

## History of Contemporary Medicine in Iran

# A Biographical History of Some Iranian Pioneers in Medical Immunology and Allergy

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The oldest literature that mentioned the immunity was related to the plague of Athens in 430 BC. The germ theory had more influence on the description of the discrimination between self and non-self which is the core concept of immunology. Allergic diseases were known from 2,000 years ago while Rhazes wrote the first medical monograph about seasonal allergic rhinitis. In Iran, Dr. Mohammad Kermanshahi introduced the basic concepts of serology in 1900. The first Department of Serology was established at Tehran University, Faculty of Medicine in 1951 by Prof. Dr. Hassan Mirdamadi. After that, immunology entered into the cellular and molecular period. Prof. Mohammad Ali Maleki established the first Iranian Society of Allergy and then Prof. Abolhassan Farhoodi found the first Department of Clinical Immunology and Allergy at Tehran University. In this paper, we review the role of famous Iranian scientists and physicians in the progress of modern immunology and allergy from a historical perspective.

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**Introduction**

Before the definition of the term “immunity”, it was generally admitted that disease was a punishment from God or even a disaster from Devils. Immunity is derived from the Latin name, *immunis*, which means “exempt”. *Immunis* was related to tax-exemption of Roman senators but in classical immunology, it was related to the plague of Athens in 430 BC. *Thucydides*, an Athenian famous historian, mentioned that persons that ameliorated from a former illness could nurse the patients without any reinfection.<sup>1</sup> This term was not used in medicine until the 19<sup>th</sup> and 20<sup>th</sup> centuries. *Hippocrates* (460 –370 BC), the famous Greek physician and the Father of Medicine, revolutionized the concept of disease and separated the discipline of medicine from religious and philosophical beliefs. He wrote the treatise known as “*On the Sacred Disease*” and explained the origin of diseases:

“It is thus with regard to the disease called Sacred: it appears to me to be nowise more divine nor more sacred than other diseases, but has a natural cause from the originates like other affections. Men regard its nature and cause as divine from ignorance and wonder...”<sup>2</sup>

Between the period of *Hippocrates* and the 19<sup>th</sup> century, the cause of disease was due to the imbalance in one of the

four humors (blood, phlegm, yellow bile or black bile). Afterward and before the discovery of the role of microbes in diseases, the “*miasma theory*” was an acceptable theory in medicine. The word *miasma* originated from ancient Greek and means “pollution”. So, this theory also is known as “bad air” or “night air”. After 1880, the theory was eventually developed and replaced by the germ theory of disease that specific germs, not *miasma*, caused specific diseases.<sup>3</sup>

Immunology is the study of the cellular and molecular components of the immune system in health and disease and mechanisms that lead to the discrimination between self and non-self. Allergology is a branch of clinical immunology that focuses on the causes and treatment of allergic hypersensitivities.<sup>4</sup> Allergic diseases are not new. They have been described in the early medical literature in various cultures, and clinical cases of allergic diseases existed 2000 years ago. An Iranian famous scientist, *Abūbakr Mohammad-e Zakariyyā-ye Rāzī* (865–925), also known by his Latinized name Rhazes, described allergic rhinitis (rose fever) approximately 900 years earlier than John Bostock (1773–1846). Rhazes wrote a treatise, which was entitled “*Shammyeh*”, and described the clinical manifestations of allergic rhinitis and advised prophylactic

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treatment to manage allergic symptoms.<sup>5</sup> In this paper, we discuss and review the importance of immunology and allergy and introduce scientists and physicians that had the greatest influence in the progression of medical immunology and allergy of the contemporary period in Iran.

### Mohammad Kermanshahi

Dr. Mohammad Kermanshahi (1829–1908) graduated from the Dar-al Fonun School and received a Doctor of Medicine (M.D.) degree from the Sorbonne University in 1879. He was the translator and author of the first Persian-language serology book in 1900 that was entitled: “*Resale dar Bayan-e Serom-e Qarabadini va Sayer-e Mayeaat-e Haywaniya-ye Qabel-e Tazriq*” (Figure 1).<sup>6</sup>

