

The Summer Undergraduate Research Fellowship (SURF) Symposium
4 August 2016
Purdue University, West Lafayette, Indiana, USA

Role of SUMOylation in Mitochondrial Division in *Tetrahymena thermophila*

Ramya Modi, James Forney
Department of Biochemistry, Purdue University

ABSTRACT

SUMOylation is a post translation modification that involves the addition of a small protein called SUMO, Small Ubiquitin-like MODifier to a target protein. It is an important mechanism for the regulation of gene expression, the maintenance of genomic stability and in modifying nuclear proteins. More recently evidence has emerged for its importance in regulating mitochondrial fission and fusion in mammalian cells. This study evaluates the parameters for optimal staining of *Tetrahymena thermophila* mitochondria using two different dyes and then examines different cell lines with defects in the SUMOylation pathway. The first staining method uses Mitotracker Green, a vital stain that can only be used with live cells and the second method uses Mitotracker Red, which can be used with live cells and is retained upon fixation. The dyes were used to stain cell lines either deficient in Ubc9 (SUMO-conjugating enzyme) or wild type controls. These stained cells are then viewed under a fluorescence microscope and the mitochondrial morphology was analyzed for different cell lines. Quantitative analysis of mitochondrial size between the Ubc9 deficient cell line and wild type cell line shows that deficient cell lines have mitochondria that are approximately half the size of mitochondria in wild type cell lines. Although these results suggest a role for SUMOylation in mitochondrial morphology, they are not consistent with models developed through studies of mammalian cells in which decreased SUMOylation should lead to increased mitochondrial fusion. Future studies using overexpression of Ubc9 and SUMO will be performed to evaluate these findings.

KEYWORDS

Tetrahymena thermophila, ciliates, Mitochondrial division, SUMOylation, SUMO-conjugating enzyme, Mitotracker, Ubc9