History and background

Pre-Islamic

The medical history of ancient Persia can be divided into three distinct periods. The sixth book of Zend-Avesta contains some of the earliest records of history of ancient Iranian medicine. The Vendidad in fact devotes most of the last chapters to medicine. In a passage of the Vendidad, one of the surviving texts of the Zandavesta, three kinds of medicine were distinguished: medicine by the knife (surgery), medicine by herbs, and medicine by divine words; and the best medicine was, according to the Vendidad, healing by divine words:

> "*Of all the healers O Spitama Zarathustra, namely those who heal with the knife, with herbs, and with sacred incantations, the last one is the most potent as he heals from the very source of diseases." (Ardibesht Yasht)*

Although the Avesta mentions several notable physicians, the most notable of Persia's ancient physicians were to emerge later on, namely: Mani, Roozbeh, and Bozorgmehr.

The second epoch covers the era of what is known as Pahlavi literature, where the entire subject of medicine was systematically treated in an interesting tractate incorporated in the encyclopedic work of Dinkart, which listed in altered form some 4333 diseases.

The third era begins with the Achaemenid dynasty, and covers the period of Darius I, whose interest in medicine was said to be so great that he re-established the school of medicine in Sais, Egypt, which previously had been destroyed, restoring its books and equipment.

The first teaching hospital where medical students methodically practiced on patients under the supervision of physicians was the Academy of Gundishapur in the Persian Empire. Some experts go so far as to claim that: "to a very large extent, the credit for the whole hospital system must be given to Persia".

According to the Vendidad physicians for the proof of proficiency had to cure three patients from the followers of Divyasnan and if they failed they could not practice medicine. At the first glance this recommendation may appear discriminative and based on human experimentation. But some authors have construed that from the beginning physicians were taught to remove the mental barrier and treat adversaries as well as friends. Interestingly, physician’s fee for service was based on the patient’s income.

A 500 year old Latin translation of the *Canon of Medicine* by Avicenna.

The Iranian science was interrupted by the Arab invasion (630 A.D.). Many schools, universities and libraries were destroyed, books were burned and scholars killed. Nevertheless, the Iranian scientists carried on and the science of Persia resurfaced during the Islamic period. To save the books from the Arab carnage, many Pahlavi writings were translated into the Arabic, and Iran produced physicians and scientists as Avicenna, Razi and mathematicians as Kharazmi and Khayyam. They collected and systematically expanded the Greek, Indian, and Persian ancient medical heritage and made further discoveries.

After Islam

One of the main roles played by medieval Iranian scholars in the scientific field was the conservation, consolidation, coordination and development of ideas and knowledge in ancient civilizations. Some Iranian *Hakim* (practitioners) such as Muhammad ibn Zakariya ar-Razi, known to the West as *Rhazes*, and Ibn Sina, better known as *Avicenna*, were not only responsible for accumulating all the existing information on medicine of the time, but adding to this knowledge by their own astute observations, experimentation and skills. "Qanoon fel teb of Avicenna" ("The Canon") and "Kitab al-hawi of Razi" ("Continens") were among the central texts in Western medical education from the 13th to the 18th centuries.

Persian physicians developed the first scientific methods for the field of medicine. This included the introduction of experimentation, quantification, clinical trials, dissection, animal testing, human experimentation and postmortem autopsy by Muslim physicians, whilst hospitals in the Islamic world featured the first drug tests, drug purity regulations, and competency tests for doctors. In the 10th century, Muhammad ibn Zakariya ar-Razi (Rhazes) was the first to introduce controlled experiment and clinical observation into the field of medicine, and the first to reject medical theories unverified by experimentation. The first known medical experiment was carried out by Razi in order to find the most hygienic place to build a hospital. He hung pieces of meat in places throughout 10th century Baghdad and observed where the meat decomposed least quickly, and that was where he built the hospital. In his *Comprehensive Book of Medicine,* Razi recorded

clinical cases of his own experience and provided very useful recordings of various diseases. In his *Doubts about Galen*, Razi was also the first to prove both Galen's theory of humorism and Aristotle's theory of classical elements false using an experimental method. He also introduced urinalysis and stool tests.

Ibn Sina (Avicenna) is considered the father of modern medicine, for his introduction of systematic experimentation and quantification into the study of physiology, the introduction of clinical trials, the experimental use and testing of drugs, and a precise guide for practical experimentation in the process of discovering and proving the effectiveness of medical substances, in his medical encyclopedia, *The Canon of Medicine* (c. 1025).

Ibn Sina also discovered the contagious nature of infectious diseases; introduced quarantine to limit the spread of contagious diseases; introduced experimental medicine, evidence-based medicine, clinical trials, randomized controlled trials, efficacy tests, and clinical pharmacology; recognized the importance of dietetics and the influence of climate and environment on health; distinguished mediastinitis from pleurisy; discovered the contagious nature of phthisis and tuberculosis, and the distribution of diseases by water and soil; provided the first careful descriptions of skin troubles, sexually transmitted diseases, perversions, and nervous ailments, as well the use of ice to treat fevers; and separated medicine from pharmacology, which was important to the development of the pharmaceutical sciences. In the 14th century, the Persian language medical work *Tashrih al-badan* (*Anatomy of the body*), by Mansur ibn Ilyas (c. 1390), contained comprehensive diagrams of the body's structural, nervous and circulatory systems.

Neurology and Neurosurgery

Evidence of surgery dates to the 3rd century BC, when the first cranial surgery was performed in the Shahr-e-Sukhteh (Burnt City) in south-eastern Iran. The archaeological studies on the skull of a 13-year-old girl suffering from hydrocephaly indicated that she had undergone cranial surgery to take a part of her skull bone and the girl lived for at least about 6 months after the surgery.

Several documents still exist from which the definitions and treatments of the headache in medieval Persia can be ascertained. These documents give detailed and precise clinical information on the different types of headaches. The medieval physicians listed various signs and symptoms, apparent causes, and hygienic and dietary rules for prevention of headaches. The medieval writings are both accurate and vivid, and they provide long lists of substances used in the treatment of headaches. Many of the approaches of physicians in medieval Persia are accepted today; however, still more of them could be of use to modern medicine.

Antiepileptic drug therapy plan in Medieval Iranian medicine is individualized, given different single and combined drug-therapy with a dosing schedule for each of those. Physicians stress the importance of dose, and route of administration and define a

schedule for drug administration. Recent animal experiments confirm the anticonvulsant potency of some of the compounds which are recommended by Medieval Iranian practitioners in epilepsy treatment.

Avicenna (Ibn Sina) was a pioneer in neuropsychiatry. In *The Canon of Medicine* (c. 1025), he first described numerous neuropsychiatric conditions, including hallucination, insomnia, mania, nightmare, melancholia, dementia, epilepsy, paralysis, stroke, vertigo and tremor.

Obstetrics and Gynecology

In the 10th century work of Shahnama, Ferdowsi describes a Caesarean section performed on Rudaba, during which a special wine agent was prepared by a Zoroastrian priest and used as an anesthetic to produce unconsciousness for the operation.A Although largely mythical in content, the passage illustrates working knowledge of anesthesia in ancient Persia.