

A Study on Immune Response System and Its Related Results

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Abstract – To investigate the status of the immune system directly, immunologists are now using new technologies. In this regard one of the best strategies is systems immunology or vaccinology. An extensive variety of variables can bother the human immune system, however the most advantageous to examine for frameworks immunology is the reaction to standard immunizations.

Systems vaccinology can uncover which parts of the insusceptible system change and how they change in light of perturbations and thus yield data about the sensitivities of a given individual's resistant immune system and the variety of safe reactions between people. By concentrating on blood, a frameworks immunology approach can be edifying about both health and disease, young and old persons.

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INTRODUCTION

Over-all, systems immunology deal with the identification of key components of a given immune system and measure its components change in response to agitations of the system. Luckily, the dominant part of these components can be measured with accessible advance in technologies and a representation of these components is available in a blood test which is broadly accessible in human studies.

Likewise, systems approaches make utilization of the way that specialized cells in the immune system are both the indicators and effectors of the immune system, that these cells communicate with each other through cytokines and direct associations and that a worldwide representation of what is going on in the safe arrangement of a specific individual at a given time can be evaluated by investigating such collaborations. In spite of the fact that blood does not constitute an immunological organ essentially, it is the channel for most resistant cells coursing in the body, particularly after an immunological stimulus, for example, vaccination.

The current advancement of numerous new high throughput advances empowers concurrent estimations of numerous cell sorts, cytokines and different biomarkers of insusceptible capacity in a similar blood test by various techniques including

FACS, ELISA, micro array, bead array, mass cytometry and sequencing etc. Briefly, FACS assay based on single cell analysis by fluorescently tag antibodies quantifications.

Micro array tell us about protein expression level and bead array based on fluorescent bead proteins readouts quenching. Similarly, mass cytometry are employed to single cell analysis using mass-reporters tag antibodies.

While, single cell sequencing give complete information about any target protein expression or mutations. Such advancement gives a chance to concentrate on human immune system variation on a universal scale, considering covariation of particular cell populations and protein contents

In order to combat with day-to-day pathogen advancement, individual immune system is continuously changed. Normally a healthy immune system frequently adapts to its encounters with hostile pathogens, nutritional components, gut microbes, and more overwhelming the influences of the most heritable factors.

It is broadly accepted that between individuals variations in immune systems exist. Yet the degree of variety is just beginning to distinctly clear. With the help of technology advancement, investigations empower assessments of interindividual variety, at

the level of individual estimations as well as at the framework level across many people in a population. Data from immune cell recurrence estimations using mass cytometry revealed variation in the relative frequencies of primary insusceptible cell population; monocytes, natural killer (NK), B cells and CD4+ / CD8+ T cells.

IMMUNE RESPONSE SYSTEM AND IT'S RELATED RESULTS

The recurrence of CD4+ T cells extends in the vicinity of 20-90% and the part of CD8+ T cells extends between 6-65%. The B cell contribution was 4-69% within the aggregate of lymphocytes. The way that apparently healthy people show such an extended level of variety in particular immune system constituents recommends novel roads for future reviews into the instruments assuring strength and access to the immune system. The immune complex system adopts versatile arrangements, compensatory pathways and useful repetition to keep up its key capacities even in "anomaly" people.

The composition of immune cells and related proteins within the immune system varies among different populations. It is imperative not to list just the scope of variety for individual estimations, but also to explore novel affiliations between immune system segments and the framework of variety between people. The structure of immune cells and proteins within an individual's immune system is known its immune type and it is intriguing to ponder whether such immune types are circulated as distinct groups or as a continuum.

Such a worldwide comprehension of the human immune system variety could assist to recognize people with exceptional immune types and immune type associated with expanded danger of extreme abnormalities and immunemediated diseases. Many scientists have used worldwide gene expression profiles to characterize variety between patients. For instance SLE is a disease infamous for its heterogeneous clinical introduction. However, in the light of worldwide gene expression profiles patients with SLE can be assembled into seven distinct groups of patients and disease seriousness.

Recently it was shown that the human immune system vary with respect to age, gender and specific environment can be studied globally. Therefore a combined comprehension of both heritable and nonheritable influences on immunity is needed to fully understand interindividual variation and its possible outcomes on immune health and disease conditions. At his was reported that some key factors play a vital role in the development of a specific immune system (Figure 1). Beside other factors, i.e., occasional and occupational, these factors play a dynamic role in the development of a specific immune system.

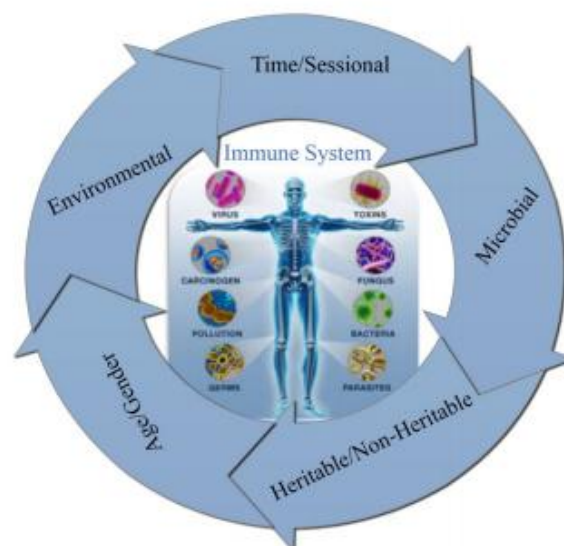


Figure 1. Human immune system development: Key factors that regulate human immune system growth, development and expansion

Age base variation play vital role in immune system regulation, i.e., young children and aged people is more vulnerable to infections than other age groups. Similarly, due to life in utero, the infant has an immune system swayed towards tolerance with predominantly naive phenotypes that mature when exposed to the environment. Compared to adults the neonatal immune system relies on discrete protective cell populations.

