

## ABSTRACT

Avicenna's Canon of Medicine: Influences and Implications

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Avicenna was a philosopher and physician around the year 1000 in what is modern day Uzbekistan. He was a revolutionary thinker, and had a profound influence on the way medicine was practiced for centuries through his medical textbook, *The Canon of Medicine*. In my thesis, I investigate how the primary influences on Avicenna in the *Canon*, specifically Hippocrates, Aristotle, and Galen, impacted his work. I also show where Avicenna adapted the writings of his predecessors, and forged his own ideas from their work. I also examine the present implications of the theories and methods presented in the *Canon*, and show how Avicenna's thoughts can be used in a modern context.

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AVICENNA'S CANON OF MEDICINE:  
INFLUENCES AND IMPLICATIONS

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## CHAPTER ONE

### *A Brief Introduction*

Ibn Sina, whose name was later Latinized to Avicenna, was a great philosopher and physician of the Islamic Golden Age. Born in 980 A.D in what is now Uzbekistan to a governor of the province, Avicenna was given the best education from an early age. According to his autobiography *The Life of Ibn Sina*, he had mastered everything that his professors could teach him by the age of fourteen, and had learned everything available to him by the time he was eighteen<sup>1</sup>. He became an accomplished physician before he turned twenty, and stated that medicine was the easiest of the sciences. At the age of 45, he collected all of his thoughts on medicine into his five-volume work *The Canon of Medicine*. This work, specifically the first volume,<sup>2</sup> is the primary focus of my thesis.

*The Canon of Medicine* was finished around the year 1025, and was the standard for medical textbooks until the mid 17<sup>th</sup> century. Though he had very limited knowledge in comparison with today's medical practice, Avicenna was remarkably accurate in many of his assertions, even on matters which were not proven until very recently.

Avicenna also used the *Canon* to convey his opinions on various medical disputes of his day, most notably those brought about by Galen. In several portions of the *Canon*, Avicenna takes care to position himself against what Galen had taught in favor of his

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<sup>1</sup> Avicenna, 1974, 4

<sup>2</sup> Until 2013, only the first volume had been translated into English. The second volume was translated in celebration of the millennial anniversary of Avicenna's initial work on the *Canon*. An English translation of the third volume was published in September 2014. The other two volumes remain in the original translations only.

own ideas or methods. While not always contradicting him, Avicenna is often responding to or commenting on Galen's works.

Avicenna was influenced by many thinkers and scholars that came before him, but most notably by Hippocrates, Aristotle, and Galen. Avicenna uses many foundational Aristotelian ideas, such as the four causes, to frame his paradigm of medicine, but derives the foundation of his medical thought from Galen and Hippocrates. In this thesis, I will enumerate these influences and establish the impact that they had on the first volume of Avicenna's *Canon of Medicine*. I then hope to show how these paradigms influences Avicenna's practice, and how his thoughts in *The Canon of Medicine* are still relevant in medicine today.

Avicenna draws the general foundations of his system of medicine from Galen, who himself used Hippocrates as his starting point, thus making Avicenna the direct intellectual descendent of Hippocrates. Avicenna's anatomical knowledge was also influenced by the recent research of physicians from the Islamic world, such as Abū Bakr ar-Rāzī and Alī ibn al-Abbās al-Majūsī. Jon McGinnis, a noted modern Avicennian scholar, states that, when there is a "disagreement about the philosophical underpinnings of medicine" Avicenna more often turns to Aristotelian thoughts for answers than to other physicians.<sup>3</sup>

Avicenna's work was important and influential in its own right, not just as it relates to other notable writers. *The Canon of Medicine* was only five volumes, as compared to Galen's twenty volume corpus, and was much easier to use and to master. Volume One included the definition of medicine, a discussion of the Elements, the

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<sup>3</sup> McGinnis, 2010, 227

Temperaments, and the Humors, and a comprehensive overview of human anatomy and physiology. Volume Two contained the treatises on simple pharmacology, while Volume Three was concerned with Special Pathology. Volumes Four and Five contained writings that covered Multi-Member diseases and the Formulary of complex medicines, respectively. In addition, some of Galen's works only survived in the Arabic translation, thus making a complete reading much more difficult. Avicenna's *Canon* was also independently important because it greatly influenced the medieval worldview, not just in medicine, but in many areas of human thought, such as ethics and philosophy. Because Avicenna wrote extensively in most areas of philosophy, he was able to construct an entire framework of thought that connected very well to itself. Whenever Avicenna encountered an intricate issue in medicine, he would simply reference his works in Biology, Physics, or Metaphysics to answer them, thus joining many of his works to each other. This shows that Avicenna understood the intricate and intimate connection between medicine and other related areas of thought, such as ethics other parts of and philosophy.

Avicenna also wrote about the classification of medicine in the broader field of science, either in the theoretical sciences or in the practical ones. Avicenna concludes that medicine is in a special class of science that is a mixture of both theoretical and practical sciences. It involves the construction of syllogisms, from which opinions are formed, making it a practical science, and those syllogisms are in turn based in theoretical definitions, giving it the theoretical element. This theoretical element is placed as a subsidiary of Physics, and its main pursuit was to discover the nature of health and disease.

Avicenna memorably defines medicine as “the art whereby health is conserved and the art whereby it is restored after being lost”.<sup>4</sup> He divides illness into three categories: temperament,<sup>5</sup> structure,<sup>6</sup> and loss of continuity.<sup>7</sup> He then goes on to discuss the various treatments for different conditions, and generally healthy activities and habits. This is not to say that an illness only exhibited characteristics of one of the categories; rather, a discerning physician can use the proportions of each category expressed to help determine the disease or illness that a patient presents.

In the field of embryology Avicenna discovered and discussed several contradictions in his own beliefs that arise from his philosophic stance.<sup>8</sup> In his works on biology, Aristotle claims that the heart is the first organ to develop, and that the heart then gives rise to other organs through the production of blood, a theory that Avicenna supported. In opposition, Galen believes that no organ develops ‘first’, and that the liver is responsible for blood-making. Avicenna believes that fetal development, the ‘humanization’, happens all in concerted steps, in accordance with his beliefs in *The Book of Healing*,<sup>9</sup> but his observations show that the process is gradual, starting with the sperm and egg “which, while potentially human, is not in fact substantially human” and ending with an obviously human child. In the *Canon of Medicine*, Avicenna references<sup>10</sup> the early fetus as a “clot ‘man’,” perhaps identifying the fetus as a person. Avicenna also writes that “the beginning of the breath is as a divine emanation from potentiality to

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<sup>4</sup> Avicenna, 1999, 25

<sup>5</sup> Such as fever or pneumonia

<sup>6</sup> Such as tumors or polydactyly

<sup>7</sup> Such as cuts or broken bones

<sup>8</sup> McGinnis, 2010, 239

<sup>9</sup> Avicenna, 2009, Volume 2, 101

<sup>10</sup> Avicenna, 1999, 117

actuality proceeding without intermission or stint until the form is completed and perfected”,<sup>11</sup> claiming that the breath of Life is not granted until the baby is fully formed and ready to be birthed. In *The Book of Animals*, Avicenna claims that further observation will support his theory of substantial changes, and that what appears to be a continuum is actually a series of discrete substantial changes. This goes to show that Avicenna’s medical works intimately involved philosophic and physical theories, and his assertions had far-reaching implications in several fields of thought.

