NANOMATERIALS IN THERAPEUTIC DENTISTRY

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Advances in nanotechnology have greatly affected various areas of medicine. This is due to the possibility of using the substance at the scale of nanometers comparable to the size of biological structures.

In dentistry, the prospect of developing materials based on nanoparticles with unique properties opens up. The advantage of composites that include particles of ultra-small size in the range of 5-100 nm is their increased wear resistance, reduced shrinkage, reduced shrinkage, better Polish, more pronounced Shine.

Development using nanotechnology composites of domestic production that meet the requirements for modern restoration materials is very relevant and will be widely used in dental practice.

The purpose of this study is to develop a program and methods of medical testing of a new domestic light-curing composite material and conduct preclinical studies.

The study was carried out within the framework of research works on the topics "To Develop the composition and process of obtaining light-curing import-substituting cement and master its production" (together with the Belarusian state technological University», № state registration 20083532), "To Develop minimally invasive methods of treatment of dental hard tissues in aesthetic dentistry" in the subprogramme "New technologies for the relief of diseases" of the state scientific research program "Fundamental and applied science for medicine".

The studies were carried out using instruments and methods to determine the properties of nanoparticles, including scanning and transmission electron microscopes, laser devices.

For preclinical studies, samples of a new light-curing composite of Belarusian production were presented. For comparative analysis we used samples of nanocomposite material of a foreign manufacturer. The working properties, the state of the tooth and composite boundaries, as well as microhardness, adhesive strength and fluorescent properties of the samples were studied. The microhardness of the thin sections made from samples of the materials were determined by hardness testing "Micromet II" company "Buehler" (Switzerland) at the Institute of powder metallurgy of the National Academy of Sciences of Belarus. To assess the adhesion strength of material used universal testing machine "Instron 1195" (UK). In accordance with the methods of studying nanoparticles, studied the fluorescence spectra of samples on an automated spectrofluorometer SDL-2 At the Institute of physics named after V.I. Stepanov of the National Academy of Sciences of Belarus.

A comparative analysis of samples of domestic nanocomposite and imported analog, conducted according to the program of medical pre-clinical studies developed by us, showed that the domestic nanocomposite has all the necessary working and physical-mechanical properties for this kind of filling materials. Samples of

domestic material have the effect of "chameleon" and the color does not differ from the hard tissues of the tooth, due to the fact that they contain glass particles ranging in size from 25 to 75 nm. The matrix reinforced by nanoparticles has a unique chemical composition and is much more wear-resistant than the matrix of light and self-hardening materials. The advantage of nanocomposites is primarily due to the optical properties of nanoparticles, their better Polish and preservation of the polished surface for a long time.

The studied domestic nanocomposite had high indicators of "microhardness" (1875.00±3.99 MPa) and "adhesive strength" (15.890±0.008 MPa), similar to those properties of imported material (1870.00±11.18 MPa and 15.930±0.011 MPa, respectively).

A comparative assessment of the fluorescence spectra of the studied domestic and imported nanocomposites produced a fluorescence peak at a wavelength of 450 nm, which corresponds to the blue hue of the natural teeth of patients. The fluorescence intensity was registered in the range of 2 960-6 950 RH.unit, which also corresponds to the intensity of light emission intact teeth.

Thus, the comparative analysis of samples of the light-curing composite material of the Belarusian production and import analog, carried out in accordance with the program of medical pre-clinical studies developed by us, showed that the domestic composite has the working and physical-mechanical properties necessary for this kind of filling materials and is not inferior in quality to the imported analog, which allows us to recommend it for further development and development in production.