



Abstract

The Effect of *RAS2* Gene Mutation in Single Cell Yeast Model [†]

Nazela Ahmed Chowdhury, Fatema Akter Sadia, Ismat Jahan Anee and Ashfaqu Muid Khandaker *

Branch of Genetics and Molecular Biology, Department of Zoology, University of Dhaka, Dhaka 1000, Bangladesh; chowdhurnazela@gmail.com (N.A.C.); fatemasadia03@gmail.com (F.A.S.); ismatjahan005@gmail.com (I.J.A.)

* Correspondence: muid.zoo@du.ac.bd; Tel.: +88-01759-044481

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Abstract: More than 30% of all human malignancies are brought about by mutations in RAS proto-oncogenes (HRAS, KRAS, and NRAS) that are greatly conserved in yeast *RAS1* and *RAS2*. This makes yeast (*Saccharomyces cerevisiae*) an efficient single-celled eukaryotic model organism to study their functions. In the current investigation, the null mutation of the *RAS2* gene was analyzed to find out its deleterious consequences in yeast cells based on their ability to utilize glycerol as a respiratory substrate, mtDNA mutation rate, mtDNA abundance, and distribution pattern. Mutant cells grown in YPEG plates demonstrated slight respiratory deficiency compared to the wild type. An erythromycin-resistant assay was carried out to analyze the spontaneous mitochondrial DNA mutation rate in the $\Delta ras2$ mutant and it was found to be greater than that of wild type. In addition, the mitochondrial DNAs of both strains were also visualized under a fluorescence microscope using DAPI fluorescent stain. It was observed that mtDNA abundance was much lower compared to wild type cells. Thus, the present investigation revealed that deletion of the *RAS2* gene resulted in mtDNA mutation and depletion.

Keywords: mutation; RAS proto-oncogenes; *S. cerevisiae*; mitochondrial DNA; cancer

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