*The Canon of Medicine* remained the definitive medical textbook for several centuries across the Muslim world and Europe. Though some of its proposed methods and treatments may seem like folk medicine of a bygone era to a modern reader, *The Canon* is a comprehensive theory of medicine that incorporates ideas and practices from some of the founders of modern medicine. To more fully understand the work, we must delve into its history, and see how Avicenna’s influences helped shape his work.

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<sup>11</sup> Avicenna, 1999, 124

## CHAPTER TWO

### Historical Background in Context of Avicenna

#### *History*

The early origins of medicine lie in what would be thought of today as “unscientific” grounds, relying on cures found outside of chemistry or biology, and inside astrology and incantations. However, in the late fifth century, medical authors begin to object to “fashionable cosmological doctrines [incorporated] into medicine”.<sup>12</sup> G.E.R. Lloyd, a noted medical historian, cites several documents that show that debate and argument were frequently employed as part of researching and adapting new ideas and theories of medicine in the ancient world. This shows how the medical beliefs of the time were formed partly by the oratorical skill of the researcher, and allows us to see the origins of the modern peer-review system within the sciences.

The earliest use of the word “doctor” covered a large number of people, ranging from physicians to spirit healers to “quacks and charlatans”.<sup>13</sup> Most doctors received apprenticeship-style training, and there were no formal medical colleges. The Greeks were also the first to separate the gods and spirits from healing and medicine. The author of *On The Sacred Disease*, originally thought to be Hippocrates though his authorship has not been proved, writes that, if one were to look at the brain of a recently-deceased person, it would be foul-smelling and moist, which was proof that the sickness was harming the body, not a divine force. He also argues that the holy gods would not defile a

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<sup>12</sup> Lloyd, 1974, 12

<sup>13</sup> Lloyd, 1974, 51

man's body in such ways as were seen with diseases. Within the Hippocratic writings, scholars also found some of the first case-histories showing the progression of the sick patients and recording several regular facets of their daily health.

Avicenna was part of a long history of Arabic scholarship that studied the Ancient Greek medical texts, and wrote numerous responses and commentaries on them. The Arab scholars inherited many of the original Greek works, and subsequently translated them and integrated them into their own philosophy. I will now briefly introduce the most important influences on Avicenna from these writers: Hippocrates, Aristotle, and Galen.

Avicenna drew upon these writers to frame and base his paradigm of medicine; however, by virtue of his chronological position, he also transmitted these authors to his readers. Avicenna synthesized some of Galen's ideas, who in turn had synthesized Aristotle and Hippocrates. Aristotle's systematic approach to science gave scholars a powerful tool for understanding the world around them, while Hippocrates had codified the right practice of medicine by physicians. It is through these writings that modern scholarship traces the Greek medical tradition back to Hippocrates.

### *Hippocrates*

Hippocrates was born 460 B.C. and died 375 B.C., and is considered the father of modern medicine and medical thought. His main set of works, the Corpus Hippocraticum, outlines various medical practice standards, including extreme professionalism and methodologies for diagnosing and curing illnesses, and regulate how medical thought should be approached, primarily giving thanks to the gods, and only practicing medicine for the sake of healing people. These writings also contain the Hippocratic Oath, which was, in all likelihood, not penned by Hippocrates. These works

are traditionally ascribed to Hippocrates; however, modern textual criticism has determined that the works are so varied in style and in age that they cannot possibly be from a single person.

Much of the Hippocratic writings seemed to be aimed at those claiming to be physicians but who have no training or desire to help anyone. Hippocrates seems also to write out his beliefs in an effort to dispel contemporary theories of medicine that he thought to be wrong-headed, such as applying hot, cold, dryness, or moisture to a person to cure different ailments.

In *The Law*, the writer, claiming to be Hippocrates, sets out general characteristics of the type of person who makes a good doctor: one who loves learning, has had an early tuition, a love of labor, and a natural inclination towards the sciences. The writer also laments that there are many who claim to be physicians, but few true doctors, and that the punishments for poor medical treatment are only shame in the medical community, and not some sort of criminal charge.

Hippocrates ascribes health to a balance of the four humors, and illness as an imbalance therein. The humors are the four primary fluids made in the body: blood, black bile, yellow bile, and phlegm. Each humor was also associated with one of the four elements: blood to air, yellow bile to fire, black bile to earth, and phlegm to water. He also prescribes mostly dietary changes or certain exercises to aid recovery, and the only prescriptive medicines are those which were thought to purge the body of factors causing illness.<sup>14</sup>

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<sup>14</sup> Boylan, 2009, IEP

In his writing *On The Surgery*, Hippocrates lays out basic techniques and guidelines to follow when performing surgery, such as how to place the hands, which instruments to use and when, and how to have light held so that the operator can see. All of this is in interesting opposition to the Hippocratic Oath, which vowed not to perform surgery, but to leave it to the surgeons, who were not viewed as healers.

Hippocrates also defines and categorizes various diseases and their ‘crisis points’, days in which the illness takes a turn for the worst, and the patient dies, or turns for the better, and the patient recovers. He also notes that, if a disease appears to be cured very quickly, the patient will likely relapse.

Probably the single most well known piece of writing attributed to Hippocrates is the Hippocratic Oath. Written around the same time as Hippocrates was alive, though its authorship has been called into question, the oath lays down the foundational tenets and attitudes that a good physician adopts. There are more than a few differences in the original Hippocratic Oath and the one which is now recited by medical graduates-to-be in the modern era, both in word and in meaning. In addition, no one oath is read in medical schools today; many different translations or versions, including or omitting various controversial segments of the original text, are now used. For example, schools strongly affiliated with a particular Christian sect may include a variation on the ‘no abortion’ clause, whereas a secular school may simply leave it out.

The Hippocratic Oath was not recited in a medical school setting until 1508 at the University of Wittenburg, Germany.<sup>15</sup> In fact, it wasn’t until the “medical” war crimes

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<sup>15</sup> Markel, 2004, 1

committed in World War Two were discovered that some professional oath was more widely taken upon graduating medical school.<sup>16</sup>

A line-by-line comparison of the two oaths quickly shows how much poetic license has been taken in the modern English translation generally in use. Whereas the opening lines of the original text swear to the ancient deities of healing, no form of god or even spirituality appears in the modern version.

In the next set of lines, the Hippocratic text swears to offer instruction “without fee or contract” to the teaching physician’s sons, the student physician’s sons, and describes an almost exclusive brotherhood of physicians. In this group, each member becomes part of a large family, sharing even in the parental duties of other physicians. The modern texts merely state that the oath-taker will “respect the hard-won scientific gains of those physicians in whose steps I walk.” Also, as shown by the hundreds of thousands of debt accrued by medical students, learning the art of medicine is anything but ‘without fee or contract’.

