

# Modern mummification sheds light on Ramses II

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Yes, a mummified domestic cat, goes in for a CT scan at the London Health Sciences Centre. Yes was mummified at the request of his owner and used to determine whether changes that happen to tissues are part of the pathological process or whether they're related to mummification. Credit: Andrew Nelson

Some millennia ago, Yes might have been the object of worship in ancient Egypt. Today, Yes – a modern, domestic house cat – is helping shed light on the practice of mummification and the lives of ancients, such as Ramses II, the most celebrated pharaoh of Egypt.

Emerging from a study looking to determine whether Ramses II had ankylosing [spondylitis](#) (AS), a [chronic inflammatory disease](#) of the spine which makes [vertebrae](#) look dense in radiographs, the study of Yes started when a graduate student asked Western professor Andrew Nelson to mummify his pet, who passed away from pancreatitis.

Since, Nelson, associate dean of research and operations in Western's Department of Anthropology, and associate dean in the Faculty of Social Science, has led the Yes investigation, looking to determine whether changes that happen to tissues are part of the [pathological process](#) or related to mummification.

In other words, is the density of the vertebrae, observed in radiographs of Ramses II, indicative of him having suffered from AS? Or, is the density a result of the mummification process?

"We're looking at the osteobiography of a mummy. We're trying to tell the story of that person's life through the analysis of bones and tissues; we want to get as accurate a picture of their life as we can, that we can properly diagnose the disease process and properly differentiate from (the mummification process)," Nelson explained.

Enter Yes, an interdisciplinary case study that was featured last week on the Discovery Channel's *The Daily Planet*.



In what is the first long-term study of tissue changes during mummification using multimodal imaging techniques, Nelson and his research team started the process of mummifying Yes in 2004. The goal was to see what changes can be observed in tissues and how long it takes for such changes to occur.

Once mummification was complete, researchers examined Yes with MR (magnetic resonance) scans and clinical CT (computerized tomography) imaging, in order to see beneath the wrappings and observe changes to tissues over time. The use of a microCT scanner allowed Nelson's

research team to non-invasively examine the remains of Yes in the afterlife.

The results of the scans showed a rapid shrinking and a decrease in tissue density, Nelson said, noting the expectation was that tissues would increase in density, not get softer.

What this means, Nelson said, is that if we observe increased density in tissue of a mummy, researchers can be confident that it represents real physiological issues, ones not part of the mummification process.

"If we see something that is markedly more dense in a mummy, we can be sure it is pathology," he said.

So, in this way, Yes has helped shed light on the life of Ramses II. While difficult to know for certain, it is possible the pharaoh had AS.

But that's not the cat's only contribution to researchers' understanding of the [mummification](#) process.

While the team left Yes' heart and [brain](#) intact, it was difficult to see any trace of the brain in the initial scans. The heart was, however, visible.

"The brain shrunk a lot and lobbed to the side of the cranial cavity," Nelson said, noting it looked as if the brain was not actually there.

"Why we care about that is that brain removal was something the Egyptians did (in humans), though not all the time. The Egyptians mummified a lot of different animals. In (scans of animals where the brain is not visible), it could be that the brain is actually still there and you have to do more detailed imaging," he continued.

"There's a lot of discussion, whether Egyptians were treating animals

differently. It appears that animals were not eviscerated in the same way – the brain was not removed. The few examples where (animals) have been held up and treated the same way as people, it's important to look at them and ask is this some exception or are we mistaken in terms of that conclusion?"

Provided by University of Western Ontario

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