Fluorescent Dextran Conjugates

Introduction

Dextrans are highly water-soluble, biocompatible polysaccharides with excellent stability and minimal toxicity. Their resistance to enzymatic degradation by endogenous cellular glycosidases makes dextran conjugates ideal long-term tracers for live-cell imaging and molecular transport studies. Fluorescent dextrans serve as powerful tools for examining cellular uptake and intracellular trafficking through processes such as microinjection, vesicular fusion, electroporation, and endocytosis.

AAT Bioquest offers a wide range of fluorescent dextran conjugates in multiple molecular weights, labeled with various high-performance fluorescent dyes. These reagents are optimized for cell biology, physiology, and bioengineering research applications requiring accurate macromolecular tracking and quantification.

Preparation and Storage of Solutions

The fluorescent dextran conjugates are readily soluble in water and most aqueous buffers. Dissolve the lyophilized powder in ultrapure water, PBS (pH 7.2–7.4), or other suitable buffer to prepare a stock solution. The solubility of dextran conjugates depends on molecular weight (refer to the table below).

To enhance solubility, vortexing, sonication, or gentle heating (40–50°C) may be applied. Avoid excessive heating or prolonged agitation, which can degrade the fluorophore. For hydrophobic dye conjugates, slightly alkaline buffers (pH 8–8.5) may enhance solubility. Once dissolved, inspect for any undissolved material. Remove particulates by centrifugation (12,000 × g for 5 minutes) or by filtration through a 0.22 µm sterile filter if sterility is required.

Molecular weight (Da)	Approximate maximum solubility (mg/mL)
3,000	100
10,000	50
70,000	25
500,000 – 2,000,000	5–10

- Freeze the lyophilized stock (<-15 °C) with minimized light exposure.
- Store aqueous solutions at 2–8°C for several weeks, protected from light.
- To inhibit microbial growth in non-cellular assays, add 2 mM sodium azide.
- For long-term storage, divide into aliquots and freeze at ≤ –20°C.
- Avoid repeated freeze–thaw cycles, which can reduce fluorescence and stability.
- Always protect from light by using amber vials or aluminum foil wrapping.

Proper storage and handling help preserve dye brightness, consistency, and tracer performance over extended use.

Applications

The broad range of molecular sizes and fluorescent labels available makes AAT Bioquest's dextran conjugates versatile tools for diverse experimental systems.
Common applications include:

- Evaluating size-exclusion properties of polymer matrices, vascular systems, and cell membranes.
- Investigating intracellular communication through gap junctions using dextrans of varying molecular sizes.
- Tracing cell lineage and studying developmental processes due to their low toxicity and excellent retention properties.
- Quantifying macromolecular diffusion in the cytoplasm and measuring flow dynamics in biological and artificial systems, including vascular networks and microfluidic devices.

- FRAP (Fluorescence Recovery After Photobleaching) and photoactivation studies for visualizing macromolecular movement and dynamics in living cells.
- pH-sensitive Protonex™ dextran conjugates enable precise monitoring of endocytosis, endosomal processing, and membrane recycling events in live cells.

Product Ordering Information

#Cat.	Product Name	Unit	MW (Da)	Ex (nm)	Em (nm)
21713	iFluor® 405–dextran conjugate	10 mg	10000	403	427
21714	iFluor® 405–dextran conjugate	10 mg	20000	403	427
21715	iFluor® 405–dextran conjugate	10 mg	70000	403	427
21716	iFluor® 405–dextran conjugate	10 mg	150000	403	427
21700	FITC–dextran conjugate	25 mg	20000	491	516
21702	FITC–dextran conjugate	25 mg	70000	491	516
21704	FITC–dextran conjugate	25 mg	150000	491	516
21706	TRITC–dextran conjugate	25 mg	20000	544	570
21708	TRITC–dextran conjugate	25 mg	70000	544	570
21710	TRITC–dextran conjugate	25 mg	150000	544	570
21718	iFluor® 647–dextran conjugate	10 mg	10000	656	670
21719	iFluor® 647–dextran conjugate	10 mg	20000	656	670
21720	iFluor® 647–dextran conjugate	10 mg	70000	656	670
21721	iFluor® 647–dextran conjugate	10 mg	150000	656	670

References

1. Yi, J., Khobrekar, N. V., Dantas, T. J., Zhou, J., & Vallee, R. B. (2016). Imaging of motor-dependent transport in neuronal and nonneuronal cells at high spatial and temporal resolution using fluorescent dextran probes. Journal of Cell Biology, 212(3), 377–390.
2. Sanyal, A., Scanavachi, G., & Somerville, E. (2024). Neuronal constitutive endolysosomal perforations enable α-synuclein aggregation by internalized PFFs using Dextran-AF647 as an endocytic marker. Journal of Cell Biology, 224(2), e202401136.
3. Galas, L., Gallavardin, T., Bénard, M., & Lehner, A. (2018). "Probe, Sample, and Instrument (PSI)": The hat-trick for fluorescence live-cell imaging using FITC-dextran labeling. Chemosensors, 6(3), 40.
4. Nie, L., Zhang, Y., Li, L., van Rijn, P., & Schirhagl, R. (2021). pH-sensitive dextran coated fluorescent nanodiamonds as a biomarker for HeLa cells' endocytic pathway and increased cellular uptake. Nanomaterials, 11(7), 1837.
5. Tannert, A., Lopez, J. G., Petkov, N., & Ivanova, A. (2021). Lysosome-targeting pH indicator based on peri-fused naphthalene monoimide with superior stability for long-term live-cell imaging and fluorescent dextran tracking. Journal of Materials Chemistry B, 9(7), 1532–1542.