### Hassan Mirdamadi

Prof. Hassan Mirdamadi (1901–1990) was born in Sede (now known as Khomeyni Shahr), located in Isfahan province (Figure 2). He was the descendant of *Mir Damad* (d. 1631 or 1632), a famous Persian philosopher and architecture contemporary of Safavid dynasty. His father was a famous traditional physician and also his encourager and mentor. After passing high school in Isfahan, he continued his studies in Dar-al Fonun School and subsequently Tehran University as a medical student. He was the manager of the clinical diagnostic laboratory in his internship. Prof. Mirdamadi received an M.D. degree in 1924. Then, he found a position in the Pasteur Institute of Iran as the director of the experimental laboratory. Afterwards, he established the branch of Pasteur Institute in Azerbaijan province and returned to Tehran as the director of the vaccine production department. This was simultaneous with the cholera epidemic in eastern Iran and he was selected as the head of the cholera vaccine laboratory. After a successful period in the Pasteur Institute of Iran, he decided to continue his study in the field of microbiology and immunology in Germany. He started postgraduate study at the Robert Koch Institute in Berlin in 1933 and graduated in 1936. Afterwards, he was educated in malariology at Institute for Tropical Medicine of Rome, Italy and finally returned to Iran. He received a position at Tehran University as an Assistant Professor of Serology and Tropical Diseases in 1941.<sup>7</sup> He was the founder of the serology lab at the faculty of medicine. Prof. Mirdamadi was the Father of Serology in Iran that separated serology laboratory with microbiology laboratory. He was the author of several medical books in the fields of laboratory diagnosis, microbiology, serology, and tropical diseases. He wrote one of the best medical dictionaries in different languages (Persian, English, German and French) when he was Emeritus Professor of Tehran University.

### Mohammad-Ali Maleki

Prof. Mohammad-Ali Maleki was born in 1903 in Yazd

(Figure 3). His father was one of the famous traditional physicians, known as “Malekol Atebba”. Prof. Mohammad-Ali Maleki passed his elementary study in Yazd and subsequently in Dar-al Fonun school in Tehran. Then, he was educated in Medicine and graduated in 1928 from Tehran University. Afterwards, he continued his study as a Resident of Dermatology and Venereal Diseases at the Saint Leo hospital of Paris, France. He was also educated in the Institute of Malariology and Tropical Diseases in Paris and Rome. He returned to Iran in 1935 as a physician and eventually as the Head of Dermatology and Venereal Diseases Department at Razi hospital of Tehran. He was also selected as the Minister of Health in 1951 and 1953.

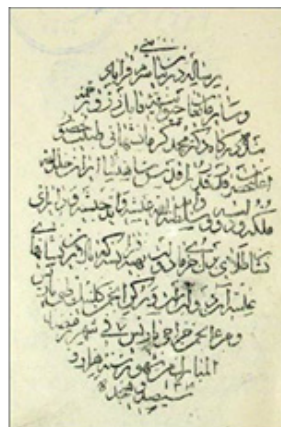


Figure 1. *Resale dar Bayan-e Serom-e Qarabadini va Sayer-e Mayeaat-e Haywaniya-ye Qabel-e Tazriq*.



Figure 2. Prof. Hassan Mirdamadi.



Figure 3. Prof. Mohammad-Ali Maleki.

Although he was known as the Father of Dermatology in Iran, he was the pioneer in describing immunopathogenesis of dermatologic diseases. He introduced anti-histamines for the treatment of allergic diseases in Iran and was one of the lecturers in the International Congress of Allergy that was held in the Paris in 1950. Prof. Maleki was also the first Iranian physician that was a member of the American Academy of Allergy, Asthma, and Immunology. He was the founder and Dean of the Iranian Society of Allergy.<sup>8</sup>

