

# SYNTHETIC ROUTE TO NOVEL ZWITTERIONIC PENTAMETHINE INDOCYANINE FLUOROPHORES WITH VARIOUS SUBSTITUTIONS

**Maksim A Spitsyn, Viktoriya E Kuznetsova and Alexander V Chudinov**

Engelhardt Institute of Molecular Biology, Russian Academy of Sciences, Russian Federation, Russia

Cyanine dyes have found applications in numerous diverse areas, such as in biological, medical and drug development, imaging of bio-targets, fluorescent sensors and probes and in anticancer treatments such as photodynamic therapy. Their excellent staining properties make them useful fluorescent probes in methods, such as flow cytometry, for the detection of nucleic acids in solution, gel electrophoresis and in fluorescence microscopy. The purpose of this study was the synthesis of electroneutral cyanine dyes with enhanced water solubility and fluorescence spectral characteristics that are superior to those of traditional monosulfonated cyanine dyes. Two series of novel zwitterionic water-soluble pentamethine cyanine dyes with geometrically balanced structures were synthesized and characterized. One series of cyanine dyes is the zwitterionic fluorophores, which contain positively charged trimethylammonioalkyl and negatively charged sulfonate groups. The second series of cyanine dyes contains a sulfonate group on one indolenine nucleus and a carboxyl group linked through an N-acylsulfonamide bond on the other indolenine nucleus. Dye-modified deoxyuridine triphosphates were synthesized and evaluated as reagents for nucleic acid labelling using PCR with Taq DNA-polymerase. The efficiency of the incorporation of labelled nucleotides was investigated via real-time PCR and using a KRAS-Biochip commercial testing system based on hybridization. Our experimental data suggest that the nucleotides containing the electroneutral cyanine dyes with a medium linker length were more effective substrates for Taq DNA polymerase for DNA labelling during PCR. The obtained results suggest that novel cyanine dyes are a promising class of fluorophores for improving labelling of nucleic acid probes.

## Biography

Spitsyn M A has graduated from Moscow State University of Fine Chemical Technologies, Faculty of Biosynthesis. He came to work in the Laboratory of Biological Microchips, Engelhardt Institute of Molecular Biology, Russian Academy of Sciences in June 2011. He is pursuing/ completed PhD with a thesis entitled New Deoxyuridytriphosphates Fluorescently Labelled by Indodicarbocyanine Dyes, for the Analysis of Biomolecules. He has published nine scientific articles in peer reviewed journals of high citation impact.

[maksspicy@gmail.com](mailto:maksspicy@gmail.com)