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ERYTHROCYTES DON'T INTERNALIZE $LaVO_4:Eu^{3+}$ NANOPARTICLES

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Aim. To determine the ability of lanthanum orthovanadate doped with europium ($LaVO_4:Eu^{3+}$) nanoparticles of approximately 100 nm in size to enter intact rat erythrocytes.

Methods. Briefly, 13 µl of freshly prepared erythrocyte suspensions obtained from blood of intact WAG rats incubated with $LaVO_4:Eu^{3+}$ nanoparticles for 24 h at 80 mg/L were used. Images of cells were acquired via the Olympus FV10i-LIV scanning confocal microscope supplemented with a 60/1.2 NA water-immersion objective. Post-acquisition images were processed taking into account the analysis of autofluorescence, background subtraction and fluorescence profiles. Europium-enabled luminescent $LaVO_4:Eu^{3+}$ nanoparticles were excited at 391 nm, while the fluorescence was acquired at 618 nm.

Results. In this study, we investigated the ability of large-sized (100 nm) rat erythrocytes to internalize $LaVO_4:Eu^{3+}$ nanoparticles. As demonstrated by scanning confocal laser microscopy, exposure of rat red blood cells to large $LaVO_4:Eu^{3+}$ nanoparticles did not result in their internalization. Instead, the nanoparticles adhered to the cell membranes and were not found in the cytosol of cells. Our findings are consistent with other experimental data on the inability of large-sized nanoparticles to enter erythrocytes and provide novel insights concerning the mechanisms of biological effects of nanostructured materials.

Conclusions. Rat red blood cells cannot internalize $LaVO_4:Eu^{3+}$ nanoparticles whose size is about 100 nm.