

Elemental Analysis of Human Remains of XV–XVII Centuries from the Moscow Kremlin Necropolis (Part 2)

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Studies of the elemental composition of unique historical samples of human remains of the XV – XVII centuries from the Moscow Kremlin necropolis by the NAA method were continued in the neutron activation analysis group at the IREN research facility of the Frank Laboratory of Neutron Physics, JINR. Among the samples obtained for analysis were a fragment of the rib of Grand Princess Maria Borisovna (died in 1467, the first wife of Ivan III); fragments of the brain and organic matter from the skull of Grand Princess Elena Glinskaya (died in 1538, mother of Ivan the Terrible); the small bone of the Princess Feodosia (died in 1594 at the age of 1.5 years, daughter of Fyodor Ivanovich and Irina Godunova); three fragments of the rib of Tsaritsa Maria Nagaya (died in 1611, the last, sixth, wife of Ivan the Terrible); as well as the vertebrae (two) from the two monastic burials of the second half of the 15th – early 16th centuries (without epitaphs, A-905 and A-906). First of all, historians were interested in the mass fractions of mercury and arsenic in the remains – elements that were actively used as part of drugs, cosmetics and poisons in the Middle Ages.

High mercury content was found in fragments of the brain and organic matter from the Elena Glinskaya 's skull in the course of the research. An increased arsenic content was found in the fragment of the rib of Maria Borisovna. The reason for the unexpected and early death of these two young women is beyond doubt - it was poisoning. They could not accumulate toxic elements at such young age using medicines and cosmetics. Both women became victims of the power struggle in the Russian state in the second half of the XV and in the first half of the XVI centuries; there were many such situations in its history.

The increased content of toxic elements in the remains of two monks is explained by the fact that they most likely performed paintings in the Chudov monastery of the Kremlin – they painted frescoes and icons. Anthropologists have identified serious injuries of the hands of both monks, so they could not do the hard work (for one of them, the right hand even dried out, it was 5 cm shorter than the left one!). Medieval paints were made from minerals containing mercury, arsenic, antimony, lead, sulfur, copper and other toxic elements. They entered the body of painters through the pores on the skin. It led to chronic (like in any harmful production!) poisoning. Both monks survived to a solid age, but they undoubtedly had many health problems. Modern paint has the same effects on humans.

The obtained results give possibility to clarify the circumstances of life and death of some representatives of the highest nobility of the Russian state, as well as to enter into scientific circulation and replenish the database of the elemental composition of human remains from the graves of not only Russian historical figures of the second half of the XV – beginning of the XVII century, but also the ordinary population from medieval Moscow.