Practicing Medicine in Ancient Egypt

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Let us start by imagining what Albert Einstein called a "thought experiment." It is the year 5015 CE and an excavation of an ancient hospital, ca. 2016 CE, uncovers an ancient book, written on paper rather than on the current electronic device. Although the book is in poor condition there is a partial hieroglyphic title, transcribed by an Egyptologist and a paleopathologist as *Merck Manual*. The book seems to be a compilation of disease descriptions and treatments by a long forgotten Dr. Merck. The diseases are difficult to decipher in an era when humans live to the age of 150 and die only when aged organs fail. It appears that the body could be attacked by minute parasitic organisms, visible only with an ancient tool called a "microscope." Some cells appear to have taken on a life of their own, destroying the body by causing diseases known by a variety of poorly preserved terms such as "cancer" or "neoplasm."

The task of our future paleopathologist is analogous to that of the difficult undertaking of deciphering ancient Egyptian medical papyri. There are a number of surviving papyri, in various degrees of completeness, which have been studied by physicians and Egyptologists. They have done remarkably well, particularly in that the writing is mostly in the difficult hieratic rather than hieroglyphic text. The modern names for the papyri are either for the original buyer or the institution in which they are housed.

Who were the physicians? There is a distinction between the embalmers, who removed organs without any real anatomical study, and the early Egyptian physicians, who developed empirical (and often magical) symptom-based treatments. The one whom we know the most about is Imhotep, the chief architect to the Egyptian pharaoh Djoser (reigned c.2630 - c.2611 BC). Imhotep was responsible for the world's first known monumental stone building, the Step Pyramid at Sakkara.

A commoner by birth, Imhotep's intelligence and determination enabled him to rise through the ranks to become one of Djoser's most trusted advisors. Imhotep's influence lived on well after his death. In the New Kingdom he was venerated as the patron of scribes, personifying wisdom and education. During the Late Period he became a local god at Memphis, where he was glorified for his skills as a physician and a healer. He is said to have extracted medicine from plants and treated diseases such as appendicitis, gout, and arthritis. Served by his own priesthood, he was considered to be an intermediary

between men and the gods. It was believed that he could help people solve difficulties in their daily lives and cure medical problems. When the Greeks conquered Egypt, they recognised in him attributes of their medicine god Asclepius and continued to build temples to him. His reputation lasted until the Arab invasion of Egypt in the seventh century CE. Of course, he was literally reborn twice by Hollywood**,** first by Boris Karloff in 1932 and then in a 1999 sequel.

The Ebers Papyrus tells us of three types of medical professionals: the doctor (*swnw*), who is a secular physician; a priest (*wab*), who is a healer; and a magician (*sau*). Egyptians believed that disease or pain was the effect of hostile divinities or demons, and that a cure could be achieved by magical or religious incantations. As effective remedies were found, a more rational approach developed. The oldest mummy of a physician was discovered recently. Qa'ar, a priest and "chief physician of the secret of the palace," lived during the 5th Dynasty.[1] When Herodotus visited Egypt in 450 BC, he noted that Egyptian medicine was that of specialists, in "diseases of the eyes, others of the head, others of the teeth, others of the stomach, and so on…."[2] The chief of dentists, Khuy, combined dentistry (*ibhy*) and proctology, "guardian of the anus" (*neru pehut*). A physician who specialized in internal medicine is known to us, studying "organs of the body that are hidden from sight." There are records of as many as 150 *swnw* in pharaonic Egypt, and records of how physicians were paid through a barter system regulated by the state. Salary was rations of cereal, bread, and beer, the ingredients of a basic diet. Most physicians were in the middle class, along with priests, scribes, and skilled workers, with some attached to the royal palace being elevated to the upper class.

Training of physicians was by instruction within the family and by schools and apprenticeship. There was little knowledge of anatomy or physiology. The function of the brain was unknown. Thought and emotions were believed to be centred in the heart, which was not removed in the embalming process. The circulation of blood was not known and a general term, *metu*, included arteries, veins, nerves, and tendons. The funerary ritual included the belief that the heart was weighed by the god Thoth against the feather of truth, *maat*. If the heart was heavy with sin, the deceased was condemned to the lowest level of the underworld, populated by three-headed crocodiles and other monsters—an exceedingly unpleasant place to spend eternity. "Houses of life" (*per ankh*), perhaps a type of medical school or library, were attached to temples and teaching was somewhat harsh. An Old Kingdom Maxim says, "A boy's ears are on his back—he listens when he is hit."

