

## Editorial

# The Past, Present and Future of Immunology

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Received: December 26, 2013; Accepted: December 29,  
 2013; Published: January 06, 2014

## Introduction

Life emerged on earth around three and a half billions of years ago in the form of unicellular micro-organisms [1], like the Amoeba which could already differentiate self from non-self in a very rudimentary way, in order to assure survival. Innate immunity constitutes the first line of defense against attempted microbial invasion, it is a well-described phenomenon in vertebrates and insects. Recently striking similarities have been described between the molecular organization of animal and plant systems for self-recognition and anti-microbial defense. Genomic analysis of plants and animals provides evidence that a sophisticated mechanism of host defense was in existence by the time the ancestors of plants and animals diverged. This system, shared by plants and animals, is the Toll pathway of NF $\kappa$ B activation of gene function [2]. That primitive defense mechanism has evolved over millions of year, into a complex, powerful, perfectly orchestrated engineering wonder, if you may, that is known to us as the human immune system. Its main purpose is still, to differentiate self from non-self in order to protect us from infection and disease.

The modern humans *Homo sapiens* was originally found in western Africa around 195,000 years ago [3]. Long before that the immune system was evolving and adapting to keep not only the newly arrived humans, but the whole planet alive and healthy.

Classical immunology dates back to the plague in Athens, in 430 BCE, when it was observed that people that recovered from the plague could take care of the sick without the risk of re-infection [4]. It gets its name from the Latin *immunitas* which means exempt.

Since the invention of the microscope in the seventeenth century and the first immunization by Edward Jenner in the eighteenth century, the E.A. von Behring work with serum against diphtheria in the dawning of the twentieth century as well as the multiple research and discoveries achieved during that century in the understanding of immunology we have come a long way in the characterization of those multiple, complex pathways that compose our immune system [5]. Some of those achievements include the identification of stem cells, the description of multiple primaries and acquired immune deficiencies such as severe combined immunodeficiency and the bubble boy and HIV, with their respective treatment options. The understanding of asthma and allergic diseases as primary inflammatory conditions, the discovery of signal transduction by G. in G Blobel in 1999, the description on new immune deficiencies like DIRA in the early

twenty first century, the introduction of biological, to mention a few [6].

Immunology has grown, strengthen its roots and spread its branches to connect all organs, tissues and systems in the human body. It has brought light and coherence to complex clinic pictures of multiple systems which were once thought to be unrelated.

This knowledge opened the door for allergy immunotherapy one hundred years ago with immune modulation that brought symptoms relief and improved quality of life to allergic rhinitis and asthma patients [7], to the development of vaccines, that have protected millions from infectious diseases and their potential sequelae [8], to the announcement in 1979 by the World Health Organization of the eradication of smallpox [9], to the understanding of autoimmune diseases and the immunology of cancer in its multiple forms, Transplant immunology have given a new opportunity of life for patients with cancer and immune deficiencies. Biological have come our way, as new treatment options for patients with autoimmune diseases as rheumatoid arthritis, hepatitis C [10], irritable bowel syndrome and B-cell lymphomas. With these achievements we are now able to provide better treatment and in some case even the hope of cure to our patients.

Every day descriptions of newly discovered immunological pathways give rise to the understanding of puzzling diseases with new hopes of treatment. Immunology and the immunologist are expanding their field of action to connect basic research with patient care. From the knowledge gained through this long and enlightening journey through the history of our planet and the evolution of our race, and for the discoveries yet to come the future looks promising.

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