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IP Management

TECHNOLOGY AND KNOWLEDGE TRANSFER

Novel Single-Subunit RNA Polymerase

FOCUS SECTORS

- RNA Polymerase
- Synthesis of RNA species
- RNA vaccines

PROJECT KEY WORDS

- RNA therapeutics
- Gene therapy

DEVELOPMENT STATUS

- Proof of concept
- Performance successfully evaluated

PATENT PROCEDURE STATUS

- Patent application filed

POTENTIAL FOR COOPERATION

- R&D Cooperation
- Transfer of rights
- Licensing

Background & Innovation

Single-subunit RNA polymerases, in particular viral DNA-directed single-subunit RNA polymerases, are frequently used in biotechnology for numerous purposes e.g. for the synthesis of RNA *in vitro* and the overexpression of recombinant genes *in vivo*. This includes the synthesis of mRNA, tRNA, rRNA, miRNA or snRNA. Such RNA polymerases have a simple structure and provide a high transcription efficiency and accuracy.

RNA polymerases are becoming increasingly important for the production of mRNA, which is used more and more often for therapeutics or for the development of new vaccines. However, there are very few of these that work precisely enough to deliver the required quality of RNA. The regularly used enzyme is the T7 RNA polymerase. We present here a new promising RNA polymerase which shows significantly better performance characteristics than the T7 and an adequate phylogenetical distance to T7.

Competitive advantage

The novel single-subunit RNA polymerase offers remarkable advantages compared to the established polymerases:

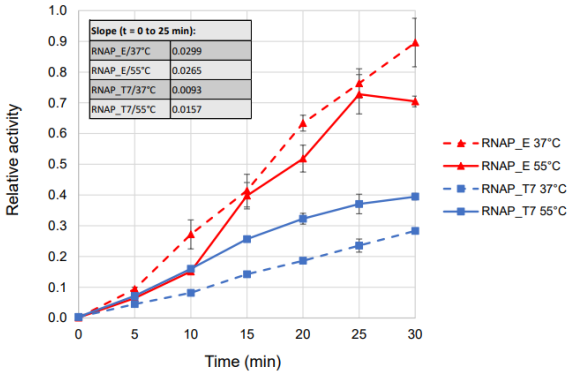
- 3.2 times faster than T7 RNA polymerase at 37°C
- Maximum activity at 37°C but > 80 % residual activity at 55°C
- Comparable activity compared to thermostable T7-variants at 50°C
- Higher thermostability than T7 RNA polymerase
- High salt tolerance
- Improved metabolic stability

Technical Description

The novel single-subunit RNA polymerase (RNAP_E) is highly efficient and can be reliable stored under suitable conditions over a long period of time. It has its maximum activity at 37°C, but it still exhibits a relatively high activity at 45°C or 55°C and even at 65°C or 75°C. Thus, the novel RNA polymerase is significant more thermostable than the known T7 RNA polymerase.

Our novel RNA polymerase can be used in numerous biotechnological applications, in particular for the production of RNA, in particular mRNA therapeutics, e.g. RNA used in gene therapy or RNA vaccines. Furthermore, the novel polymerase is perfectly suitable for diagnostic methods or the amplification of RNA in metagenomics screening methods.

The following figure shows the activity of the novel RNA polymerase (RNAP_E) and the activity of T7 polymerase at different temperatures. The data illustrate very well the increased activity of the novel polymerase compared to the established T7 polymerase. This applies to both temperatures shown in the diagram.



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