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The Life and Career of Dr. Rasoul Pournaki, Eminent Researcher of Pasteur Institute of Iran

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ABSTRACT

Rasoul Pournaki (1921-2008), a prominent researcher, worked with the Pasture Institute of Iran from 1948 to 1978. He served meritoriously to control infectious diseases in Iran. His main research fields were the plague, relapsing fever, and poliomyelitis. He was the Director of Epidemiology and Virology Departments in the Pasteur Institute of Iran. This paper aims to appreciate his scientific contributions in control of infectious diseases by reviewing his notable services and studies.

Early life and education. Rasoul Pournaki was born on 22 Feb 1921 in Khoy, West Azerbaijan, Iran. He completed his primary education in Khoy. In 1939, he received his diploma from Ferdowsi High School in Tabriz. In 1943, he achieved the Doctor of Veterinary Medicine (DVM) degree from the University of Tehran. From 1943 to 1948, he worked at the chemistry laboratory in the School of Veterinary Medicine at the University of Tehran. In 1948, he started working with the Pasteur Institute of Iran.

Career. From 1948 to 1978, in the Pasture Institute of Iran, Rasoul Pournaki devoted his life to science conducting research and specialized services to control infectious diseases. Even after his retirement, he continued his cooperation with the institute and did not hesitate to support his colleagues (Fig. 1).

Research work. Dr. Pournaki's research area predominantly focused on the control and prevention of infectious diseases, such as plague, relapsing fever, and poliomyelitis.

Plague. The plague outbreaks frequently struck Iran, especially at the borders. Several factors, including a weak public health system, lack of quarantine arrangements, scattered treatment centers, and rituals such as washing the dead bodies in rivers before burial, and transferring corpses into sacred places contributed to plague epidemics [1]. Three great plague pandemics reduced the world population and caused a catastrophe in the socio-economic development of Iran [2]. In 1947, the plague struck Kurdistan in western Iran again. The plague remained in this area due to the presence of suitable vectors and reservoirs [3].

In 1948, Dr. Rasoul Pournaki began his career at the Institute of Pasteur of Iran [4]. He joined a research team led by Dr. Marcel Baltazard to control the plague outbreaks in the country [5] (Figs 2 and 3). In 1952, when the plague outbreaks occurred in the west of the country, the Pasteur Institute of Iran established a research center in Akanlu, at the border between Zanjan, Kurdistan, and Hamedan provinces to study the plague. Studies of plagues in humans and rodents by the specialized teams of the Pasteur Institute of Iran controlled the plague in the area. In this research center, Dr. Pournaki and his colleagues conducted extensive research on the plague, promoting the Akanlu Research Center as one of the world-leading referral centers of the plague [6]. One of the remarkable discoveries of this team was disclosing the ability of *Y. pestis* bacteria to survive in the burrows of dead rodents for an extended time, and its capability to reinfect the new rodents colonizing the empty burrows [7]. In addition to the well-established rodent-flea-rodent cycle, they demonstrated the existence of the burrow-rodent-burrow cycle, allowing the inter-epizootic maintenance of the plague bacillus in its endemic foci [8].

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Dr. Pournaki was the director of the epidemiology department in the Pasteur Institute of Iran from 1950 to 1961, during which the research team managed to control the outbreaks of different infectious diseases in the country. Consequently, they wrote the first instructions on the laboratory diagnosis of plague bacillus [9]. They completed their work with a significant finding on the reservoirs of plague in the area. They showed that among the four *Meriones* species, *M. persicus* and *M. libycus* were resistant to plague, while *M. tristrami* and *M. vinogradovi* were susceptible to this bacterium. Hence, for the first time, they hypothesized that the plague-resistant rodents, and not the susceptible ones, were the real reservoir hosts of the plague bacterium, a hypothesis is now widely accepted [8].

Relapsing fever. in 1912, for the first time, *Borrelia persica* was isolated from the patients in Northwestern Iran. In 1930, the Razi Vaccine and Serum Research Institute, Pasteur Institute of Iran, and Tehran University initiated extensive studies on the biological, ecological, and epidemiological aspects of relapsing fever spirochetes and their transmission route [10]. These attempts resulted in the identification of *B. persica* and *B. microti* in ticks, and *B. persica* and *B. baltazardi* in the blood of relapsing fever patients [11, 12]. Dr. Pournaki accompanied Dr. Marcel Baltazard's investigation team on relapsing disease fever. They identified *Ornithodoros* ticks as the primary vector of tick-borne relapsing fevers [13].



Fig. 1. From right, Dr. Darre-Tabatabai (Director of Tuberculosis Department), Dr. Rasoul Pournaki (the former Director of Virology Department), Dr. Mahdokht Pourmansour (Director of BCG Department), 1981, Pasteur Institute of Iran.



