CleanCap®
capping technologies

TriLink BIOTECHNOLOGIES
part of Maravai LifeSciences

Determined to deliver
effective mRNA capping solutions

Bring your therapeutic or vaccine to market faster with an effective mRNA capping strategy

An essential part of any mRNA compound is the 5’ cap structure, which is critical to the stability, expression, and immunogenicity of an mRNA.

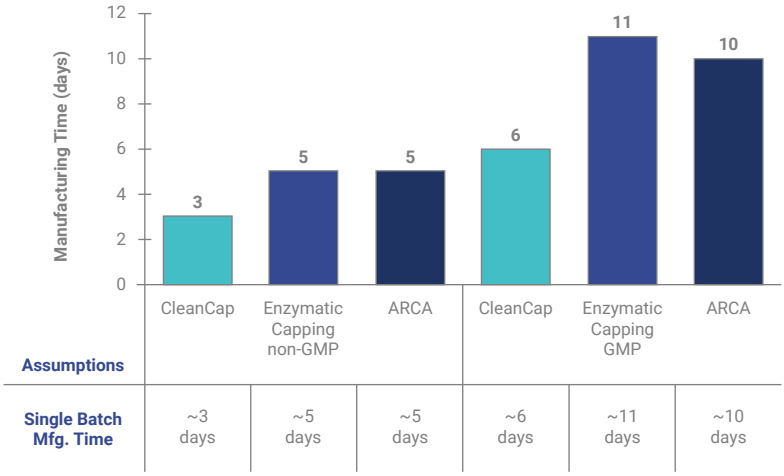
TriLink has revolutionized mRNA capping strategies with its one-pot CleanCap® capping solutions generating the optimal Cap1 structure with more than 95% efficiency.

This co-transcriptional capping process:

- Shortens therapeutic mRNA manufacturing processes by nearly a week
- Has demonstrated a reduction in overall manufacturing costs 20-40% lower than other capping methods
- Allows you to meet product development deadlines and cost-saving targets.

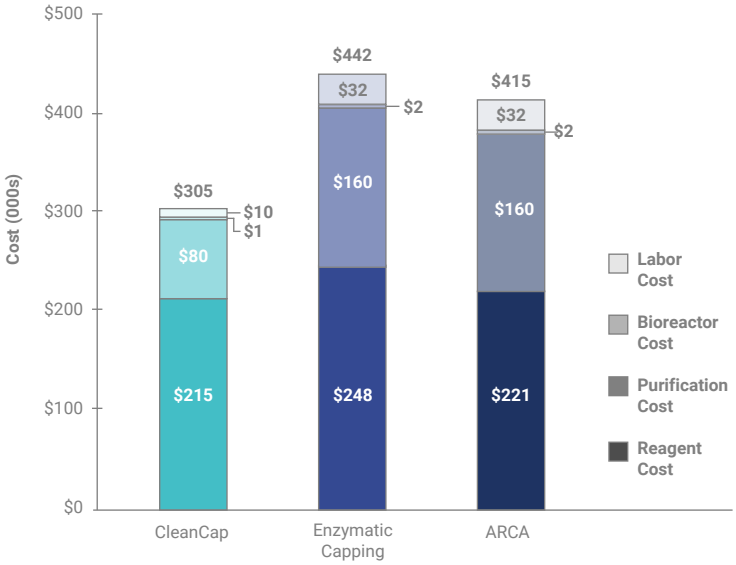
Estimated manufacturing time

for single batch of mRNA production



Estimated total manufacturing cost

for 1 g mRNA GMP production



Find the right analog for your application

TriLink BioTechnologies continues to innovate its growing offering of cap analogs to help meet a variety of applications including CleanCap technology.

CleanCap® applications include:

Vaccine development, ex-vivo cell therapies, in-vivo gene therapies,

CRISPR-Cas9 and related gene editing platforms, Recombinases and transposases TALENS, and Zinc Finger Nucleases

