

## Primer-independent DNA Polymerase and its use for DNA synthesis

CSIC and the Institut Pasteur have developed new DNA polymerase enzymes with priming activity that do not require externally provided primers for DNA replication. These polymerases are able to initiate a faithful and processive *de novo* DNA replication of circular and linear templates in absence of pre-existing primers or additional protein factors.

Industrial partners are being sought to collaborate through a patent licence agreement.

### An offer for Patent Licensing

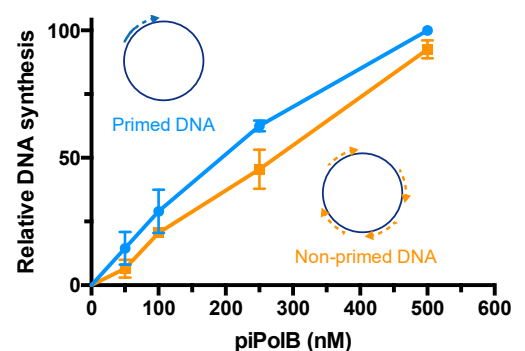
#### DNA synthesis without primers

The primary role of replicative DNA polymerases is to accurately and efficiently replicate the genome in order to ensure the maintenance of the genetic information and its faithful transmission through generations. This is not a simple task considering the size of the genome and its constant exposure to endogenous and environmental DNA damaging agents.

The first evidence of the existence of an enzymatic activity capable of synthesizing DNA came in 1958 with the discovery of *E. coli* Pol I by A. Kornberg and colleagues. Since then, DNA polymerases are believed to require a preexisting primer providing a hydroxyl moiety to anchor the incoming nucleotide. This requisite, often referred as the “primer rule”, has been a dogma in the field for almost sixty years, and has directed the development of DNA amplification methods.

These new DNA polymerases, dubbed piPolBs (for *primer-independent PolBs*) are able to synthesize DNA *de novo*, without the requirement of a pre-existing primer or accessory factors, which can reduce the bias of the synthesized DNA. Moreover, piPolBs are processive DNA polymerases, endowed with proofreading and strand-displacement capacities.

Importantly, they are also endowed with translesion synthesis capacity, allowing replication of damaged DNA.



Relative DNA synthesis by piPolB in the presence or absence of a pre-existing DNA primer

#### Main innovations and advantages

- They do not require external primer or DNA primase to be added to the reaction mixture for DNA amplification.
- They can synthesize *de novo* DNA exclusively dependent on an intrinsic template.
- Their priming capacity does not rely on a specific template sequence.
- They maintain an efficient DNA primer extension and DNA polymerization activity as well as proofreading and strand-displacement capacities.
- They present an efficient intrinsic processive translation synthesis capacity, elongating the primer processively without introducing frameshift mutations.

#### Patent Status

Priority patent application filed

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