Editorial

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Immunogenetics

José Moisés Laparra Llopis*

Molecular Immunonutrition, Instituto Madrileño de Estudios Avanzados en Alimentación, Spain

*Corresponding author: José Moisés Laparra Llopis, Molecular Immunonutrition, Instituto Madrileño de Estudios Avanzados en Alimentación, Spain

Josenlio2@al.ed

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Introduction

Immunogenetics is the study of the genetic basis of the immune response. It includes the study of normal immunological pathways and the identification of genetic variations that result in immune defects, which may result in the identification of new therapeutic targets for immune diseases. Autoimmune diseases, such as type 1 diabetes, are complex genetic traits which result from defects in the immune system. Identification of genes defining the immune defects may identify new target genes for therapeutic approaches. Alternatively, genetic variations can also help to define the immunological pathway leading to disease. Immunology deals with the biological and biochemical basis for the body's defences against germs (such as bacteria, viruses, and fungi), as well as against foreign agents such as biological toxins and environmental pollutants, and failures and malfunctions of these defences mechanisms. Apart from these external effects on the organism, there are also defences reactions regarding the body's own cells, e.g. in the scope of the bodily reactions on cancer and the lacking reaction of a body on healthy cells in the scope of an immune-mediated disease. The term Immunogenetics comprises all processes of an organism, which are, on the one hand, controlled and influenced by the genes of the organism, and are, on the other hand, significant with regard to the immunological defences reactions of the organism. Computational Immunogenetics encompasses the use and application of bioinformatics methods, mathematical models and statistical techniques for the study of immune system function. The considerable heterogeneity of the immune system requires systems approaches to be used to model such a complexity and to respond to questions posed by biomedical audience to help them solve biomedical questions. Computational approaches are increasingly vital to understand the implications of the wealth of gene expression and epigenetics data being gathered from immune cells, and dozens of immune databases play a vital role in organizing the vast quantities of experimental data generated by modern high-throughput technologies. Multi-scale methodologies are increasingly being used to characterise the interplay between the molecular, cellular and organism levels of the immune system. Finally, computational immunology is making an important contribution to an emerging field of computational biomedicine: *in silico* clinical trials.

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Conflict of Interest

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