

# Skin disease from Ancient Egypt to Renaissance Italy: A review of Mummies!

Kieron Leslie and Nick Levell, Institute of Paleodermatology, Norfolk and Norwich University Hospital, Colney Lane, Norwich, Norfolk NR4 7UZ, United Kingdom.

## Introduction

The ancient Egyptians believed that the bodies of the dead must be preserved if their souls were to live on in the afterworld. Other cultures from around the world also mummified their dead and occasionally corpses have been naturally preserved by favourable environmental conditions. This has provided us with a window on skin disease from the distant past. The largest resource of mummies is from ancient Egypt. The process of Mummification began about 2500 B.C. and became more refined through the centuries. It reached its pinnacle with Cleopatra VII (51-30 B.C.).

## Mummified Skin

The skin of mummified bodies has often been exposed to harsh chemical treatment and extremes of temperature. Many mummies were simply wrapped in clothing and left in pits or caves and left to be ravaged by environmental bacteria and fungi. Despite these factors, skin has often been well preserved. The skin tends to be shrunken and deeply pigmented and is very brittle on macroscopic examination<sup>1</sup>. There is preservation of both nails and hair and even epidermal ridging is observed. Preparation of mummified tissue for histological examination is modified from preparation of fresh tissue due to its altered physico-chemical properties. Initially the tissue must be rehydrated which takes between one to four days<sup>2</sup>. Haematoxylin and eosin staining is often used although it can be difficult as the eosin can stain most of the tissue non-selectively<sup>3</sup>. Many skin structures have been seen intact in mummified skin including the stratum corneum, keratinocytes, melanin, pilosebaceous units, collagen & elastic fibres, blood vessels & red blood cells and subcutaneous adipose tissue.



Figure 1: The Mummy of an Atacameño girl from Chile who died approximately 1000 A.D. She was naturally mummified due to dehydration in the desert soil. Note the excellent preservation of facial skin, eyebrows and scalp hair.

## Infections

The mummy of Maria of Aragon, Marquise of Vasto (1503-1568) in a Naples Abbey was exhumed in the early 1980's. She was famed for her beauty and moved in the same intellectual circles as Michaelangelo in Renaissance Italy. Examination of the mummy revealed a 1cm ulcer on the left arm (figure 4), which was dressed with a linen bandage<sup>4</sup>. Electron microscopic examination revealed spiral like structures typical of spirochetes at the base of the ulcer. Indirect immunofluorescence with anti-treponema pallidum antibody identified a large number of filaments with the morphological characteristics of fluorescent treponemes (figure 2). The authors concluded that the ulcer represented a luetic gumma of tertiary syphilis. Other bacteria such as corynebacterium<sup>5</sup> and mycobacteria have been identified by PCR analysis of skin DNA in mummies.



Figure 2: Intense positive immunofluorescence with Anti T pallidum.

Cutaneous viral infections have also been described, most notably the mummy of Rameses V (approx 1140 B.C.) showed evidence of smallpox (Figure 3). The mummy of a 2-year old boy, which dated back to the mid sixteenth century, had a diffuse vesiculo-pustular eruption<sup>6</sup>. The macroscopic and regional distribution suggested smallpox. Indirect immunofluorescence was positive with anti-vaccinia antibody. These findings were confirmed by other researchers<sup>7</sup>, who found particles identical to orthopoxvirus virions in the mummified skin. Fortunately the virus had lost its viability. Human papilloma virus has also been identified in mummies. Maria of Aragon (previously referred to concerning syphilis) was noted to have a pedunculated skin tumour affecting the right paravulvar region<sup>8</sup> (figure 4). Light microscopy revealed an exophytic skin lesion with thickened epidermis and less dense internal tissue with dilated vessels. DNA studies confirmed the presence of HPV type 18, which is known to have high oncogenic potential.

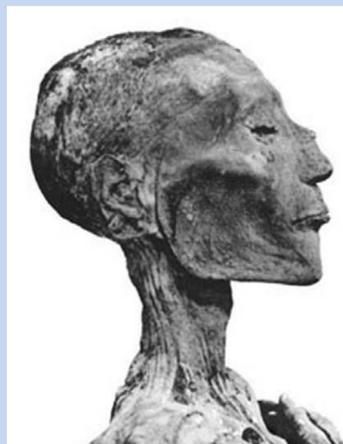


Figure 3: Mummified Head of Rameses V (Died 1140 BC) showing a pustular eruption on Cheeks thought to be due to Small Pox.