Figure 1: An Egyptian physician of the 18th Dynasty (1500-1400 B.C.E.).

Medical practice did have similarities to the present, with history, examination, laboratory studies, diagnosis, and prognosis. Thorough questioning (the history of the present illness, or HPI) was followed by examination of the body (physical examination, PE), utilizing palpation, the sense of smell, and checking the pulse, although it is unclear if the significance of the pulse was known. Study of the urine, excrement, and expectoration (laboratory results) followed. Set phrases were used: "If you examine a man having…" "You will say what is the matter with him; a patient who suffers from…" Treatment was based on prognosis, with three general statements: "A disease that I will treat;" "A disease that I will contend with;" or "A disease that nothing can be done about."

Ancillary staff appears to have been limited to massage therapy and nurses, for wet-nursing or child care. Although midwives must have existed, there is no Egyptian word for midwife and no medical papyri for childbirth. We have some titles for a number of specialty practices in ancient Egypt, such as dentists and ophthalmologists, but there are none for gynecology or obstetrics. Medical care of women was probably conducted by women, perhaps specialized midwives. The papyri do list many tests for fertility, pregnancy, and the sex determination of the unborn child. An example is moistening the seeds of barley and emmer with a woman's urine. Growth of all would indicate pregnancy, growth of barley would indicate a male, growth of emmer a female, and no growth would indicate that there was no pregnancy. Modern tests have shown that this test was not valid.

The papyri say little about labor and delivery other than a few incantations to hasten birth. A variety of drugs are listed for contraction of the uterus. There appear to be early descriptions of

complications of delivery such as fistulas (abnormal connections) between the vagina, rectum, and urinary bladder. Information about treatment of the neonate includes prognostic indicators for survival.

Medications used in ancient Egypt were aimed at symptom relief rather than cure, since the cause of most diseases was unknown. Similar drugs were used well into the nineteenth century. In contrast, modern treatment is directed at cure. Magic played a major role and may have provided a placebo effect. There are many entries in the medical papyri for dietary items but these appear to have been intended for therapeutic use rather than dietary correction.

Little is known about how raw materials for drugs were collected. Animal products were taken from farm or domestic animals but those from wild animals, such as crocodile excrement, must have presented certain issues. Mineral products were readily found in Egypt and drugs were prepared from a wide variety of plants. There were no pharmacists, as medications were prepared by the *swnw*.

The remedies were usually introduced by the phrase, "You shall prepare (*ir*) for him…" followed by instructions for grinding, mashing, straining, or cooking.[3] Active principles were extracted by solution in water, alcohol, or oil and administered in water, honey, milk, oil, wine, or beer, measured by volume rather than weight. The smallest volume was a *ro*, about 14 ml, or a mouthful.

The most common route of administration was oral. Drugs were also given by enema or suppository into the rectum. Gynecologic papyri indicate a number of remedies and suppositories to be placed in the vagina and many medications were applied directly to the skin. Fumigation, inhalation, or sitting on burning medicine was also used.

Figure 2: A medicine bottle, "Saw dust, acacia leaves, galena, goose fat. Bandage with it."

Although hundreds of medicinal items are in the medical papyri, many have not been translated and the diseases for which they were intended are often obscure. An example is the castor oil plant, as in several entries in the Ebers Papyrus:

> a) One crushes its roots in water, to place on a head which is sick: he will then become well immediately, like one who is not ill.
> b) A little of its fruit (beans) is chewed with beer by a man with *wehi*-condition in his faeces. This is an elimination of disease from the belly of a man. . . .
> d) Its oil (merhet) is also prepared from its fruit (beans) to anoint [a man] with *wehau*-skin disease . . . . which is painful. . . . Really excellent, a million times.[4]

Some remedies contained as many as thirty-seven items. It is unclear whether an item was an active principle, a vehicle, or simply added for taste. Honey, for example, might work for all three categories. Many drugs, such as *djaret*, were used so extensively that it is not possible to determine what it was or for what it was intended. Many substances were also used for supposed magical properties. There is one instance of an effective drug that was probably administered accidentally. Tetracycline was found in the bones of a mummy from the Roman period Dakhleh Oasis site. It is possible that the antibiotic was formed in beer brewing by contamination with an airborne fungus and then ingested with the beer.

