

Modified Nucleoside Triphosphates: **Your Tried & Trusted Solution for mRNA Therapies**

Now Available at GMP Grade



Leading the Way in mRNA™

 **TriLink**
BIOTECHNOLOGIES
part of Maravai LifeSciences



Premier Materials for mRNA Therapies

Backed by 25+ years of experience, TriLink's industry-leading high-purity modified nucleoside triphosphates (NTPs) optimize and enhance mRNA performance to promote robust expression. Our extensive portfolio includes the most-requested modified NTPs, readily available and custom made to order.

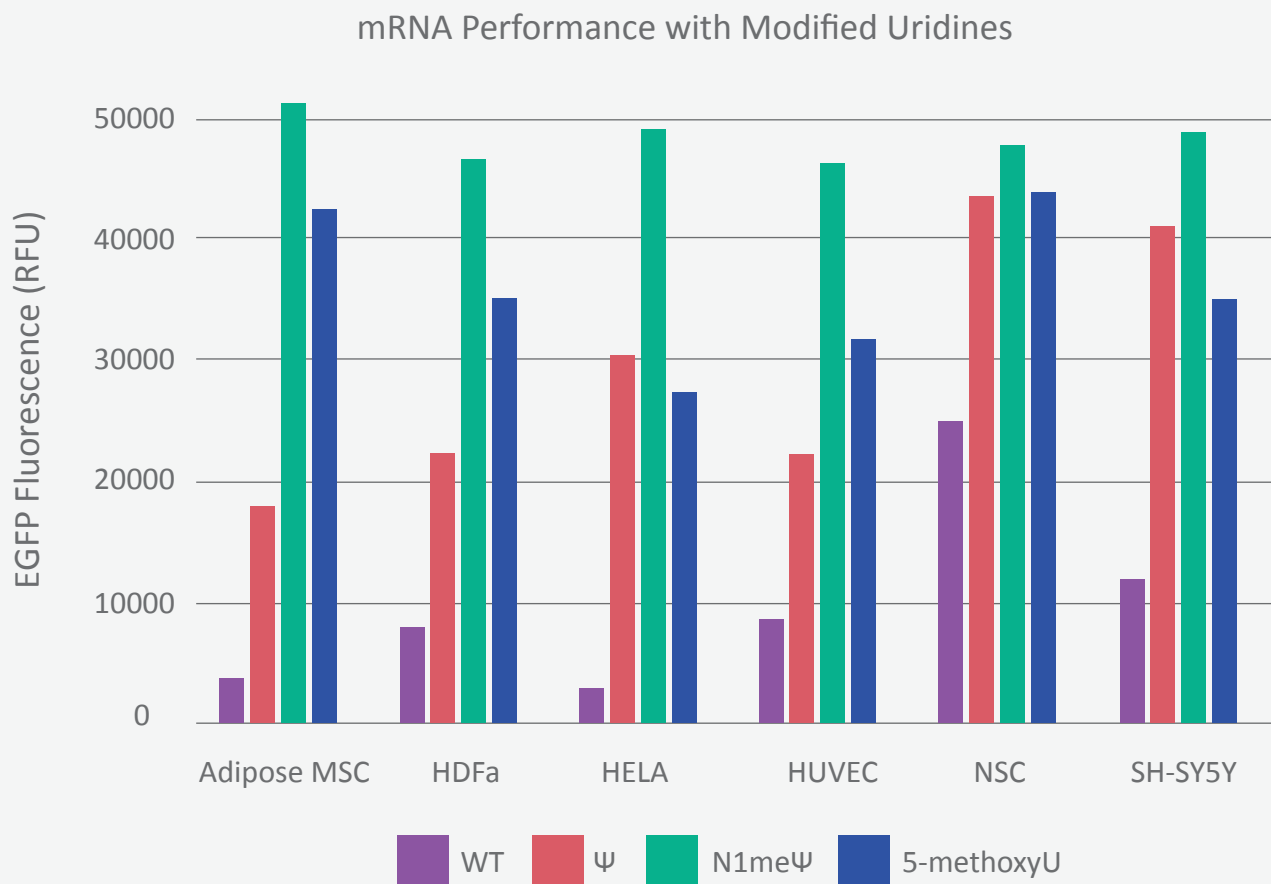
Modifications that Matter

For mRNA applications, the most popular chemically synthesized modified uridine options include:

**N1-Methylpseudouridine
-5'-Triphosphate**

**5-Methoxyuridine
-5'-Triphosphate**




**Pseudouridine
-5'-Triphosphate**



Four capped mRNA constructs coding for the enhanced green fluorescent protein (EGFP) were transcribed and with different uridine substitutions: pseudouridine (Ψ), N1-methylpseudouridine (N1me Ψ), 5-methoxyuridine (5-methoxyU) or wildtype uridine (WT U). 20 ng of each respective mRNA was transfected into the following cell lines: adipose mesenchymal stem cells (MSC), dermal fibroblasts cells (HDFa), cervical cell line HeLa, umbilical vein endothelial cells (HUVEC), human neural stem cells (NSC), and neuroblastoma line SH-SY5Y. GFP fluorescence was measured after 45 hours at 535 nm. Values are reported as relative fluorescence units (RFU) from background. All modified mRNAs produced more EGFP signal than the wildtype uridine mRNA constructs, and N1me Ψ had the highest signal strength.