### Hossein Mirshamsi

Prof. Hossein Mirshamsi (1914–2008) was born in Isfahan (Figure 4). He passed his elementary and high schools in Isfahan and then graduated in Veterinary Medicine from Tehran University in 1941. Prof. Mirshamsi found a position at the Razi Vaccine and Serum Research Institute as an assistant at the laboratory. After working for nine years, he decided to continue his study in the field of microbiology and immunology at Pasteur Institute of Paris and graduated in 1951. In addition, he researched microbial vaccines and toxoids in the United States for four months. After that, he returned to Iran and established the Department of Vaccine Development for diphtheria, tetanus, and pertussis at Razi Institute. Prof. Mirshamsi obtained a research grant from the National Institute of Health (NIH) and Food and Agriculture Organization (FAO) for viral vaccines. After returning to Iran, he decided to manufacture the polio vaccine and succeeded in 1969. He was very patriotic and vigorously tried to manufacture further vaccines. He also successfully manufactured the polio vaccine in 1973 and afterwards mumps and rubella vaccines in 1986 and 1987, respectively. So, he truly was the Father of Vaccinology in Iran. Prof. Mirshamsi was an advisor of the World Health Organization (WHO) for the manufacturing of vaccines in Jordan, Tunisia, and North Korea. He was the Visiting Professor of Tehran University for teaching virology and immunology. He was author of some textbooks in virology, immunology, and vaccinology. When he had passed away, Prof. Hassan Tadjbakhsh wrote about him:

*“It is in Iranian mythology that when a child is born, a star lights up in the sky, and when he dies, this star is extinct. But the stars of some people like Dr. Mirshamsi become brighter after their deceased”*<sup>9</sup>.

### Gholamreza Nazari

Prof. Gholamreza Nazari (1916–2002) was born in Bandar Anzali, located in Gilan province (Figure 5). He passed his elementary study in Rasht and eventually graduated in medicine from Tehran University in 1941. After graduation, he returned to Bandar Anzali as a physician that was simultaneous with the outbreak of typhoid fever in north of Iran. He organized the non-governmental organization (NGO) for battling with typhus and smallpox. After succeeding in the prevention



Figure 4. Prof. Hossein Mirshamsi.



Figure 5. Prof. Gholamreza Nazari.

of most contagious diseases, he decided to continue his postgraduate study at the University of Paris. He was educated in immunology, microbiology, parasitology, and hematology for seven years. Afterwards, he returned to Iran and separated the Department of Immunology from the Department of Microbiology at Tehran University. He was the pioneer of immunodiagnostics such as immunological tests for diagnosis of autoimmune-related infertility, serological tests for diagnosis of infectious diseases, blood grouping tests (ABO) and Rh test. For the first time in the Middle East, he established an immunodiagnostic test for syphilis. Prof. Nazari was also the founder of the immunofluorescence research center at Tehran University.

### Abolhassan Farhoodi

Prof. Abolhassan Farhoodi (1924–2006) was born in Qom (Figure 6). He completed his elementary and high schools in Qom and then received an M.D. degree from Tehran University in 1953. He was one of the best students of Prof. Mohammad Gharib, an Iranian distinguished professor, and the Father of Pediatrics in Iran. After graduation, he found a position at Tehran University, faculty of Agriculture as the director of the infirmary

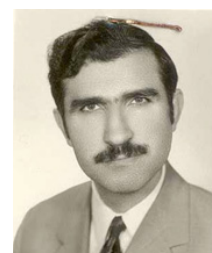


Figure 6. Prof. Abolhassan Farhoodi.

that was located in Karaj. He also established the medical laboratory in the aforementioned infirmary and for the first time evaluated the prevalence of hypothyroidism in Karaj region. He continued his study as a Resident of Pediatrics under the supervision of Prof. Gharib. Eventually, he was educated in London University in a Fellowship of Pediatric Clinical Immunology and Allergy.<sup>10</sup> Then, he returned to Iran and set-up the immunodiagnostic tests in the Pediatric Department of Tehran University. The first allergy clinic in Iran was established by Prof. Mohammad Beheshti, an internist of Tehran University, in 1969 in collaboration with Dr. Mohammad Tavaf, an allergist that graduated from Sorbonne University of Paris, and Dr. Majid Kimiyae, an allergist that was educated in the USA. Nevertheless, the first more practical and scientific immunology and allergy clinic in Iran that was equipped with the immunodiagnostic system was established by Prof. Abolhasan Farhoodi in 1981 at Imam Khomeini Hospital Complex. In addition, he organized the Fellowship Program of Clinical Immunology and Allergy in collaboration with Prof. Reza Farid Hosseini (Mashhad University of Medical Sciences), Prof. Reza Amin (Shiraz University of Medical Sciences), and late Prof. Nasser Javahertarash (Iran University of Medical Sciences) in 1989.<sup>11</sup> Many of the Iranian top scientists and physicians in pediatric clinical immunology and allergy were trained by him: Prof. Mostafa Moein, Prof. Asgar Aghamohammadi, Prof. Saba Arshi, Prof. Alireza Ranjbar, and Prof. Nima Rezaei.