Drugs of mineral origin are more easily identified. Natron (*hesmen*), used in mummification, was widely available and as a paste was used for drawing out fluid and reducing swelling. Common salt, a mild emetic (inducing vomiting), had a wide use, being taken orally, by enema, or applied locally to the eyes, ears, and skin.

Malachite, a green pigment, was used cosmetically and for eye diseases. The green color is due to oxidized copper and would inhibit the growth of *Staphylococcus aureus*. The Ebers Papyrus prescribes it for a burn that had become foul. Many other listed minerals are insoluble in body fluids and would have had no effect.

There was a wide variety of drugs of animal origin. Honey was used in hundreds of remedies, especially in open wounds, where it would inhibit bacterial growth. Milk and urine were mostly used as a vehicle. Excrement and blood was used from many species, including cat, ass, bird, lizard, crocodile, fly, and human. Most were applied externally but it is hard to see any benefit. Placenta of cat was recommended to prevent hair from turning gray. Cow or goat bile was used for human bites and for eye issues. Animal fat was used in making greasy ointments and also to transfer some desired property of the animal. Meat was applied to wounds the first day, probably to aid clotting. Liver and other organs were prescribed but for untranslated disorders.

There are about 160 herbal remedies that have been identified but again there is little agreement on what diseases were being treated. There is some evidence of narcotic agents but none as to their medical uses. Cannabis (hemp) was used in making rope and its medical application is occasionally seen

in the papyri but without mention of an effect on the nervous system. The most effective pain medication was probably beer or wine, and intoxication was well known.

The word for cough, *seryt*, is well understood. There is no evidence of the use of opiate suppressants but the use of honey—a component of modern cough drops—and dates would have provided some relief. There were many remedies for the gastro-intestinal and urinary systems, although the distinction between the two is often unclear. The treatments generally do not define the illnesses, and the large number of remedies suggests that none were efficacious.

The little information in the papyri on surgery in ancient Egypt indicates that it was largely related to trauma. No surgical instruments have been found. A wall relief on the temple of Kom Ombo shows a number of instruments that may have been for surgical or household uses.

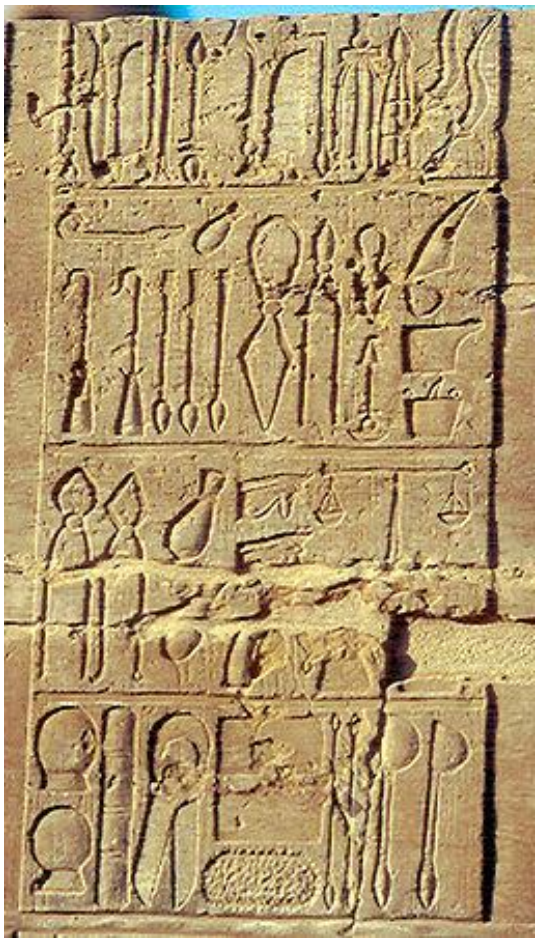

Figure 3: Medical instruments depicted on wall of temple at Kom Ombo, Ptolemaic period.

