all-encompassing description includes multiple exposures ranging from pollution, allergens, diet, lifestyle factors and infections, to human and microbial metabolism (figure 1). A more specific proposed definition of the exposome is the cumulative effects of environmental exposure and the associated biological response [2].