### Hossein Saadatzaheh

Prof. Hossein Saadatzaheh (1930–1987) was born in Tehran (Figure 7). He completed his high school degree from Razi High School of Tehran as an outstanding student. Then, he received his M.D. degree from Tehran University and after graduation started military service in Urmia, in northwest of Iran as the Dean of the infirmary. Afterwards, he found a position at Tehran University as an Instructor. Subsequently, he passed the professional courses in microbiology, immunology, and dermatology at Paris University. He was a specialist in immunodiagnosis of hydatid cyst and also complement diagnostic tests. He established the diagnostic laboratory (Boghra pathobiology laboratory) in 1971 on Shahpour street (now known as Vahdat-e Eslami st.) of Tehran. Prof. Saadatzaheh was a beloved professor for his sympathetic and kind behavior. He was the Deputy Minister of Culture and Science and also Secretary of Medical Education Council in Ministry of Health, Treatment and Medical Training. He was very diligent and active in his work and passed away on 8 June 1987 due to cardiac arrest at Tehran University.

### Samuel Rahbar

Prof. Samuel Rahbar (1929–2012) was born in Hamadan, located west of Iran (Figure 8). His mother usually spoke



Figure 7. Prof. Hossein Saadatzaheh.

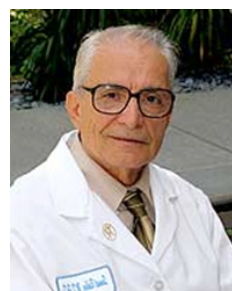


Figure 8. Prof. Samuel Rahbar.

French at home so that children become familiar with a foreign language. His older brother was a chemistry and physics teacher and wrote some books which were taught for many years in high schools in Iran. These events were important in his life and the future of his education. He received an MD degree from Tehran University in 1953. From 1953 to 1960, Prof. Rahbar pursued clinical activities in Abadan and Tehran and returned to academic life as a postgraduate student of Immunology in 1959 and finally received his PhD degree from Tehran University in 1963. Afterwards, he found a position in this university as Assistant Professor of Immunology. Prof. Rahbar was a Visiting Scientist at the Albert Einstein College of Medicine in New York (1968–1969), where he collaborated with Prof. Helen Margaret Ranney (1920–2010), a famous American hematologist who described the inheritance pattern of sickle-cell anemia. He then returned to Tehran University and became the Head of the Department of Applied Biology in 1970. He eagerly followed the advice of Prof. Hermann Lehmann (1910–1984) and established the hemoglobin research laboratory at Tehran University and conducted research for more than 15 years. Finally, he discovered eleven types of abnormal hemoglobins and most important of them was glycated hemoglobin (HbA1c).<sup>12</sup> He revolutionized diabetes research and care. He was a true pioneer in hemoglobin research and dedicated himself to basic and translational science for identification of glycated hemoglobin.<sup>13</sup> In 1979, he joined the Department of Diabetes, Endocrinology, and Metabolism at the City of Hope in Duarte, California and continued advanced research in the therapy of diabetes for more than 30 years. Prof. Rahbar developed small



molecule inhibitors of advanced glycation endproducts (AGEs) which are important in decreasing neuropathy and retinopathy of diabetic patients.<sup>14</sup> In 2012, Prof. Rahbar was recognized for scientific accomplishments by the American Diabetes Association. He was granted the prestigious Samuel Rahbar Outstanding Discovery Award.<sup>15</sup> This award is one of the highest honors bestowed to diabetes researchers. He was a patriot and vigorously supported his country and used Persian words in his papers such as Iran, Avicenna, Perspolis, Kurosh, Arya and Persian Gulf.<sup>16</sup>

### Mohammad-Bagher Eslami

Prof. Mohammad-Bagher Eslami was born in 1936 in Khansar, located in Isfahan province (Figure 9). After completing his elementary school, he moved to Tehran with his family. He graduated from Pahlavi High School that was located on Rey street. He receives his VMD degree from Tehran University, Faculty of Veterinary Medicine in 1959. Afterwards, he continued his study in Germany for two years and then in Scotland, University of Glasgow, as a Postgraduate Fellow of Immunology under the supervision of Prof. Bob White, one of the founders of British Society of Immunology. After passing the preliminary examination, he moved to Western Hospital of Glasgow for more training in clinical immunology. After graduation with a PhD degree, he decided to pursue the field of “development of monoclonal antibody” but unfortunately his father passed away and inevitably he returned to Iran in 1981. He started his academic career at the Department of Pathobiology in Tehran University as Assistance Professor of Immunology and he was Head of this department for 25 years. Prof. Eslami has been the Editor-in-Chief of Iranian Journal of Allergy, Asthma, and Immunology for more than fifteen years.