The next most altered portion of the Oath is the sixth paragraph, concerning the non-use of the surgeon’s knife, “even upon those suffering from stones.” There is much debate about the intent behind forbidding surgery in medicine, however, the most prominent theory states that surgery in the ancient world, indeed into the 19<sup>th</sup> century, carried more risk than benefit, and was thought to be better left to those whose sole occupation was surgery. The original Oath does not forbid surgery as a form of cure; it simply does not allow it for use by anyone assuming the title of ‘physician’.

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<sup>16</sup> Markel, 2004, 2

Overall, the tone of the original Oath reflects an older external code of ethics: thanking the gods, forbidding surgery or any abortions at all, and creating somewhat of a cult of physicians; in contrast, the several versions of the modern Oath reflect modern moral, scientific, and bioethical ideals, focusing less on the behavior and mindset of the physician in all aspects of life, and more on the general thoughts about how one should approach medicine.

### *Aristotle*

Nearly concurrent with the life of Hippocrates was that of another influential intellect, Aristotle. Born in 384 B.C., approximately fourteen years before the death of Hippocrates, Aristotle would grow to become a founder of Western philosophy, and a prolific writer in many fields. Aristotle is also credited as the father of modern science, and his idea of systematic classification of the natural world has become the basis of scientific thought today. He is most famous for his works *Nicomachean Ethics*, *Politics*, *Physics*, and *Metaphysics*, to name a few. One of the cornerstone ideas presented in *Physics* is that of the four causes, which are discussed below. The principle of the four causes is one that Avicenna quotes directly in the opening pages of *The Canon*, and builds on in many of the subsequent treatises.

Aristotle has been called “the first scientist” alluding to his many methodologies and natural philosophy that frames the body that we know today as natural science. Aristotle also asserted that a proper classification of things is necessary to discover new things about them. His classification was driven by the four causes: the material cause, the efficient cause, the formal cause, and the final cause, although the final two had explanatory priority. The material cause describes what an object is made from; for

example, the material cause of a desk is wood. The efficient cause follows more closely with what we think of today as a ‘cause’; it is the contact action. For example, the cause of a painting is the painter. The formal cause is the form that an object is to become; the formal cause of the baby is a man, and the formal cause of the block of bronze is a statue. Like it, the final cause is the end to which something is directed towards. Health is the final cause of fitness, such as walking.<sup>17</sup>

The formal and final causes have explanatory priority, meaning that they are more heavily relied upon in explaining natural processes, such as generation. According to Aristotle, the end to which an object is heading, the final cause, explains the process that it takes to get there. An acorn growing into a tree does so by the processes of natural generation, because of its final cause to become a tree. The formal cause is also employed in explanation because the form that something takes is intimately related to its end objective or final cause.

Aristotle’s works in philosophy encompassed much more than just natural philosophy; his writings extended into ethics. His ethical system had many components in common with his natural philosophy, and both areas of his works would be major influences on many later thinkers, including Avicenna. These theses and other of Aristotle’s works form the basis of Avicenna’s *Canon*, as outlined in his first treatise.

Ethics and morality are not sterile, isolated subjects in any of Aristotle’s writings. Discussing either topic brings up foundational questions that must be answered to more fully understand the framework. The reason for practicing ethical behavior is to achieve happiness. For Aristotle, happiness should be thought of more as blessedness, and is not a

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<sup>17</sup> Aristotle, Physics II.3, 194b24

physical pleasure-seeking or a temporary feeling. Rather, being happy is the highest goal, and is achieved by being virtuous. People should not seek honor or riches or power, but a virtuous life. The virtuous life is epitomized in the great-souled virtuous man, who is fulfilling his final cause by using his reason in the world. The final cause, one of the four causes that every object has, is the end goal to which the object is aiming, or its purpose. Everything, from people to acorns, has a material cause, which is what it is made out of, a formal cause, which is a thing's shape, an efficient cause, which is the agent by which a thing exists, and a final cause, which is the reason or end to which a thing exists. The application of reason is the means by which we decide which action to take, or in what amounts. The virtuous action usually falls in the middle between two extreme versions of the action. For example, one extreme of 'courage' is foolhardiness, or too much courage. The other extreme is cowardice, or too little courage, leaving the appropriate and virtuous amount as the mean between the two extremes.

Peoples' purpose, 'telos', in life is to apply our reason. We can know that we have a purpose because all of our individual parts have a purpose, and it stands to reason that the sum of the purposed parts would have a purpose on its own. The Virtuous Man is one who does virtuous things as a second nature, and enjoys doing them. The Virtuous Man is also one who is aware of his virtue, more like Achilles than Mother Teresa, in that he is not timid or humble about it.

All of these concepts would have been known by Avicenna since the beginning of his education, and would profoundly influence his later writings. In the *Canon of Medicine*, Avicenna uses Aristotle as the foundation of his own philosophy, using his same terms but building on them in his own direction.

## *Galen*

By the third century, the medical thought of Hippocrates had been cultivated and improved upon by medical practitioners. One of these physicians became so eminent as to have his influence stretch down the centuries to Avicenna. This man, Galen, was the foremost physician of the Roman world. Born in 129 A.D., he spoke and wrote in Greek, and lived in Pergamon, in modern-day Turkey. He originated the idea that the different balances of the four humors of the body had physiological and psychological effects, and correctly hypothesized the function of several body structures, such as motor and sensory nerves. Galen also made claims that did not sit well with later discoveries, such as the precise structure or function of the bladder, or the method of classifying health or disease. Avicenna argues both for and against Galen in the *Canon*, choosing instead to side with Aristotle when a conflict arose between the two.

Galen was one of the most prolific Greek writers, composing almost half of the whole corpus of ancient Greek literature. However, most of these works were lost, and many texts that we have today that claim to be written by Galen are spurious. Many of his surviving documents have not been translated into any modern languages. One that has survived is a short treatise on medical ethics, titled *If Anyone Is the Best Physician, He Is Also a Philosopher*.

In this short work, Galen implores the reading physicians to study the Hippocratic texts, and to continue research into medicine. Hippocrates is cited as “the best of all physicians,” and Galen criticizes those who claim to practice medicine, “without even knowing where it [the organ] is situated.” He vehemently attacks those who say that they are healers, but who “...make two mistakes in a single word, an achievement that is not

easy to imagine”; that is to say, those who are so incorrect in what they are saying that they manage to get two things wrong in a single word. Galen encourages the “followers of Hippocrates” to continue research in medicine, although he laments how few people will heed his call. He decries the fact that wealth and fame are more highly honored than excellence, and that no one great in any art, including medicine, has loved money; “you must despise one of them.” Galen also specifically targets the Sophists’ school of thought in several different passages.

