Fund "Nauka" Project № 23005 Resume – Competition-Based Session 2023:
"A study on the accuracy of the TMJ movements replicated by a new dental articulator prototype, including central occlusion models, via 3D scanning with a laboratory scanner, CBCT, and conventional methods"
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The accurate registration and replication of each patient's occlusion is an important requirement in the CAD/CAM system era. Conventional or virtual, the dental articulator is a compulsory device in the process of creating a denture construction. Imitating the movements of the mandible, it allows the modeling of the occlusal surfaces of the restorations with maximum accuracy, excluding as much as possible the additional overarticulation of the produced constructions.

The aim of the research project is approbation of a new analog dental articulator with the help of digital and conventional methods, which would prove its efficiency and will aid its implementation and popularization in dental laboratories and in dental practice.

In order to achieve the goal set, the following tasks were formulated:

1. Convert the metal prototype into an object, suitable for imaging diagnostics, via cone-beam computed tomography (CBCT);
2. Assess the accuracy of the new device and prove its advantages over an alternative device, which is most widely used in dental laboratories and dental practice, as well as in the training of students majoring in these fields;
3. Create a laboratory protocol for work with the new dental articulator;
4. Disseminate the results.

The research methods are statistical, laboratory and digital. The accuracy assessment methods are divided into 2 groups:

1. Digital: 3D scanning with a laboratory scanner, CBCT, comparison of the 3D scans with the CBCT ones, registering the dynamic occlusion with the help of the Exocad dental software using the following modules: Virtual Articulator, DentalCad, and DICOM Viewer.
2. Conventional: visual assessment (cephalometric analysis of the distances between landmarks with the help of a ruler and protractor, and registering the deviations).

Practical work is related to 3D scanning of a metal dental articulator prototype, 3D printing of the prototype, 3D scanning with a laboratory scanner and CBCT, registering the

dynamic occlusion with the help of the Exocad dental software and conventional measurements.

The study, which has a scientific and practice part, is expected to lead to an increase in the knowledge related to the research linked to the introduction of new devices. The useful dental articulator model would be popularized and implemented in dental laboratories, dental practices, and in the training of students majoring in these fields.

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