### Hassan Tadjbakhsh

Prof. Hassan Tadjbakhsh was born on of October 24, 1937 in the Emamzadeh Yahya district of Tehran (Figure 10). His father, Taghi Tadjbakhsh, was an expert in the Ministry of Agriculture. His mother’s grandfather, Ostad Mohammad-Taghi Khan, was the publisher of the Vaghaye-e Etefaghiyeh daily newspaper. Prof. Tadjbakhsh started his elementary education in Rasti School on September 23, 1944 which was located in Darvaze Dowlat district of Tehran. He was infected with diphtheria (that was known as Khonnagh in Iran) in childhood. At that time the mortality rate due to diphtheria was high in Iran but, fortunately, the newly imported anti-diphtheria serum rescued him from death. He then entered into the Elmiyeh High School in 1950 that was one of the best high schools in Tehran. Prof. Tadjbakhsh has authored his first article about *Mullá Muhsin Feyz Kashani* (1597–1675) and his mystic perspective when he was seventeen years old. It was the turning point in his life that he



Figure 9. Prof. Mohammad-Bagher Eslami.



Figure 10. Prof. Hassan Tadjbakhsh.

started researching for history and culture of Persia. He then passed the entrance examination of the Faculty of Veterinary Medicine in 1956 and graduated from Tehran University in 1961. Subsequently, he passed the military service in the Veterinary Organization, the section of tuberculosis and wrote an article about *Corynebacterium Ovis*. Prof. Hassan Tadjbakhsh took a French Government Scholarship for postgraduate study at Pasteur Institute of Paris in the field of microbiology and immunology. He learned the valuable knowledge and sciences from Prof. François Jacob (1920–2013), Prof. André Lwoff (1902–1994), and Prof. Jacques Monod (1910–1976) that won the shared Noble Prize in Physiology and Medicine in 1965 for their discoveries concerning genetic control of enzymes in viruses. After graduation and receiving a PhD degree in microbiology and immunology, he returned to Iran in 1967 as Assistant Professor at Faculty of Veterinary Medicine, Tehran University. Prof. Hassan Tadjbakhsh wrote more than 22 books and more than 200 articles in the fields of microbiology, immunology, genetics, history, philosophy, mysticism and Persian literature. He is the Distinguished Emeritus Professor of Tehran University, member of the Academy of Science of the Islamic Republic of Iran and also received different laureates such as Congress of Iranian Honorable Scientists and medal of honor in 4<sup>th</sup> International Prof. Alireza Yalda Congress in Medical Sciences. He is the author of one of the best books on the history of science entitled, “History of Veterinary Medicine and Medicine of Iran”.<sup>17</sup>

### Reza Amin

Prof. Reza Amin was born in Shiraz in 1939 (Figure 11). He passed elementary and high school education in



Figure 11. Prof. Reza Amin.

Shiraz and then started his academic study in the field of Medicine at Shiraz University and graduated in 1965. After passing the Military Service and then the Educational Commission for Foreign Medical Graduates (ECFMG) exam, he moved to the USA as a Pediatrics Resident at the Children's Hospital of Chicago. After receiving Board Certification in Pediatrics, he started his fellowship in the field of Pediatric Clinical Immunology and Allergy at the University of Wisconsin in Madison, USA. He learned and gained experience under the supervision of Prof. J. Arkins and Prof. J. Fink. He returned to Iran in 1973 and established the Clinical Immunology and Allergy Department at Shiraz University of Medical Sciences. He is the pioneer of clinical immunology and allergy in Shiraz and trained many physicians.

