Original article

Was Akhenaten really sick?

Akhénaton était-il malade ?

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Abstract

The depictions of Akhenaten have long interested medicine and above all endocrinology because of the eunuch gynoid morphology of this pharaoh. These depictions call to mind various diagnostic hypotheses that have been successively considered as endocrinology progresses, with emphasis on the three diseases recently identified (gynecomastia family, Kennedy’s disease, and fertile eunuch syndrome), which are compatible with the now proven fertility of Akhenaten.

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Résumé

Les représentations d’Akhénaton ont depuis longtemps intéressé la médecine et surtout l’endocrinologie en raison de la morphologie gynoïde ou eunuchoidé de ce pharaon. Nous rappelons les diverses hypothèses diagnostiques envisagées successivement avec les progrès de l’endocrinologie en insistant sur les trois maladies plus récemment identifiées (gynécomastie familiale, maladie de Kennedy, syndrome des eunuques fertiles) compatibles avec la fertilité maintenant prouvée d’Akhénaton.

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There is no shortage of medical interpretations concerning the androgynous morphology of Pharaoh Akhenaten Amenhotep IV, a key figure in ancient Egyptian history, husband of Nefertiti and father of Tutankhamen.

At the beginning of his reign at age 10, his iconography shows a plump, chubby-cheeked young boy with no indication of anything out of the ordinary. Sculpture from this same period remains within the traditional canons which idealize the king. It is when Akhenaten replaces Amenhotep IV that images begin to evoke a eunuchoid condition or hypoandry along with gynoid fat and adipose muscle distribution and what appears to be gynecomastia (Fig. 1). Akhenaten had six daughters by his royal first wife Nefertiti, one child with a second wife Kiya, and a son, Tutankhamen, sired with one of his sisters, or with Nefertiti herself if she was the King’s first cousin, as suggested by the Egyptologist M. Gabolde (personal communication). His fertility has been irrefutably demonstrated by Z. Hawass et al. [1] with a DNA study of 11 mummies belonging to the immediate family of Tutankhamen, confirming he is indeed the son of the mummy from KV 55 tomb.

This parentage eliminates those attributed diagnoses, which all cause infertility. In particular is Klinefelter syndrome, or other sporadic endocrine pathologies, since several family members present an aspect of gynecomastia [2].

Endocrinology annals successively discuss the following diagnoses:

• acromegaly, described by Pierre Marie in 1885, because of the nutcracker chin which evokes a prognathism. Artists often give this characteristic to Akhenaten; however, it is the only morphological trait in various artistic images that belong to this disease;
• Babinski Fröhlich syndrome, reported in 1900, is due to a tumor in the diencephalon-hypophysial region. It is accompanied by considerable obesity, altered genitals, impotence and infertility. Akhenaten’s demonstrated fertility refutes this diagnosis;
• Barraquer’s disease (1906) and Simons disease (1911), or lipodystrophy, is characterized by a progressive and complete disappearance of the subcutaneous adipose tissue in the upper part of the body, contrasting with its development in the

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This fragment of a royal group from the Amarna period represents Akhenaten as seen by Dimitri Labourey. The gyroid morphology and development of the breast are clearly visible. © 2006 Musée du Louvre N831/Christian Décamps.

lower part below the umbilicus. Even if the face of Akhenaten appears emaciated, nothing indicates that there is loss of subcutaneous adipose tissue;

- Klinefelter’s disease [3], described in 1942, was the most frequent diagnosis mentioned due to the portrayal of its characteristic hypoandrogenism. The recent evidence of Akhenaten’s fertility can now exclude this diagnosis.

Given the recently proven fertility of Akhenaten, three other rare familial endocrine diseases having his observed morphology might be compatible:

