The Neurosciences in Averroes’ “Principles of Medicine”

Fernando Delgado

From the Neuroradiology Section Hospital Universitario Reina Sofía. Córdoba. España Avda Menéndez Pidal s/n Córdoba, Spain

Correspondence: Dr. Fernando Delgado · Neuroradiology Section Hospital Universitario Reina Sofía Córdoba 14004, España Avda Menéndez Pidal s/n Córdoba, 14004 Spain · fdelgado.neuro@gmail.com

Ann Saudi Med 2012; 32(3): 327-331
DOI: 10.5144/0256-4947.2012.327

One of the fundamental advances of the transition of the Middle Ages to the Renaissance was the rediscovery of the Greek philosophers. Among the greatest representatives of this epoch we find the Cordovan doctor and philosopher Averroes (Ibn Rushd) who, with his commentaries on the works of Aristotle, brought a new philosophical vision to Western Europe. His contribution to medicine has been overshadowed to some extent by this great work of philosophy. Our intention is to evaluate, in the context of the neurosciences, the vision of health and sickness that he left us in his book “The Book of the Principles of Medicine. The organisation of the Kulliyat is based on Aristotelian concepts. Averroes regarded the nervous system not as a single entity but rather as a complex of various elements. The anatomy of the nervous system is studied in two parts: the encephalus and the periphery. Both the encephalic nervous system and the sensory organs are regarded as heterogeneous organs. Averroes structures the anatomical order without taking into account the local movements of the living body. The mission of the senses is to maintain contact between external reality and the structure of the organism. This requires an external process, a point of union and an internal process. The ultimate goal is the preservation of health in a balanced disposition and the cure of disease in the organism in disequilibrium.

We may regard Averroes (Ibn Rushd) as the “Andalucian Arab” who, in the course of history, has had a great influence on human thought. The 12th century probably produced more glorious names than any other epoch in the history of the culture of Al-Andalus. Avenzoar (Ibn Zuhr), Maimonides, al-Gafiqi (Abdderrahman), and Averroes are all universal figures. Etymologically speaking, these were philosophers, which is to say “lovers of wisdom”, and their wisdom was not dedicated solely to medicine.

Averroes (Ibn Rushd) was born in Córdova in 1126 (Figure 1), when that city was the capital of the Western or Cordovan Caliphate, and he died on 10 December 1198 in Marrakesh, capital of the Almohad Empire, which controlled the north-west of Africa and Al-Andalus. He was a man of many talents, who was interested in subjects as diverse as philosophy, Islamic jurisprudence, astronomy, mathematics, geography and medicine; an original spirit, a stubborn observer of nature to the point of being an aficionado of empirical verification. In short, he was a tenacious seeker after the reality of things.1,2

Arab medicine bridged the thirteenth and fourteenth centuries, closing the gap between the Greek tradition (Hippocrates, Aristotle, Galen) and the emerging European schools of medicine (Salerno, Bologna, Montpellier, Padua, Prague, Paris, Tübingen, Oxford). Averroes had a particular taste for breaking with the neo-Platonic interpretation of Aristotelianism that had culminated with Avicenna. As opposed to the Avicennian “marvellous order of being”, he attacked the concessions to religious ideology and presented the idea of an independent and scientific interpretation of philosophy, rendering unto God that which is God’s and to temporal wisdom that which belonged to it. For Averroes (Ibn Rushd), the study of the ancients did not
mean renouncing one’s own intellectual acuity or the empirical observation of natural phenomena. As his first point, Averroes established observation as the basis of his knowledge, making his deductions from the work he had done or had observed in performing autopsies. The contribution of Averroes (Ibn Rushd) to the transmission of this medical knowledge has been obscured by his influence on philosophy, particularly on Thomas Aquinas and the French Averroists.3

What we now call scientific validity is based on the universal value of the general principle of causality, as Averroes (Ibn Rushd) observed several centuries before this principle was set out by Kant. This principle is not a postulate, but rather is based on the repeated observation of experience. Whether it is a matter of creation, generation, transformation or motivation, for a piece of knowledge to be acceptable as such, it is essential to accept the real necessity of a cause; otherwise it is not science. The intention of the Cordovan thinker was to ascertain the truth, thus confirming his confidence in the ability of the human mind to comprehend the world. The overcoming of doubt through philosophical argument will bring us to the truth. Not even the magisterial authority of Aristotle can stop him; he refuses to accept the authority of the Stagyrite if it contradicts his own personal observations.