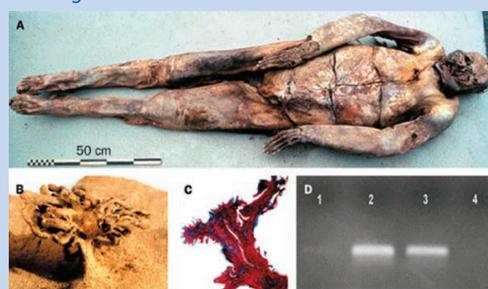


Figure 4: A shows the mummy of Maria of Aragon, note the ulcer in the upper left arm. B shows the pedunculated lesion arising from the right paravulvar region. C: Light Microscopy of Tumour x10. D: PCR products of HPV.

## Parasites

Mucocutaneous leishmaniasis is endemic around the Andes in South America. Figure 5 shows a mummy from the Chiribaya culture (1000-1250 AD) of southern Peru. The facial disfigurement possibly resulting from leishmaniasis<sup>9</sup>. This individual was also noted to be infested with head lice. Mummified royalty from Spain have also not escaped lice infestation<sup>10</sup>. Pubic Lice have also been found on mummies<sup>11</sup>.



Figure 5: A shows destruction of facial structures and closely cropped hair possibly due to lice infestation. B shows lice nits and eggs adhering to the hair.

## Tumours

A number of benign and malignant skin tumours have been seen in Mummies. A random sample of tissue taken from the heel of an Egyptian mummy showed a well-circumscribed dermal mass composed of whorled dark staining material<sup>12</sup>. A Masson's trichrome stain showed a small amount of fibrous tissue within the lesion and an iron stain was notably positive. The author made a tentative diagnosis of a possible histiocytoma. Figure 6 shows the mummy of a 14-year old boy. He was found to have a nodule measuring 4cm by 4 cm just below the right axilla; histology confirmed it to be a lipoma.



Figure 6: Image on left: nodule indicated by white arrow. Histological section (H&E) shown on right.

Malignant skin tumours have also been described. The Mummy of Ferdinando Orsini, Duke of Gravina in Apulia (died 1549) had a basal cell carcinoma affecting the internal orbit angle<sup>13</sup>. No doubt this arose from the long-term exposure to the UV-rich sunlight of southern Italy. The basal cell naevus syndrome has been reported in Egyptian mummies<sup>14</sup>. There have also been reports of possible malignant melanomas affecting mummies in Peru<sup>15</sup>.

## Inflammatory Dermatoses

There are very few cases of inflammatory dermatoses reported in the literature possibly due to the relatively poor epidermal preservation of mummified skin. As far as we are aware there are no reports of eczema or psoriasis except one case from 1904 tentatively diagnosing eczema from gross appearances in an American South West mummy<sup>16</sup>. Zimmerman and Clark<sup>17</sup> reported a case of an Egyptian mummy dating from 892 B.C. Subcorneal vesicles were found in inguinal skin although the back and scalp skin was spared. They made a tentative diagnosis of subcorneal pustular dermatosis. If the diagnosis were correct this would predate Sneddon and Wilkinson's description by three millennia. The differential diagnoses included impetigo or pemphigus foliaceus.

## Other Cutaneous abnormalities

Venous insufficiency was described by the ancient Egyptians in the Ebers Papyrus (c.1552 B.C.). An ulcer from an Egyptian mummy dating from about 1300B.C was thought to be secondary to venous hypertension<sup>18</sup>. The ulcer was just above the lateral malleolus and histology showed haemosiderin deposition around some of the blood vessels. A callus has also been described in an Egyptian mummy<sup>19</sup>.

## Otzi, the Tyrolean Iceman

A mummy preserved in the Val Senales Glacier dating from 3000B.C was discovered in 1991. He was nick named Otzi after the Otzal Alps. Various cutaneous abnormalities were found including the presence of three Beau's lines on his remaining fingernail<sup>20</sup> and a traumatic wound to his right hand (figure 7) which was thought to occur a few days before his death<sup>21</sup>.



Figure 7: Otzi's Right Hand: Upper image: macroscopic view of stab wound. Lower image shows histological features.

## Conclusions

The macroscopic and histopathological findings in mummies attest to the extraordinary resilience of human skin. Examination of mummified skin allows us to understand some of the dermatological conditions prevalent in ancient history. Mummies date from five thousand years ago to a few hundred years and have been described all over the world. Diseases reported include cutaneous infections and infestations and a few tumours. The paucity of reports of the common inflammatory dermatoses and tumours of the present day is unexplained. Currently there is no better record of ancient skin disease; but it is possible that DNA studies in the future will answer many of our questions from the past.

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