

Methods and management in ancient Egyptian and Greek medicine

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Abstract

Objective: Demonstrate that some ancient Egyptian medical treatments are still used today while Greeks appropriated many concepts that have partially disappeared. **Methods:** Through the study of classical authors, Egyptian papyri, ancient medical sources and historical and recent research, this article examines some neglected aspects in the traditional picture of ancient Egyptian medicine, now considered the cradle of scientific inquiry. **Results:** A framework of important health conditions must be highlighted in Egypt: accurate diagnosis similar to the present, training of highly skilled specialists, a health care system, greatly advanced for its time, although including magical practices and spells, because all types of healers coexisted peacefully. Hippocratic medicine also adopted Egyptian incubation, the same scientific and rational systems in patient therapy and older Egyptian ideas and remedies. The brilliant Egyptian hypothesis about gastrointestinal residuals or *wxdw*, a methodical approach to interpreting internal diseases, opened the road to a coherent and scientific therapy. Based on the Egyptian idea of self-intoxication through dangerous materials and of pathogenic decay that survives in the modern use of the Greek word *sepsis*, different Greek medical schools have been influenced and are even well developed in modern times. When they realized that putrefaction began in the intestine, they applied mummification and embalming for corpses and employed emetics, purges and enemas in patients. Greeks, by contrast, to avoid contamination, adopted dead cremation and their false humoral theory remained until the 17th century AC, as well as the false benign pus. **Conclusions:** Egyptian physicians, still ignoring the concept of infection or inflammation, clearly recognized local purulence and identified the presence and growth of pathogenic agents in infections. Thus, they were pioneers in solving pyogenic lesion debridement and diagnose the feverish profile of a noxious laceration, starting the prevention and control of infection used today.

Keywords: ancient Egypt and Greece; pioneer physicians; false theories

Introduction

Ancient Egypt, one of the greatest civilizations, became the cradle of scientific inquiry and social development for over 3 millennia. Its medical activity, one of the oldest documented because Ancient Egyptian medical papyri have survived intact, due to the hot and dry climate in the country and with high practice standards, really advanced for its time, has been vastly underestimated in disease prevention and treatment. It was called *Hmt* which means art, way of action, craft or *techne* [1], with a papyrus scroll at the end, determinative linked to a treatise or written words. A centralized medical structure recommended the appropriate therapeutic methods [2], reinforcing the unity of doctrine, while Ancient Greek medicine, instead, was a compilation of divergent theories and practices that were constantly expanding through new scientists' interpretations. Egyptians, "the healthiest of all humans (Herodotus [3] II, 77.3 and 84), together with the Lybians", would have invented the art of medicine (Pliny [4] VII, 56). However, especially in prehistory, ecological damage sometimes caused widespread malnutrition. However, especially in prehistory, ecological damage caused widespread malnutrition, but sustainable agricultural practice improved health. Although few medical artifacts survive, much should be studied about the diseases afflicting that ancient populous. "Evidence from papyri, tomb bas reliefs and the writings of historians of antiquity reflected an intense interest in the sciences, humanities and medicine, born from an educated society which had overcome the superstitions of its nomadic ancestors" [5]. Certainly, Egypt influenced not only ancient Greek medicine but also today's treatments because its findings are still valid.

Egyptian Health Management and health policy-makers

It is well known that Pharaoh, the guarantor of the well-being of his subjects, was surrounded by an entourage of scholar doctors specialized in public health. This organized and structured government improved and developed medical research while members of this society, relatively wealthy and with a stable life, could afford adequate public health care. The infrastructure, though, was not like today with sewage systems, proper medical care and public hygiene, but the existent water supply reduced the disease transmission. Physicians advised people to wash and shave their bodies to prevent infections, to avoid eating unclean animals and raw fish and to observe carefully basic rules, following a balanced and moderate diet. Its medicine of high level scrupulously promoted sanitary laws and strict hygiene due to religious reasons, tradition and social pressure. Medical ordinances were used to monitor water for cleaning human beings and to regulate funeral sanitation. Egyptians had an unusual obsession with personal body hygiene in daily life rather than health concerns and "they take baths twice every day in cold water and twice every night" (Herodotus II, 37) with cosmetics and perfumes. Priests also regularly washed themselves, their clothing and eating utensils in appeal to their gods.

Despite this, doctors curiously prescribed animal dung which might have had useful mold and fermentation substances, but was probably infected with bacteria at the same time and well have caused tetanus toxin when applied as a wound dressing. Excrements proved to be downright deleterious; nevertheless, it continued to be used in Europe until the Middle Ages.

The artisans' village of Deir el-Medina [6, 7] (Figure 1), first excavated by Ernesto Schiaparelli in 1905 and from 1922 to 1955 by a French team directed by Bernard Bruyère on the Nile west bank, is a good example that portrayed a society with an advanced medicine and treatment system. It is one of the most thoroughly documented accounts with records and ostraca of community life in ancient world that detail its organization, social interactions, working and living conditions, medical care in the New Kingdom. These artisans were literate residents, with an important role, better education and more money than any other town's counterparts, obtained directly state

permission to build their own tombs. This community of craftsmen, painters, masons, plasterers, sculptors, scribes, building the royal tombs in the Kings' Valley, just like the others, received health care through medical treatment, prayer and magic because all the workers of different social classes had full and equal access to care protection and facilities with a certain degree of quality. Among the medical staff, there was some sort of division: a trained physician for the most serious cases, who spent days mixing the more complicated remedies by himself [8], a charmer or doctor-priest associated with the goddess Selket (Figure 2, 3), specialized in magical cures for scorpion bites [9, 10].

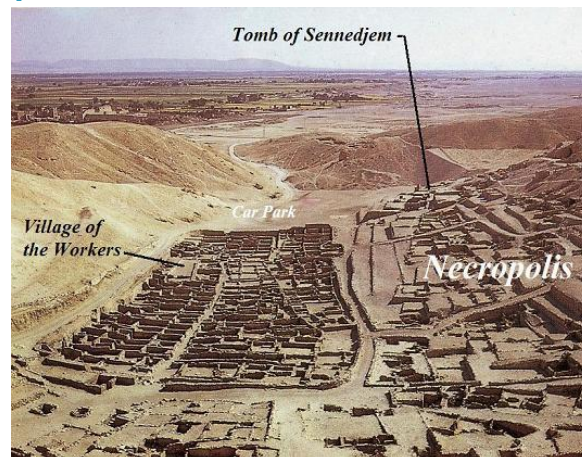


Figure 1 Artisans' village of Deir el-Medina (Megaconstrucciones.net)

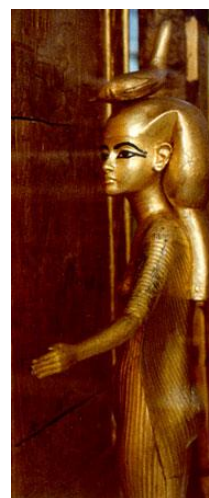


Figure 2 Goddess Selket protecting Tuthankamon's surrounding for shrine canopic vases, wood with stucco, gilding and glass paste (Cairo Museum)



Figure 3 Scorpion Goddess Selket 6th/4th century BC (Louvre Museum)

and also an ordinary part-time worker skilled in medicine earning a little extra salary for medical services [11], an example of healers receiving a minimum compensation granted by the State to preserve its rehabilitative functions [12]. Selket, the Egyptian scorpion goddess of magic, protection and healing, was also protector of the dead. This arachnid, numerous in the desert regions of ancient Egypt, symbolized chaos and was believed that it take shapes by the restless dead. Its neurotoxic venom destroy nerve tissue and affect the nervous system, causing muscle paralysis, difficult breathing and usually death by asphyxiation. The doctor-priests of Selket treated the stings with medical prescriptions and magical spells and also applied 'treatment by the knife'.