The Kulliyat
The book was conceived of as a manual, whose main contents were basic and general ideas regarding medicine, as well as collecting what earlier doctors had said (Figure 2). The work consisted of seven books: The Book of Anatomy, The Book of Physiology, The Book of Pathology, The Book of Symptomatology, The Book of Pharmacology, The Book of Hygiene, and The Book of Therapeutics. We have used the translation of María de la Concepción Vázquez de Benito and Camilo Álvarez Morales, which is based on the manuscript in the Sacromonte Abbey in Granada, dated 21 April 1187, i.e while Averroes was still alive.4

The neurosciences in the Kulliyat
The anatomy described by Averroes (Ibn Rushd) in the Kulliyat is based on other texts, and is very similar to that of Avicenna. Although there is some doubt as to whether the author performed dissections himself, he must have attended those of Avenzoar, his master. He himself declared that everyone who performs a dissection increases his faith in God. Although there still exist tendencies in Islam that reject autopsies as a component of the teaching of anatomy, autopsies were in fact performed in Muslim countries, both in the western Al-
Andalus region and in Persia.\textsuperscript{5,6}

In his approach to cerebral anatomy, Averroes (Ibn Rushd) was a child of his time and of his teachers, in that he considered the most important thing to be the spirit which, by analogy, can only be located in hollow organs. He maintained that “the imagination is located in the frontal ventricle of the brain and is the faculty that retains the image of an object after it has disappeared from the senses. The faculty of reflection (thought) is obviously located in the medial ventricle of the brain, and this is the faculty that leaves us in ignorance until we develop it, which is why it is found only in Man. The faculties of memory and retention are located in the posterior part of the brain”.\textsuperscript{4}

It is through his claim that below the brain, beneath the dura mater, we find the marvellous network of arteries that ascends to the head, that we can perceive the influence of Galen. He interprets the sinus cavernosus as the place where the vital spirit from the heart is transformed into animal spirit. This apparently erroneous interpretation of venous structures as arterial continued throughout the Middle Ages.\textsuperscript{7,8} As we know, Galen prioritized the brain over the heart. For him, the heart was a necessary supporting structure, but the important part of the organism as a being was represented in the brain.

Although Averroes (Ibn Rushd) did observe a direct relationship between the brain and the nerves that control the extremities, he claimed that the brain is only a general who commands his troops but is subordinate to the king, who issues the appropriate commands—that monarch being the heart. He arrived at this conclusion on the basis of the theory of the heat of the heart and the cold of the brain, a theory that derives from the ancient Greeks. Since the heart is a warm organ, it is the only one capable of transmitting the said heat, i.e., energy, to the rest of the organism. Due to its coldness, the brain is left to be merely a regulator of this cardiac activity.\textsuperscript{4}

For the Cordovan philosopher, “The spirits are either instruments closely related to the faculty that rules the animal body or are rulers on their own account, but it is best that we suppose that they are the proximate instrument and the material itself, for which reason a lack of them in the body inevitably results in death.”\textsuperscript{4}

Averroes came to the conclusion that the brain is the servant of the heart, in which the seat of common sense is located. This is to say that there is something beyond the corporeal senses that can be supposed to be the ultimate cause, origin and foundation of life. Such is my understanding of Averroes’ interpretation of the human mind, a mind that lacks any need for divine intervention.

