

Fluorescent Dextran Conjugates

Introduction

Dextrans have good water solubility, low toxicity and stability. They are resistant to cleavage by most endogenous cellular glycosidases, making dextran conjugates the ideal long-term tracers for live cells. Fluorescent dextrans serve as valuable markers for cell loading of macromolecules by micro-injection, vesicular fusion, electroporation, the uptake and internal processing of exogenous materials by phagocytotic and endocytic pathways. AAT Bioquest offers fluorescent dextran conjugates in a variety of molecular weights and labeled with different functional dyes.

Preparing Stock Solutions

AAT Bioquest's dextran conjugates are provided as pure lyophilized powder containing only trace amounts of salts. Our dextran conjugates were purified using a combination of precipitation, dialysis, gel filtration and other techniques. Dextran conjugates are generally soluble in aqueous buffers to at least 10 mg/mL. Their solubilities decrease as the molecular weight increases. The maximum solubility in aqueous buffer is about 100 mg/mL for 3,000 MW dextrans, 50 mg/mL for 10,000 MW dextrans, 25 mg/mL for 70,000 MW dextrans and 5–10 mg/mL for the 500,000 and 2,000,000 MW dextrans. Vortexing, sonicating, or briefly heating (40–50°C) may increase the solubility. Any insoluble particles formed during dissolution should be removed by centrifuging the mixture in a microfuge at 12,000 × g for 5 minutes. Alternatively, the particles may be removed by filtrating a dilute solution of the dextran through Whatman #2 filter paper. Aqueous solutions of dextrans may be stored at 2–6 °C for several weeks with the addition of sodium azide to a final concentration of 2 mM to inhibit bacterial growth. For long-term storage, we recommend to divide the aqueous solution into aliquots and freeze at –20°C. AVOID REPEATED FREEZING AND THAWING.

Net Charges and Sizes of Dextran Conjugates

The net charge on a dextran depends on the fluorophore. All our calcium dye-labeled dextran conjugates are anionic with 3-5 negative charges. Our Protonex dye-labeled dextran conjugates are either neutral or cationic. Dextran conjugates with molecular weights up to 70,000 daltons are routinely employed to trace neuronal projections and can function efficiently as anterograde or retrograde tracers, depending on the study method and tissue type used. 3,000 MW dextran conjugates may be preferred in some applications because they penetrate peripheral neuronal processes better and diffuse faster than higher MW dextrans.

Potential Applications of Fluorescent Dextran Conjugates

The availability of various sizes of conjugated dextrans makes them well suited for evaluating exclusion properties of artificial polymer matrices, vascular networks and cell membranes. The size-exclusion properties of dextrans might be explored to investigate intracellular communication through gap junctions. Dextran conjugates have been used extensively by developmental biologists for tracing cell lineage because of their excellent retention properties and low toxicity. Fluorescent dextrans have been used in studies of macromolecular diffusion through cytoplasm, fluid flow velocity, liposome encapsulation and vascular flow in whole animals. Monitoring the diffusion of the dextran tracer is typically accomplished using fluorescence recovery after photobleaching (FRAP) techniques, or by photoactivation of caged fluorophore–dextran conjugates.

Fluorescent pH-sensitive dextran conjugates have been used to monitor the uptake and internal processing of exogenous materials by endocytosis. Our Protonex dextran conjugates may be useful for studying endosome fusion, cell membrane changes and vesicular morphology.

Compared to the free ion indicator, the dextran conjugates of our calcium indicators exhibit both reduced compartmentalization and much lower rates of dye leakage. Such conjugates have been utilized in measurements of intracellular calcium and/or magnesium concentrations in a wide variety of cell types, including plant and fungal cells. Under the same conditions tested, our Cal-520 dextran conjugates perform much better than the corresponding Fluo-4 and Calcium Green dextran conjugates.

Product Ordering Information

Cat#	Product Name	Unit Size
20508	Cal-590™-Dextran Conjugate *MW 3,000*	1 mg
20509	Cal-590™-Dextran Conjugate *MW 10,000*	1 mg
20545	Cal-630™-Dextran Conjugate *MW 3,000*	1 mg
20546	Cal-630™-Dextran Conjugate *MW 10,000*	1 mg
20600	Cal-520®-Dextran Conjugate *MW 3,000*	1 mg
20601	Cal-520®-Dextran Conjugate *MW 10,000*	5 mg
21211	RatioWorks™ PDMPO Dextran	1 mg
21217	Protonex™ Green 500 Dextran	1 mg

References

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