"It seems that, although the medical practitioners followed several approaches to healing, the prevalence and influence of 'irrational' treatments were probably less important than previously supposed" [13]; information provided by multidisciplinary studies and a substantial body of high-quality research evidence. Several hieratic medical ostraca, preserved in good condition on the site, include semi-official documents that mention rates and reasons for worker's absence, letters, sending for acquiring medical ingredients and even a handful of prescriptions. From the 1st Dynasty onwards, physicians were formally trained to provide first aid, to care for the sick and they had the knowledge and skills to dispense rational and effective therapies for their patients. Nevertheless, magico-religious practices undoubtedly continued throughout the millennia, and, in the absence of an effective rational remedy, Egyptians could also resort to magic and incantations.

Medicine, generally performed in temples, included centers for study and treatment known as 'Pr-ankh' or 'House of Life' and there were renowned medical establishments in Abydos and Sais [14]. To become healers, intellectuals and students made the theoretical and possibly the practical surgical training [15] there and coexisted with priests, who trained them, and worshipping staff. They used these practices to examine their own patients and, as public officials paid by the state, they offered free treatment to them. Ptolemies probably refined and perpetuated an existing Egyptian structure but collected medical tax (*iatrikon*) [16,17] since Pharaonic custom was: "On their military campaigns and their journeys in the country [18] they all receive treatment without the payment of any private fee. Physicians draw their support from public funds" and administration (Diodorus I, 82, 3). It was State-organized and State-supported expeditions to the remote, desolate and dangerous parts of Egypt in search of precious metals and other necessary materials or army expeditions that included physicians subsidized by the state. The medical tax, paid in a bank by certain Greek groups, appears in a small number of medical papyri (P. Hamburg 2, 171 (250); PSI 4, 371 (246) (= Pap. Zenon Pestman bilingual) during a relatively short period, ca. 310 to around 175 BC and then it disappears. This money was distributed to some or all physicians. But in P. Hibeh I, 102 (248/7) the tax-payer payer paid directly the physician.

These institutions provided a public healthcare system: free and accessible to the whole population, general to members of all social classes, national and available throughout the country at all times. It was integrated, through reciprocity laws, to a more general population requirement: irrigation, education, justice, storage and supply of food and beverages, etc.

"The principal subjects studied and practiced by this community of educated men were medicine, magic, theology, ritual and dream interpretation" [19] and also included history, astronomy, geometry, drugs and pharmacy. All physicians had to well know their art [20], not being allowed to leave orthodox treatments or to use alternative methods outside the reference range because Pharaoh's doctors promulgated rules and regulations and they needed to protect themselves from future sanctions in case of diagnostic errors. Disciplinary legal measures and even exemplary punishments were imposed to safeguard professional competence against the risks of controversial medications or any violation of codified therapy or prescriptions [21]. It was a major obstacle for learning from their own observations.

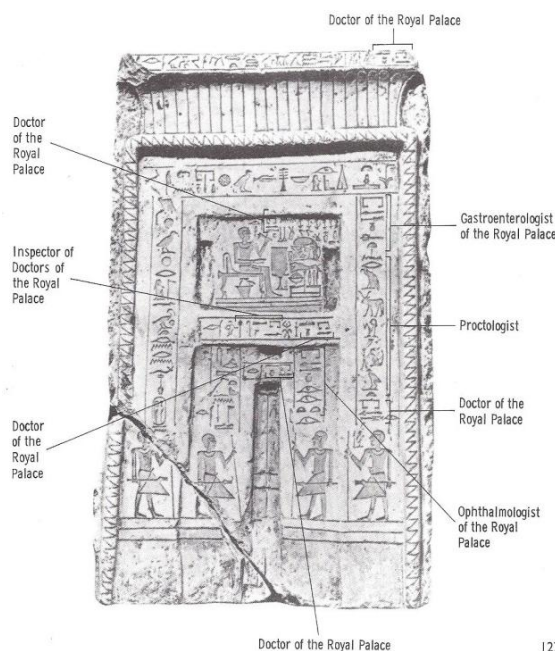


Figure 4 Limestone stele of Iry, chief of court physicians, 'guardian of the royal bowel movement' and ophthalmologist (Nunn (1996): 127)

New ideas took a very long time to set up due to the deeply rooted traditions, and scribes also commissioned to write tomb inscriptions, normally copied old texts or reproduced traditional pieces of writing. However, they often edited the new documents, dropping some old content and adding modifications. The claim of extraordinary antiquity for the medical books was certainly not intended to indicate its obsolescence but, rather, to bolster its authority and presumed validity. Egyptian medicine, integrated into established institutions, probably entailed some inertia in medical practices and indeed, Egyptian culture placed a positive value on continuity and authority rather than on innovation. Nevertheless, the demand that it was unified, unitary and unchanging [22] seems exaggerated and Robert Ritner [23] provides evidence of changes in techniques and interpretations; since there were arguments and personal preferences in the temples, often rivals and disputants, personal preference as innovation also existed in ritual magic. Medical authority, like other forms of power, was associated with the state and the religious infrastructure, involving traditional sources of access against the forces of chaos.

The temple handled *sekhaw's* school where scribes or scientists drew up or copied sacred texts on medicine that were among the earliest Egyptian writings. They discussed and solved the arising new questions to formulate completely new texts about philosophical, medical, religious and literary problems and were able to document their research and knowledge. These scrolls were kept in the niches called 'Houses of Books'. Rather than a library and a *scriptorium*, they were centers of knowledge run for priests, where trained physicians, among other demands, had to spend a long time for rote learning and copying without requiring any formal examinations [24, 25]. In the 3rd century AD, Greek physicians still visited the school of Memphis (Galen, *De compositum medicamentum*, V, 2 [26]) to study the quantity of books collected or copied in these houses, and "they were certainly the model on which the 'Mouseion' of Alexandria was early founded" [27].

Hieratic scripts talk of a medical hierarchy with highly skilled specialists from the Ancient Kingdom onwards. Each physician treated a specific organ such as the eyes, head, abdomen, teeth, anus, or unknown diseases of internal cases, where they could not see the alterations of the organs and they tried to interpret the inner liquids changes, but sometimes they practiced multiple specialties. A certain Sekhetnankh [28] was Sahure's "nose doctor" (5th Dynasty) and Iry

(4th Dynasty) (Figure 4) was a royal physician “guardian of the royal bowel movement” among other occupations [29]. Specific deities were also associated with medical specialization: Duaw (eye diseases); Tawrt and Hathor (childbirth and its complications); Sekhmet (pestilence, probably infectious diseases); and Horus (snake bites, probably toxicology).

At the top, a first-level group of doctors, recruited and supported by the Palace and prominent by their vast culture, performed different specialties, and several other activities in many areas and had to train the medical personnel of provincial centers [30]. These prestigious great doctors, masters, scholars and even theologians worked handling scientific knowledge and medico-religious speculations in the royal court to be used by practitioners, supervised by inspectors and traveled even with the king in diplomacy missions. They accomplished multiple functions: “They were able to heal sick people (Horapollon, I, 38 [31]), to predict the future (Josephus (I, 154-168) [32], Suidas, Aelian (X, 29) [33]), to know the simples (Galen), the history of ancient kings (Diodorus), and they even made it rain (Ammianus Marcellinus 14.1.7 [34]). Their colleagues, the reader-priests, enjoyed universal fame and accomplished lay tasks in medicine and in prescriptions (P. Londres [35] VIII, 12; P. Berlín [36] VIII, 10). They used magic spells and were the officiating priests in funeral rituals” [37].

