Cytotoxicity and divalent cation chelation by quinoline derivatives in aqueous solutions

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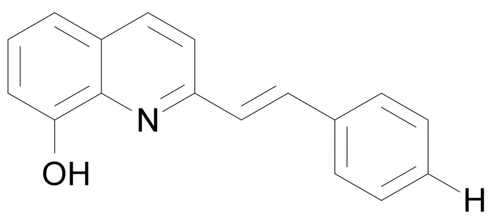
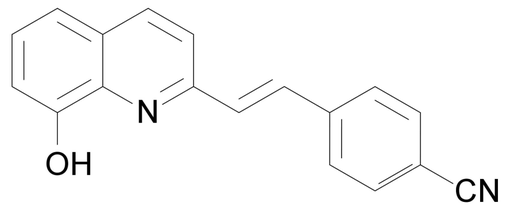
The aim: to investigate the chelating ability and stability of cationic complexes of 8-hydroxyquinoline derivatives in physiological solution, cytotoxicity and fluorescence in cancer cells.

Methods

Quinoline derivatives:



2-(2-phenylethenyl)quinolin-8-ol (STQ-H)



2-[2-(4-cyanophenyl)ethenyl]quinolin-8-ol (STQ-CN)

Cytotoxycity and luminescence investigations

The cells lines DU-145 (prostate cancer) and MDA-MB-231 (breast cancer) were obtained from the bank of human and animal tissue cell lines of the R. E. Kavetsky Institute of Experimental Pathology, Oncology and Radiobiology. Cells were incubated in DMEM medium (ThermoFisher, USA) with increased concentrations of glucose and pyruvate, 10% calf serum (Biowest, France), 40 μg/ml gentamicin and an atmosphere of 5% CO_2 at 37 °C. Derivatives of 8-hydroxyquinolines in DMSO were added to the incubation solution by the method of fourfold dilutions at the concentration range of 0.125-0.00003 mM for 48 h. The incubation medium was removed and the 8-hydroxyquinoline derivative in physiological solution (5 mM) was added. Cells were stained for 5, 10, 20 or 30 min. Washed for 1 minute in physiological solution. Luminescence was investigated on a Carl Zeiss microscope with a camera AxioCam ICc5 and luminescent block HXP 120 V.

