



Contents lists available at ScienceDirect

Forensic Science International: Genetics Supplement Series

journal homepage: www.elsevier.com/locate/fsigss

Comparison of two Neolithic mtDNA haplotypes from a Czech excavation site with the results of mitochondrial DNA studies on European Neolithic and Mesolithic individuals

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ARTICLE INFO

Keywords:
Ancient DNA
mtDNA
Sequencing
Haplotype
Haplogroup

ABSTRACT

The aim of the present study was to compare the mtDNA haplotypes (haplogroups H and W) obtained from 2 young females buried within a Neolithic circular enclosure (rondel) with the results of the scientific studies on Neolithic and Mesolithic skeletal material. We collected 164 mtDNA literature sequences and data concerning the age of the specimen, location of the excavation site (Denmark, France, Germany, Hungary, Italy, Poland, Spain, and Sweden), D-loop mutations, haplogroups, sequencing primers, and methods used.

1. Introduction

The Kolin site (Czech Republic) is situated within a region of intense prehistoric settlement at the edge of the Elbe River terrace. Large rescue excavations carried out in this area (2008–2010) preceded the construction of the Kolin bypass road. In addition to others, the site revealed numerous features dated to Stroked Pottery culture (StK), including several burials.

2. Materials and methods

2.1. DNA extraction

The bone remains of 2 young females buried within a Neolithic circular enclosure (rondel) dated to the Stroked Pottery Culture (4934–4970 calBC (95.4%) and 4650–4462 calBC (95.4%)) at Kolin (Czech Republic). DNA isolation from the dentine powder was performed using the PrepFiler[®] BTA Forensic DNA Extraction Kit (Thermo Fisher Scientific, USA). Extracted DNA was purified using the OneStep PCR inhibitor Removal kit (ZYMO Research, USA) followed by dialysis on filters (Merck Millipore, Germany).

2.2. DNA quantitation

Extracted DNA was quantified by real-time PCR with primers

targeting the sequence of the ALU transposable element with an amplicon size 63 bp [1].

2.3. DNA typing

The mitochondrial DNA (mtDNA) regions HVRI and HVRII were amplified with primers designed for mtDNA miniamplicons [2].

2.4. Haplogroup prediction

mtDNA haplogroup prediction was performed using the Haplogroup online tool [3].

2.5. mtDNA literature sequences

We collected data for 164 European Neolithic and Mesolithic skeletal remains, for which at least the HVRI region was sequenced [4–18].

3. Results

The results of the mtDNA typing of 2 young females buried within a Neolithic circular enclosure are presented in Table 1. Table 2 lists the European Neolithic and Mesolithic mtDNA haplotypes and their haplogroups (Hg) retrieved from the literature.

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<http://dx.doi.org/10.1016/j.fsigss.2017.09.032>

Received 1 September 2017; Accepted 11 September 2017
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Table 1

Results of the mtDNA typing of 2 young females buried within a Neolithic circular enclosure

sample	mtDNA mutations	Predicted haplogroup
Female 1	16162G, 16519C, 73G, 152C, 263G, 315.1C	H1a
Female 2	16223T, 16519C, 73G, 152T, 189G, 195C, 204C, 207A, 263G, 315.1C	W

Table 2

List of European Neolithic and Mesolithic mtDNA haplotypes and their haplogroups (Hg) retrieved from the literature. Thirty-four sequences synonymous to rCRS were omitted. The last column contains read lengths in base pairs (bp)

Hg	Haplotype								Read length (bp)	
H1	16291T								391	
H	16209C								391	
U5	16183C	16189C	16270T					391		
H3	16235G								391	
J	16069T								391	
N1a	16129A	16172C	16223T	16320T	16355T	16391A		391		
V	16298C								391	
K	16224C								391	
J	16069T	16126C	16126C	16193T	16278T				391	
N1a	16172C	16223T	16320T	16355T	16382T				391	
X2b	16189C								391	
K	16224C								391	
K	16224C								391	
K	16224C								391	
U5b	16093C	16189C	16270T					391		
U5	16224C								391	
J2	16069T	16193T	16362C						391	
X	16093C								391	
N1a	16172C	16223T	16234T	16248T	16320T				391	
U5b2b1a	16129A	16183C	16189C	16270T	16362C				391	
K	16093C								391	
K	16093C								391	
V	16291T								391	
T	16126C								391	
U	16183C	16189C	16234T					391		
K	16093C								391	
J1	16069T								391	
J1	16069T								391	
U5	16183C	16189C						391		
H	16234T								391	
T2b	16126C	16189C	16294T	16296T	16304C				268	
H5	16304C								268	
HV0	16298C								268	
U5a	16256T	16270T						268		
H5	16304C								268	
T2b	16126C	16294T	16296T	16304C				268		
H5	16304C								268	
H1	16189C								268	
H1	16263C								454	
HV	16298C								454	
X2	16042A	16179T	16189C	16223T	16255A	16278T	16297C	16362C	455	
HV0	16298C								455	
HV0	16298C								455	
U2e	16051G	16092C	16129C	16182C	16183C	16189C	16362C		455	
W5a	16223T	16292T	16362C						455	
I1	16129A	16172C	16223T	16311C	16391A				455	
K1	16093C	16224C	16311C	16319A						455
U5a1	16256T	16270T	16399G						455	
T1a	16126C	16163G	16186T	16189C	16294T				455	
K	16224C								455	
H20	16218T	16328A						455		
N	16147T	16223T	16362C						455	
H2a	16235G	16261T	16291T	16293G	16304C				455	
N9a	16223T	16257A	16261T						455	
N9a	16223T	16257A	16261T						455	
N9a	16223T	16257A	16261T						455	
N1a	16147A	16172C	16189C	16223T	16248T	16274A	16355T		455	
D1/G1a1	16223T								455	
C5	16223T	16288C	16298C	16327T						455
M/R24	16324C								455	
U4	16356C								340	

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