The hierarchy started with the ‘*swnw*’, who worked outside the temple and went to see their patients as ordinary roving doctors; and included ‘*imy-r swnw*’ (overseer of doctors); ‘*wr swnw*’ (chief of doctors); ‘*smsw swnw*’ (eldest of doctors) and, finally, ‘*shd swnw*’ (inspector of doctors) [38]. Women could also perform this profession, as we can see in Pereshet’s relief, describing her as ‘*imy-rt-swny*’, lady director of lady physicians, being the only known reference to support the theory of medical women jobs in a male-dominated society that respected, however female’s roles. But in Ptolemaic times, a significant number of women doctors in the rural country [39] confirmed their existence. By contrast, the apparent absence of midwifery in Egyptian medicine would be due to their low and informal socio-cultural status, being an occasional role for older women [40].

All types of healers, with widely specialized training in the *House of Life* to deal with different kinds of diseases, natural and supernatural, coexisted peacefully: healers, magicians, priests, physicians, exorcists or witch doctors who cured through charms and amulets as *sau* (amulet men). It appears in the texts some distinction between physicians and surgeons, the ‘man with the *hemen* instrument’ (Ebers [41] 860, 871). Practitioners also had fruitful contact with their seniors and teachers there, using instruments to study surgery, but evidently, it was not his exclusive prerogative. Also the priests of Sekhmet, *uab*, with some medical attributions but no training whom Ebell considered surgeons [42] were attached and have probably been taught in that institution. They had a number of important functions: driving out or destroying the evil entity possessing a person, preventing of plagues; inspection of sacrificial animals and even the practice of veterinary medicine. One of them, the Chief Physician’s son, knew the secrets of the Chest of Bubastis (‘The House of Books’) [43]. The social status, personal skills, preferences and the explicit diversity in theory and methodology marked differences between healers and also the variations in training and consequent expertise derived from a high degree of medical-magical knowledge preserved in written form. The medical body comprised too another kind of specialists called *wr* (‘Book of the bandagists’, P. Smith [44] 7, 20-21): nurses, masseurs, embalmers, manicurists and bandages [45].

Magicians and herbalists selected their healing plants according to the secrets of simples, a doctrine taught by the god Toth, inventor of writing and drugs [46]. These ingredients, used by physicians as curative remedies, came from Egypt or from trade with the Near East, Africa and southern Mediterranean lands [47]. The therapeutic efficacy of papyri prescriptions, considered ineffective by some medical historians, has been recently re-evaluated through archaeobotanical and phytogeographical studies, which have given credible identifications to 284 components. About 2000 remedies of medical papyri provide ample specifications, details of the

ingredients, methods of preparation, dosages and administration routes [48], make reproducible prescriptions and about 50% of these drug sources remain still in use. At least since 1820 BC, Egyptians prepared and delivered drugs, according to current research, and since 1550 BC, accurate measurements were introduced in each composition [49]. 64% of these therapeutic medicines are based on rational protocols and standards, and nearly 2500 plants have microbiological activities, maybe due to their good aroma and their slow decomposition.

To investigate the use of blue lotus flower as narcotic or aphrodisiac, analytical techniques such as gas chromatography-mass spectrometry and liquid chromatography-mass spectrometry have been applied and also to identify the origin of resins and unguents and ancient medicine trade routes [50].

Without any doubt and thanks to archaeological evidence, an organized and well-established medical care system could be established in Djoser’s times (Third Dynasty 2700 BC) [51]. Two important documents, among others, have been discovered: the medical Ebers [52] and Edwin Smith papyri, being part of the basic corpus and treaties of the ‘House of Life’ that classified practice observations [53]. The last was attributed to Imhotep, vizier, architect, physician and astronomer, credited with the creation of medical science and later identified by the Greeks with Asklepios [54]. Others works originated in temple libraries, town archives and doctors’ houses or tombs. Ebers papyrus, (originally from Thebes and probably a provincial practitioner’s private compendium, it was discovered in 1862 and acquired by George Ebers in 1873. Dated 1555 BC, it was probably a copy of a much older work written around 2500 BC, the Imhotep’s time), the only complete, contains 876 prescriptions using 500 substances, brief annotations on surgery and a treatise of the heart and other of *wxdw* (CIII, 1 s.) also reproduced in Berlin Papyrus (1300-1200 BC, XV, 1 s.) because some material was usually repeated in more than one document. It seems to have omitted some other diseases, but each etiologic topic was included and classified within the same paragraph, solved with similar recipes.

Methods for effective health care

Some temples, with a reputation as healing centers, were used like hospitals or ‘*sanatorium*’ for ‘therapeutic incubation’, a traditional Egyptian method. In the precinct of Dendera complex (Figure 5) Daumas [55] identified in his archaeological excavations a brick building in the west courtyard of the Temple of Hathor, running parallel to the Sacred Lake. The Ptolemaic and Roman main building of Hathor occupied the site of a much earlier temple. The sanatorium was originally built using a combination of red brick, stone and mud bricks, the latter forming the outer walls of the building [56, 57]. Patients, placed in small and dark cells with sanitary installations, were totally or partially submerged in curative waters that passed over healing statues. Using lamps, burning perfumed woods and sacred songs to enter a trance state, they were visited by the deity in a dream who recommended the exact treatment. Egyptian priests and priestesses utilized healing songs, baths, special diets, medical incantations and prayers [58] as therapies to cure these suppliants. Since at least the reigns of Amenhotep II (ca.1439-1406 BC) and Tutmosis IV (ca.1406-1398 BC), or even in the Middle Kingdom (ca.1900 BC) at Sais and Heliopolis, this mystical and psychological method subordinated to suggestion, was applied medically. Other two sites of the Late Period (664-323 BC), situated in Saqqara [59] and Deir el-Bahari [60] and renowned as sleep temples and healing centers, were contemporary of the Greek abaton because Hippocratic medicine adopted Egyptian incubation to treat current disease or to foretell the future [61]. Nevertheless for P. Lang, “there were considerable structural, organizational and functional differences between Egyptian sanctuaries and Asklepieia” [62], although it is possible to think that Greeks followed the Egyptian example.

Meanwhile, some modern practices that have remained for centuries have their origin in Ancient Egypt [63], such as correct medical diagnosis founded on a rigorous semiological analysis and

systematic method, testing different symptoms and signs, grouped in syndromes. The examination involved a careful inspection, auscultation, aggressive palpation and percussion [64] to determine painful areas, control of pulse fluctuations and patient's discharges and a detailed injury evaluation as it is shown in Edwin Smith's surgical papyrus. Remarkable for its structured approach and rigorous scheme, it dealt with 48 traumatic surgical cases, topographically ordered from the skull to the chest, and included a title and instructions for patient examination [27]. This document might be considered the very beginning of modern neuroscience since it is perhaps the earliest to describe and analyze the brain. Interrogation, empiricism, logic and rationality were introduced to provide prognostic information and different phases of treatment required the description, duration and functions in the illness course, monitoring patients' evolution. Such as a contemporary physician who applies the empirical scientific method [65], the diagnostic appreciations in Egypt were based on the observation through the senses of the clinical phenomenon and the emergence of secondary complications [66]. Disease was constructed there as a process with specific symptoms and signs and therapy was subordinated to important patients' conditions. This cultural systematic competence and explanatory model approach were also incorporated and appropriated by the Hippocratic medicine.

Egyptians, with a basic knowledge of the cardiovascular system, associated the heartbeats with the blood motion inside the body, indicated by the pulse and the rhythmic blood spitting from severed arteries [67]. Blood was not seen to circulate but rather to slowly flow [68]. The 'Heart and blood vessels section', in Smith and Ebers Papyri (854) may be the first description of the body's blood motion, connecting the heart to arteries; if true, it would predate the Greek scientific philosopher Democritus (460-370 BC) by over two millennia. He traveled to Egypt and later gave a crude description of arteries filled with air while the veins pooled blood after death.