In another work titled *On the Natural Faculties* Galen discusses and argues several different schools of thought about medicine and its practice, particularly against the Sophists. He makes a distinction between two different types of life: one having only nature, such as a plant, and the other having a soul and a nature, such as men and animals. He also describes the different stages of life, which he calls Genesis, Growth, and Nutrition. He gives a philosophic and somewhat esoteric description of each, and describes how they are interrelated and his various theories on their mechanisms in the human body. Galen then draws upon a rather strange analogy involving children playing with a pig’s bladder, and filling it with air and heating it to cause it to expand. He argues that this is not growth, because it is not fueled by Nutrition; if the children were somehow able to bring nutrition to the bladder, then they would be doing the work of Nature. However, they cannot, “for to imitate this is beyond the power not only of children, but of any one ever; it is a property of Nature alone.” Galen then describes his proposed mechanism of absorbing nutrition, and how the alteration of food into base nutrients is similar in process to blood becoming bone or flesh.

Galen then changes the tone of the essay somewhat by directly addressing the two schools of thought prevalent in his time concerning the nature of matter: those who believe matter to be continuously changing from Genesis to Destruction, and those who believe it, “to be unchangeable, unalterable, and subdivided into fine particles, which are separated from one another by empty spaces.” In light of modern science, neither model is fully accurate, but both have their merits. Galen aligned his thought much more closely to the former opinion, similar to the opinion that Avicenna would later take. Neither Galen nor Avicenna supported the idea of “atoms” or “molecules”; they opted instead for the continuously changing elements or a “punctuated equilibrium” as Avicenna would term it.

Galen’s ideas about medicine were heavily based in Hippocrates. He wrote many commentaries on Hippocrates’s works, and referenced and cited him many times. However, he also acknowledges that Hippocrates work was incomplete, and that all of what Hippocrates learned in his life is learned very early on in medical training. He asks the physicians not to squander the knowledge they have been given by furthering their knowledge of medicine, so that future generations will be given an even greater vantage point from which to practice medicine.

In his fragmented commentary on Hippocrates’s *On the Nature of Man*, Galen begins by defining “nature” as Hippocrates would have meant it, most likely as observable nature, and cites Plato’s *Phaedrus* in defining how we ought to go about systematically observing the ‘nature’ of the body and the world around us. In the next section of the Hippocratic text, where Hippocrates states that “whoever is accustomed to hear people speaking about human nature beyond the extent to which it relates to

medicine – it is not useful for him to hear this account,” Galen concludes that we cannot interpret the original meaning of the passage, but that it most likely was intended to combat those who wish to take the findings of medicine and push them into pure conjecture.<sup>18</sup>

In looking over summaries of many of Galen’s other works, most of which have never been translated into English, it should be noted that, in almost every one, he makes a point of arguing against the Sophists, even insulting them. In his book *About the Sects*, Galen systematically lists the various sects in medicine, the two most notable being the Empiricists and the Rationalists. Galen seems to dislike the dogmatic views held in both parties, but he holds a view blended from both. He relies neither totally on reason nor only on observable facts, but claims that the two must be joined in order to fully utilize our faculties.

The works and discoveries of these three physicians provided touchstones for later medical thought, and have been extremely influential on the body of medical knowledge. In their own ways, each writer’s influence carried to Avicenna’s works as well.

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<sup>18</sup> Kuhn, 2004

## CHAPTER THREE

### Avicenna, *The Canon*, and Its Theoretical Dimensions

#### *Avicenna*

For the next seven hundred years, medicine continued to evolve and reshape itself as new discoveries were made, yet it maintained the distinct characteristics given to it by Hippocrates, Aristotle, and Galen. However, just before the turn of the millennium, a new philosopher and physician would reshape medical thought, formed from the basis that those thinkers provided. That man was Avicenna.

Avicenna was born to a wealthy merchant and governor in what is today the country of Uzbekistan in 980 A.D. This was a period of important philosophic and scientific advance, often called the Islamic Golden Era. His powerful intellect was quickly recognized, and he was given the best education in Bukhara. According to his autobiography, he says that he mastered all of the sciences by the age of 18, and began working as a physician and a philosopher. It will be useful here to enumerate the writings and ideas to which Avicenna would have been exposed.

The Muslims were the primary inheritors of the Greek manuscripts, and thus structured their education in the same way that the Greek schools would have. Avicenna would have received an education very similar to one at the Athenian or Alexandrian institutions.

The first course taught at the Athenian institution was Logic, and the ‘five predicables’ on which science and philosophy are built. The pupils then delved into

Aristotle's *Categories* and then into the *Prior* and *Posterior Analytics*. Finally, in order to develop the students' abstract thinking skills, they studied Euclid's *Elements of Geometry*.<sup>19</sup>

The second subject that the students focused on was what is now thought of as Science and Metaphysics. Aristotle's *Physics* and *De Caelo* and Ptolemy's *Almagest* made up the body of this part of the curriculum. Moving from the heavenly bodies, students at the schools would then study Aristotle's *On Generation and Corruption*, followed by his work *De Anima*. These readings were chosen to provide students with a strong knowledge about the nature of the world around them.

Following the physical world, the students arrived at the study of ethics and politics, drawn from Aristotle's *Nicomachean Ethics* and several of Plato's dialogues, respectively. Plato's *Republic* was perhaps chosen over Aristotle's *Politics* in the Arabic curriculum because the Philosopher-King was more readily translated to the already-present Muslim figures, such as the Prophet-Lawgiver Muhammad or the ideal religious leader, such as a Caliph or Imam.<sup>20</sup>

This whole curriculum would be translated into Arabic and would have been studied by those learning Philosophy or Science, called *falsafa*, including Avicenna. The readings and courses taught highlight the strong Greek teachings and ideals that were used as the basis of thought for the Medieval Islamic thinkers.

The task of translating the entire corpus of Greek works into Arabic was started by Al-Mansur. The movement continued apace under al-Ma'mun; this was also when the

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<sup>19</sup> McGinnis, 2010, 7

<sup>20</sup> McGinnis, 2010, 15

first Arabic philosopher, al-Kindī, began his work. Al-Kindī aided in the translation of the Greek texts, and defended the usefulness of the translations and other “foreign sciences” from the strong Muslim theologians, thus preserving much of what Avicenna would later study.

While Avicenna received an education deeply rooted in the Greek philosophic tradition, he also would have been influenced by the Muslim worldview of his time. The Quran makes many claims that fall under the realm of philosophy, and thus were defended by incorporating them into the philosopher’s perspectives. There were two main theological groups called kalām that had formed by Avicenna’s time: the Mu’tazilites and the Ash’arites. The Ash’arites were the more traditional group, whereas the Mu’tazilites claimed that the Quran had to be read “through the eye of logic and reason.” They challenged several points about the Quran and its claims about the nature of God. The Mu’tazilites reached their full intellectual influence during the lifetime of Avicenna, which may have had an impact on his view of the proper arrangement of faith and reason.

