THE INFLUENCE OF HE-NE LASER LIGHT ON THE LIFE-CYCLE OF MERISTEM CELLS IN ALLIUM CEPA L.

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The authors conducted research on the influence of helium-neon laser light with a radiation wave-length of 632.8 nm and an areal density of 2 W/m². The experimental groups were onions, the heels of which were irradiated for 2 and 8 minutes (which corresponds to an areal density of 240 J/m² and 960 J/m², respectively). The course of the cell life-cycle was analysed in the root-tip meristem, which was obtained from irradiated onions and seeds from the F₁ generation of the onions which had been irradiated for 8 minutes.

On the basis of the cytological analysis, the stimulating influence of laser light on cell divisions was established. As a result of two-minute exposure, there was a small, statistically insignificant increase in mitotic activity – the mitotic index was 5.3%, whereas in the control it was 3.6%. Lengthening the exposure time to 8 minutes led to a statistically significant increase in mitotic activity – it reached a value of 7.9%. Mitotic activity increases together with a rise in surface-acting energy. On the other hand, a comparison of the mitotic activity in meristem cells from onions with 8 minutes exposure with the mitotic activity of F₁ generation cells revealed comparable values – 7.9% and 8.1%, respectively. The obtained results suggest that radiation has a stimulating and permanent influence. The increase in the mitotic indexes was an effect of a larger number of cells in prophase stage, so it can be supposed that laser rays influence processes which take place in interphase in a stimulating manner, and perhaps they extend the duration of prophase itself.

The analysis of D’Amato coefficient values for all the irradiated groups showed values approximate to the control. Therefore, it can be concluded that radiation at the given dose is not an inhibitor of the karyokinetic spindle. However, to a small percentage, its incorrect activity was observed, such as for example, faulty chromosome congression in the equatorial surface, multipolar spindles. Moreover, in the irradiated material, we observed some other incorrect images of particular phases of mitosis, e.g. sticky bridges between segregating chromosomes, eliminations and fragmentations of chromosomes, as well as micronuclei and binuclear cells.

To summarise, it can be stated that laser light at the applied dose is of stimulating character, and it is also a physical mutagen, acting in a klastogenic and turbogenic manner.