# How Early Islamic Science Advanced Medicine

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Sancho I, ruler of the kingdom of Léon in the north of modern-day Spain, was overthrown by rebel nobles in A.D. 958. Their motive, even by the turbulent politics of the day, was an unusual one: The king was unable to fulfill his regal duties with dignity, the rebels said, because he was too fat.

The relatives of Sancho acted quickly to restore his power. In an example of the lively interchange of ideas and loyalties in multicultural, medieval Spain, his grandmother, Queen Toda Aznar of the Christian kingdom of Navarra, sought help from another Spanish kingdom deep in Spain's south: the Muslim Caliphate of Córdoba. Queen Toda approached Córdoba's great ruler, the caliph 'Abd al-Rahman III, with two bold requests: help with a cure for her grandson's morbid obesity and military support to regain the throne.

The caliph put the first matter in the hands of Hisdai ibn Shaprut, his Jewish physician, who put the Leonese king on a strict diet. Once Sancho slimmed down enough to be able to ride properly, he reclaimed his lost crown with the help of Muslim troops.

Physicians from Islamic countries during the late Middle Ages enjoyed great respect. Their reputation was well deserved, for the study and practice of medicine was then led by Muslim societies across their immense territory, which extended from modern-day southern Spain to Iran.

## Timeline: Golden Age of Knowledge

Curative Arabic talisman. Oriental Institute, Naples
Photograph by Oronoz/Album

**Seventh Century**
After the Prophet Muhammad's death in 632, Islam expands beyond Arabia to Persia, Palestine, Syria, Lebanon, Iraq, and North Africa.

**Eighth Century**
Caliph Harun al-Rashid founds the House of Wisdom in Baghdad. The city's scholars translate many ancient manuscripts and medical texts.

**Ninth Century**
Al-Razi (Rhazes) is born in Persia. Physician, chemist, and teacher, he writes many important medical works later translated into Latin and Greek.

**10th Century**
Surgeon Al-Zahrawi (Abulcasis) is born in Córdoba. Inventor of many medical instruments, he writes the first illustrated surgical book.

**11th Century**
In Baghdad, Ibn Sina (Avicenna) writes the *Canon of Medicine,* a five-volume work encompassing all known medical knowledge of the time.

**12th Century**
Ibn Rushd (Averroës) is born. Philosopher, astronomer, and physician, he writes a medical encyclopedia known as the *Colliget* in Latin.

**14th Century**
Ottoman Serefeddin Sabuncuoglu is born. A surgeon, he creates illustrated works showing the advanced procedures of Muslim medicine.

Located in modern-day Turkey, the 13th-century Divrigi Hospital was built alongside a mosque, and the two are a UNESCO World Heritage site.

Photograph by Luca Mozzati/Age Fotostock

# In the Beginning

Before the message of the Prophet Muhammad spread beyond the Arabian Peninsula, local medical attitudes were based on the words of the founder of Islam: “Make use of medical treatment, for Allah has not made a disease without appointing a remedy for it, with the exception of one disease: old age.”

Muslim doctors were also pharmacists who produced their own medicines. Above, a 14th-century pharmaceutical container made in Damascus. Photograph by AKG/Album

Early Muslim medicine drew on traditional practices from the region, some dating back to ancient Mesopotamia and ancient Babylon in the third millennium B.C. Traditional natural remedies, such as the use of honey or olive oil, and the use of suction cups (*hijama*) are still used today in many Islamic countries and around the world to treat ailments.

An indicator of health in this early Muslim society was one’s dreams. Muhammad ibn Sirin, working in what is today Iraq, composed a great Arabic work, *Tabir al-Anam,* on dream interpretation in the eighth century. Its main source was *Oneirocritica—The Interpretation of Dreams*—written by the Greek author Artemidorus Daldianus some 500 years earlier. In addition to this early form of psychological therapy, rituals and talismans appeared in medical treatises. Islam did not reject these practices outright and “benign” magic was lawful, provided certain rules were followed.

In 622 the Prophet Muhammad departed from Mecca for Medina, and that year marks the beginning of the Islamic calendar. Just two centuries later, his successors, the caliphs, had extended their domains eastward toward Iran and India, and westward along the coast of North Africa and Europe. Although Arabian medicine spread with Islam, its rulers were also keen to absorb the wisdom of other cultures, especially the Greco-Roman culture preserved in Egypt and the Near East. They sought to lay claim to the knowledge of philosophy, technology, and medicine, sometimes referred to as the “science of the ancients.”

