Commentary

The exposome: A new paradigm in public health research

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KEYWORDS
Exposome;
Health;
Disease.

ABSTRACT

Exposome is a new concept in area of environmental studies. Most health and disease conditions are complex, to embrace the complexity of human exposures across time and how this can be reflected in their health; exposome has been suggested as a novel tool. Exposome involves the totality of external exposure in terms of pollution, psychological stressors, diet, lifestyle, noise, conflicts,... in brief, everything across life and linking that to internal responses in term of biological changes on genomics, proteomics, and metabolomics level and how this can lead to disease development or support healthy outcomes. Although the term of "exposome" could entail the study of the environment in the form of external environmental pollutants, this is not true. In fact, the exposome approach is a new understanding of how the environment can interact with body's biological processes. So, rather than studying individual or various external agents and their impact on health outcomes, in the exposome we correlate these diverse external exposures to several changes on molecular levels. That is to say that in exposome, we have two major internal components to be studied alongside the totality of exposures, namely internal dose and internal response.

Introduction

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Although the term of "exposome" could entail the study of the environment in the form of external environmental pollutants, this is not true. In fact, the exposome approach is a new understanding of how the environment can interact with body's biological processes. So, rather than studying individual or various external agents and their impact on health outcomes, in the exposome we correlate these diverse external exposures to several changes on molecular levels. That is to say that in exposome, we have two major internal components to be studied alongside the totality of exposures, namely internal dose and internal response (Zeng et al., 2019).

Internal dose is how our body interacts and metabolizes the external exposures, in this regard genetic changes and mutations play an important role. So, different levels of acetylators, and changes in cholinesterase activities are all dictated by genes and vary according to genetic profiles. For that

sequencing is crucial to evaluate the expected dose that will reach a person's body. On the other hand, internal response entails the changes happening in our bodies as a response to the complex exposure to various agents. The changes can be traced on different levels of processes, starting from genomics and transcriptomics and ending by metabolomics (Uppal et al., 2013).

The major challenge in the case of exposome study is to incorporate all the data sets into one multi-omics analysis leading to the development of what we call an" exposome network" that can be correlated to definite health outcomes. This will need newly developed tools and analytical pipelines that can accommodate the high throughput data produced through the process of exposome studies. Additionally, big sample size cohorts will be mandatory to have appropriate power for such multi-omics analysis (Li et al., 2012).

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