### Farrokh Modabber

Prof. Farrokh Modabber was born on February 27, 1940 in Rasht (Figure 12). Due to his father's illness (severe Asthma) they had to move to Tehran after the first year of his elementary school. He completed his education at Alborz High School, which was one of the best if not the best high schools in Tehran at that time. After graduation, he participated and was selected in a national examination conducted by the Ministry of Education to receive a full scholarship to study Microbiology and Immunology abroad. Subsequently, the British Council selected him to study in England in King's College but he didn't like to study there. He immediately applied to the University of California at Los Angeles (UCLA) and obtained his Bachelor's degree in Bacteriology (1964) and a Ph.D. in Microbiology (emphasis on Immunology, 1968). He set-up to develop a very sensitive technique for looking at antigen



Figure 12. Prof. Farrokh Modabber.

recognition by cells (the ability of cells to bind antigens) under the guidance of Prof. Eli Sercarz. His first paper was published in the prestigious journal, *Science*.<sup>18</sup> After obtaining the Ph.D. degree, he applied and was awarded a Harvard Fellowship under the supervision of Prof. Albert Coons, who had invented the immunofluorescence technique and he published another paper in *Science*.<sup>19</sup> While he was offered a faculty position at the Harvard School of Public Health (HSPH) as Assistant Professor, he decided to return to Iran as an Associate Professor at Pahlavi Medical School (now Shiraz University of Medical Sciences) at the Department of Microbiology, (1971–72) and then at Tehran University, School of Public Health in 1973. He introduced the field of “cellular immunology” to medical and graduate students. This was a novel development in the field of Immunology at that time. He was appointed as the Head of the Pathobiology Department at Tehran University and established a joint Master's Program in Immunobiology with Harvard University, which was recognized by numerous other top universities (i.e. UCLA, London, Harvard, etc.) so that students after their successful Master's degree in Tehran could enter a PhD program directly. In collaboration with Paul Terasaki's lab (UCLA, the pioneer of HLA typing who developed the Terasaki test that became the international standard method for tissue typing), he established the first HLA typing system in Iran on a small scale. He also established the immunoparasitology research especially leishmaniasis in Iran. After 1979, he was awarded several positions at Pasteur Institute of Paris, Tusla University and the Tropical Disease Research (TDR) Center at WHO. Afterwards, he took a position as Director of Infectious Disease Research Institute (IDRI) (an NGO) in Seattle, WA, USA. This Institute had developed the first-second generation vaccine of leishmaniasis. He then started to work as a consultant for different organizations (i.e. The European & Developing Countries Clinical Trials Partnership (EDCTP); Bayer AG; Mologen AG; and Drugs for Neglected Diseases initiative (DNDi)). He finally joined DNDi in 2008 and managed the development of multi-drug treatment of visceral leishmaniasis. He is now a Senior Advisor on Leishmaniasis at DNDi, Geneva.

### Behrooz Nikbin

Prof. Behrooz Nikbin was born on January 17, 1941 in Sarakhs, located in Khorasan province (Figure 13). He completed his high school in Mashhad and then went to Paris and subsequently to Brussel, Belgium to study Medicine. Afterwards, he received a Diploma in Immunology and Blood Transfusion- and fellowship in organ transplantation. He then returned to Iran and found a position at Tehran University as Assistant Professor of Immunology. He established the HLA-typing technique at the Department of Immunology and Applied Biology



Figure 13. Prof. Behrooz Nikbin.

and subsequently in collaboration with Prof. Fereydoon Ala, the founder of the Iranian National Blood Transfusion Service (INBTS), established the immunogenetic and transplantation laboratory in INBTS. He was also the member of the Transplantation Committee at the Ministry of Health, Treatment and Medical Training. He is the pioneer of immunogenetics in Iran and trained many immunologists and now is the Emeritus Professor of Tehran University of Medical Sciences.