The First-Ever GMP-Grade NTPs

As one of the first manufacturers of N1-methylpseudouridine-5'-triphosphate, TriLink provides some of the best NTPs on the market—including the *first* GMP-grade chemically synthesized NTPs available. Support your mRNA therapeutics programs with proven foundational components used in mRNA vaccine programs worldwide.

Modified NTP Testing Under 'For Further Processing' Label		
 Identity	 Purity and Impurities	 Safety (Microbial)
<ul style="list-style-type: none"> > Appearance by visual inspection > pH by USP <791> > Concentration by UV/Vis spectroscopy > Atomic mass and identity by ion-pair reversed-phase HPLC – mass spec > Structure profile identity by ¹H NMR 	<ul style="list-style-type: none"> > Purity by anion exchange HPLC > Purity by ³¹P NMR > RNase detection assay > Sodium content by ion chromatography > Residual acetate by ion chromatography > Residual ethanol by gas chromatography > Residual triethylamine by gas chromatography 	<ul style="list-style-type: none"> > Endotoxin by USP <85> > Bioburden by USP <61>

Scale Swiftly from Clinical to Commercial

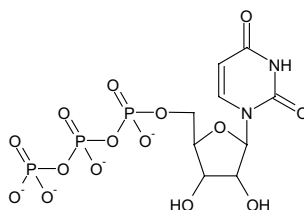
Our NTP portfolio provides peace of mind when scaling from clinical to commercial programs. TriLink operates an ISO 9001:2015 facility that ensures your mRNA production materials meet reported requirements for identity, purity, and safety. Our stringent quality systems and dedicated team of experts ensure consistency in the product, process, and documentation.

	Research Use Only	For Further Processing*
Quality Standards	ISO 9001:2015	ISO 9001:2015, and additional quality provisions as described in our quality agreement
Release Documentation	Certificate of Analysis	Certificate of Analysis, Certificate of Origin, Certificate of Release
Batch Production Documentation	Synthesis sheets	Fully traceable Master Batch Record
Manufacturing Space	Controlled, unclassified	ISO 8 or 7, ISO 5 laminar flow hood final fill
Equipment Qualification	Qualification for critical systems	Installation and operational qualification of all instrumentation
Verification/Validation	n/a	Test method validation; manufacturing process verification, cleaning validation, computer system validation
Raw Materials Testing	n/a	Accept on Certificate of Analysis and testing of critical raw materials
Stability	Historical	Formal stability data

*A quality agreement is required to obtain GMP-grade raw materials. Please inquire for details.

>150
NTP types to
meet diverse
research needs:

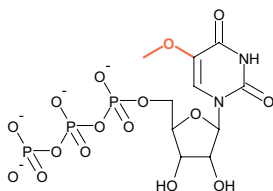
Unmodified Bases



The standard bases, provided as rATP, rGTP, rUTP, and rCTP are the building blocks for all in-vitro transcribed mRNA.

Uridine-5'-triphosphate

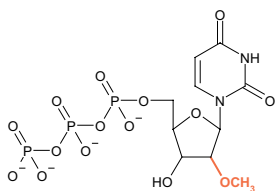
Base Modified



5-Methoxyuridine-5'-Triphosphate

Modifying the nucleobase can improve mRNA performance by masking therapeutic mRNA from the immune responses that are generally triggered by exogenous mRNA.

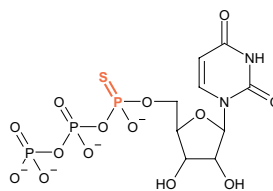
Sugar Modified



2'-O-Methyluridine-5'-Triphosphate

Modifying the ribose sugar at 2' hydroxyl position can impart RNA nuclease resistance (e.g., modifications at the 2' hydroxyl position). Sugar modifications can impact the yield of in-vitro transcription reactions and may require optimization.

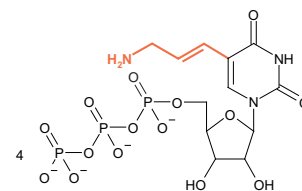
Alpha Phosphate Modified



Uridine-5'-O-(1-Thiotriphosphate)

Adding a thiophosphate at the NTP's alpha position allows for a modified phosphorothioate backbone, accelerating the rate of translation initiation. Adding 1-Thio-ATP for the polyadenylation step can prevent degradation of the poly(A) by 3' deadenylases.

Linker Modified



5-Aminoallyluridine-5'-Triphosphate

Specific base modifications (like aminoallyl) provide a primary amine for easy coupling with molecules of interest (biotin, fluorescent dyes, etc.). These modified RNAs are useful in discovery settings or for RNA enrichment.

The Industry-Leading Provider of Premier mRNA Therapy Materials

With decades of experience, innovative technology, and a team committed to your success, we are the ideal partner to support you as you scale from clinical to commercial.



25+ Years
of Experience



In >45 Therapeutic
Programs Worldwide



Simplified Supply
Chain Solutions



Dedicated Program
Team & Day-to Day
Communication



Trusted by Top
Pharma & Biotech
Companies

Ready to Get Started?

Contact Us

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