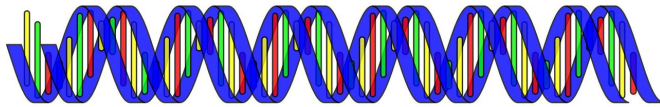


Study provides new understanding of mitochondria genome, potential for new avenues of treatment for cancers

6 February 2020



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A study led by The University of Texas MD Anderson Cancer Center furthered understanding about mitochondria, the cell components known as the "powerhouse of the cell." Knowing more about the genome is crucial given that mitochondria play important roles in tumorigenesis.

Findings were published in the Feb. 5 online issue of *Nature Genetics* and resulted through collaboration with the International Cancer Genome Consortium—The Cancer Genome Atlas Pan—Cancer Analysis of Whole Genomes (PCAWG) project, an effort involving more than 1,300 scientists and clinicians from 37 countries. Since its inception, the PCAWG has analyzed more than 2,600 genomes across 38 tumor types.

"This study lays a foundation for translating mitochondrial biology into clinical applications," said Han Liang, Ph.D., professor of Bioinformatics & Computational Biology. "Our analysis presents the most definitive mutational landscape of mitochondrial genomes and identifies several hyper-mutated cases. Such truncated mutations are remarkably enriched in kidney, colorectal and

thyroid cancers, suggesting oncogenic impact with the activation of signaling pathways."

Mitochondria are crucial cellular organelles, with a single human cell containing several hundred mitochondria. The [cell components](#) play essential roles in generating most of the cell's energy through a process known as oxidative phosphorylation. The [mitochondrial genome](#) encodes 13 proteins that form respiratory chain complexes with other proteins.

"The involvement of mitochondria in carcinogenesis has long been suspected because altered energy metabolism is a common feature of cancer," said Liang. "Furthermore, mitochondria play important roles in other tasks, such as biosynthesis, signaling, cellular differentiation, cell growth and death."

The team found that the mitochondrial [genome](#) is an essential component in understanding the complex molecular patterns observed in cancer genomes and helping to pinpoint potential [cancer](#) driver events.

"Our results underscore the clinical importance of mitochondria. This study has untangled and characterized the full spectrum of molecular alterations of mitochondria in human cancers," said Liang. "We have highlighted the function of mitochondrial genes in [oxidative phosphorylation](#), DNA repair and cell cycle, showing their connections with clinically actionable genes."

More information: et al, Comprehensive molecular characterization of mitochondrial genomes in human cancers, *Nature Genetics* (2020). [DOI: 10.1038/s41588-019-0557-x](https://doi.org/10.1038/s41588-019-0557-x)

Provided by University of Texas M. D. Anderson
Cancer Center

APA citation: Study provides new understanding of mitochondria genome, potential for new avenues of
treatment for cancers (2020, February 6) retrieved 23 August 2022 from

<https://medicalxpress.com/news/2020-02-mitochondria-genome-potential-avenues-treatment.html>

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