#### Reza Farid Hosseini

Prof. Reza Farid Hosseini was born in 1941 in Mashhad (Figure 14). He passed the elementary education and high school in Mashhad. The turning point of his life was the encounter with Prof. Sayyed Jalal-ed-Din Ashtiani (1925–2005), an Iranian famous Professor of Philosophy and Islamic Mysticist, and also Dr. Ali Shariati (1933–1977), an Iranian famous sociologist. Subsequently, after graduation from high school, he was educated in Medicine at Mashhad University. After graduation, he went to United Kingdom (UK) and was educated in the field of Internal Medicine at St George's Hospital, one of UK's largest teaching hospitals, and then was trained in Pulmonology at Cardiff University of Wales. At that time, Immunology was in its infancy period and scientists in the United Kingdom were the pioneers in this field. He learned basic and clinical immunology from Prof. Jack Pepys (Father of British Clinical Allergy), Prof. Deborah Doniach (Distinguished Professor of Clinical Immunology and pioneer in the field of autoimmune diseases) and



Figure 14. Prof. Reza Farid Hosseini.

Prof. Ivan Roitt (in 1956, together with Prof. Deborah Doniach and Prof. Peter Campbell, he made the classic discovery of thyroglobulin autoantibodies in Hashimoto's thyroiditis which helped to open the whole concept of a relationship between autoimmunity and human disease). Prof. Reza Farid Hosseini described the autoimmune feature of type 1 diabetes under the supervision of Prof. Deborah Doniach for the first time. For completing his education, he was trained in the London University and University of Minnesota, USA and finally received Fellowship Certificate from American Academy of Allergy, Asthma, and Immunology (AAAAI). He then returned to Iran in 1977 as Assistant Professor at Faculty of Medicine, Mashhad University of Medical Sciences. Prof. Reza Farid Hosseini established the Department of Immunology and Allergy in Mashhad. He is also a pioneer of immunology and allergy at Mashhad University of Medical Sciences. He trained many physicians, fellows, Ph.D. and MSc students and some of them are top scientists in the world. He is the Editor-in-Chief of the comprehensive textbook in immunology that published in Persian language, entitled, "Basic Immunology". Prof. Reza Farid Hosseini in collaboration with late Dr. Hassan Baradaran and Dr. Seyed Abdol Rahim Rezaee translated the famous textbook entitled, "Cellular and Molecular Immunology" into Persian for the first time in Iran that was selected as the best book in Iran. Furthermore, he has authored more than 30 books in the field of medical sciences, mysticism, and history. Recently, the book entitled, "History of Immunology and Allergy in Iran and World" authored by Prof. Reza Farid Hosseini, Prof. Behrooz Nikbin, and Dr. Reza Jafari was published. He is also the pioneer of Human T-lymphotropic virus 1 (HTLV-1) research and therapy. For the first time in Iran, he isolated HTLV-1 from patients diagnosed with adult T cell leukemia (ATL) in Mashhad (the virus is endemic in the northeast of Iran).<sup>20</sup>

#### Shahnaz Rafie Tehrani

Prof. Shahnaz Rafie Tehrani was born in 1941 in Shahriar, located in Alborz province (Figure 15). She passed elementary and high schools in Tehran and then in the field of Medicine at Tehran University. She continued postgraduate study in Immunology and Clinical Laboratory Science at Tehran University and subsequently was selected as Assistant Professor at the Department of Immunology, Tehran University. She went to the United States and completed her research in the field of Autoimmune diseases at UCLA and Irvine University. She investigated inducing oral tolerance for treatment of autoimmune patients and trained many postgraduate students who are now famous professors in Iran. She is also the first woman in Iran who obtained Professorship in Immunology.





Figure 15. Prof. Shahnaz Rafie Tehrani.

### Ahmad Masoud

Prof. Ahmad Masoud was born in 1943 in Sowme'eh Sara, located in Gilan province (Figure 16). He passed elementary and high school education in Sowme'eh Sara and in 1960 started his study in the field of Pharmacy at Tehran University and graduated in 1967. Afterwards, he went to France and continued his study in the field of Microbiology and Immunology at Université Claude Bernard Lyon and subsequently received his Postdoctorate degree in 1974 from Pasteur Institute of Paris in the field of Immunohematology and Immunopathology. He was also trained in the field of Cellular Immunology and Cancer Immunology at NIH. He returned to Iran and revolutionized the Department of Immunology in Tehran University. He was Head of the Department for more than fifteen years. Prof. Masoud was editor of the outstanding book entitled, "Immunology of Aging" that was written in Persian and subsequently was written in English in collaboration with Prof. Nima Rezaei. He unexpectedly passed away on August 18, 2014.<sup>21</sup>