Despite this swirling milieu of concurrent influences, Avicenna did not simply synthesize and incorporate prior medical and philosophic thought into his works; he added to them and built his own system on top of these ideas. While he did incorporate several important themes from Aristotle and Galen, such as the four elements, the four causes, temperaments, and the importance of the influence of the seasons and astrology, he integrated them into a cohesive and logical system in a way that had not been done before. He published the culmination of this medical framework in a four volume work, *The Canon of Medicine*, towards the end of his life. His social, intellectual, and medical

context all had important influence this opus magnum, which lasted for nearly a millennium as the standard medical textbook.

### *The Canon and Philosophy*

Avicenna saw medicine and philosophy as deeply connected, as is shown throughout the *Canon of Medicine*. Philosophy provides the support and much of the proof for many of the claims that he makes, and he will frequently direct readers seeking proof to works on philosophy. For example, in paragraph 44, Avicenna states that “the physician is again reminded that he must seek an explanation of the deepest intricacies of his subject in [esoteric] philosophy, for they are not self-evident.”<sup>21</sup> This also shows that Avicenna believes that natural philosophy is not self-evident, and must be reached through applied reason. In paragraph 16, Avicenna also clearly defines the limitations of medicine, and tells how the doctor must rely on precepts gained through the natural sciences and philosophy.<sup>22</sup>

For a knowledge of some things, he [the physician] depends on the doctor of physical sciences; in the case of other things, knowledge is derived by inference [reasoning]. One must presuppose a knowledge of the accepted principles of the respective sciences of origins, in order to know whatever they are worthy of credence or not [criteriology]; and one makes inferences from the other sciences which are logically antecedent to these. In this manner, one passes up step by step until one reaches the very beginnings of all knowledge- namely, pure philosophy; to wit, meta-physics.

Hence, if a doctor undertakes the proofs of existence of the 'elements' and the 'constitutions' and their derivatives from medicine itself he errs, for medicine cannot make these things clear, belonging as they do to the domain of natural science.

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<sup>21</sup> Avicenna, 1999, 64

<sup>22</sup> Avicenna, 1999, 31

The “things” that Avicenna references in the first line are the elements, constitutions, temperaments, and fluids of the body; these topics are covered in the first treatises of the *Canon*. The elements are Earth, Fire, Air, and Water. The temperament of a particular object is its make-up of these elements. For example, the muscles have a greater percentage of Fire in them than they do water. A person’s constitution is what Aristotle called the formal cause; those with a weak or abnormal constitution were more prone to certain diseases. The fluids of the body were the four humors, whose proportions were thought in part to govern the health of the body. In the next lines of the quote, Avicenna states that one cannot be a physician unless he accepts the precepts derived from natural philosophy. This entire framework must be accepted before the reader can continue in the *Canon*, and this framework is discovered and understood through philosophy. Thus, we see that Avicenna’s, and therefore Aristotle’s philosophy, set the foundation for the entire *Canon of Medicine*, and can only be reached by reasoning. This is also very similar to the Galenic idea that, in order to be a good physician, one must also have a working knowledge of philosophy.

Many things that were considered medical physiological topics for Avicenna are thought of today as psychological. A person’s physical composition was thought to directly influence their personality, and imbalances in personality could often be treated with physiological remedies. According to Avicenna,<sup>23</sup> “(It is to be noted that) a temperament, as understood by medicine, is never strictly equable or strictly inequable. The physician should abide by the philosopher who is aware that the really 'equable' temperament does not actually exist in the human being any more than it exists in any

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<sup>23</sup> Avicenna, 1999, 58

'member'." The temperament of a person or member is the elemental composition of that object; the ratio of the elements has a direct relation to how that object behaves, even if that object was a human being. It was thought that people with more Fire in them were more courageous, and could be prone to anger. Consequently, no person or part of a person was ever truly equal in ratio of all elements. A person who was completely equal with regards to all elements would never become ill, as no imposed imbalance would upset the ratios. However, humans are more equally balanced than any other creatures, a trait that allows us to rule over the rest of nature.

The view that medicine and philosophy are intimately intertwined was not introduced by Avicenna, but appeared as early as Galen, about 700 years earlier. In *If Anyone Is the Best Physician, He Is Also a Philosopher*, Galen explains that many who claim to be physicians are no more than "poisoners" because they lack any philosophic training. These people do not know the logical progression of disease, or arrangement of organs in the body, or are unable to predict the future condition of the patient because they have not meditated on philosophy. In this treatise, Galen cites Hippocrates as having meditated on the philosophy of his time, and exhorts physicians that wish to follow his example to do the same.

Avicenna inherited this tradition, and expanded on it greatly, writing his own corpus of philosophy that supported his medical thought. While Galen did this to a certain extent, the majority of his work was devoted strictly to medicine, and many of his original writings have been lost.

Despite the wide range of topics that these quotes were drawn from, they all portray the mindset that Avicenna had towards the relationship between medicine and philosophy. Medicine is dependent on, and in ways subservient to, the discipline of philosophy. Avicenna rested his medical thought on general observations, which were justified in his philosophic works on the natural sciences. Medicine was a logical extension of the claims of the philosophy, and its successful application provided support for the theories it operated on; however, medicine cannot prove the ‘imponderables’, because they cannot be observed. Things which cannot be proven through medical testing or knowledge are rooted in philosophy.

Surprisingly, Avicenna “had relatively little to say about such practical sciences as ethics and politics,” according to McGinnis.<sup>24</sup> However, Avicenna did devote the last six chapters of his work *Metaphysics* to the topic, and blends themes and elements from Islam, Plato, and Aristotle. McGinnis claims that this scarcity is due in part to the way Avicenna thought about ethics. Avicenna thought<sup>25</sup> that a life well lived, a good or happy life, “is that which everything desires, and what everything desires is either existence or the perfection of existence as such.”

Avicenna also claims in his work *Psychology* that the greatest thing a human can do is to “theorize and contemplate,” especially about God, or the Necessary Existent. Avicenna also appears to have held the belief that the fully-actualized contemplative life is not possible in this world, but in the afterlife, making his ethics a type of metaphysics. This is very similar to Aristotle’s final cause for humanity, which is to exercise our

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<sup>24</sup> McGinnis, 2010, 209

<sup>25</sup> Avicenna, 1028, 15

reason. Avicenna also had a somewhat dualistic viewpoint of the soul and body; that they were fundamentally different, but very closely tied.

For Avicenna, the practical intellect and the theoretical intellect work together to create ethical thought. Ethics arise when the theoretical minds reflects on social norms and mores that arise from a collective practical intellect. Avicenna also points out that these mores were at some point dictated by a Lawgiver-Prophet, tying the ‘ethics’ to a higher being. Avicenna even claims that one’s “moral temperament” is formed by how an individual’s practical intellect judges actions in accordance with the socially normal moral judgments.

Avicenna, believing that reason and intellect should rule the body and are essential for achieving full human-ness, sees vices and bodily needs as hindering the development of the person, and death as a reprieve from these stumbling blocks. Living well, by living moderately and by letting reason guide, prepares the departure of the soul from the body.<sup>26</sup>

In the opening of the *Canon of Medicine*, Avicenna begins by classifying and defining the roles of medicine. In the quote from the first pages, he argues against a classification put forth by Galen on the states of the body. Galen argues that there are three states: health, illness, and a state which cannot be considered strict health but is also not really illness. Avicenna disagrees,<sup>27</sup> and says that only the first two are necessary. A body that is in the in-between state is health-in-decline, and should be considered illness.