CleanCap® AU

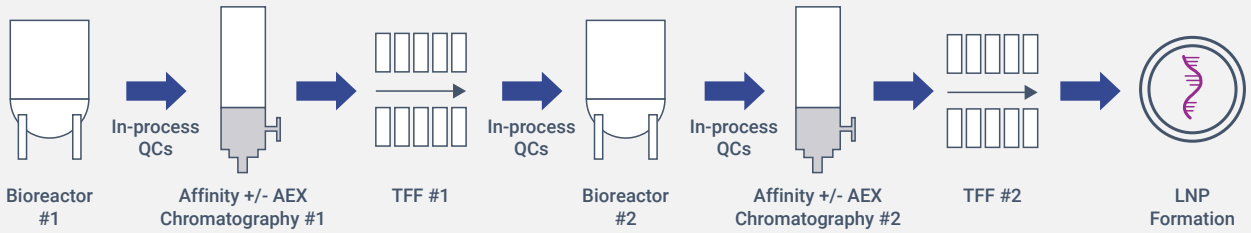
- Designed specifically for self-amplifying RNA applications
- Naturally occurring 5’ N7-Methylguanosine structure and 2’ O-methylation on the first base
- Yields the authentic alphavirus 5’ virus cap structure

Streamline your mRNA manufacturing process

With the rapid growth of mRNA-based vaccines and therapeutics in drug development pipelines, the race to be first-to-market with novel lifesaving therapeutics is accelerating. By using a streamlined process with your mRNA program, you experience fewer hurdles, increase your likelihood of success in bringing your products through the clinic and ultimately improving patients' lives.

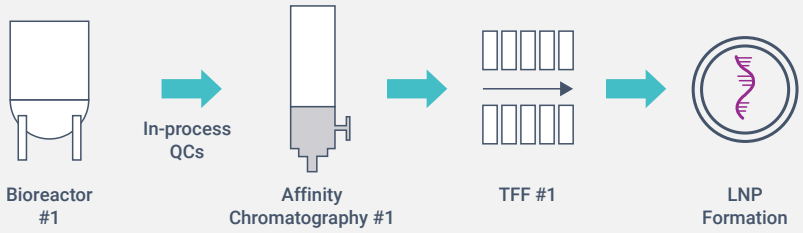
An enzymatic capping strategy requires two bioreactor reactions, the first to synthesize mRNA and the second to cap the mRNA. This often requires additional reagents and enzymes to produce the natural Cap1 structure with expected yield values between 50-70%*.

Enzymatic capping workflow overview



The CleanCap® technology solution produces a Cap1 structure during a single co-transcriptional reaction, requiring only one purification and bioreactor step without the need for additional reagents and enzymes. This simplified manufacturing process contributes to a high expected yield, ranging from 80-95%*

CleanCap® technology capping workflow overview



CleanCap® AG

- Naturally occurring 5' N7-Methylguanosine structure and 2' O-methylation on the first base
- Proven to provide up to 95% capping efficiency

CleanCap® AG 3' OMe

- Modification
- Includes the 2' O-methylation on the first base and 5' N7-Methylguanosine structure with an additional O-methylation on the 3' position of the cap
- Proven to provide up to 98% capping efficiency

CleanCap® M6

- Combined modifications of CleanCap Reagent AG 3'OMe and a methylation of position 6 of the first adenosine
- Provides up to 98% capping efficiency
- Increased protein yield, up to 30% more than other CleanCap analogs and capping methods
- Increase potency of your mRNA drug substance

Our expertise powers your innovation

Scalable processes and manufacturing

Maintaining scalability allows your project to keep to the timeline, absorb unexpected surges for product, and remain aligned with your clinical research goals. Our 118,000 sq ft facility contains multiple specialized manufacturing suites and support labs, ensuring success across a wide variety of synthesis scales.

Analytical support

With more than 20 years of experience, we understand your analytical objectives from process development (PD) to scale-up and GMP manufacturing. TriLink has developed extensive in-house capabilities in method development and analytical testing to ensure a high-quality manufacturing process. We work with you to ensure effective method development to meet your objectives at each stage of product development.

Analytical services available for CleanCap® capping technologies include:

Active moiety quantification
- Concentration (UV-Vis)

Identification
- MS, 1H NMR

Purity
- IP-RP HPLC, AX-HPLC, 31P NMR

Safety (for GMP grade products)
- Endotoxin, Bioburden

Contaminating nucleases (for GMP grade products)
- DNase and RNase Detection

Why partner with TriLink BioTechnologies?

As the leader in nucleic acid and mRNA solutions for more than 25 years, TriLink delivers unrivaled chemical and biological experience, CDMO services, and high-quality readymade and custom materials to realize the power and potential of mRNA.

ISO 9001:2015 certified manufacturing facilities

High quality standards on RUO and GMP products and services

Simplified supply chain

Dedicated program management team

*Research conducted by a third-party consulting firm

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