### Behjatossadat Moayedi

Prof. Behjatossadat Moayedi was born in 1943 in Isfahan (Figure 17). Her father was a famous physician in Isfahan. She passed the elementary and high school education in Isfahan and started her academic study in the field of pharmacy at Tehran University. She was trained under the supervision of Prof. Hassan Mirdamadi and Prof. Samuel Rahbar in the field of hemoglobinopathy. Afterwards, she was selected as a Postgraduate Fellow of Clinical Laboratory Science at Isfahan University and then as an Instructor. She then went to the United States to complete her study in the field of immunohematology and blood banking at Medical College of Virginia, School of Blood Banking and finally she returned to Iran in 1978. Furthermore, she was educated as Resident of Clinical Pathology in Iran and selected as Assistant Professor of Immunohematology and Immunopathology at Isfahan University of Medical Sciences. She established the Department of Immunology in Isfahan and was a pioneer of immunohematology in Iran. She was selected as Distinguished Professor of Immunohematology in Isfahan University of Medical Sciences. She wrote several books about immunohematology, immunology, and



Figure 16. Prof. Ahmad Masoud.



Figure 17. Prof. Behjatossadat Moayedi.

immunodiagnostics. She is also known as Professor of Medical Ethics.

### Mostafa Moin

Prof. Mostafa Moin was born in 1951 in Najafabad, located in Isfahan province (Figure 18). He passed elementary education in Najafabad and then high school in Isfahan. He started his academic education in 1969 in Medicine at Pahlavi University (Shiraz University of Medical Sciences). He continued his study as a Resident of Pediatrics and received his Board Certification in 1979. Simultaneously, he organized the National Seminar of Public Health and Medicine at Shiraz University. Afterwards, he returned to Isfahan as an Assistant Professor of Pediatrics at Isfahan University. He found and organized the rural health system in a deprived area around Isfahan. He was then selected as the Dean of Shiraz University, Parliamentary representative of Shiraz, Isfahan and Tehran Constituencies and subsequently as the Minister of Culture and Higher Education under President Akbar Hashemi Rafsanjani (1989-1993) and President Mohammad Khatami (1997–

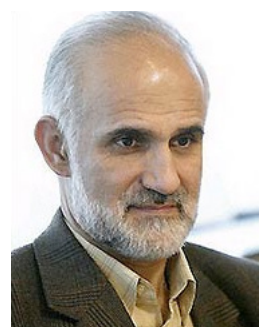


Figure 18. Prof. Mostafa Moin.



2000) and later became the Minister of Science, Research, and Technology (the same position, with a changed name) under President Khatami (2000-2003). At that period, he was trained in the field of Pediatric Clinical Immunology and Allergy under the supervision of Prof. Farhoodi and received Fellowship Board Certification in 1996. He is the Founder and Head of several scientific Institutes, Societies and Journals such as Iranian Institute for the Advancement of Knowledge and Research (since 1991), Iranian Society of Asthma & Allergy (ISAA, since 1996), National Committee for Asthma & Allergy (since 1999), Immunology, Asthma and Allergy Research Institute (since 2000), Iranian Journal of Allergy, Asthma and Immunology (since 2000), UNESCO Chair of Health Education in Iran (2004–2014), Iranian Society for Ethics in Science & Technology (2004 - 2013), Iranian Association for Scientific Development (since 2005), Iranian Journal of Ethics in Science and Technology (since 2006) and the Board of Trustees of Rahman Scientific and Socio-Cultural Institute (since 2006). He has also received several scientific laureates such as Highest International Professor Yalda Award for Distinguished Teaching and Research in Medical Sciences (2010), Distinguished Researcher in the 15<sup>th</sup> Avicenna Festival (2013) and the most influential individual announced by Essential Science Indicators in 2015 (ranked in the top 1% of the world scientists). He has authored several books and more than 300 papers in Scientific Journals and National & International Scientific Meetings and Congresses (since 1996). Prof. Moin is patriotic, a reformist and conscientious. He is also the Professor of Medical Ethics and his main concern is the organizational justice and freedom in the society.<sup>11</sup>

#### Authors' Contribution

RJ conceived and designed the research, wrote the paper. ARR designed the research, provided essential data. RFH designed and supervised the research.

#### Conflict of Interest Disclosures

The authors have no conflicts of interest.

#### Ethical Statement

Not applicable.

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