So far, Averroes (Ibn Rushd) is rational, in that by claiming that a human being is superior to a sponge, he claims that the difference is quantitative rather than qualitative, because if we believed that a sponge and a human being are absolutely different, formed through unrelated acts of creation, it would be impossible to claim that they are analogous forms of life. On the other hand, precisely because the inorganic and the living worlds were formed in different acts of creation, we cannot draw analogies between them.

Minor phrases and comments enable us to intuit the greatness of this Cordovan philosopher; for example, in opposing the commonly held opinion that animals come to where food is to be found by “guesswork or inspiration”, i.e., by magic, Averroes (Ibn Rushd) established that the cause lies in an olfactory sensitivity that is much more acute in these animals than in human beings. It is the interpretation of nature and the elimination of elements of magic that permeates the reasoning of this advanced thinker in the final centuries of the Middle Ages.

“The faculty that causes the animal to move is the faculty of imagination preceded by desire, which is then put into effect”. With this introduction, our philosopher restates an analogy with human beings. We are simply animals, certainly superior, but the difference is quantitative rather than qualitative. If we believe that Man possesses a soul that animates, that soul is also to be found in animals.

If we follow Aristotle’s dictum that “everything that moves has a motor, and that motor, which is the body, only moves if it is moved” to its logical conclusion, his reasoning takes us to the brink of absurdity, because every movement caused by a motor agency must have its origin in another motor agency, and so on ad infinitum, unless there exists an incorporeal being that is capable of initiating movement without itself being moved. And this incorporeal being is a property of the soul. Where does this energy come from Averroes (Ibn Rushd) offers us the solution; it comes from the innate heat of the animal. Once again, note the analogy; animals possess motivation and they perform their actions by means of the inherent heat of their hearts.\textsuperscript{4}

The position of Galen, on the other hand, was that the brain is the organ responsible for generating thoughts, representing emotions and initiating movements, all of which implies that the soul must reside in the brain.

The senses place the organism in contact with the external world, and the sense most closely studied by
Averroes (Ibn Rushd) was sight, which receives the forms of objects in the following way. First, the air receives the perceptible shapes by means of light, bringing them to the eye. Thereafter, the ‘sensorium’ receives them and transmits them to the imagination, where the completely dematerialized process of interpretation takes place.

This connection enables him to explain the perception of images in our dreams. He rejects the belief that dreams are derived from angels or demons, and creates an explanation to the effect that images captured by the sensorium and developed by thought return in our dreams, from the internal structure of sensory elements, being captured as though they were actually external.

With respect to illness, Averroes tells us: "You must understand that medical treatment does not consist of speculating about a possible illness that might occur, being evaluated by mere hypothesis, but attempts rather to identify all illnesses through perception and observation in order to establish their causes thereafter, as we mention elsewhere (in this book)". That is to say, we ought to distance ourselves from speculation and base ourselves on observation. Obviously we only observe via our own knowledge. In the ancient world, humors and external agents were the causes of disease. Through this prism, our philosopher attempted to reason on the basis of certain self-evident propositions, which we might even go so far as to call aphorisms.

The basis of many of the chemical treatments that Averroes advocates is no more than theoretical allopathic medicine, "cool" medicines for supposedly "warm" diseases, and vice versa. A quality is assigned to every illness or sign; hot, cold, humid or dry, and each of these is assigned a treatment that counteracts this supposed quality through the qualities that Galenic medicine has assigned to individual drugs.

One of the aspects particularly stressed by Averroes as a good medieval doctor is the conservation of health by exercise and various diets based on the theory of opposites. For diseases of the brain, this being a "cold" organ, we need in most cases to use something that has warmth and aroma. But if we come to the conclusion that the brain produces warm waste products we need to administer the opposite treatment (ie, to dampen and cool the brain).

