Generation and Investigation of a *C. elegans* disease model harbouringcontinuous heteroplasmy of a mtDNA deletion

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Mitochondria are energy-producing organelles involved in a myriad of cellular processes, such as cell proliferation, apoptosis, and calcium homeostasis. Because of the involvement of mitochondria in numerous cellular processes, it is not surprising that mutations in the mtDNA can result in not only rare mitochondrial disease (MD) but also in several common diseases, especially late-onset disease. However, studies aiming to elucidate the exact mechanisms involved in these putative associations have often come up short. Cellular responses to mitochondrial dysfunction are vast and varied and do not correlate well with obvious markers such as genetic variation. In addition, the lack of suitable disease models harbouring mtDNA mutations has delayed our understanding of the mechanisms underlying MD. Developments in *Caenorhabditis elegans (C. elegans)* research have provided an opportunity to establish models that are considered *in vivo* but are more amenable to genetic manipulation. To address this problem, a well-characterized *C. elegans* strain, LB138, (*uaDf5* mtDNA) carrying a large 3.1bp heteroplasmic mtDNA deletion was used to investigate the biological changes that occur in response to different levels of heteroplasmy. Since there is no cure for MD currently, it is hoped that this information will aid clinicians and scientists in diagnosing and developing therapeutic strategies for patients with both MD and common disease.

Keywords: Mitochondria, Mitochondrial disease, mtDNA, *C. elegans*, *uaDf5,* and Heteroplasmy.