Fluorescent turn-off nanosensor for the quantitative determination of doxorubicin

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Doxorubicin (Dox) is the most commonly used drug from the group of anthracycline antibiotics for chemotherapy. Dox has high activity against many types of cancerous tumours. The use of Dox has significant disadvantages of destroying both cancerous and healthy cells, as Dox is highly cardio-, cyto- and neurotoxic. For this reason, it is necessary to continuously monitor the concentration of Dox in in the patient's body.

Well-known methods of quantitative determination of Dox in body fluids and tissues, such as high-performance liquid chromatography, voltammetry and others, are time consuming and expensive. Also, chemotherapy uses drugs containing excipients that may affect the efficiency and accuracy of Dox concentration determination.

Dox has a fairly intense natural fluorescence in the 540-660 nm range. This makes it possible to use the fluorescent turn-off nanosensor based on quantum dots (QDs). The fluorescence intensity of QDs changes the interaction of nanoparticles with Dox molecules.

We showed Dox by fluorescent turn-off nanosensor based on QDs luminescence quenching. The luminescence intensity of QDs decreases with increasing concentration of Dox. The method shows the possibility of determining Dox in the human blood [1].

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1) Mescheryakova, S. A., Matlakhov, I. S., Strokin, P. D., Drozd, D. D., Goryacheva, I. Y., & Goryacheva, O. A. (2023). Fluorescent Alloyed CdZnSeS/ZnS Nanosensor for Doxorubicin Detection. Biosensors, 13(6), 596.