Fig. 2. Investigation of vector and reservoirs of plague, Kurdistan, western Iran (1953). Collection of fleas from the rodents, right, Dr. Pournaki.

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Fig. 3. Investigation on Plague in West of Iran (1956). The capture of reservoir rodents. First, from Right, Dr. Rasoul Pournaki; the third person (pointing to the rodents), Dr. Marcel Baltazard.

Poliomyelitis. Dr. Pournaki was the director of the Virology Department in the Pasteur Institute of Iran from 1961 to 1971. Poliomyelitis was detected in Iranian children after World War II. Two hypotheses described the occurrence of this disease in Iran:1) the disease was exotic, and visiting foreigners were transmitting the disease to the Iranian population, and 2) the disease was endemic in Iran. In the 1950s, epidemiological studies on poliomyelitis began on a global scale. Pasteur Institute of Iran immediately established a cell culture and virology service to meet the needs of the country. In a ten-year study, Dr. Pournaki and his colleagues tested blood samples from different age groups for antibodies against poliovirus. They found that most infected individuals were ≤ four years old, and the infection was infrequent in individuals ≥ ten years old. As a result, the vaccination was limited to seven-year-old and younger children. They learned that a live oral vaccine comprising a non-pathogenic virus was more effective and feasible in the national vaccination program than inactive or incomplete vaccines due to its lower cost, requiring the least technical staff, and no side effects [14-17].

Other infectious diseases. Dr. Pournaki and his colleagues, using the electron microscopy, found the paravaccinia virus in the lymph nodes of the calf [18]. They found no immunological cross-reaction between vaccinia virus and paravaccinia virus or milker's nodules virus [17].

Dr. Pournaki studied smallpox and vaccinia virus antigens and immune sera by the precipitation microreaction in a gelatinized medium and showed a strong reaction between hyperimmune rabbit antivaccinia sera and chorioallantoic membranes infected with vaccinia virus extract. The developed method was used in the diagnosis of smallpox [18]. He also contributed to the evaluation of anti-cytomegalovirus antibodies in children [19].

Lectures. Dr. Pournaki presented a lecture on the advancement of science and technology in the Islamic world in an international congress at Tehran University in 1993. He defined science in different languages and cultures and disclosed the importance of medicine in the Islamic world history [20].

International activities. Dr. Pournaki participated in different international activities, including international seminars, conferences, courses, and missions. (Table 1, Fig. 4).

Table 1. The list of Dr. Rasoul Pournaki's missions

No	year	location	Mission topic
1	1961	France, USA, Switzerland	Novel methods for the development of the viral vaccine
2	1964	Yugoslavia, Morocco, Spain, France	The production of the live polio vaccine
3	1972	France, Switzerland, UK	The production and preparation of viral vaccines
4	1973	Monte-Carlo, France	International Symposium on Biological Standardization
5	1974	The United Kingdom	A symposium on the Immunization of Respiratory diseases
6	1978	Paris, France	The meeting of the directors of the Pasteur Institute of Iran and Paris
7	1974	USA, UK, Switzerland	Scientific journey

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Fig. 4: The letter from the director of the Pasteur Institute of Iran to Prime minister regarding Dr. Rasoul Pournaki's mission to England, Switzerland, and France to study the feasibility of producing viral vaccines, 1972. **(**Dr. Sabar Mirza Farmanfarmaian, to the Prime Minister: This is to inform you that, head of the Department of Virology of Pasteur Institute of Iran, is going to France, Switzerland, and the United Kingdom for six weeks from early August to study the possibility of producing viral vaccines. Our institute will pay the daily excessive fees and expenses of this mission according to the regulations. We will be grateful if you order for issuing a service passport for him)



Fig. 5: A street in Akanlu Village, Kabudar Ahang, Hamadan Province named after Dr. Rasoul Pournaki to celebrate his scientific activities in this region.

Personal life. In addition to medical science, Dr. Pournaki was well-versed in philosophy, jurisprudence, principles, and wisdom. He was the childhood and adolescent classmate and friend of Dr. Abbas Zaryab Khoei, a prominent literary man. They studied philosophy together in Qom and attended the Ayatollah Roohollah Khomeini (Imam Khomeini) classes. Dr. Pournaki had a minimalist lifestyle; he never married and had no children.

Death and legacy. After 30 years of serving in the Pasteur Institute, he retired in 1978. On 23 Apr 2008, Pournaki died at the age of 87 in Tehran, Iran.

The team of The Research Centre for Emerging and Reemerging Infectious Diseases of the Pasteur Institute of Iran recommended naming one of the streets of Akanlu Village, Kabudar Ahang, Hamadan Province, after him to commemorate his scientific contributions (Fig. 5).

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest associated with this manuscript.

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