DISCUSSION

On the other hand the immune systems of aged people respond slowly due to loss of immune cells, lymphopenia and decreased in diversity of variable receptor genes on lymphocytes B and T cells. Low-grade inflammatory status of higher concentrations of proinflammatory cytokines (i.e., TNF) exist in aged people.

About 24 protein biomarkers are highly influenced by the age factor. However, it is important to note that even if certain factors are found to correlate positively or negatively with age. This cannot be taken as evidence of their contribution in the process of ageing. Environmental factors can often affect individuals differently during different stages of life and adaptive changes in the immune system to such aspects could explain age correlated immune system parameters.

Time base variation during an immune response seems to be an ongoing moving target within a specific individual. Nonetheless, this does not happen outside of such episodes, at least not in healthy adults. Analysis of such blood samples takes weeks to months apart from that healthy adults show

highly stable immune cell frequencies and serum protein levels.

Recent studies over the course of annual samplings indicate that in healthy people immune profiles remain stable up to 6 years, suggesting that each individual makes a baseline state of well-regulated immune system framework. For example to an acute challenge the immune responses lead to extreme changes that involved a sharp increases in serum protein concentrations and immune cell populations, which return quickly to the same baseline state as before the challenge. All through the mechanisms that regulate such coordination are poorly understood, but still it becomes easier to study all system components within the same sample simultaneously with technology developments that will assist to improve our mechanistic understanding.

Like other factor seasonal variation also affects same or different individual immune system differently. By kids different type 1 diabetes change over the season, i.e., elevated in pre-winters and winter months with least occurrence in summer times generally in the northern half of the globe.

Similarly, numerous rheumatoid arthritis patients encounter periodic variations in joint indications due to alterations in immune cell structure and frequencies through the span of the year.

In line circadian, varies in fiery signs, i.e., rigidity and agony being most noticeably worse in morning, is a characterizing manifestation of rheumatoid arthritis. Suggesting the linkage of circadian direction toward the endogenous hormones cortisol that increase the intensity of interleukin-6 (IL-6) during morning hours.

Comparatively women are more prone to various immunemediated abnormalities identified by > 80% patients with immune system disorders, i.e., SLE, Sjorgren syndrome and thyroid illness. However, the occurrence of ankylosis spondylitis is higher in men. While, concentrations of serum proteins and their functional immune responses properties between men and women are not clear. Similarly entire blood gene expression level examination demonstrated clear differences between men and women, both for autosomal and sex linked genes.

For example due to immunomodulatory effects of estrogen as an enhancer and testosterone as a suppressor of humoral immunity, it seems that women mount stronger immune responses than men. Recently it was found that gene expression level in man toward influenza virus vaccination was lower than women.

CONCLUSION

With the help of available analytical techniques, we can easily differentiate inter-individuals immune

system components variations in both healthy and diseased cases. These analysis techniques will allow us to predict the onset of disease threshold and it's curing immunological parameters. Similarly, personalized immune therapies (with focused immune cells vary) for cancer and related immune pathological conditions would help us to interpret the main cause of variations. In broad spectrum, the knowledge about individual's stable and functional immune system state will help us to provide better and long lasting health care for the whole population through alteration modifiable factors conditions.

Briefly, host genetics, age, sex, environment, heritable and non-heritable factors are the influential cause of infection in many patients. However more considerations have been given to the heritable factors that influence the components of individual immune system, i.e., population of immune cells and serum protein concentration. Overall, in the development and progression of individual immune system specifications these factors play a significant role coherently.

REFERENCES

1. Hayday A.C. & Peakman M. (2008). The habitual, diverse and surmountable obstacles to human immunology research. *Nature immunology*. 2008; 9: pp. 575-580.
2. Hagan T., Nakaya H.I., Subramaniam S., et. al. (2015). Systems vaccinology: Enabling rational vaccine design with systems biological approaches. *Vaccine*; 33: pp. 5294-5301.
3. Davis M.M. (2008). A prescription for human immunology. *Immunity*: 29: pp. 835-838.
4. Steinman R.M. & Mellman I. (2004). Immunotherapy: bewitched, bothered, and bewildered no more. *Science*; 305: pp. 197-200.
5. Afridi S., Hoessli D.C., Hameed M.W. (2016). Mechanistic understanding and significance of small peptides interaction with MHC class II molecules for therapeutic applications. *Immunological reviews*; 272: pp. 151-168.
6. Afridi S. (2015). A cyclic peptide accelerates the loading of peptide antigens in major histocompatibility complex class II molecules. *Biochemical and biophysical research communications*; 456: pp. 774-779.
7. Bendall S.C. (2011). Single-cell mass cytometry of differential immune and drug

responses across a human hematopoietic continuum. *Science*; 332: pp. 687-696.

8. Delehanty J.B., Ligler F.S. (2002). A microarray immunoassay for simultaneous detection of proteins and bacteria. *Analytical Chemistry*; 74: pp. 5681-5687.
9. Newell E.W., Sigal N., Bendall S.C., et. al. (2012). Cytometry by time-of-flight shows combinatorial cytokine expression and virus-specific cell niches within a continuum of CD8+ T cell phenotypes. *Immunity*; 36: pp. 142-152.

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