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<sup>26</sup> McGinnis, 2010, 210

<sup>27</sup> Avicenna, 1999, 26

Another thing- there is no need to assert that “there are three states of the human body- sickness, health, and a state which is neither health nor disease.” The first two cover everything. Careful consideration of the subject will make it clear to the physician either that the threefold grouping is unnecessary or that the group which we reject is unnecessary.

The first two states really cover everything. Careful consideration will convince the physician that the third state is dual- on the one hand an infirmity, and on the other hand a habit of body [some ugliness of form, for instance] or a condition which cannot be called strict health although the actions and functions of the body are normal .One must not risk defining ‘health’ in an arbitrary fashion, and include in it a condition which does not belong to it.

In the passages following this one in the *Canon*, Avicenna discusses the effects of temperament on the body and its members. Nearly quoting Aristotle, Avicenna believes that the balance between the two extremes of excess and deficiency is “very close to the theoretical ideal.” He then continues with the passage reproduced above to sort the varieties of balance that can be measured in humans. Avicenna uses these standards, though some are only in the theoretical, to define how the temperaments in a human body should be distributed. He compares the human as a species to other animals, itself, the climate around a particular group, and to people in more extreme climates. The second group concerns the relationship of the individual to other people, the same person, different parts of the same person, and the same affected part of the person at different times. In the next passages, Avicenna discusses the range of use of each measurement; the list goes from only theoretical to useful in everyday practice. This passage shows that Avicenna’s concept of health is based on what is considered healthy for most people, and on the patient themselves, and not on some theoretical ideal.<sup>28</sup>

The eight Varieties of equipoise: Human beings show eight varieties of equable temperament.

A. In relation to beings other than man.

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<sup>28</sup> Avicenna, 1999, 59

i. equability of man as compared to other creatures; ii. That which is found in different human beings; iii. That which is taken in relation to external factors, such as race, climate, atmosphere; iv. One taken in comparison with the temperament of extremes of climate.

B. In relation to the individual himself

v. as compared to another person; vi. As compared with the states of one and the same person; vii. As compared one member with another; viii. As compared with the states of one and the same member at different times.

While this may seem like a trivial facet of Avicenna's practice, it actually has very interesting connections with current debates in healthcare. Should physicians aspire to heal their patients to a collectively-agreed upon norm, or should medicine be more personalized and tailored to the individual? While the medicine of Avicenna's time was much simpler than it is today, the notion of a personal standard of "health" and "illness" has continued to spark debate, as modern scholars decide what the true definition of health should be in policy and practice.

Avicenna, in accordance with his rigorous training in Aristotelian and Galenic philosophy, acknowledged four main elements: fire, air, earth, and water. Each of these was associated with a set of two primary qualities, either hot or cold, and wet or dry. Fire is hot and dry, air is hot and moist, earth is cold and dry, and water is cold and moist. All matter was made out of these elements combined in various proportions, and objects or bodies formed from the collection of these elements. This theory of the elements is not to be confused with our modern atomic theory and the table of elements. The elements of Avicenna's philosophy were "imponderable," and bore no resemblance to the small particles or molecular theory of today.

The Elemental theory was used extensively by Aristotle, and is reproduced exactly in the *Canon*. This foundational statement has profound influences in many

different areas of Avicenna's medical paradigm. For example, in Avicenna's embryology, the heart was the first organ to form, being that it was made with fire as the primary element. This quality gave the heart generative significance, and supported the idea that the other organs arose after the heart was formed. This is in direct opposition to Galen, who through observation claimed that no one organ developed first. It is in this dissent that Galen's and Avicenna's method of discovery are most acutely revealed.

Galen was a firm believer in the power of observation and empirical proof, and is remembered, in part, for his frequent public vivisections. He demonstrated many of his theories through experiments on monkeys and pigs; for example, to prove that the function of the bladder was to store urine and only flowed in one direction, he clamped the urethra of a pig shut from the inside and recorded the results over several days. He used these observations to guide his theories. However, at the same time, Avicenna had a near-unshakable faith in the writings and theories of Aristotle, and even his observations were influenced by Aristotle's theories. This suggests that, though Avicenna was guided by empirical evidence, it was evidence that was interpreted through a philosophical framework adopted, in large part, from Aristotle. Near the beginning of the *Canon*, where Avicenna is defining terms and vocabulary used in the book, he defines "theory" and "practice" in such a way that alludes to this method of interpretation. He states that "these two aspects belong together- one deals with the basic principles of knowledge; the other with the mode of operation of these principles. The former is theory, the latter is applied knowledge." It is here that Avicenna clearly defines the role of theory as a means to acquire knowledge, and practice as a way of applying it. This notion was contrary to Galen's method of operation.

Following logically from the idea of the elements is the notion of different temperaments, which can be defined as a quality which results from the interaction of a specific ratio of elements in an object. That is to say, one object that has a certain amount of elements in it will be very different than a second object with a different ratio of elements that compose it.

The temperaments can be thought of as the average of the elements in a particular object or body. Each element has one that is exactly contradictory to it, and so cancels the effects that that element has on the whole. This eventually causes the object to reach a state of equilibrium, which is that object's normal temperament. Objects can be classified according to their temperament into two divisions: equitable or inequitable. A state of temperament that is equitable has an exact balance of each element, and is the perfect median between any extremes of composition. A state of inequitable temperament is anything other than this, varying in degrees of difference. To use Avicenna's example,<sup>29</sup> humans are the most equitable bodies, having the closest to perfect balance of the elements in our members. As one descends through the tree of life to more simple creatures, they become less equitable, and more altered by minor changes in ratio of elements. Our unique position as "most-equitable" animal also affords us the capacity of reason and intellect.

Each of the organs of the body has its own ideal temperament, and therefore behaves in its own peculiar way. For example, the heart should have more fire in it than the brain does for normal, healthy function. Likewise, the brain should be moist and cold, which are qualities that are not healthy for the heart to have. Disrupting this balance will

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<sup>29</sup> Avicenna, 1999, 61

create a response appropriate to the manner in which the organ was displaced. Adding more air or water to the heart will hinder its function significantly, whereas adding excesses of these elements to the brain will only effect a minor change.

It follows that examining the temperament of the body would allow the physician some insight into the health of the patient. This idea is exactly what Galen describes in his Humorist theory, which he derived from the observations of Hippocrates. The humors are defined as the substances which occur naturally in the body and are used to make body-substance. These fluids show up in varying proportions when the body is ill, with different proportions corresponding to different ailments. Each humor also has a certain temperament, and therefore certain elements, associated with it. For example, blood is hot and moist, and therefore has more fire and water in it than it does air or earth. As mentioned before, the four humors are blood, black bile, yellow bile, and phlegm. An excess of any of these fluids is illness; however, some people have a naturally-occurring amount of a fluid that is more than is seen in others normally. These people take on certain qualities that we still associate with the root words today. A sanguine person, literally full of blood, was usually thought to be more happy and courageous, whereas a phlegmatic person was cold and melancholic.