Egyptians recognized the heart as the main center of the vessels *mtw*, with a second point of convergence in the anus area, carrying not only blood but also air, water, tears, urine, semen and faeces.

On the other hand, surgeons, with an array of instruments, practiced common, basic and successful surgery, limited to minor surgical incisions, but not deep inside the body. Mummified or skeletal remains, via anatomical and radiological studies, provided a wealth of information about teeth and skeleton diseases and confirmed these actions. Like his Greek counterpart, the Egyptian practitioner used sutures in minor lacerations, healed war wounds, shoulder dislocations, fractures of bones, trepanation of skulls, achieved hemostasis by cautery and made some attempts of antisepsis by means of copper salts [69]. Management of humeral fractures had been discussed in surgical texts and the recommended techniques for reduction by traction, followed by bandages with linen and splinting, remained unchangeable (Smith 46).

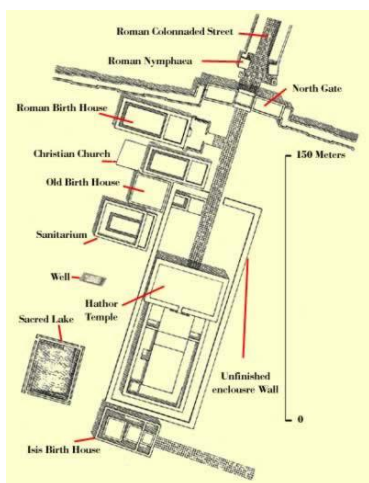


Figure 5 Sanatorium in Dendera complex, Egypt

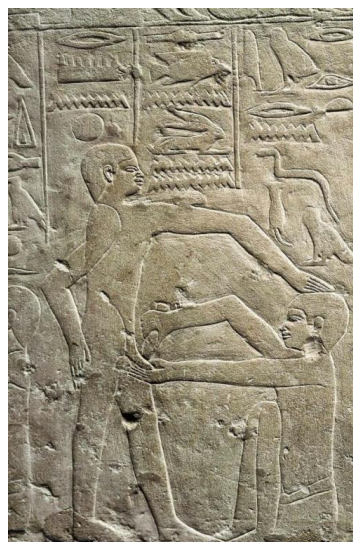


Figure 6 Circumcision scene from the tomb Ankh-ma-Hor (Saqqara), Egypt, 2500-3000 BC (Reproduced by kind permission of the Wellcome Library, London)



Figure 7 Prosthetic forms: wood and leather toe of Deir el-Medina (Ghalihoungui P (1983): 11)

Egyptians knew how to stitch wounds effectively and close the skin surface, applying topical treatments of fresh or living meat, lint, animal fat, aromatic resins and honey, used on open wounds as well as pus removal to promote their healing. It has been recently proved that the ancient Egyptian ointments, based on grease and honey an antibiotic agent with antibacterial properties, have bactericidal action, reducing *Staphylococcus aureus* and *Escherichia coli* from 105 to 102 counts in only 24 hours. The use of compresses impregnated with wine, with an approximate alcohol content of 10%, and the presence of malvoside and enocide pigments [70] could kill *Escherichia coli* colonies in 60 minutes [71]. Instead, lint or adhesive linen tape provided a fibrous base for tissue closure and animal fat acted as a barrier to environmental pathogens, including certain herbal remedies inside the excellent bandages that would speed up the process of natural recovery, avoiding inflammations. They were capable of diagnosing what we know today as a gangrenous necrosis septic and suppurative complications.

Circumcision (Figure 6) of a newborn male baby or adolescent was a common practice and also punitive amputation of the nose, tongue, ears, hands, etc., but the existence of therapeutic amputations is not clear [72]. Prosthetic forms did also exist, perhaps in order to make the deceased more presentable or for decorative purposes. But two artificial great toes associated with mummies, one found in Deir el-Medina (Figure 7) made of wood and leather, suggest that, in each case, the prosthesis was probably worn by an amputee during his life,



Figure 8 Staphylococcus skin Infection (Slide Player)

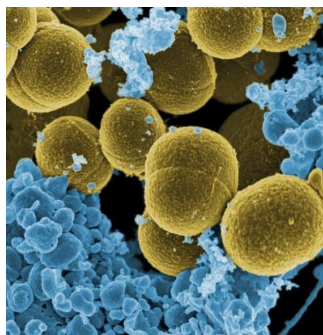


Figure 9 Staphylococcus aureus (Wikimedia)

to facilitate walking. Then these replicas could be the earliest surviving intravital limb prostheses.

Nevertheless, the fundamental Egyptian hypothesis about gastrointestinal residuals or *wxdw* (that tentatively can be pronounced as 'ukhedu'), was a coherent and scientific approach to interpreting internal and hidden diseases. This etiological theory, central to their view of human pathology, opened the road to treating through a rational therapy indigestible food related to the alimentation and digestion process. Even though Egyptians could not see microorganisms in the intestinal flora, they knew that guts contained some type of dangerous material as early as 2500 BC, if the original P. Ebers would be dated back a thousand years before the available copy.

The word *wxdw*, considered early as a particular disease related to leprosy, smallpox, and syphilis, was later perceived as an etiological principle [73]. When Egyptians realized that corpse decomposition, characterized by its unpleasant odor, began in the bowel, in order to prevent its spread and stop physical destruction, they employed mummification and embalming (the latter named *sdwx*, the same word used for treatment in general [74]). Associated with poisons and the goddess Selket, the extracted dead intestines were preserved in a canopic jar with a falcon head called Qebehsenuef's. The first evidence of this process corresponds to the fourth Dynasty, but it is possible that Imhotep had already developed the idea of preserving bodies. He, for the first time, built a monumental stone pyramid that served to protect Djoser Pharaoh's mummy as a dwelling place for all eternity. About 2700 BC Egypt had reached the first peak of prosperity [75] and the famous Step Pyramid of Saqqara represented a significant leap in architectural size and sophistication with the scale suddenly reached. The king Djoser's reign (ca.2691-2625 BC), called the 'Classical Age', was a period of wealth and splendor in Egypt where wisdom, prestige and happiness flourished, with an overall sense of well-being, even in medicine and suitable health and future. For this motive, we believe that the embalming method and the *wxdw* theory were outlined at that time, a bit earlier than Ebers Papyrus was written. Imhotep probably conceived that magnificent funeral complex because, after the development of the *wxdw*'s new theory, he would have put there an incorruptible body, now disappeared. Even after death, the pharaoh was still 'at work' in this tomb, going from one building to another.

Applying the same theory to living people, the noxious agent *wxdw* produced, in this case, some diseases and intestinal auto-intoxication or self-poisoning in the process of internal putrefaction from retained wastes in the colon. These toxic substances in feces and lower intestine (*pHwy*), the main pathogenic and toxic by-products from the foods,

could produce, transported everywhere throughout the vascular system vessels (*mtw*), a whole body intoxication, even in the heart, blood or tissues. They were capable of causing, wherever they go, decay, organic destruction and numerous suppurative illnesses [76], such as fever and pulse changes, compatible with the Hippocratic flux (congestion or $\rho \epsilon \acute{\upsilon} \mu \alpha \tau \alpha$). Herodotus (II, 77) already established a link between digestion and disease, saying that Egyptians believed ingested food to be the cause of all illnesses.

Egyptians established a prophylactic measure to prevent these disorders and to clean the gastrointestinal tract: the use of emetics, purges and enemas for three consecutive days every month. In so doing, they became all-time experts on enemas. Composed of colocynth, castor oil plant and possibly aloes, they refreshed the heart and anus and expelled fevers [77]. They learned this enteroclysis technique from the ibis, worshipped as the god Toth because it introduced water to clean its bowel with its long beak (Pliny VIII, 41). Another prophylactic treatment was pulling back down these residues (*materia peccans* = cause of disease) or pathogenic substances, capable of fermentation after abnormal digestion, with gentle massages and later expelling them by the rectum.

