

# Medicine in Stamps

## Galen (130-201 A.D.): History's Most Enduring Medic

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At the turn of the first millennium, Hippocratic medicine dominated western civilisation. Despite a poor understanding of anatomy and pathophysiology, the physicians of that age generally accepted that natural rather than supernatural causes were responsible for human maladies. But one man, virtually single-handedly, brought the face of science to the healing art. Expanding upon clinical observation with brilliant experimentation, he influenced the course of medicine over the next 1,500 years. That man was Claudius Galen.

Born in Pergamum, a Greco-Roman town in Asia Minor (now part of the city of Bergama, Turkey) in the year 130 A.D., Galen was a second century Greek philosopher-physician who switched to the medical profession after his father dreamt of this calling for his son. Galen's training and experiences brought him to Alexandria and Rome, and he rose quickly to fame with public demonstrations of anatomical and surgical skills. He became physician to the Roman emperor Marcus Aurelius and his ambitious son Commodus (both featured in the recent movie, *Gladiator*). His most famous diagnosis was that of "overindulgence" in the emperor himself, and he is also said to have collected a fee of four hundred gold pieces, fifteen times the going rate, for making a house-call on the wife of the Roman consul Flavius Boethius.

It was Galen's good fortune that parchment and bookmaking were invented during his time. He wrote prodigiously and was able to preserve his medical research in some twenty-two volumes of printed text, representing half of all Greek medical literature that is available to us today.

### GALEN WAS RIGHT

In medicine's embryonic days, Galen was the first to insist on scientific experimentation as the evidentiary basis for medical conclusions. He was an astute clinician, and adhered to Hippocrates' exhortation to carefully observe the signs and symptoms of disease. However, he built upon simple observations with actual experiments, and brought the understanding of the human condition to new heights. If medicine was art for Hippocrates, it was science for Galen.

Galen recognised the critical importance of anatomy, and performed thousands of animal dissections, his favourite being the macaque monkey. He also dissected pigs and dogs, and on one occasion, an elephant. Human dissection was forbidden in his days; as a result, he drew many erroneous conclusions when extrapolating the animal findings to man. His understanding of human anatomy was limited; the little he knew came from studying the wounds of the gladiators he treated, and from observations of old human skeletons at Alexandria. Notwithstanding this serious shortcoming, Galen was the first to correctly show that:

- Arteries were filled with blood rather than the vague life providing substance inhaled into the body called pneuma;
- Chest expansion from diaphragmatic and thoracic muscle action preceded ventilation rather than the reverse;
- Urine was formed by the kidneys, not the bladder;
- The spinal cord and spinal nerves controlled specific neuromuscular functions;
- Voice control originated in the recurrent laryngeal nerve, not in the heart;
- The heart was the origin of blood vessels, and the brain the source of nerves, not the converse;



- Sensory nerves were distinguishable from motor nerves;
- Complex herbal therapy (galenicals) was effective in a number of medical conditions.

Three men dominated medicine at the dawn of the first millennium. There was Dioscorides the herbalist; Pliny the natural historian; and Galen the experimenter. However, it was Galen's towering discoveries, preserved in his most renowned anatomical work, *De Usu Partium* (The Uses of the Parts of the Body), that captured the historical spotlight. They even eclipsed the findings of yet another great man of his time – Aretaeus – who described the diabetic symptoms of polydipsia and polyuria, and correctly predicted contralateral paralysis following cerebral haemorrhage.

### GALEN WAS WRONG

Despite his brilliance, Galen committed cardinal errors. His dogmatically held views, coloured by religious absolutism, led to false conclusions. He subscribed to teleology (the use of design or purpose as an explanation of natural phenomena) that ended with unwarranted speculations.

Galen's fervent belief in the four humours (blood, yellow bile, black bile, and phlegm) was a direct inheritance from Hippocrates, so his prescriptions were misdirected at attempting to balance these humours. Like his predecessors, he wrongly believed that the formation of pus was a necessary part of wound healing. He embraced the concept of "pneuma", subscribed to the notion of innate heat of the heart, and insisted that there was a direct communication between the two ventricles, each with its own separate circulation.

Anatomical findings from animal dissections also led him astray. The best example is the identification of a set of coiled blood vessels at the base of the brain of animals called the rete mirabile. Not knowing that such vessels did not exist in humans, he incorrectly proposed that they slowed the flow of vital pneuma to allow its conversion to psychic pneuma in the brain.

On the basis of human observations and animal experiments, Galen surmised that the body had three basic organs – heart, brain, and liver. Pneuma from inspired air enters the left heart where it vitalises the warmed blood that flows to the body, especially the brain. There, at its

base, vital pneuma is converted to spiritual pneuma, which the brain then distributes via hollow nerves. Ingested food passes into the liver, where it is converted into blood and vegetative pneuma. Through the veins, the blood is sent to nourish the rest of the body, passing ultimately from the right side of the heart, via pores, into the left ventricle.

For the next 1,500 years, physicians adhered to these erroneous teachings of Galen. Medical science had to wait until the 16<sup>th</sup> century before these mistaken notions were corrected, first by the elegant human anatomical studies of Vesalius, followed by Harvey's demonstration of the circulation of blood.

### THE PARADOX OF GALEN

Galen's name, derived from the word "galenos," means calm and serene, qualities that suitably described his father, but not Galen himself. He was anything but calm and serene, history depicting him as fiery and excitable, very much like his mother who is said to be quarrelsome and easy to arouse. Galen was also an arrogant man, evident in these utterances: "Never as yet have I gone astray, whether in treatment or in prognosis, as have so many other physicians of great reputation. . . . Whoever seeks fame by deed, not alone by learned speech, need only become familiar, at small cost of trouble, with all that I have achieved by active research during the course of my entire life."

The proud and jealous Galen hurled insults on disagreeing colleagues, and bragged about his intellect and accomplishments. Cocksure and odious, he was quick to take offence and apparently had no friends. He touted the truth based on an absolute trust in the perfection of a deity-given world, and allowed teleological notions to affect his scientific judgment. Our genius of medicine would have done better to heed his father's advice that "as desirable as are all the sciences, more desirable still are the virtues of wisdom, justice, fortitude and temperance, virtues extolled by everyone, even those who have them not."

To this day, it remains a puzzle why Galen's misplaced dogma remained unshakeable for so long. The man who rivals Hippocrates as medicine's greatest succeeded in closing the minds of physicians to further experimentation and scientific enquiry for another fifteen centuries.