

POLG Rabbit mAb

Catalog # AP76662

Product Information

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|--------------------------|------------------------|
| Application | WB |
| Primary Accession | P54098 |
| Reactivity | Human |
| Host | Rabbit |
| Clonality | Monoclonal Antibody |
| Isotype | IgG |
| Conjugate | Unconjugated |
| Purification | Affinity Purified |
| Calculated MW | 139562 |

Additional Information

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| Gene ID | 5428 |
| Other Names | POLG |
| Dilution | WB~~1:1000 |
| Format | Liquid in 50mM Tris-Glycine(pH 7.4), 0.15M NaCl, 40%Glycerol, 0.01% sodium azide and 0.05% BSA. |
| Storage | Store at 4°C short term. Aliquot and store at -20°C long term. Avoid freeze/thaw cycles. |

Protein Information

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| Name | POLG {ECO:0000303 PubMed:10827171, ECO:0000312 HGNC:HGNC:9179} |
| Function | Catalytic subunit of DNA polymerase gamma solely responsible for replication of mitochondrial DNA (mtDNA). Replicates both heavy and light strands of the circular mtDNA genome using a single-stranded DNA template, RNA primers and the four deoxyribonucleoside triphosphates as substrates (PubMed: 11477093 , PubMed: 11897778 , PubMed: 15917273 , PubMed: 19837034 , PubMed: 9558343). Has 5' -> 3' polymerase activity. Functionally interacts with TWNK and SSBP1 at the replication fork to form a highly processive replisome, where TWNK unwinds the double-stranded DNA template prior to replication and SSBP1 covers the parental heavy strand to enable continuous replication of the entire mitochondrial genome. A single nucleotide incorporation cycle includes binding of the incoming nucleotide at the insertion site, a phosphodiester bond formation reaction that extends the 3'-end of the primer DNA, and translocation of the primer terminus to the post-insertion site. After completing replication of a mtDNA strand, mediates 3' -> 5' exonucleolytic degradation at the nick to enable proper ligation |

(PubMed:[11477093](#), PubMed:[11897778](#), PubMed:[15167897](#), PubMed:[15917273](#), PubMed:[19837034](#), PubMed:[26095671](#), PubMed:[9558343](#)). Highly accurate due to high nucleotide selectivity and 3' -> 5' exonucleolytic proofreading. Proficiently corrects base substitutions, single-base additions and deletions in non-repetitive sequences and short repeats, but displays lower proofreading activity when replicating longer homopolymeric stretches. Exerts exonuclease activity toward single-stranded DNA and double-stranded DNA containing 3'- terminal mismatches. When a misincorporation occurs, transitions from replication to a pro-nucleolytic editing mode and removes the misincorporated nucleoside in the exonuclease active site. Proceeds via an SN2 nucleolytic mechanism in which Asp-198 catalyzes phosphodiester bond hydrolysis and Glu-200 stabilizes the leaving group. As a result the primer strand becomes one nucleotide shorter and is positioned in the post-insertion site, ready to resume DNA synthesis (PubMed:[10827171](#), PubMed:[11477094](#), PubMed:[11504725](#), PubMed:[37202477](#)). Exerts 5'-deoxyribose phosphate (dRP) lyase activity and mediates repair-associated mtDNA synthesis (gap filling) in base-excision repair pathway. Catalyzes the release of the 5'-terminal 2-deoxyribose-5-phosphate sugar moiety from incised apurinic/apyrimidinic (AP) sites to produce a substrate for DNA ligase. The dRP lyase reaction does not require divalent metal ions and likely proceeds via a Schiff base intermediate in a beta-elimination reaction mechanism (PubMed:[9770471](#)).

Cellular Location

Mitochondrion. Mitochondrion matrix, mitochondrion nucleoid

Background

POLG (DNA polymerase gamma) is composed of a C-terminal polymerase ('pol') domain and an amino-terminal exonuclease ('exo') domain. The exo domain increases the fidelity of mitochondrial DNA replication by conferring a proofreading activity to the enzyme (PMID: 12210792). Catalytic subunit of POLG solely responsible for replication of mitochondrial DNA (mtDNA). Replicates both heavy and light strands of the circular mtDNA genome using a single-stranded DNA template, RNA primers and the four deoxyribonucleoside triphosphates as substrates (PMID:11477093; 11897778; 15917273; 19837034; 9558343).

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