Each of the humors is also associated with a corresponding season. Seasonal changes and astrology played an important part of Avicenna's medical practice, as the stars and conditions under which a person was born influenced many facets of their character and physiology. Different humors were thought to be in greater excess during their season; for example, a person was likely to have an excess of phlegm during the winter.

While it is not elaborated on in the first volume of the *Canon*, the effects of different pharmaceuticals are either magnified or dampened based on the season that corresponds with their primary element. Medicines made primarily of earthy ingredients will be less effective in fall, and will be more potent in the spring. This is the same line of thinking used when deciding which medicines to prescribe based on the diagnosis. If a person has an excess of phlegm, now called a cold, they may be given spices or other warming agents in an attempt to restore the elemental balance within the body.

## CHAPTER FOUR

### The Practical Aspects of *The Canon*

#### *In Avicenna's Daily Practice*

As discussed in the previous chapter, Avicenna's entire framework of medical practice was set in the context of theories about the elements, temperaments, and humors. In his daily practice, the temperament of a patient, both in the present and their average temperament over time, would have to be carefully considered when determining a diagnosis. Thesis IV of the first volume of the *Canon* is devoted to the practical treatment of intemperament, where Avicenna recommends<sup>30</sup> that "the management of persons with hot intemperament [is to] be conducted in these two intentions: (1) to restore equilibrium; (2) to conserve the existing state of health." The first priority when treating someone who has already been diagnosed with an intemperament is to restore the balance of the elements, either by adding a substance that will counter the imbalance or by removing a fluid that contained the imbalance. This is also shown in the *Canon* in Avicenna's discussion of the treatment of ulcers, where he states that, though the ulcer may be confined to a single location, "the temperament of the body must be considered as a whole. If the body is of very dry temperament, and the diseased member is more humid than normal, we aim to reduce the humidity to one more nearly approaching equipoise."<sup>31</sup>

Avicenna also used the theory of the humors in his daily practice. When a patient presented with pain or dysfunction, and he was able to diagnose the particular type of

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<sup>30</sup> Avicenna, 1999, 437

<sup>31</sup> Avicenna, 1999, 523

pain, the suffering could be relieved by evacuating a specific humor from that organ or region. For example, Avicenna<sup>32</sup> asks the student to suppose that “there is considerable flow of blood from above the mouth in a man.” An appropriate course of action in treatment would be “to draw [blood] downwards towards a neighboring part of diverse character: that is, we cause the blood to flow down into the nostrils and emerge from them.”<sup>33</sup> If the physician so chooses, in accordance with the circumstances and condition of the patient, he may “draw from a distant part of diverse character: that is, in the former example, we bleed from veins in the lower part of the body.”<sup>34</sup> Similar treatment options were available if the other humors were in excess in any part of the body. The physician could choose to remove the humor from the immediate area, if it could be done with ease, or from a distant but connected area, which could be more accessible.

While the humors, elements, and temperaments were closely interconnected, they were not the only factors that had to be taken into account when assessing a patient’s condition. In a passage that today would seem very unusual, Avicenna describes the qualities of a good wet nurse, and lists<sup>35</sup> among them to be “only slowly aroused by the bad passions of the mind, such as anger, gloom, fear, etc. For all these injure the constitution and may change the milk or pass into it.” Avicenna, in order to show the link between personal character and physical composition of the body, goes on to state<sup>36</sup> that “it is for this reason that some people reject a nurse who is stupid.” New mothers do not want a nurse to disrupt the development of the child by passing on any negative qualities

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<sup>32</sup> Avicenna, 1999, 476

<sup>33</sup> Avicenna, 1999, 476

<sup>34</sup> Avicenna, 1999, 476

<sup>35</sup> Avicenna, 1999, 366

<sup>36</sup> Avicenna, 1999, 367

in her milk.

Another factor that had to be considered in daily practice was the astrology and place of residence of a patient. When treating a patient, one must keep in mind their normal temperament, and to which elements they are more frequently exposed. This is shown<sup>37</sup> in the *Canon* when Avicenna states that “if many luminous stars rise in one region of the sky, and the sun approaches towards that region, the people living directly or nearly directly under the sun’s rays are exposed to greater heat. But if the rays are oblique, the heating effect is lessened.” When treating a patient from such a region, the excess heat that they are exposed to daily must be noted when assessing their temperament. In similar fashion, the predominate winds in the patient’s country must be known, as different winds carry with them their own temperaments. A person from a country that is normally blown by the Easterly Wind will be drier and cooler than the Westerly Wind.<sup>38</sup>

Due to the interconnected nature of the elements, temperaments, humors, and astrology, Avicenna had to consider every facet of a patient’s condition in order to provide adequate care. This fact led him to adopt a holistic view of medicine, which caused his practice to look profoundly different than standard medical practice does today.

#### *Avicenna’s Holistic View of Medicine*

Avicenna’s application of medicine, especially his belief in the temperaments and humors, led him to a more holistic view of medicine than main-stream healthcare has adopted today. If a patient is viewed as a complex collective, with each part influencing

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<sup>37</sup> Avicenna, 1999, 195

<sup>38</sup> Avicenna, 1999, 199

the whole in a different manner, the methodology of treatment is enacted differently than if the patient is seen as having a specific, isolated issue. The elemental theory and humorism that Avicenna adopted in his practice may have looked more like a modern Doctor of Osteopathic Medicine (D.O.) than a traditional M.D. In recent years, medical schools that have trained students in the traditional method of isolated system-oriented treatment have adopted theories and practices taught in D.O. schools, including alternative healing methods such as acupuncture or a focus on general well-being.

Health is a complex property for Avicenna, and each organ or system of organs can influence the other systems both positively and negatively. Avicenna thinks of the emotional states, which are linked to the temperament of the nervous system and brain, as having a reliable and predictable influence on the pulse of blood, which in turn has a direct influence on many other systems such as digestion.<sup>39</sup> Thus, becoming angered can lead to a patient having diarrhea. This idea is shown again in his section on analyzing urine; a physician should note if the patient has recently undergone “fasting, wakefulness, toil, anger, dread- for all these cause the urine to become more lemon-yellow or redder in tint.”<sup>40</sup> The idea of intimately interconnected systems was far ahead of its time, and allowed Avicenna to become a highly adept healer.

