# Novel Mitochondria-Targeting Abasic Site-Reactive Probe (mTAP)

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## BACKGROUND

Defects in mitochondrial DNA (mtDNA) are a hallmark of numerous mitochondrial disorders and human diseases, often leading to impaired cellular energy production. While mtDNA is a critical signaling molecule, it is vulnerable to genotoxic stress, resulting in detrimental mtDNA loss. The absence of a precise chemical intervention to safeguard mtDNA levels under such stress presents a substantial opportunity for novel therapeutic and research tools.

## BRIEF DESCRIPTION

Professor Linlin Zhao and their team from the University of California, Riverside have developed mTAP, a new chemical probe engineered to selectively bind to abasic sites within mitochondrial DNA without affecting nuclear DNA. Unlike non-specific agents, mTAP is equipped with a mitochondria-targeting group, ensuring its precise localization. This invention is advantageous over current technology because its mechanism of action involves forming a stable chemical bond with damaged DNA sites, thereby protecting mtDNA from enzymatic cleavage and maintaining its replication and transcriptional activities.

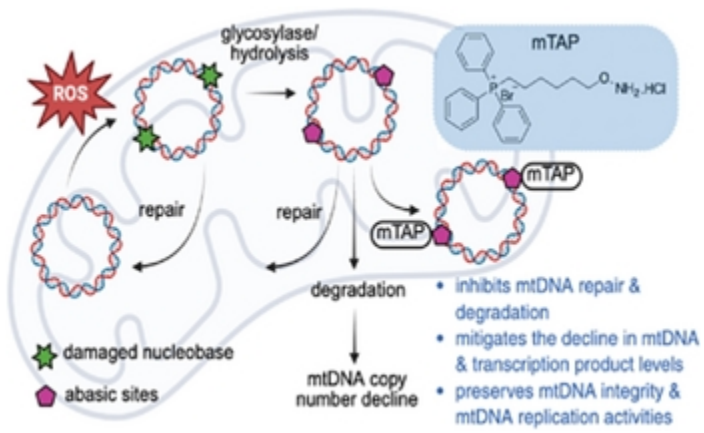


**Fig 1:** The UCR mitochondria-targeting water-soluble probe mTAP exclusively reacts with mitochondrial abasic sites, and retains mitochondrial DNA levels under genotoxic stress which are responsible for certain mitochondrial diseases.

## APPLICATIONS

- For the development of novel therapeutics for mitochondrial disorders and as a research tool for the study of mitochondrial DNA repair mechanisms.

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### OTHER INFORMATION

#### KEYWORDS

Abasic site, DNA damage, DNA Repair, Mitochondrial DNA, Mitochondrial DNA repair

#### CATEGORIZED AS

- **Biotechnology**
  - Genomics
- **Research Tools**
  - Reagents

#### RELATED CASES

2025-698-0

▶ For various biotechnology applications such as a drug discovery platforms for diseases linked to mtDNA dysfunction and as a diagnostic assay for cellular genotoxic stress.

## PATENT STATUS

Patent Pending

## RELATED MATERIALS

▶ A. Jana, Yu-H. Chen, L. Zhao, Angew. Chem. Int. Ed. 2025, e202502470. https://doi.org/10.1002/anie.202502470 - 07/15/2025

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