**Photoconvertible capsules with multiple dyes for stem cell tracking**

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Investigating the pathways of individual cells within populations is critical to understand their interactions, migration patterns, and fate. Optical labeling of cells is usually performed via transfection for subsequent production of green fluorescent (GFP-like) proteins within the cells [1]. Nevertheless, such genetic modifications might change the behavior of cells and give rise to the question of their safety in personalized medicine. These complications are especially important in case of personalized stem cell therapy [2].

In this study, photoconvertible polymer microcapsules were proposed as a cell-labeling alternative to the genetic modifications of stem cells. Such capsules were synthesized by the thermal treatment in a polyvinyl alcohol (PVA) gel with the dye. The use of PVA gel increased the yield of capsule production by 250 times compared to the previous synthesis in water [3]. Several dyes have been investigated as potential convertible labels, such as rhodamine B, rhodamine 6G, pyronin B, fluorescein, acridine yellow, acridine orange, and thiazine red. Using confocal laser scanning microscopy, the brightness of the fluorescence, photostability, and photoconversion of capsules containing these dyes were evaluated. Capsules containing rhodamine B and rhodamine 6G were found to be the most promising for cell labeling. The photoconversion mechanism of rhodamine dyes was verified by mass spectrometry. Cell experiments demonstrated the high viability of cells with internalized capsules and high uptake efficiency. Successful photoconversion of the capsules inside the mouse mesenchymal stem cells was achieved while preserving their viability. The migration of stem cells in a glioma population was observed using the developed labeling technique.

These photoconvertible polymer microcapsules provide new opportunities for cell tracking. Such labels serve as an alternative to GFP-like proteins and may give rise to studies on diverse cell migrations.

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**Literature**

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