Otherwise, if *wxdw* were absorbed, the risk of coagulation, thick blood or a vessel blockage (*sna*) (Bln, XIII, 3-7) would increase, producing heart stroke, abscesses filled with pus (*ryt*), or stay stuck in the rectum, one of the major infectious Egyptian diseases. Sometimes this corruption affected bile (*arwt*) and phlegm (*stt*), as said by Ebell [78], turning into a concretion that blocks physiological functions and provokes subsequent body putrefaction. *Wxdw* could also lead to physical destruction and aging and the contaminated blood was only alleviated (Eb. 91, 12-19) by applying venesection, first performed by Egyptian physicians [79]. For R. Steuer, it was related to *pyemia*, (produced by the absorption of pyogenic bacteria and the presence of pus in the blood), a type of *septicemia* that leads to widespread metastatic abscesses, usually caused by the *staphylococcus* bacteria, and also suppurative infections of the blood (Figure 8, 9). "The early Greeks physicians believed, however, that decomposition of blood, phlegm and bile, fundamental humors, was responsible for pus formation, whereas the Egyptians held that pus was a modification of *wxdw*" [80].

The Egyptian concept of pathogenic decay even survived in the modern use of the Greek word *sepsis* [81]. Sepsis is a Greek word for decomposition of animal or vegetable organic matter, cited by authors as Aristotle and the Hippocratic Corpus with its antithesis, *pepsis*. Its use as a medical term declined until 1750, when Sir John Pringles, the father of military healthiness, employed this word in his work *Experiments upon septic and antiseptic substances*, seeing the importance of these principles in hospitals and camps. This theory influenced different Greek medical schools and was well-developed in modern times. For Stueur and Sanders [82], it was related to the etiological concepts of disease in Cnidian Medicine, later transformed into the Hippocratic humoral pathology. However, T. Bardinet does not accept this connection because the results should be demonstrated carefully. Also the theory of peritoma attributed to Euryphon of Cnidus is not exact because it is an expression of Aristotle [83]. But at the end of the 19th century, the medical community also assimilated the *sepsis* concept, related to the words *septicemia*, *pyemia* or *sapremia* (a constitutional disorder due to chemical poisoning by bacteria products resulting from putrefactive processes in a wound infection).

Even today, bacterial diarrhea, food or waterborne diseases, hepatitis A and typhoid fever acquired from local meals represent Egypt as a high risk for foreigners. Contaminated water with fecal matter or sewage interferes with the functioning of the liver and provokes schistosomiasis (bilharziasis), a parasitic disease caused by blood flukes (trematode worms) of the genus *Schistosoma*, whose intermediate host is a freshwater snail [84]. The parasite larval form, exposed to contaminated water, penetrates people's skin. When the worm matures and reproduces in the blood vessels, liver, kidneys and intestines, releasing eggs that become trapped in tissues, it produces mortality. According to mummified remains and manuscripts, parasitic infestations known in ancient Egypt have come to light, but internal illnesses are difficult to detect. However the advent of

polymerase chain reaction (PCR) in genetic analysis has enabled medico-Egyptologists to determine the population's infections and so build a picture of disease migration and prevalence during the Dynastic period [85]. Examined mummies using a range of techniques such as histology, immunocytochemistry, enzyme-linked immunosorbent assay and DNA analysis have helped identify ancient diseases and find *Schistosoma DNA* fragments in a 2000-year-old mummy [86].

Additionally, the Nile contains several species of parasites that infect human beings, causing lifelong illnesses and health problems that need effective medical treatment beyond the contagious diseases and annual pestilences spread by the flood. Ancient Egyptians also suffered numerous epidemics and tomb art often described pestilence and death in years when the Nile inundation failed. A mere exposure to air was perceived as pathogenic and a cause of sickness since bad air could carry, like today, pestilences, bacteria and viruses called at that time 'demons'. Among the infectious diseases the smallpox was localized in the skin lesions of Ramses V's mummified remains on his face and trunk. There is also evidence from the ancient period that tuberculosis, caused by a mycobacterium, afflicted the Nile Valley inhabitants and other prevalent afflictions were arthritis, osteomyelitis, diarrhea, dysentery and periostitis [87].

Health Management in Greece

Egyptians irradiated their prestige and cultural authority, leaving an undeniable mark upon almost all aspects of ancient Greek life, especially on medicine. Homer (ca.s. IX B.C.) already recognized in *The Odyssey* [88] (IV, 219) that they were more skilled in medicine than in any other art and thus, their conceptual systems, the transmission and diffusion of their empirical knowledge progressively



Figure 10 Disabled Egyptian individuals: Seneb and his family, limestone sculpture, IV Dynasty, 2686-2181 BC (Cairo Museum)

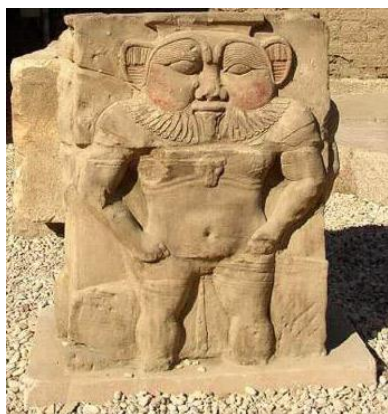


Figure 11 Naked dwarf-male god Bes, high relief (Denderah Temple, Egypt)

extended to other countries beyond their boundaries [89, 90]. Local governments in the Greek city-states, with a variety of political systems, democratic rule in Athens, monarchy and dictatorship in Macedonia and military dominance in Sparta, had not yet recognized the need for a public health policy. Nevertheless, their citizens started to discuss the right to live or die and the quality of life. They had approved euthanasia as a moral obligation for painful and incurable diseases or incapacitating physical disorders, using an efficient and bloodless manner, a quick-acting and relatively painless drug such as hemlock [91]. Abortion and infanticide were legal and eugenic solutions to defective newborns without any institutional guaranteed assistance. However, Athenians regularly maintained a number of degraded and useless human beings at the public expense to be sacrificed in case of public calamities. During the Thargelia festival in May, devoted to purification as an Athenian early harvest, two or three human outcast scapegoats or *Agnus castrum* were annually sacrificed, or once a year in other places to purify the cities, in the so-called 'expulsion of hunger', and to rid people of evils, plagues, famine or other public adversity [92]. Excommunicated six days before their execution, "they alone might bear the sins of all the people" [93].

For Plato (*Republic* [94], 408d-410b) pedagogical, therapeutic activities and laws were provided only for citizens who were in good mental and bodily condition, the State let those with birth defects die and executed those whose soul was bad and incorrigible. Individual rights and freedom were subject to authority power in order to protect public welfare. Egyptian courts, instead, offered roles to disabled and dwarf individuals (Figure 10) as priests and servants at the side of princesses, well attested in numerous scenes from el-Amarna [95]. Few real benefits could be obtained from them, but in their mentality, they did not conceive of leaving this kind of people out of society. The male god Bes (Figure 11), who mastered wild desert animals, and his female counterpart, Beset, a naked dwarf-lady, considered to be a princess, had also been connected with the Middle Kingdom at a very early date.