# The Old Wisdom

As Islam expanded, the cities where Greek science had flourished came under Muslim control. These included Alexandria in Egypt and Edessa in modern-day Turkey. On the eastern bounds of Islam, Gondeshapur in Persia had become a center for Greek medicine and learning after scholars migrated there in A.D. 529, following the decision of the emperor Justinian to close the Academy in Athens. The new Muslim elites who occupied Gondeshapur were determined to revive, absorb, and spread what they saw as this lost learning. They also wanted to build on it.

Greek science became the basis for the development of Arabic medicine. The early theoretical basis of Islamic medicine drew on the Greek and Roman theory of humors, attributed to Hippocrates, writing in the fourth century B.C. The system of humors divides human fluids into four basic types: blood, phlegm, yellow bile, and black bile. The balance between each one determines whether an individual is sick or well. Patients became depressed, for example, because of a surfeit of black bile. The combination, in Greek, of the words for "black," *melanin,* and "bile," *khole,* is the root of the word "melancholy." Sanguine, phlegmatic, or choleric temperaments likewise suffered from an imbalance in the other humors. Health could be restored by rebalancing them with diets and purges, and explains the importance that Islamic medicine placed on hygiene and diet.

Gifted translators gave the Muslims access to these Greek and Latin texts. Scholars such as Yahya ibn Masawayh (known in the West as Ioannis Mesue) and his student, Hunayn ibn Ishaq (known as Johannitius in Latin) produced over 50 translations alone. Both men were Syrian Nestorians, a denomination of Christianity considered heretical in the eastern Roman Empire, and had been forced to flee to Persia.

Their ability to speak several languages—including Greek and Syriac (a Semitic language close to Arabic)—was in high demand. In other cities across the new Islamic world, Muslim patrons hired these men. The caliph Al-Ma'mun of the Abbasid dynasty in Baghdad put Hunayn ibn Ishaq in charge of the translators at the city's famous Bayt al-Hikma, or House of Wisdom.

## Muslim Medical Schools

**The most important** institution for imparting knowledge about medicine and other disciplines was the madrassa, a school built in, or alongside, a mosque. Many madrassas became highly specialized academies, often with close links to hospitals. Notable hospitals were in Cairo, Harran (in modern-day Turkey), and Baghdad, where students would often visit patients to observe their treatment at the hands of qualified doctors, in much the same way as medical interns and residents do today. A basic part of theoretical training was learning summaries in verse form, such as Avicenna's *Poem of Medicine.* There were also question-and-answer drills on medical compendia, such as the *Paradise of Wisdom,* compiled by Ali ibn Rabban al-Tabari around 850.

By the 900s, drawing from a growing body of Greek, Persian, and Sanskrit works translated into Arabic, Islamic medicine quickly became the most sophisticated in the world. Christians, Jews, Hindus, and scholars from many other traditions, looked to Arabic as a language of science. Doctors of different faiths worked together, debating and studying with Arabic as the common tongue.

The Abbasid Caliphate of Baghdad enjoyed a long period of intellectual experimentation that lasted throughout the 10th and 11th centuries. Among its many glittering figures was Al-Razi, known in Latin as Rhazes, a Persian pharmacologist and physician who ran the hospital in Baghdad. But the brightest star in the Baghdad firmament was undoubtedly the extraordinary Ibn Sina, known in the West as Avicenna. Already a doctor at age 18, his great volume *Al-Qanun fi al-Tibb—Canon of Medicine—* became one of the most famous medical works of all time, and an extraordinary exercise in the bringing together of different disciplines and cultures. Avicenna's attempt to harmonize the medical practices of

the Greek thinker Galen with the philosophy of Aristotle reveals the multiple nature of the debt owed to Muslim scholarship, which did not merely revive Greek authors, but stimulated new patterns of thought for the centuries ahead. The reconciling of practical science, thought, and religion ensured *Canon* was studied by European medics until the 18th century.

# Scholarly Works in Spain

At the westernmost limits of the Islamic world, Muslim Spain was also undergoing a period of scholarly development. By the 10th century, Córdoba was the biggest, most cultured city in Europe, described by some as "the Ornament of the World." The city was also a great center of study and exploration.

Essential volumes in any scientist's library were preserved in Córdoba. For instance, *De materia medica —On Medical Material—*the classic treatise of Dioscorides, written at the time of the emperor Nero in the first century A.D., was translated into Arabic in Córdoba, on the orders of Caliph 'Abd al-Rahman III. This practical study of the medicinal qualities of plants and herbs, including a study of cannabis and peppermint, was now accessible to more scholars than ever before.