Results

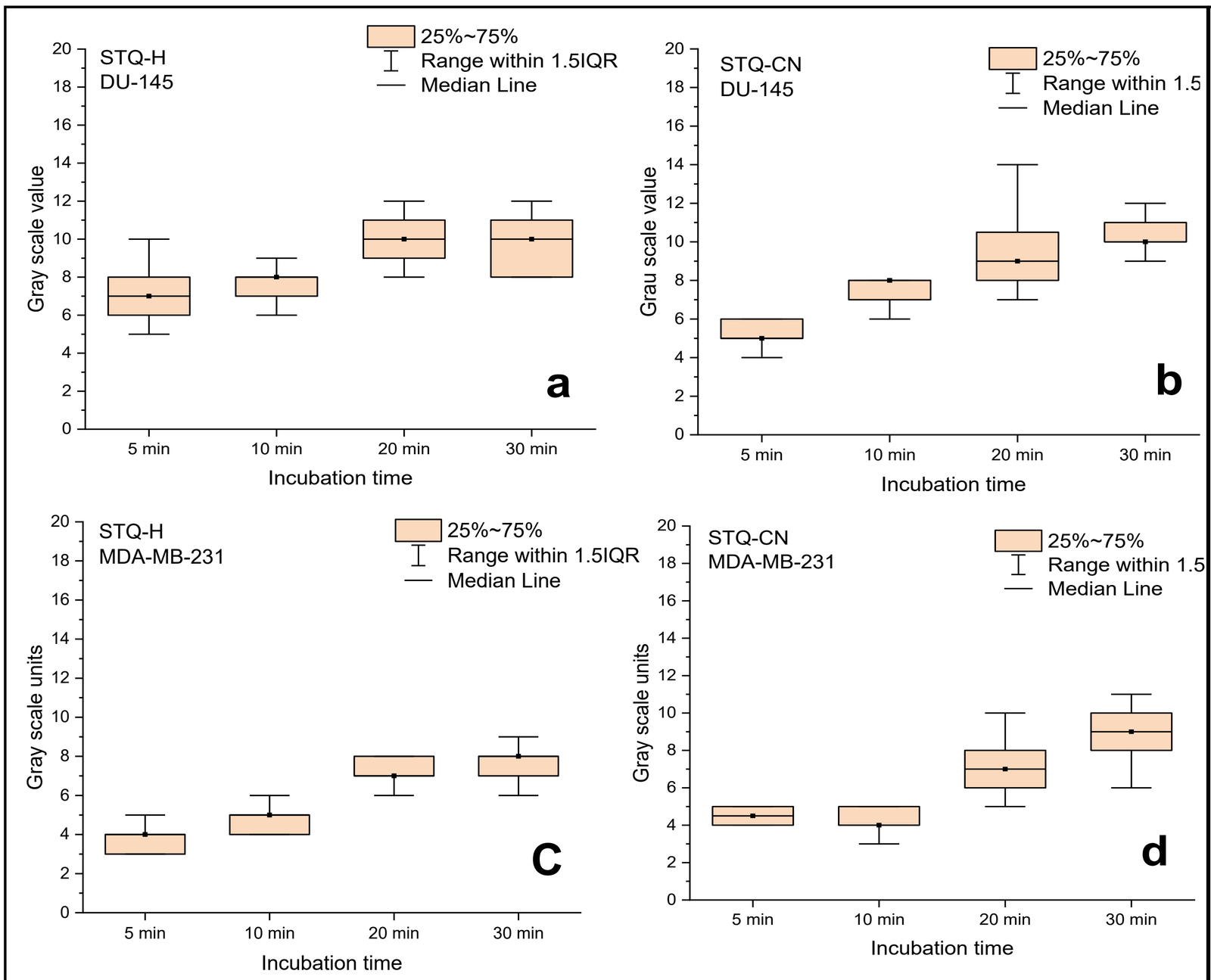


Figure 1. Luminescence of STQ-H (a, c), STQ-CN (b, d) in prostare (DU-145) and breast (MDA-MB-231) cancer cells after 5, 10, 20, 30 min incubation. 8-hydroxyquinoline-derivative concentration was 5 mM.

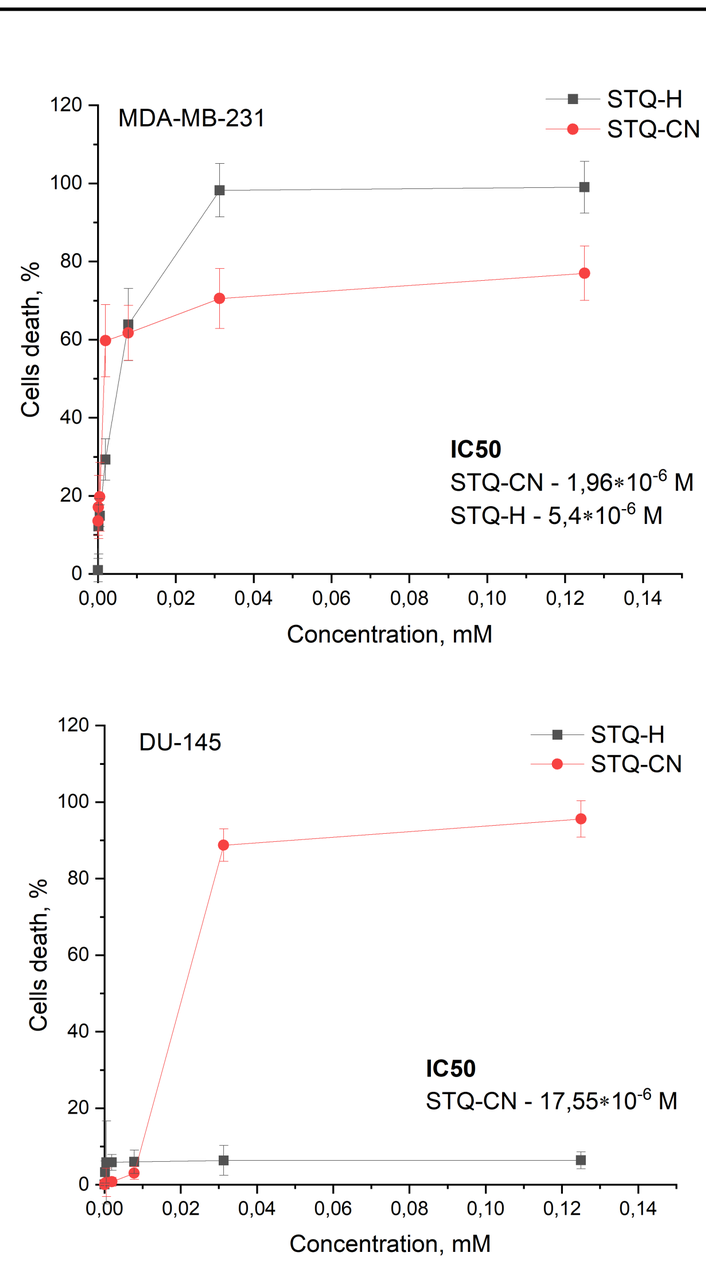


Figure 2. Cytotoxicity of STQ-H, STQ-CN for breast cancer MDA-MB-231 and prostate cancer DU-145 cells line.

Conclusions

A high sensitivity of cells to STQ-CN was revealed. IC50 were $17.55 \cdot 10^{-6}$ M for DU-145 and $1.96 \cdot 10^{-6}$ M for MDA-MB-231. No cytotoxicity of STQ-H to DU-145 was detected, but it strongly inhibited MDA-MB-231 (IC50 $5.4 \cdot 10^{-6}$ M). Luminescence investigations was indicated a similar rate of STQ-H and STQ-CN accumulation in the cytoplasm.