Although the Greek *polis* did not satisfy the requirements of a good water supply and public wastewater systems, people were genuine believers in living a healthy lifestyle and doing things in moderation. Physicians, "even if they belonged to a fraternal Asclepiad association, were free agents - free also to collect fees from patients and apprentices" [96]. Nevertheless, in view of the Greek doctors' scarcity and their traditional itinerancy, a city would pay one or more reputable, known, recommended and respected physicians, coming perhaps from a school of medical experts such as Cos, a fixed salary to ensure their public presence [97]. In Hippocratic deontology, though, the precept was to help the sick or at least to abstain from doing harm, to consider the patient's wealth and resources and even to give the services for nothing. But slaves and women did not share the benefits of freedom, equality, social welfare laws and moralistic medicine, although the Hippocratic corpus has a closely related group of gynecological treatises: *On the Nature of the Woman*, *On the Diseases of Women*, *Generation*, *On the Nature of the Child*, and *On Sterile Women* that often took literally references of Egyptian Papyri. Nevertheless, slave healing care was usually bad and frequently developed by slaves and untrained physicians using improvised methods. They ignored Hippocratic persuasion and the impact of physical activity or healthy food. They did not receive any medication or just took some pills to get on with their jobs, even though they felt ill. Therefore, they either improved or died (Plato, *Republic*, 405c-407a).

Regarding the factors of internal sickness, both cultures thought that suffering pain involved vengeance from the dead, the malevolence of enemies or a divine punishment for sins, related in Greece to a moral transgression or hereditary stigmas, the main cause of family and social contamination (*miasmas*). Every sin of earlier generations affected future generations and had negative consequences for society. Physical and spiritual impurity further highlighted human mortality and social attempts of purification allowed to avoid contamination and eradicated faults [98]. In this theory, certain diseases were caused by a miasma (μίαιμα = in

ancient Greek, pollution), a noxious form of 'bad air', also known as 'night air'. The origin of epidemics was due to pollution emanating from rotting organic matter, swamp vapors or sewage foul odors. Diseases were the product of environmental factors such as contaminated water, *effluvia* and poor hygienic conditions. Greek medicine associated putrefaction and the term *sepsis* with disease, in clear relation to stinking exhalations rising from undesirable substances. Disease and death were a major sources of contamination and ritualistic cleansing behaviors can be observed in the sacrifice act to prevent 'chains of contagion' because death begot impurity. The family and the environment became polluted, and they were afraid of being condemned to ostracism. They adopted corpse incineration to avoid contamination [99] due to foul odor arising from the dead. The miasma theory was eventually given up by scientists and physicians after 1880 and they accepted instead the germ theory, where specific germs caused a specific disease.

With no knowledge of the existence of microorganisms that invaded vital tissues, Greek doctors and philosophers did not realize about the existence of microorganisms that could invade the body and thought that the air was inhabited by daimōns (*δαίμων* or numen), supernatural and invisible beings, benevolent or guardian spirits associated with divine inspiration (Plato, *Cratylus* 398, *Euthyphro* or *Apology of Socrates*). Insanity and mental illness or disorders were punishments for a moral fault caused by supernatural powers or external demoniacal forces. Magic and superstition were the most suitable therapy, used by Egyptian and Greek healers, as certain passages of the Hippocratic source, *On the sacred disease*, despite its intention to fight false beliefs.

Different medical schools in ancient Greece, based on logic and philosophical principles better than an empirical method, applied a compilation of theories and a diverse collection of methods and beliefs. The rivalry between schools was the result of divergences of



Figure 12 Alcmeon of Croton (500-450 BC): mental activity centered in the brain (Greek ceramic)

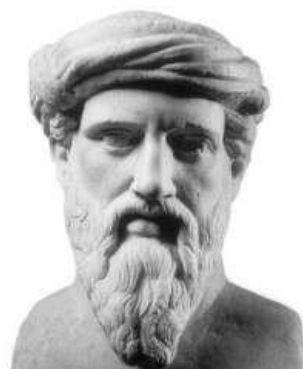


Figure 13 Pythagoras (571-495 BC) and vegetarianism, (Capitoline Museum)



Figure 14 Rod of Asclepius

detail but some of them usually rejected magico-religious medicine, sometimes vigorously attacked. Physicians, constantly expanding through new ideologies and trials, not have a uniform body of knowledge and practice. However the use of logical discussions, mathematics and science had an important influence on the development of ideas. The practice of observing patients began in Cnidus, the earliest medical school (700 BC). From 550 BC onwards, Greek physicians applied in medicine the rational thinking of great philosophers as the first philosophical branches in Sicily and Calabria did. The Pythagorean school, born in Ionian Greece, brought its theory of numbers into natural sciences and also in Crotona, where Alcmeon worked. In this sense, the 40-day period of quarantine to avoid contagion derived from the idea that it was a sacred number. This early medical writer and philosopher, Alcmeon (Figure 12), was the first to wonder about the possible internal motives of illnesses caused by environmental problems, nutrition and lifestyle. With remarkable perception, he very early established that mental activity was centered on the brain and considered two types of blood vessels, one of them empty after death. Unfortunately, the intuitions and ideas of this closed intellectual circle were soon cast into oblivion. Socrates, another independent influence, promoted an alternative teaching method of asking questions and Hippocrates made progress in systematic clinical medicine, studying the disease by patients' direct physical examination.

Among ancient Greeks, eating sacrificial meat was a political act, rejected by some sects such as Pythagoreans and Orphics, who postulate vegetarianism. Pythagoras (Figure 13) considered it a sin to kill animals for food, living beings with their own souls, and proposed an ascetic life-style characterized by frugality and abstinence to regain immortality lost by divine punishment. The habits of flesh-eating men stimulated ferocity between human beings and consuming perishable animal food could contaminate or spoil health [100]. On the other hand, eating meat clouded the reasoning faculties.

Greek methods to improve effective health care

Greece had two types of physicians: first, the priest-physicians who lived and practiced in Asclepius' sanctuaries, the god of medicine wearing Egyptian sandals, and second, a roving physician group uniformly male. Both exercised their distinct functions in sharply different ways, even if they shared the same god and had to prove themselves in a competitive and roving market. Their diagnosis on the basis of symptoms emphasized treating the whole patient-mind, body, spirit and environment. Dietary rules and ecological conditions such as air, location, climate, season were fundamental to medical teachings at Cos and Cnidus. Nevertheless they refused to tie medicine closely to philosophical and cosmological principles, considering it better to take an interest in prophylaxis, the patient's psychology and mental condition.

In spite of their apparent period of enlightenment, many doctors would still appeal to their Gods if treatments were not effective, and patients, in this case, could turn to the divinity's healing power. Sufferer had to eject their sin through a purification process, visiting deities' shrines where they could listen to hymns and relax on the holy grounds until they laid down at night in the *a-baton* ('not to be walked

upon'), a holy place or sacred hall. They spent the night asleep and holy snakes would be freed to cure them. The Asclepius rod or staff (Figure 14), a feature piece of traveling physicians, remains a symbol of cure and medicine and had only a single snake, while the caduceus or wand of Hermes had two entwined reptiles. It is the staff carried by Hermes and by heralds in general in Greek mythology and the two entwined serpents are sometimes surmounted by wings. In Roman iconography it is carried in the left hand of Mercury, the messenger of the gods, guide of the dead and protector of merchants. It provided the basis for astrological symbol representing the planet Mercury and in astrology and alchemy comes to denote the elemental metal of the same name. "Sometimes, no doubt, priests gave the patient opium and similar drugs to produce dreams" [101], to relieve pain and as a sedative, combining iron, hellebore, squills, lime and even hemlock for the same purpose. Disease was apparently diagnosed there partly on dreams and divination and partly on pathological symptoms. Sick waited to receive advice from god, who would visit them in a dream and prescribe the remedy or would appear either in person or in the guise of the sacred animals kept at the temple often a snake or a dog which would lick the afflicted part of the suppliant's body [102]. Thus, Hippocratic medicine adopted Egyptian incubation, their accurate observation of reality as well as universally applicable theories.