Though the primary focus of Avicenna’s *Canon* was medical instruction, he takes care to mention the necessity of a general understanding of philosophy. The first pages<sup>41</sup> are devoted to conveying the foundational philosophy that the rest of the medical thought rests on, namely the definition and divisions of medicine, the four causes, the elements,

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<sup>39</sup> Avicenna, 1999, 321

<sup>40</sup> Avicenna, 1999, 323

<sup>41</sup> Avicenna, 1999, 25

temperaments, and the humors. The practice of using matters of philosophy as a starting point in medical education extends to today. Modern medical students must take ethics classes during their first two years of medical school, and many institutions extend this requirement into the latter two years. Medical students at most schools have the opportunity to fill some role, whether at the clinic or hospital, from the first few weeks of medical school, and must have already established their ethical grounding. In addition, science is creating as many new bioethical problems as it creates medical advancements. Medicine now is being offered choices in treatment and care that have never been available before, but science does not tell us how to choose. This process falls in the realm of ethics, and any answers must come from outside the realm of science itself.

While it may not be immediately applicable to the medical students while they are in school, the instructors and the institutions they work for must decide how medicine is going to be taught. This is a philosophy of its own, and leads to another modern application of ideas offered in the *Canon*. Most medical schools today have decided to teach medicine based around individual systems of organs and the ways they function in the body. That is to say, concepts of health and function are taught in terms of their component parts. When a person becomes ill, a doctor is asked to treat the specific part of the person that has malfunctioned.

### *Modern Application*

It is a reasonable notion to question the usefulness of studying Avicenna's life and works in modern society. We have made scientific advancements far beyond anything available to him in his time, and know much more about the inner workings of nature and the human body. This exercise retains a historical usefulness, and allows the inquirer to

see the roots that modern medicine and medical thought sprung from. We are also given a glimpse into the origins of many different disciplines, as they were once all connected much more closely than they are today. The study of the history of medicine entails learning the history of religion, philosophy, ethics, and astrology, and gives us a richer understanding of each of these areas of thought.

Modern scholarship has cast Avicenna in several different roles. Some would portray him as one of the most revolutionary physicians the world had seen in his time. Others, however, would depict him as merely interpreting Galen, condensing his works, and repackaging him for the Islamic world.<sup>42</sup> While Avicenna did use Galen as a starting point, and agreed with him on many issues, this was not a rule, as Avicenna pointedly diverged from Galen's theories and practices on numerous occasions in the *Canon*. When discussing the reason for a salty taste of serous humor or phlegm, Avicenna states that "though Galen believed that this kind of serous humor owed its saltiness to admixture with putrescence or wateriness, my teaching is that the putrescence makes it salty by setting up oxidation in it."<sup>43</sup> Again, we see Avicenna offering evidence against a theory put forth by Galen when he discusses the proper function of blood in the body. Avicenna does interpret Galen, saying "Galen regards the blood as the only normal body-fluid, for he considers that all others are excrementitious and quite useless. But if the blood were the only nourisher of the various organs of the body, it would be as much as saying they are all alike in temperament and nature."<sup>44</sup> These passages show us that, though Avicenna quotes Galen frequently, he does diverge from Galen's ideas in favor of his own.

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<sup>42</sup> Cardwell, 2003

<sup>43</sup> Avicenna, 1999, 81

<sup>44</sup> Avicenna, 1999, 87

Avicenna's *Canon* had roots in more than the medical theories of Galen; however, he did not simply reinterpret these other sources either. Hippocrates plays an interesting role in the *Canon*, though not nearly as direct or obvious a role as Aristotle or Galen. Avicenna quotes Hippocrates, mostly in short statements, such as when he is discussing the use of toxic medicines used in evacuation. "As Hippocrates says, 'medicine purges and ages.'"<sup>45</sup> Though Avicenna quotes Hippocrates, and would have had access to and been trained in his works, there are places in the *Canon* that directly defy the Hippocratic Oath. In a more prominent example, Avicenna includes a section in the *Canon* detailing the methods of making an incision,<sup>46</sup> which is strictly forbidden by the Hippocratic Oath. This is very interesting, as we can now see that even a millennium ago, physicians were diverging from the original medical writings and adapting their practice to the changing sciences.

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<sup>45</sup> Avicenna 1999, 383

<sup>46</sup> Avicenna, 1999, 520

## CONCLUSION

Avicenna revolutionized medicine, and set the standard for medical textbooks for several centuries after his death. He was heavily influenced by the Greek tradition handed down to him from Hippocrates and Aristotle, and framed his practice in part according to the works of Galen. While these authors had a potent influence on his writing, Avicenna still forged his own ideas and argued against some of those set out by his predecessors and contemporaries. Looking at the *Canon* in light of today's medical knowledge, we see that some of the methods and theories were folk medical wisdom of the time. However, we also see that many of Avicenna's hypotheses were remarkably accurate, such as the function of salt in the body<sup>47</sup> and the role of different nerves.<sup>48</sup>

Perhaps even more interesting are the theories found in the *Canon* that raise difficult ethical questions that we wrestle with today more than ever. In fact, some of Avicenna's theories allow the reader to come to conclusions in areas where modern bioethical thought has not yet found a solution. For instance, Avicenna states<sup>49</sup> that the goal of medicine is not the aversion of death, or "securing the utmost longevity possible to the human being"; rather, the goal of medicine is the preservation of a person's peculiar constitution until the moment of their natural death. This statement, if understood literally by patient and doctor, solves several end-of-life questions that physicians must face in the modern age of medicine. If the goal of medicine is reoriented to quality of life as the primary factor, far fewer procedures or treatments would be made,

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<sup>47</sup> Avicenna, 1999, 323

<sup>48</sup> Avicenna, 1999, 68

<sup>49</sup> Avicenna, 1999, 361

and that time and money could be reinvested on assuring the patient's comfort and overall well-being. In a larger sense, valuable resources would not be spent on cases that had minimal chance of significant improvement, and could be devoted to cases with more potential for success.

Though Avicenna lived in a time and place far removed from anything most people in the 21<sup>st</sup> century have encountered, his works still remain relevant today, and offer insights into the origins of many modern disciplines. In Avicenna's time, several subjects were classified under similar headings, such as physics and philosophy that have since separated into their own distinct disciplines. Beyond this, there has been a divergence between the sciences and humanities, on top of the subsequent divisions within these categories. For Avicenna, the study of physics was a nearly entirely philosophic endeavor, as evidenced<sup>50</sup> by his writings on motion and the nature of moving bodies in his other great work, *The Book of Healing*. The title of that work would seem misleading to a casual observer, as no part of it is concerned with medicine or healing. The book goes by another name, *The Physics of The Healing*, which closer approximates its contents, and reveals how connected these topics were almost a millennium ago. Looking at the *Canon of Medicine* offers us similar insights, and portrays a world where physics, medicine, astrology, and philosophy were studied simultaneously.

### *Next Steps*

Though this project shed light on several different topics, it leaves many questions unanswered. Are we able to apply Avicenna's ethics to new medical issues? How else can the *Canon* be used to identify major currents in the philosophy and medicine of the

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<sup>50</sup> Avicenna, 1027, 107

Islamic Golden Age? Were there any contemporary physicians whose thoughts Avicenna incorporated into his work? Further research must be done in order to answer these and other questions which may arise. Avicenna and the field of medical history have many more gems to offer us that are still relevant to today.

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