A genetic approach for investigating cannibalism in prehistoric Sweden

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Kuru is a prion disease, like mad cow disease (BSE) and Creutzfeld-Jakob disease, which is a fatal neurodegenerative condition that is transmitted through cannibalism. The last known kuru epidemic happened in Papua New Guinea in a tribe called Fore. Fore people were eating their dead in funerals as a way to honor them and they probably never even thought that honoring their dead in that way would make them dead too. During the 1950's, after practicing cannibalism for over 50 years and losing 10% of the population to kuru, Australian authorities banned mortuary feasts which also put an end to kuru. Due to the long incubation periods of kuru, there has been reports of kuru incidents since then, but the afflicted were infected before the banning. The unexposed young generation does not carry any signs of the sickness.

After the epidemic, scientists carried out researches about the disease, studied the exposed population and monitored how kuru manifested in different people. Genetic approaches were also taken and they discovered the only responsible gene for all prion diseases, a gene called PRNP which is located on the 20th chromosome. There are several different variations discovered on the gene that cause inherited prion diseases as well as another variation that gives resistance to prion diseases. People with heterozygote alleles for a particular codon (codon 129) on the PRNP gene were much more resistant to kuru while people who carried only one type of two possible alleles (homozygotes) had shorter incubation periods for kuru and died very early. Resistance to kuru resulted as an advantage in means of longer life span and increased survival and reproductive rate for the people with heterozygosity. A research group led by Simon Mead went further on and compared human sequences from all around the world and concluded that the heterozygosity advantage was universal and was spread via natural selection which could be observed only if enough prehistoric cannibalism occurred to create a protection from epidemics of prion diseases.

Additionally, archaeologists from all around the world reported their suspicion about cannibalism taking place in prehistoric ages. They found charred bones, bones with cut marks, bones butchered in a specific way as if to extract fat, muscle tissue or marrow. Biochemical and osteological analyses supported the hypothesis of cannibalism in different time periods. There has also been suggestions of cannibalism in prehistoric Sweden, among hunter-gatherer tribes, where archaeologists have found some bones with peculiar cut marks on them.

We wanted to combine the archaeological and genetic approaches and sequence old human remains from Gotland and Västergötland in Sweden to see if we could observe a heterozygosity advantage in those remains. We sequenced the PRNP gene in 9 human remains from New Stone Age and Late Mesolithic Age and observed heterozygote individuals in Late Mesolithic Ages and no heterozygosity in New Stone Age. We wanted to see if our results indicated a heterozygosity advantage like it was suggested by the research team mentioned above. But statistical calculations showed no heterozygosity advantage in ancient humans. One reason could be that since there were so few samples, it was not possible to get a statistically correct result. Another reason could be based on another group of researchers' theory that the heterozygosity advantage that Simon Mead's team suggested was an overestimation. In any case we need further analysis to prove either of these hypotheses and we are working on it right now.

Until then, the myth of cannibalism in prehistoric Sweden will remain a mystery.

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