



---

### E41 Multidisciplinary Study of a 17<sup>th</sup>-Century French Natural Mummy

*Dedouit Fabrice, MD\**, Hopital Rangueil, Service de Medecine Legale, 1av. J. Poulhes, TSA 50032, Toulouse Cedex 9 31059, FRANCE; *Fatima-Zohra Mokrane, MD*, 1 Avenue Professeur Jean Poulhès, 31059 Toulouse Cedex 9, Toulouse 31059, FRANCE; *Rozenn Colleter*, Laboratory AMIS, 37 allées Jules Guesde, Toulouse 31073, FRANCE; *Frederic Savall*, Service de médecine légale, Hopital de Rangueil, 1 avenue Professeur Jean Poulhès, Toulouse Cedex 9 31059, FRANCE; *Sylvie Duchesne*, Laboratory AMIS, 37 allées Jules Guesde, Toulouse 31073, FRANCE; *Patrice Gerard*, Laboratory AMIS, 37 allées Jules Guesde, Toulouse 31073, FRANCE; *Eric Crubezy, PhD*, Université Paul Sabatier, 37 Allées Jules Guesdes, Toulouse 31000, FRANCE; *Hervé Rousseau, PhD*, 1 Avenue Professeur Jean Poulhès, Toulouse 31059, FRANCE; *Daniel Rouge, MD*, Service de Medecine Legale, Centre Hospitalier Univ Rangueil, Avenue du Professeur Jean Poulhes, Toulouse Cedex 4 31403, FRANCE; and *Norbert Telmon, PhD, MD*, Service Medico-Judiciare, CHU Rangueil, 1 Avenue Jean Poulhes, Toulouse F-31054, FRANCE

---

The goal of this presentation is to illustrate the interests and the potentialities of the Multislice Computed Tomography (MSCT) in forensic anthropology and archaeology. A multidisciplinary study on a 17<sup>th</sup>-century French natural mummy presenting intentional heart removal will be presented.

This presentation will impact the forensic science community by providing an example of an original use of MSCT on a natural mummy.

**Introduction and Background:** In the Convent of the Jacobins (Rennes, Brittany, France, a rescue excavation was performed, permitting the study of approximately 1,000 graves dated between the 14<sup>th</sup> and the 18<sup>th</sup> centuries AD. In this collection, a perfectly preserved tomb was excavated in a 17<sup>th</sup>-century chapel. The body was that of a woman, dressed in a suit of probable Dominican community, buried in a trapezoidal lead sarcophagus. The body extracted from the lead sarcophagus was transferred in the Toulouse Hospital to undergo undressing, MSCT exploration, and autopsy.

The discovery of a well-preserved mummy thought to be a female noble was an exceptional opportunity for comparison between the findings of conventional autopsy and of MSCT before autopsy. This woman was born in 1584 and died in 1656. According to research, there has been no previous comparison of such data in a natural French mummy.

**Material and Methods:** A full-body MSCT was performed in Toulouse in the radiology department, after a complete undressing. This undressing permitted an external examination, revealing the presence of a cross-shaped, surgical thoraco-abdominal incision. The first hypothesis was that this incision represented an entry access for the embalming process. A complete autopsy was performed. Samples of tissues or macroscopic lesions were taken for complementary investigations, mainly bio-molecular analysis and ancient DNA determination.

**Results:** MSCT: (1) at the cephalic extremity, an aspect of intentional cranial deformation was visible. The rest of the brain was also visible. The bone structures were completely covered with a thick layer of a hyperdense material; (2) at the cervical stage, some carotid calcifications were visible. The spine was intact; (3) at chest level, the MSCT revealed that a thoracotomy had been realized, with a bilateral section of the sterno-costal cartilages. Furthermore, the pericardial sac was empty, with the heart absent. A mediastinal and pericardial cut was visible. It was possible to localize all the major thoracic vessels (arteries and veins) which were air filled. The lungs were present, presenting bilateral adhesions; (4) at the abdomino-pelvic stage, some arterial calcifications were visible (aorta and internal iliac branches). Some hyperdensities were visible within both kidney parenchyma. The soft tissues of the posterior part of the body and the adjacent bones were hyperdense; and, (5) the bones appeared to be demineralized.

*Autopsy* — the autopsy confirmed all the MSCT findings: (1) the skull and most of the bones were black in color; (2) at the thoracic part, the section of the heart vessels was confirmed. Some ligatures were visible at the aortic and pulmonary artery trunk; (2) at the abdomino-pelvic stage, within both kidneys, some stones were found; and, (3) the organs were globally lytic, but with no evident major abnormalities.

**Discussion:** This case illustrates the complementarity of the PMCT and the autopsy for mummies.



## General Section - 2016

In this case, the cause of death remained uncertain; however, some medical pre-existing pathological states were visible: calcified carotid plaques and voluminous kidney stones. Some taphonomical processes were visible: diffuse bone demineralization and hyperdense layer covering most of the bones (skull, lower limbs). This aspect of hyperdense layer was associated with dark bone coloration. According to research, this aspect has never been described. It is hypothesized that this aspect was due to a transfer of some metallic particles of lead, from the coffin to the soft tissues and the adjacent bones. Although the evidence of a surgical scar first oriented toward an artificial mummification process, the mummy was finally determined to be a natural mummy. The MSCT revealed the heart evisceration, with a bilateral cut of sterno-costal cartilages. The rest of the exploration revealed no other organ removal.

**Conclusion:** This case demonstrates that MSCT and post-processing techniques are indispensable tools in the multidisciplinary investigation of mummies.

---

### Natural Mummy, Multislice Computed Tomography, Autopsy