INTERDISCIPLINARY APPROACH IN IDENTIFICATION OF HISTORIC REMAINS FROM EARLY BRONZE AGE CULTURE

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During the archaeological research of burial site from Bronze Age culture in eastern Poland, grave No. 10 was registered. The grave cavity was rectangular and oriented NW-SE. The skeleton of an adult male, lying on his back in a straight position, with the head oriented NW and accompanied by flint tools and arrowheads was recovered from the grave. The comprehensive examination of the skull and the few elements of postcranial skeleton was performed using the methods normally applied in forensic investigation. The methods used in the identification were as follows: 1. DNA analysis of samples from some bone fragments was performed. The results allow the establishment of the degree of kinship. For comparative analysis the samples from 12 other graves were collected. The analysis using STR and SNP markers can give more information about the ancestry of the remains. 2. Computer tomography and dental CT were used to obtain images for further investigation. CT scanning was performed with a GE Lightspeed CT scanner, using a protocol allowing isotropic voxel slices with 0,625mm thickness to be obtained. These slices were then used for secondary reconstruction (2D and 3D). GE Advantage Windows 4.4 workstation equipped with GE Healthcare firmware was used. All measurements were done with an accuracy of 0,1mm. Standard software for secondary reconstructions 2D MPR and 3D Volume Rendering was used. Dental CT was performed with the use of cone-beam tomography NewTom 3G (QR Verona, Italy). From axial images the pantomographic reconstruction of dentition was obtained and further used for dental age estimation.3. Estimation of the dental age- the method published by Kvaal et al. (1995). The method based on the radiographs was used because it requires neither extraction of teeth from alveolar sockets nor a section of the teeth. Both, excellent preservation of teeth and high quality of the image allowed for the appropriate measurements and resulted in the estimation of the dental age at the time of death.4. Reconstruction of geometry – the most important element of the data analysis in image processing is segmentation (extraction of anatomical structures from CT image). The quality of the 3D model of the skull depends on the correctness of segmentation process.5. 3D scanning of the skull using the optical scanner ATOS II (GOM).6. Facial approximation was performed based on anthropometric analysis of the skull and using the 3D skull reconstruction. Two different methods of facial approximation were used. The identification of human remains is complex and challenging for specialists and often requires the collaboration of experts representing many scientific fields. The

results of the investigation are of great importance for both, cognition (scope of human variability) and practice (in medico-legal proceedings). The results of the identification analysis which form the biological profile of the deceased in large extent depend on the reliability of applied methods. Moreover, the methods enable an approximation of the deceased appearance before the death. All the methods and modern techniques commonly used in forensic identification can be successfully applied in an analysis of the historical remains.Through the use of advanced methods the important information about the bony structures of the skull was obtained. The reconstruction of the skull was important for archivization. The approximation of facial appearance was also possible. Forensic experts added a small piece to historical puzzle.