

## **Abstract**

Morphological differences between Neandertal and recent human pelvises have been explained as relating to birth, though there are few recognizably female pelvic remains in the Neandertal record. Birth hypotheses depend on the most complete Neandertal pelvis, a male unlikely to be informative about birth, or the most complete female partial pelvis, which has been reconstructed differently based on different assumptions. The aim of this project is to systematically compare the female pelvic morphology of Neandertals and a large cold adapted sample of recent humans to assess how differences in birth-related pelvic anatomy might affect the birth process. This study tests the null hypothesis that there are no significant morphological differences between these samples.

Based on two reliably sexually dimorphic pelvic features in Neandertals, seven female Neandertal individuals were identified. This sample was used to develop a suite of 30 measurements that could be taken on at least two female Neandertals and that potentially related to the birth process. A bootstrap resampling algorithm compared the small Neandertal sample to the larger recent human sample for all measurements, by calculating the probability of finding the Neandertal mean in a recent human subsample of identical size. The null hypothesis was rejected for 15 of 30 birth-related measurements, with Neandertals being significantly larger than the recent humans for eight of those measurements and smaller for seven.

These findings demonstrate that there are significant differences between the samples that cannot be explained by differences in body size. The differences that did not reflect changes in joint size fit the Neandertal pelvic model predicted by the male Kebara 2 pelvis, suggesting that for pelvic morphology, Neandertal females more closely resemble Neandertal males than they do females today. Based on these findings, I hypothesize how the differences quantified in this study relate to birth. I suggest that

Neandertal pelvic morphology is best explained by posture differences that require further exploration, but that the Neandertal bony birth canal may have also adapted to birth neonates that were differently shaped than those of recent humans.