Another theory of treatment is based on the location or even on the analogy of the name; thus, bleeding for diseases of the brain will be better in the cephalic vein than in the basilic vein, since the former is more closely associated with the brain. If the right ear bleeds, the point of bleeding ought to be the right cephalic vein and not the left, and vice versa. In cases of nasal haemorrhage, when bleeding is from the right nasal fossa, the cupping glass should be applied to the liver, while for bleeding from the left nasal fossa it should be applied to the spleen. For the treatment of pain, the use of derivatives of opium was already known, although he recommends caution in their use.

With respect to individual ‘drugs’, contemporary medicine draws our attention to lack of any grounds for using them, and points out that they were employed in accordance with Galenic tradition, virtually without questioning what the ancient doctors had left in their writings. When we return to this topic, we find that virtually none of the treatments of diseases of the brain are still in use.

We can summarise Averroes’ philosophical reasoning by taking it from his book "On the intellect", in which he claims that it is obvious that we ought first to feel, then to imagine and only then will we be able to capture the universal. In this sense, science is not the knowledge of universal concepts but rather that of specific individuals in a universal manner. The mind operates on particulars, abstracting from them the common nature that is distributed throughout the material. By extracting natural laws from the individual cases of its material and makes them universal, the intellect enables us to express correct judgements.

Unfortunately, after the 13th century, in the Islamic world it was the followers of medicine of the Prophet who became the accepted representatives of mainstream medicine, which meant that the influence of Averroes in medicine was eclipsed in the Muslim world, while his true successors emerged in the western world.

Conclusions
The texts of Averroes (Ibn Rushd) are a key to understanding the arrival of the use of reason as our light and guide in Renaissance science. With his book "Kulliyat", he wrote not only a treatise of general pathology but also taught us that our own experience and discernment are what ought to serve us in our search for truth.
1. A. Martín-Araguz, C. Bustamante-Martínez, V. Fernández-Armayor, J.M. Moreno-Martínez. La neurociencia en Al Ándalus y su influencia en la medicina escolástica medieval [Neuroscience in Al Andalus and its influence on medieval scholastic medicine]. REV NEUROL 2002; 34 (9): 877-892
2. Abdelghani Tbakhi, Samir S. Amr. Ibn Rushd (Averroës): Prince of Sciences Ann Saudi Med 2008; 28(2):145-147
3. José Antonio Giménez Mas. En el Sesquicentenario de Cajal: Averroes y el Sistema Nervioso [The Cajal 150th anniversary: Averroes and the Nervous System]. REV ESP PATOLOG 2002; 35 (4): 561-570
4. Abu-i-Walid Ibn Rushd (Averroes). El libro de las generalidades de la medicina [The book of the Generalities of Medicine]. Editorial Trotta. Madrid. 2003. Translation: María de la Concepción Vázquez de Benito and Camilo Álvarez Morales
5. Mohammadali M. Shoja, R. Shane Tubbs, Mohammad R. Ardalan, Marios Loukas, Garabed Eknoyan, E. George Salter, W. Jerry Oakes. Anatomy of the cranial nerves in medieval persian literature: Esmail Jorjani (ad 1042–1137) and the Treasure of the Khwarazm Shah. Neurosurgery 2007; 61:1325–1331
6. Mohammadali M. Shoja, R. Shane Tubbs. The history of anatomy in Persia, J. Anat. 2007; 210:359–378
7. Benoît Bataille, Michel Wager, Françoise Lapierre, J. Michel Goujon, Kevin Buffenoir, Philippe Rigaud. the significance of the rete mirabile in Vesalius’s work: An example of the dangers of inductive inference in medicine. Neurosurgery 2007; 60:761–788
8. Giuseppe Viale. The Rete Mirabile of the cranial base: A millenary legend. Neurosurgery 2006; 58:1198–1208
9. Abu-i-Walid Ibn Rushd (Averroes). Sobre el in telecto [Book on the Soul], Editorial Trotta. Madrid. 2004. Edition and Translation: Andrés Martínez Lorca.