Abstract

Analyses of dental morphology and its variations evaluated at the level of individuals or entire populations are an important part of many studies. Dental morphology assessment can be performed by a wide range of methods, each of which brings different possibilities, advantages, but also certain limitations. Earlier traditional methods of assessing dental morphology have provided a wealth of valuable information about tooth morphology and its variations, but they also have some limitations, such as the degree of subjectivity involved in traditional assessment of discrete dental features, which creates the risk of inconsistent observations and analysis results, or the limited amount of information obtained about tooth shape using traditional morphometric measurements. Overcoming these limitations has been possible by implementation of new assessment approaches that exploit the potential of advanced imaging technologies and can capture detailed dental morphology. On this basis, the new assessment approaches allow analyses of tooth shapes and components, as well as dental tissue thicknesses and detailed examination of the occlusal crown surface morphology. The output of these morphological analyses can be used to investigate, for example, gene flow between populations, sexual dimorphism within a populations, can contribute to molecular analyses of dental development, or can interpret the lifestyle of the individuals studied. However, even these new evaluation approaches have their drawbacks. Advanced imaging technologies used bring in high technical demands and they are also often associated with high prices, which can reduce the availability of these devices. High technical demands are also placed on data collection, processing and storage, which require advanced computer programmes and high-capacity data storage. In addition, data handling is very time-consuming, which can have a negative impact on the size of the set of teeth. The extensiveness of studies is also negatively affected by the difficulty of comparing the data obtained, as there are no freely accessible databases of 3D dental scans, plus methodological differences often occur within individual studies, which prevents large-scale comparisons. Despite these disadvantages, however, there has been widespread adoption of new methods for assessing dental morphology, which have not only provided new analytical capabilities but also many new insights into dental morphology and its variability.

Key words: dental morphology, 3D scanners, computed tomography, geometric morphometrics, morphometric mapping, dental topographic analysis