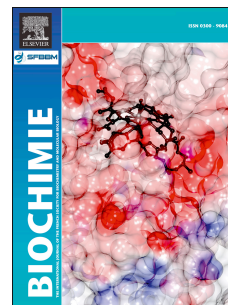


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Integration of the human exposome with the human genome to advance medicine

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**Integration of the human exposome with the human genome to advance medicine.****Barouki R<sup>1,2\*</sup>, Audouze K<sup>3</sup>, Coumoul X<sup>1</sup>, Demenais F<sup>4</sup>, Gauguier D<sup>5,6,7</sup>**<sup>1</sup>INSERM UMR-S 1124, Université Paris Descartes, Université Sorbonne Paris Cité, Paris, France<sup>2</sup> Service de Biochimie Métabolomique et Protéomique, Hôpital Universitaire Necker Enfants Malades, AP-HP, Paris, France<sup>3</sup> INSERM UMR-S973, Molécules Thérapeutiques in silico, Université Paris Diderot, Université Sorbonne Paris Cité, Paris, France<sup>4</sup> INSERM UMR-S 946, Genetic Variation and Human Diseases Unit, Université Paris Diderot, Université Sorbonne Paris Cité, Paris, France<sup>5</sup> INSERM UMR\_S1138, Sorbonne Universités, Université Pierre & Marie Curie, Université Paris Descartes, Sorbonne Paris Cité, Paris, France<sup>6</sup> Imperial College London, Section of Biomolecular Medicine, Division of Computational and Systems Medicine, Department of Surgery and Cancer, Faculty of Medicine, Sir Alexander Fleming building, London, United Kingdom<sup>7</sup> McGill University and Genome Quebec Innovation Centre, Montréal, Canada

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**Abstract**

Identifying precise and predictive biomarkers of health and disease is a critical objective of clinical biochemistry and biomedical research. New concepts and technologies have emerged recently that could support such an objective. The exposome corresponds to the totality of exposure over the lifetime. Research in this field allowed the development of sensors and biological biomarkers using omics technologies that are relevant for predicting the effect of those exposure on human health. Precision medicine has primarily focused on adapting treatments to the genetic profiles of tumors, when in fact, it had originally a wider scope including the use of robust biomarkers for disease prevention. Large-scale genetic studies have also contributed to highlight gene environment interactions, and were extended more recently to epigenetics. In line with the systems medicine approach, we propose to integrate the genome and exposome data in what we present as the exposome-genome paradigm. Such an integrated view will help strengthen approaches to identify relevant predictive markers that can support precise prevention actions both at the population and at the individual levels.

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