OPEN ACCESS Freely available online

Journal of Clinical and Cellular Immunology

Perspective

Immunomics: Technologies and its Applications

Amar Nijagal*, **Sarah Mohamedaly**

Department of Surgery and the Liver Center, University of California, San Francisco, CA 94143-0570, USA

DESCRIPTION

Immunomics is the use of genome-wide techniques to research immune system regulation and response to infections. Scientists have been able to view biological networks and infer interrelationships between genes and/or proteins thanks to the emergence of genomic and proteomic technologies; recently, these technologies have been utilized to help better understand how the immune system functions and is controlled. Two-thirds of the genome is active in one or more immune cell types, and only around 1% of genes are expressed exclusively in a single cell type. As a result, it's vital to understand the expression patterns of various immune cell types in the context of a network, rather than as individuals, in order to appropriately identify and relate their responsibilities. Immune system disorders including autoimmune illnesses, immunodeficiency, and cancer can all benefit from genetic insights into pathological mechanisms.

TECHNOLOGIES

Immunomic microarrays: Several types of microarrays have been developed to study the immune system's reaction and interactions in detail. Antibodies serve as probes, while antigens serve as targets, in antibody microarrays. They may be used to quantify antigen concentrations directly using antibody probes that are specific for that antigen. Antigen peptides serve as probes, while serum antibodies serve as targets, in peptide microarrays. These can be utilised for functional immunomic applications such as the delineation of B-cell epitopes, vaccination research, detection tests, and antibody specificity analyses to better understand autoimmune disorders and allergies.

Lymphochip: Ash Alizadeh of Stanford University developed the Lymphochip, a customised human cDNA microarray enriched for genes essential to immune function. Three different sources yielded 17,853 cDNA clones. The initial batch of clones were chosen based on whether or not the detected Expressed Sequence Tags (ESTs) were unique or enriched primarily in lymphoid cDNA libraries; these clones account for around 80% of the Lymphochip clones.

T- and- B-cell-epitope mapping tools: Antibody epitope mapping determines the antigen-binding sites of antibodies. To establish an antibody's epitope, scientists had to separate antigens, digest them into smaller fragments, and determine which of these fragments activated T- and B-cell responses.

APPLICATIONS

The combination of entire pathogen genome sequencing and high-throughput genomics technology has aided vaccine development. Reverse vaccinology examines the genetic sequences of pathogens such as viruses, bacteria, and parasites to find genes that may encode pathogenic genes. Reverse vaccinology was used for the first time to identify vaccine candidates for *Neisseria meningitidis serogroup B*. On the basis of sequence characteristics, computational techniques identified 600 probable surface-exposed or secreted proteins from a MenB pathogenic strain's full genome sequence. Immune cells utilise a variety of receptors and signalling pathways to monitor and protect the body, which results in characteristic patterns of altered gene expression in peripheral blood cells that reflect the severity of the infection or damage.

CONCLUSION

Scientists investigating the immune system have always had to look for antigens on an individual basis and determine the protein sequence of these antigens that would trigger an immune response. Antigens were extracted from entire cells, digested into smaller pieces, and tested against T- and B-cells to assess T- and B-cell responses in this process. These traditional techniques could only see the system in a static state and needed a significant amount of time and effort. Immunomics' capacity to look at the immune system as a whole and define it as a dynamic model has made this approach simpler. The continual motility, turnover, and adaptability of the immune system's constituent cells have been discovered to be some of the system's most defining properties. Furthermore, contemporary genomic technologies, such as microarrays, can track microbe interactions with innate immune cells and record immune system gene expression across time. New proteomic methods, such as T-cell and B-cell epitope mapping, can also help investigators find antibody-antigen associations more quickly.

Correspondence to: Amar Nijagal, Department of Surgery and the Liver Center, University of California, San Francisco, CA 94143-0570, USA, E-mail:amar.Nijagal3@ucsf.edu

Received date: Oct 05, 2021; **Accepted date**: Oct 19, 2021; **Published date**: Oct 26, 2021

Citation: Nijagal A, Mohamedaly S (2021) Immunomics: Technologies and its Applications. J Clin Cell Immunol.12:637.