- familial gynecomastia [4] is clearly depicted in several artistic renditions over four generations of the XVIIIth dynasty, such as Akhenaten himself, his grandfather, his father and his son Tutankhamen. This type of gynecomastia is caused by excess aromatase activity, an enzyme responsible for the conversion of androgens to estrogens C19. Excess estrogen production from androgens occurs in the gonads, but also locally in target tissues in general, and breast and fat tissues in particular. Hence the gynecomastia and eunuchoid aspect, without any male fertility anomaly. This pathology, an autosomal dominant transmission, is linked to a mutation of the aromatase (CYP19) located on chromosome 15 (15q21) [5,6];
- Kennedy’s disease can equally be considered since its symptoms include familial gynecomastia and post-pubertal hypoandrogenism which is a genetically determined X-linked disease. A classical neurological sign, such as muscle atrophy most often appears after the age of 40. Additionally, gynecomastia and post-pubertal hypoandrogenism are due to partial androgen resistance associated with a molecular abnormality of the protein with linked to protein androgen receptors. Depending on the molecular alteration, fertility may be normal [7];
- “Fertile Eunuch Syndrome”, described by Mac Cullagh [8], is characterized by a eunuch morphology contrasted with the persistence of spermatogenesis compatible with fertility. This syndrome’s physiopathology lies in a partial anomaly of LH action on those testicular cells responsible for the secretion of testosterone, while FSH secretion is normal, producing spermatogenesis. LH deficient activity has been recently identified at the molecular level [9]. Alteration of the molecular sub-unit beta structure of LH, thus, cannot normally activate the LH membrane receptor of the Leydig cell.

The fundamental question remains: was Akhenaten really sick? We have nothing to officially answer this question, but ancient Egypt’s iconography and statuary provide, nonetheless, interesting information:

- was Akhenaten’s and his family’s gynecomastia real?
  Two issues bring this into question:
  o some artistic representations show clearly male figures with definite breasts. The most famous are those of the gods “Hapi”, who are linked to the flooding of the Nile and are often seen holding the “semataouit” which symbolizes the union of Upper and Lower Egypt. These androgynous gods, linked to the flood, are symbols of fertility with their mammaries vividly illustrating that. On display at the Cairo Museum is the statue of the steward Irigadanen from the Saite period. Significant obesity and typically female breast development can be seen carved on a wooden panel relief representing a dignitary with the same characteristics. We find in these representations the same symbolism as in the gods previously cited: obesity testifies to their social hierarchical importance and breast development suggests, like a maternal figure, how they nourish those under their authority,
  o in classical statuary, numerous representations show human torsos with pronounced inframammaries emphasizing not pronounced breasts, but rather powerful pectoral muscles. This pseudo-gynecomastia is quite notable, for example, in the famous Mykérinos triads in the Cairo Museum or in Egyptian soldiers and Nubian archers in the same museum. It is likely that the new iconographic canons of Amarna have retained this characteristic physical power of the king;
- on a more general level, it is indisputable that the family of Akhenaten had some unusual morphological characteristics.
In particular, there is an elongated skull seen on X-rays of Tutankhamen’s skull as well as on Tuthmosis III’s mummy. This elongation has been deliberately exaggerated in depictions of Akhenaten’s family, especially his daughters, but also in Tutankhamen himself. We see this displayed in the Cairo Museum on the famous bust showing Nefertum under the guise of the young King out of a lotus flower. The shape of the skull is quite exaggerated relative to the reality shown in the X-rays.

In the same spirit then, could not Akhenaten have emphasized, or even created entirely this gyroid morphology seen in all the statues and bas-reliefs, in order to represent himself both as the father and the nurturing mother of his subjects? It is more difficult to find symbolism in his emaciated face, but it could part of the same gap within classical representations: firstly, the idealized features of the young King Amenhotep IV show, and for good reason, none of Akhenaten’s apparent deformities. Secondly, the Louvre has a human head (N 2289), evoking the Amarna style. The pierced ears, eyes, mouth and hollow cheeks all being reminiscent of Akhenaten. Obviously, the new style given to the statuary went beyond the confines of the royal palace, and sculptors began using them for other individuals.

These reflections do not claim to answer the question posed for decades by specialists concerning this pharaoh’s atypical appearance. We tried, in light of the recent contributions of molecular biology in endocrinology, to analyze the most probable pathologies. These pathologies, if indeed they existed, were tested against the expanding knowledge of Egyptology, thus allowing us to know about Egyptian art and its symbolism. In any event, we now know that while not a certainty, there is a high probability that the mummy’s tomb KV 55 is that of Akhenaten. We see that the dysmorphic features, real or fake, have not altered his fertility and left intact his capacity to be the ruler of one of the most powerful empires of its time, the instigator of a political and religious reform emphasizing the relationship between the King and the Solar Divinity of monotheism, and the inspiration for prodigious artistic creation.

**Disclosure of interest**

The authors declare that they have no conflicts of interest concerning this article.

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