

## Embryology and Heart in Persian Medicine

Dear Editor-in-Chief,

The heart, as an organ of the human body, has been a mysterious object even from prehistoric times and as such has been the object of much curiosity and interest. The history of cardiac anatomy dates back to 3500 BC, when the Greeks and Egyptians first established their understanding of this structure based on their religious beliefs. For the ancient Greeks, the heart was always a fascinating subject for continuous study, and their scientific endeavors gradually further illuminated the anatomy of the heart.<sup>1</sup> Nowadays, it is known that the heart is the first functional organ to form during vertebrate development, in the third week.<sup>2</sup> A review of historical evidence in Persian medicine shows that this scientific finding has a longer history. Ali ibn Sahl Rabban al-Tabari (d. 873 AD), who was the author of *Firdaws al-Hikma* (Paradise of Wisdom) (Ali b. Rabban al-Ṭabari. *Firdausu'l-Hikmat* or *Paradise of Wisdom*. Edited by Şiddiği MZ. Berlin: Kunstdruckerei Sonne; 1928:137–138.), quotes Aristotle (384–322 BC) as saying that “the first organ to form in an embryo is the heart.” Tabari corroborates Aristotle’s theory in this regard and mentions that Hippocrates (460–375 BC) opposed the theory as he had observed the brain to be the first organ to develop in a chicken embryo.<sup>3</sup>

Tabari provided no sufficient evidence to refute Hippocrates’ theory and to confirm Aristotle’s. Aristotle (Figure 1), meanwhile, appears to have adopted a proper philosophical and diagnostic view highlighting the primacy of the life source, that is, the heart, over the other organs; however, he fails to present a strong reason in the field of medicine to prove his claims against Hippocrates’ experimental observations. Ignoring philosophical arguments, Hippocrates was exclusively concerned with observations as he observed the egg containing the embryo and set it as a benchmark for studying the human embryo. Avicenna (980–1037 AD), on the strength of his competence in medical science and philosophy, was the first scholar to succeed in refuting Hippocrates’ theory by criticizing the comparison between chicken and human and confirming Aristotle’s theory by reiterating some philosophical arguments.<sup>4</sup> Some authors have stated that Avicenna rejected another theory posited by an unknown physician claiming that the liver was the first organ to form in an embryo.<sup>3</sup>

It is worthy of note that Greek and Persian physicians considered 3 organs, namely the heart, the liver, and the brain, as vital organs, implying that life is not possible

without these 3 organs. Hippocrates advanced the notion that the brain was the first organ to take shape, whereas Aristotle and Avicenna postulated that the heart preceded the other body organs. Rhazes (859–925 AD) was a physician<sup>4</sup> who speculated that the liver was the first organ to develop in an embryo.<sup>3</sup> To justify his theory, Rhazes argued that the production of nutrients should come before the creation of the heart and the brain, and since the liver is the organ making such nutrients, its formation should come before that of the heart. Fakhr al-Din al-Razi (1149–1209 AD) argued that the disagreements between physicians stemmed from the definitions that they put forward for the heart.<sup>5</sup> According to him, if the heart refers to a complete muscle tissue, Rhazes’s theory is acceptable because the heart muscle is formed over time as the embryo grows in the uterus; nonetheless, Avicenna is right if the heart is an empty space in the vein that is first formed and has no muscle.<sup>4</sup> We now know that a part of the vein takes blood away to all parts of the body at the beginning of an embryo’s life and evolves over time. The Persian and Greek physicians appear to have been cognizant not only of the time of the heart formation but also of its initial structure and gradual formation.<sup>2</sup>



Figure 1. One page of Ali ibn Rabban al-Tabari’s book in which he quotes Aristotle on embryology

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