One clear diagnosis of a case that would presently be treated surgically, an umbilical hernia, is in the Ebers Papyrus. “A swelling of . . . his abdomen above his umbilicus . . . which comes forth when he

coughs. . . . You treat it like the *sahemem* treatment."[3] Unfortunately, the translation of that treatment is not known. Umbilical hernias are clearly depicted in some tomb reliefs. Circumcision of an adult male is shown in an Old Kingdom tomb and the hieroglyphs indicate the use of some pain medication, the nature of which is unknown. Evidence of orthopedic surgery is seen in a mummy with a prosthetic toe**.**

Figure 4: The Edwin Smith Papyrus.

The Edwin Smith papyrus consists of forty-eight cases of trauma, starting at the top of the head and proceeding down to finish with a spinal injury. The usual treatment for a wound was initial bandaging with meat, followed by oil and honey, which would lessen swelling and inhibit infection. Bacteria do not grow in honey, which is why the honey in your kitchen is not refrigerated. Stitching was recommended in appropriate cases and needles survive made of copper and silver. Infected wounds (with "ruddy lips") were treated with herbs and green pigment, a copper salt that would have had some anti-bacterial effect.

The treatment of fractures and dislocations are well described and many mummies and skeletons show good healing. One remarkable case is that of the Pharaoh Seqenenra, whose mummy shows several

ax wounds incurred in battle. X-rays have shown signs of early healing, indicating survival of at least a few months.

Snake bites were much feared and the Brooklyn papyrus has an extensive listing of types of snakes, clinical effects, and prognosis. Treatment was primarily local, with the addition of magical incantations. There are many remedies containing onions for snake bites. The papyrus also notes bites by scorpions (but the treatment section is lost), crocodiles, and humans.

Various materials are recommended for contraception, all to be placed in the vagina. Some, such as crocodile excrement, might have been to discourage the male! Crocodile dung is actually slightly alkaline, like modern-day spermicides, so it could have worked.

The eye plays a major part in Egyptian mythology. The eye of Horus was torn out by Seth and magically restored, as the *wedjat* eye as a symbol for protection and cure**.** While there is no evidence of eye disease in mummies, there are many representations of blindness, particularly of harpists. Ophthalmologists were *swny irty*, doctor of the eyes. There were many remedies for various conditions, including blindness, cloudiness and darkness (presumably cataracts), trachoma, foreign body removal, and other words that have not been translated.

Figure 5: The Blind Harpist.

Although ancient Egyptians suffered all of the dental ills seen in modern populations, including attrition, caries, abscesses, and periodontal disease, and the word for dentist is *ibhy*, there is little in the papyri about dental operative techniques. A few remedies for strengthening the teeth are seen but the pathology is not clear and the application of herbs or honey was not likely to have been helpful. There is one example in a mummy of a dental bridge, dated to 2,000 BCE. Dentists used gold wire as a means to bind a loose tooth to a neighboring tooth that was sound. Patients could have their jaw bone drilled in order to drain an abscessed tooth or teeth. Teeth were filled using a type of mineral cement, and gum disease was also treated by using myrrh and other antiseptic herbs.

Egyptian medicine appears to have been static for over 2,000 years, from the Old Kingdom until the influence of Greek medicine. In 331 BCE the new city of Alexandria became the major cultural and scientific center of the Greek world, including a medical school. Greek medicine essentially supplanted that of ancient Egypt when the Greek physician Herophilus moved to Alexandria in the third century BCE and began the modern studies of anatomy and physiology. Although the Romans ruled Egypt after 31 BCE, Greek language and medicine remained dominant. Coptic Christianity was established early in Egypt and medicine remained predominantly Greek until the Arab conquest of 641 CE. The language of ancient Egyptian and its medicine was lost until the nineteenth century decipherment of hieroglyphics by Champollion. Our understanding of ancient Egyptian medicine remains an ongoing process.

NOTES

1. Bruno Halioua and Bernard Ziskind, *Medicine in the Days of the Pharaohs* (Cambridge, MA: Harvard University Press, 2005), p. 10.
2. Amy Ione, *Art and the Brain: Plasticity, Embodiment, and the Unclosed Circle* (Leiden, Netherlands: Brill, 2016), p. 38.
3. John F. Nunn, *Ancient Egyptian Medicine* (Norman, OK: University of Oklahoma Press, 2002), p. 139.
4. Elizabeth Anne Jones, *Awaken to Healing Fragrance: The Power of Essential Oil Therapy* (Berkeley, CA: North Atlantic Books, 2010), p. 187.