The most famous of these sacred buildings, very successful, was the sanctuary of Epidaurus in the Peloponnese (Figure 15), a religious site of pilgrimage, organized as a healthy spa, gymnasium, public baths and sports stadium. Cures included rituals and spells and also fasting, food, drugs and exercise. Pure air, cheerful surroundings, proper diet and temperate habits were advocated and among other methods of treatment were: massages, sea-bathing, mineral waters, purgatives and emetics. In this context, thinking or 'exercise' the mind was the most important soul recreation for philosophers [103], utile to preserve health.

Temples were also well-known ancient Greece medical schools; many of them were located throughout the Mediterranean, from Trikkis in Thessaly to the island of Cos. A spirit of emulation prevailed and a high ethical standard was attained. According to a later legend, Hippocrates (Figure 16) was descended from the god Asclepius and was brought up in the temple/hospital of Cos, related to Tessaly [104] as the son of a renowned priest-physician. The relationship between Greek secular medicine (represented by Hippocrates) (Figure 16) and religious medicine (based on faith healing and magic) is difficult to discern, although they were apparently not as antagonistic as they are considered today.

Survivals from the past became psychological realities and obvious facts: the tendency to follow pre-established convictions and rules and the belief in women's inferiority were prejudices and ideas of the society at that time. This is not to deny that Greek culture also accommodated magico-religious forms of therapy. According to Dodds [105], Hippocratic medicine was not entirely rational because it showed rationalized vestiges of ancient thought. In the Hellenistic period, Greeks believed in the therapeutic efficacy of divinity as well

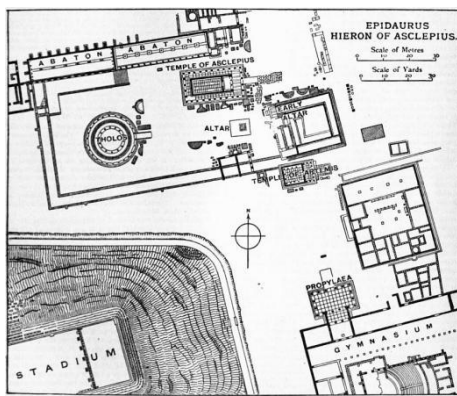


Figure 15 Abaton in Epidaurus, Peloponnese

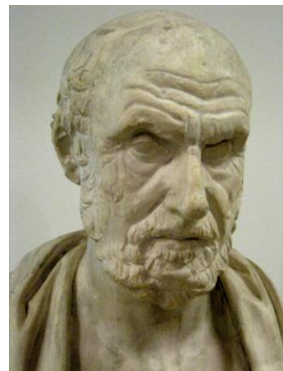


Figure 16 Hippocrates and humoral theory (British Museum)

as human laying on of hands, in the healing power of statues and amulets and in the curative sleep or ritual incubation performed in more than three hundred temples dedicated to Asclepius, scattered throughout the country. It would be better to consider that it was a pre-scientific medicine with an archaic mentality, as revealed by the excrement use. Thus, this medicine is rational when it was compared with that magico-religious, but remains irrational compared to a more refined scientific practice.

However, the Hippocratic School (ca.440 BC) was very important because medicine, not yet a definable subject, linked to philosophy and the ritual practice and discarding incantations (Theurgy), was only just established as a professional discipline in its own right. Since then, the Hippocratic Oath has been a vow taken by medical students when they became qualified doctors. Physicians were considered, at the same time, not only as practitioners of a skilled professional but also as followers of a religious tradition, serving as temple healers. Students had to pay a fee to enter the school, including oral teachings and practical works and were taken under their teacher's wings as assistants. Nevertheless, their low status in society as craftsmen rather than experts was due to the fact that their work required their hands much more than the application of their minds, and for this reason, they included philosophy [106].

He and his followers adopted the four-element theory (Figure 17) to explain the natural world proposed half a century before by the philosopher and physician Empedocles of Agrigentum (490-430 BC). In consequence, Greek medicine began to revolve around the humoral theory and the balance of four fundamental senses of humor as well as the individual's harmony with the environment. This false doctrine, surviving for nearly 2000 years, was astonishingly popular and long-held, lasting from the 5th century BC until the chemical revolution and science development (17th century AD).

Strictly speaking, a number of Cnidian School treatises were purely empirical and monotonous, especially concerned with the general localization of disease and the micro-macrocosmic philosophical system. The substantial basis was the *wxdw*-pain, known thanks to contacts with Greek mercenary settlements and military colonies in the Saite Dynasty and, step by step, through various Greek systems, they arrived at the Greek concept of *perittomé*. At that time, the economic, military and political relationships between Greece and Egypt were intensified with these Greek settlements in the Delta region when Saite Pharaohs faced a cultural and artistic renaissance in Egypt, recopying ancient medical papyri, among others. New concepts and Egyptian influence passed geo-political boundaries and Egyptian art was reflected upon Archaic Greek style (Figure 18) while Ionic philosophers became popular following Egyptian thought. Meanwhile, Egyptian gastrointestinal residual theory also gave many important clues to Coan humoral doctrine. The medical sciences emerged now in Greece and, under this important influence, their written texts were presented in the favorite Ionic dialect, even in the Doric area.

Coan documents put less emphasis on therapy and more attention to evaluating individual cases and patients' sensitivity. Without reaching the concept of noxious humor, Cnidian etiology emphasized the gross

imbalance of body fluxes, as in chapter VII of *Airs, Water, Places*, where they came from the head, upsetting the stomach. Gradually, the doctrine evolved until established that the balance of the body's four basic fluids or humor (*eucrasia*) was essential for good health and that imbalance (*dyscrasia*) provoked illness. However, this theory progressively lost influence over the centuries until it was abandoned because it was found to be false and was mainly an obstacle to medical practice.

In a sense, Hippocratic medicine was a vigorous rational technique that followed and re-elaborated Egyptian precepts. His practitioners were advised that "Examining the body required sight, hearing, smell, touch, taste, reason (Epidemics VI, 8, 17) and the understanding of actual facts. Nevertheless, the Greeks' reliance on palpation was much more restrained than the aggressive Egyptians 'touch' in wounds and, when feasible, it was complemented with auscultation (On Diseases II, 61). Scrupulous observation and organization of different elements and symptoms were applied to elaborate a method of control, reminiscent also of Plato's theory, "to make a synthesis of all data concerning an illness in order to determine the similarities", then new differences would be outlined to arrive finally at a unique similarity (Epidemics VI, 3, 12). By means of prognosis and after examining the current phase symptoms and signs, the past and present state of disorders were established to predict the disease course and facilitate treatment decisions, before careful questioning of the patient. Hippocrates, widely considered as the founding father of medicine, dominated and influenced clinical medicine, modern pathology and biology with his theories of disease, cure and physiology until the 18th century. Therefore, Greek physicians also included a preoccupation for the first noticeable symptom, a significant factor in causing disorders, and they controlled different body fluids: blood, saliva, phlegm, sweat, pus, vomit, sperm, feces and urine. Hippocrates identified two distinct networks of arteries and veins in the cardiovascular system and also believed that the liver and spleen were the central organs within which blood traveled to the heart to be warmed and cooled by the air entering the lungs and the heart via the trachea.

