NEW DOMESTIC INSTRUMENTS FOR DETERMINING VISUAL ACUITY

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Methods of determining visual acuity in clinical ophthalmology should be simple and available, providing reproducibility of the results in the same patient.

The results of determining visual acuity are affected to a considerable extent by the brightness and contrast of the test objects presented, and therefore the instrument used for this purpose should provide uniformity of the conditions of investigation and preservation of their constancy.

In recent years an intense search has been underway to find new methods of presenting tests and designing instruments for determining visual acuity [1-7]. The most diverse instruments, from simple printed charts to complex remote-controlled projection instruments, are manufactured abroad for the purpose of determining visual acuity. Transparent instruments, as simpler, more convenient, and comparatively cheap, have become popular.

The operating principle of transparent instruments consists in the following. The test objects, manufactured by the photographic method on transparent material, are placed between the light source and the observer. Opal glass is placed between the light source and test objects to provide uniform illumination.

The characters, manufactured by the photographic method, have a high contrast and sharply outlined edges, which is rather difficult to obtain in the manufacture of charts by the printing method on ordinary paper. The All-Union Scientific-Research Institute of Medical Instrument Manufacture (VNIIMP) jointly with the Helmholtz Moscow Scientific-Research Institute of Eye Disease (MNIIGB) developed the transportable transparent instrument "Vizotest-1P." The instrument is a rectangular case whose front and rear walls are made of transparent organic glass and contain the test charts (Fig. 1).

Landolt rings from the Golovin-Sivtsev chart are used in the instrument for test characters. The charts are made on photographic film and secured in a metal frame between plates of transparent and opal organic glass. The transparent glass protects the film with the test objects against contamination and damage.

Characters for investigating visual acuity from 0.1 to 0.4 are situated on one side of the instrument and from 0.5 to 2.0 on the other side, which made it possible to reduce the size of the instrument and increase the uniformity of illumination. The frame with the charts of test objects is fastened to the case, within which are installed four ordinary 15-W, 220- or 127-V incandescent bulbs. They provide a background brightness of at least 90 cd/m², which corresponds to a white background illumination of 350 lx.

For alternate presentation of the test objects the case of the instrument can be rotated about the horizontal axis. The design provides proper positioning of the instrument both when...

Fig. 1. "Vizotest-1P" transportable instrument for investigating visual acuity.


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Fig. 2. POZB-1 instrument for investigating the acuity of near vision.

Fig. 3. Test objects for determining astigmatism. a) Radial figure with rays every 10°; b) six crosses, each of which is turned 5° with respect to the preceding one.

In clinical tests of the "Vizotest-1P" instrument conducted at MNIIGB and the eye clinic of the Moscow Regional Scientific-Research Clinical Institute data identical to the results of investigations on the Roth instrument were obtained. Clinical tests of the instrument showed that it meets the requirements imposed on it.

The VNIIMP jointly with the MNIIGB developed the transparent instrument POZB-1 for determining near visual acuity. The instrument is a rectangular case whose front wall has a window (Fig. 2).

Inside the case are four 220- or 127-V incandescent bulbs covered with opal organic glass which provide a background brightness of at least 90 cd/m².

The instrument case is mounted on a stand with frictional pivots which allow tilting and fixing it in any position within 45° from the vertical plane. On the right side of the instrument case is attached a 350-mm-long chain for checking the distance of the investigation. The test objects are made in the form of changeable cassettes so that different visual functions can be investigated. The cassettes are inserted through a slot in the upper panel of the instrument case.

Characters in the form of Landolt rings, Pfuger hooks, and letters of the Russian alphabet grouped into lines for visual acuity from 0.1 to 1.0 and also a printed text from the charts presently being published were used for determining visual acuity. To create identical reading conditions for the entire range of visual acuity, the same type, copied in the appropriate scale for each value of visual acuity, is used in the tests.

The instrument set contains tests for determining astigmatism (Fig. 3). The test objects are made by the photographic method on film and are fastened in cassettes between two plates of thin transparent organic glass.

The instrument also has test objects for investigating binocular vision. The fields of vision are separated by means of filters of complementary colors, for which purpose the instrument set includes red-green spectacles.