

Novel NIR Dyes for the Endogenous Labelling of Exosomes

The recognition of the biological, diagnostic and medical importance of exosomes has given rise to an urgent need for efficient labelling of these extracellular vesicles in ways that do not alter their inherent characteristics. RCSI scientists have developed a simple and efficient endogenous method of labelling exosomes with a novel NIR dye without the need for tedious immunolabelling or synthetic or chromatographic manipulations.

BACKGROUND

Exosomes are extracellular vesicles (EVs) of size less than 150 nm released by cells into their surrounding environment. It is now recognised that exosomes can directly activate membrane receptors of the recipient cells and can also deliver active biomolecules, such as transcription factors, mRNA and miRNAs.

Recent studies have highlighted that they may play crucial roles in the pathogenesis of diseases, including the metastatic dissemination of cancer from the site of origin to distant sites. Diagnostically, their protein and nucleic acid signatures are used as prognostic markers in liquid biopsies and as disease biomarkers.

Fluorescence is the tool of choice for probing the molecular processes of biological systems such as exosomes. Fluorescent probes with near-infrared (NIR) wavelengths offer an added benefit of direct translation from cellular to in vivo usage due to the penetration of NIR-light through body tissue.

VALUE PROPOSITION

There is a clear unmet need both from academia and industry for a simple endogenous process for exosome labelling that maintains their biological integrity.

Current approaches see exosomes labelled following their isolation by either immuno-labelling, covalent linking or passive diffusion of a probe. These post-isolation labelling methods have met with only limited success as they risk loss of exosome integrity due to surface modifications, chemical contamination with conjugation reagents or physical damage during chromatographic purification.

To address this need, RCSI have developed an NIR-AZA probe which upon non-specific cell internalization leads to intracellular exosome labelling and subsequent cellular secretion of isolatable and stable labelled exosomes.

TECHNOLOGY

An amphiphilic NIR Dye (AZA-1) has been developed and patented by RCSI for its use in the endogenous labelling of exosomes. This method does not require the use of immuno-labels, reagents for conjugation reactions or chromatographic purifications.

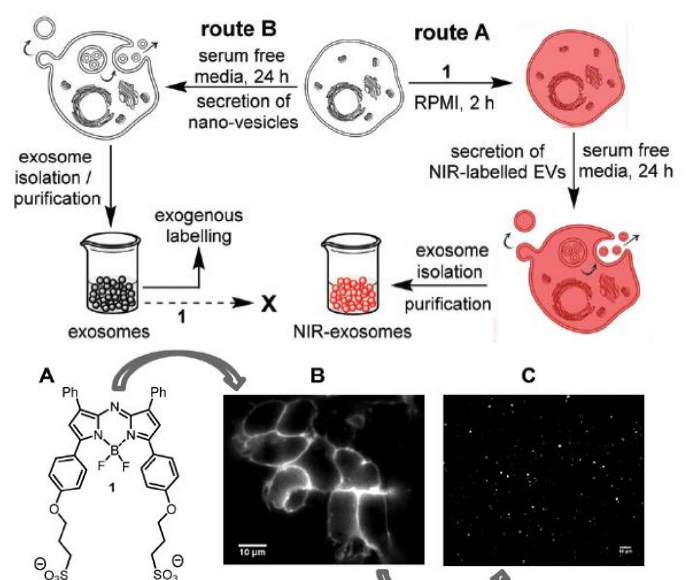


Fig 1. NIR Dye (AZA-1) enables the simple and effective endogenous labelling of exosomes (route A) without the tedious purification and isolation steps of current procedures (route B)

FEATURES	BENEFITS
Simple exogenous labelling of exosomes	Avoids tedious post expression isolation and labelling steps
NIR-AZA fluorophore	Facilitates both in vitro and in vivo imaging

TECHNOLOGY READINESS LEVEL

- Patent application filed
- In vitro proof of concept