For the first time, Greeks established differences between acute and chronic wounds, calling them 'fresh' and 'not healing', respectively. Not internal surgical operations were initially performed, but the treatment of war wounds, produced often in the fighting between Greek states, gave doctors vast experience in practical first aid. Internal surgery was practiced as early as the 5th century BC, in cases where there was no pre-existing internal break. An operation to remove pus in the pleural cavity was made by the insertion of a draining tube between ribs (open drainage) (On Diseases II, 47). Celsus, in his 7 book, highlighted Alexandrian surgeons of the Ptolemaic period in Egypt again and listed cases of umbilical, inguinal

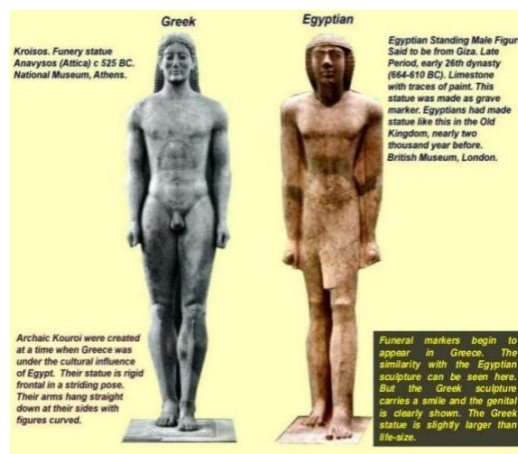


Figure 18 Influence of the Egyptian art reflected upon Archaic Greek style

or scrotal hernias and tonsils removal, surgical incisions to take off urinary stones from bladder, the replacement of rectal prolapse, etc. They used vinegar or wine as traditional antiseptics with acetic and malic acids of bactericidal power. Special drugs, called 'enhemēs', were sprinkled by Greeks, particularly on fresh wounds (antiseptic styptic liquids and powders), often made of zinc oxide with lead powder, of lead oxide, of copper oxide with copper sulphate or of alun. Their bandages were linen cloths soaked in wine or a leaf-covered sponge or wool pad, dipped in oil and wine, and often with various poultices [107] due to their practical experience, such as gym trainers. Some similarities between Egyptian and Greek physicians' therapeutics were noted. They made limited surgical incisions, used sutures, achieved hemostasis or tissue destruction by cautery and made some attempts at disinfection. Some of these principles came from Egyptian medicine, especially the use of honey and grease on open wounds.

Even if they ignored the concept of microorganisms, infection or lymphatic system, Greek surgeons identified suppurative infections in external wounds with the subsequent local spread of pus, today known as *sepsis*. It was produced by decomposition of mistreated tissues, by leakage of blood or by afflux of fluids. Instead, in abdominal abscesses, a blood accumulation or stagnation in the area was supplemented by the displacement of phlegm. An increase in black bile produced physical blood changes. Nowadays, systematic inflammation diminishes the oxygen saturation of venous blood in the processes and the absence of pyogenic response may indicate immunodeficiencies, even in the context of malnourished, elderly or weakened patients.

Although it seems paradoxical and apparently ambiguous, Hippocratic suppuration could have had a benign healing process or a harmful bad prognosis. Related to *pepsis* and *sepsis* concepts, both represented the organic matter decomposition or disintegration, a natural biological progression. As nowadays, *sepsis* implies infection, 'bad odors' in the colon and toxic side-effects of putrefaction, associated with death like Egyptian *wxdw* and also with stinking swamps or rotten organic matter (*miasmas*). *Pepsis*, moreover, was closer to 'firing', 'maturation' and 'fermentation', related to the digestive course in the stomach and the production of wine, vinegar and other ferments. Pus was interpreted as an adequate evolution of the process because suppuration helped to destroy necrotic tissues and its total absence was an ominous sign due to defective humor maturation.

During the 4th century BC, Chrysippus of Cnidus, one of the physicians trained in Egypt and educated in their apyogen surgical techniques, discovered the use of hemostatic dressing as well as other bloodless methods, adopted later by Herophilus and Erasistratus, but also venesection and cautery with caustic substances to promote pus appearance, now considered deleterious [108]. Nevertheless, due to the increasing importance of philosophical principles, surgeons lost

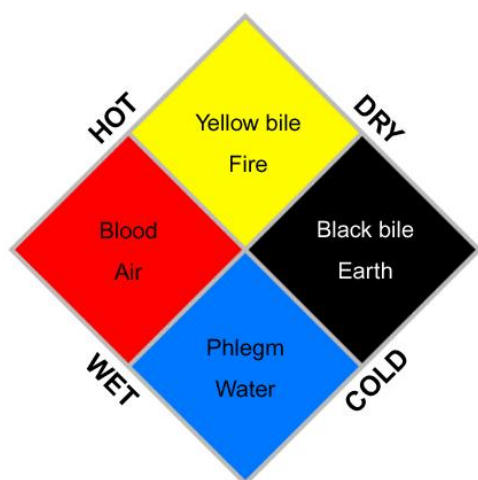


Figure 17 Hippocratic four-element theory

prestige and reputation, limited to a craft skill sector and manual practices. Separated from the physician's aim, focused only on diet and gymnastics, medicine gradually became a speculative philosophy and the barber-surgeons, without any anatomical knowledge, gained their experience through practice. In 280 BC, a Greek barber invented a pus-extractor or abscess-drainage, called today syringe (*pyúlkos*), in order to drain purulent foci; surgical practice disappeared a little later [109]. Until Paracelsus, who claimed against the pus *bonum and laudabile*, and Ambroise Paré (1509-1590), who decided to put an end to the indiscriminate pus production, medicine in Greece could not offer appropriate surgical management of infected wounds.

Egyptian ingredients appeared in several Hippocratic drug prescriptions, especially in gynecological treatises, which continued the strong tradition of Pharaonic medicine, but they did not specify the amount of ingredients meticulously as the Pharaonic physicians did. Around 300 BC, Alexander the Great founded the city of Alexandria in Egypt and, unifying the two tendencies, became a vast center of education, learning and medical research [110]. Greeks imported Egyptian substances into their *pharmacopeia* and the influence became more noticeable there. Finally, scientific anatomy was developed, intensifying the study of human bodies and forgetting traditional Greek taboos.

Conclusions

There are important similarities and divergences to score between both cultures: they employed the same scientific and rational systems for the patient's therapy, use the same drugs and medicines, had similar sickness concepts related to magic, punishments or sins, developed of anatomical inferences without dissections and similarities about pregnancy tests or dreams interpretations [111]. Notwithstanding, some of the modern practices originated in Ancient Egypt first, like the ability to control the pulse fluctuations and monitor heart rate and apply empiricism, logic and rationality to provide prognostic information, while other Greek medical concepts have partially disappeared.

The Egyptian State offered qualified treatment, medical research and a free, general, accessible public healthcare system to the community, being denied for Greek authorities. Defective newborns and slaves were frequently poorly medically treated and euthanasia was imposed for incurable or incapacitating diseases.

Each Egyptian physician, highly skilled, used to treat one kind of sickness only, giving rise to the division of medical knowledge into specialties, still in force while in Greece, instead, different schools developed a diversity of useful methods but their intellectual intuitions were soon cast into oblivion and they collect fees from patients as the present time.

Artificial prosthesis in Egypt was probably the earliest known, disregarded in Greek practices.

Egyptians proposed a brilliant hypothesis for internal diseases: self-intoxication with *wxdw*, pathological gastrointestinal residuals of indigestible meals, employing a prophylactic method to eliminate them through emetics, purges and enemas for three consecutive days every month and for the corpses a therapeutic process of mummification and embalming. Greeks adopted cremation to avoid dead bodies' contamination and Coan humoral doctrine took important information from Egyptian gastrointestinal residual theory [111].

The phenomenon of *sepsis* in traumatic lesions with local suppuration and systematic infection was well identified in Ancient Egypt, understanding the direct relation between trauma and infection and giving rise to modern surgery. Thus Egyptian physicians "were pioneers recognizing and counteracting infected chronic wounds, finding appropriate treatments, *establishing the bases for the Western semiology method to deal with septic patients*" [110]. Greeks, instead, considered the problem as a benign pus and an adequate evolution of the process. The Greek humoral theory, which survived until the 17th seventeenth century AD or more, was also found to be false.

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