# Method of Enhancing Translation Ability and Stability of RNA Molecules, Treatments and Kits

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## Technology description

This invention provides methods and kits to produce mRNAs containing $N^6$, 2′ -O-dimethyladenosine (m6Am) residues at the 5′ UTR and also provides methods to use such mRNAs for enhancing stability, translation and protein yields for basic research, gene therapy applications and in vitro/cell free systems.

**Technology Overview**

mRNAs hold great promise in research and gene therapy but face 2 major drawbacks, namely low translation levels due to competition with endogenous mRNAs and lack of stability due to rapid degradation upon entering cells.

m6Am is a modified base and is found in some mRNAs immediately after the m7G cap at the 5′ end. The inventors have shown that the introduction of m6Am into the 5′ UTR of transcripts dramatically increases their stability (2-3 fold), thereby allowing it to persist for a longer period of time in cells. It also raises translation levels by promoting translation initiation. This technology requires a single m6Am, which can be easily incorporated into mRNAs using specific polymerases or enzymatic reactions. This invention therefore, facilitates the production of large amounts of a desired protein usingin vitroprotein production systems.

## Additional Information

Reversible methylation of m6Am in the 5' cap controls mRNA stability . Mauer J. et.al., Nature 2017

## Application area

· Kits to enhance protein yields inin vitro(cell-free) protein synthesis reactions andin vivo
· Increased protein production for gene therapy applications
· Enhanced mRNA translation in disease states for the treatment of the diseases / conditions

## Advantages

· Enhanced stability of the transcript along with higher translation levels resulting in high protein yields
· The m6Am modification can be readily incorporated into mRNAs.

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