Abstract

In forensic cases it can be challenging to differentiate between a live birth and a stillbirth. Few methods are accepted which become less precise with an increased post mortem interval. Therefore, it is aimed to evaluate the utility of stable isotope analysis and tooth histology to detect stillbirth. Up to now 8 archaeological "mother-infant-pairs" (MIP) were screened for their stable isotope composition of nitrogen ($\delta^{15}N$) and carbon ($\delta^{13}C$) and tooth histology was performed in 2 cases. A slight trend in the stable isotope data is visible however, further samples are required to fully evaluate their utility.

Introduction

In forensic cases that involve remains of a neonate it is necessary to establish if the child was born alive (Fig. 1). Forensic experts have limited methods and with increased decomposition the evaluation becomes more difficult. One method is the examination of a neonatal line (NNL). It can be observed in the enamal of deciduous teeth and is related to labor. To be clearly visible the child has to survive birth at least 7 to 10 days ($\pm 1$). Stable isotopes are used in archaeological studies in the context of weaning but to date no study has addressed the identification of stillbirth. The aim is to investigate if the stable isotopes $\delta^{15}N$ and $\delta^{13}C$ could provide additional information about the survival of the birth.

Results

• The collagen quality criteria were fulfilled in 7/8 cases.
• The deviation of $\delta^{15}N$ and $\delta^{13}C$ for each of the 7 MIP was calculated.
• Less deviation is seen for $\delta^{15}N$ than for $\delta^{13}C$ values (Fig. 3).
• The roman series indicate the beginning of a breastfeeding signal for 14/15 neonates (Fig 4).
• No NNL was observed on the examined teeth (Fig. 5-6).

Discussion

The necessity to develop additional methods to detect stillbirth is given:
• Stillbirth is still ten times more often recorded in medical records than sudden infant death syndrome in high income countries ($\pm 2$).
• The discovery of discharged neonates is frequently reported.

With a sufficient sample size archaeological material might provide fundamental new information for in further depth studies.