One of the caliph's brilliant courtiers, the surgeon Al-Zahrawi, also known as Abulcasis, compiled the *Al-Tasrif—The Method of Medicine—*a 30-volume encyclopedia that documented accounts of his and his colleagues' experiences in treating the sick and injured: surgical instruments, operating techniques, pharmacological methods to prepare tablets and drugs to protect the heart, surgical procedures used in midwifery, cauterizing and healing wounds, and the treatment of headaches. It also drew upon the work of previous scholars, such as seventh-century Byzantine medic Paul of Aegina. Translated into Latin in the 12th century, *Method* was a foundational medical text in Europe well into the Renaissance.

The 12th century saw the emergence of the work of the outstanding Ibn Rushd—known in Christendom as Averroës—and the Jewish physician and thinker Moses Maimonides. Both men reflect the strong ties between philosophy and medicine during the Islamic golden age. Averroës, author of some of the greatest commentaries of the Middle Ages on Aristotle and Plato, was also personal physician to the caliphs. Moses Maimonides became the personal doctor of Saladin, the Muslim champion against the Crusaders. Among Maimonides's many works was his *Moreh Nevukhim,* or *Guide for the Perplexed,* a masterwork attempting to reconcile religious belief with philosophical inquiry.

> Pilgrims to Mecca returned home with this copper bowl, thought to bestow healing properties to water drunk from it. Faithful Muslims put their trust in both Allah and the doctor's skill. Photograph by AKG/Album

# Under the Knife

While writing about medicine predominated in Islamic culture, the practice of medicine made great progress as well. New treatments were developed for specific ailments, including a revolutionary treatment to treat cataracts. The 10th-century physician Al-Mawsili developed a hollow syringe to remove cataracts via suction; the technique has improved with time, but the basic premise of the procedure remains sound to this day. Ibn Isa, a 10th-century scholar from Iraq, wrote perhaps what was the most complete book of eye diseases, the *Notebook of the Oculist,* detailing 130 conditions. The book was translated into Latin in 1497 followed by several more languages, allowing it to serve as an authoritative work for centuries.

The greatest advances in surgery of the era were detailed by Al-Zahrawi who invented a wide range of instruments: forceps, pincers, scalpels, catheters, cauteries, lancets, and specula, all carefully illustrated

in his writings. His recommendations on pain-reduction techniques, such as the use of very cold sponges, were followed by Western medics for centuries. One of his greatest innovations was the use of catgut for stitching up patients after an operation, a practice that is still in use today.

### SURGEON AND SCHOLAR

**Serefeddin Sabuncuoglu was a 15th-century surgeon who worked at the hospital in Amasya (in modern-day Turkey). In 1466 he presented the Ottoman sultan Mehmed II with the medical atlas Imperial Surgery, which contains 140 miniatures depicting procedures such as incisions, setting fractures, and cauterizations.**

## Healing and Teaching

One of the most lasting contributions of Islam was the hospital. Funded by donations called *waqf,* public hospitals treated the sick, provided a place to convalesce and recover, housed the mentally ill, and provided shelter to the aged and infirm. Jewish and Christian doctors, in addition to Muslim physicians, worked in these institutions. Hospitals allowed the poorest to benefit from the knowledge of outstanding doctors: Beggars in Baghdad might be operated on by Rhazes, the great surgeon of the city hospital.

As was increasingly the case in Christian Europe, great cities in the Muslim world competed to house such institutions, hoping to attract the best teachers and books. The Ahmad ibn Tulun Hospital, one of the first of its kind, was built in Cairo between 872 and 874. Perhaps the best known hospital of the Islamic world, Al-Mansuri Hospital, was also built in Cairo, by the sultan Qalawun in 1285. Four wards, each one specializing in different pathologies, were reputed to house thousands of patients. The buildings surrounded a courtyard cooled by fountains.

Study and education were also important components of Muslim medical culture, and hospitals affiliated with universities educated the next generation of physicians. Founded in the 12th century, the Syrian Al-Nuri Hospital in Damascus was one of the leading medical schools of its time, complete with an impressive library donated by the ruler Nur al-Din ibn Zangi. Much like medical students of today, scholars learned from mentoring by experienced doctors. Hospitals featured large lecture halls where talks and readings of classic manuscripts would be held.

The teachings at these universities provided the foundation for the great medical advances to come, which all stand on the shoulders of the extraordinary discoveries and practices from Islam’s golden age.