



Tipo de trabalho: RESUMO SIMPLES (MÁXIMO 2 PÁGINAS)

EFFECT OF ULTRAVIOLET B RADIATION ON THE MODULATION OF GENES RELATED TO MITOCHONDRIAL QUALITY AND MITOPHAGY¹

**Giuliam Kátia Strücker², Heloísa Schramm Da Silva³, Thaline De Quadros⁴,
Sofia Troppmair⁵, Dib Ammar⁶, Evelise Maria Nazari⁷**

¹ Pesquisa Institucional desenvolvida no Laboratório de Reprodução e Desenvolvimento Animal (LRDA), Departamento de Biologia, Embriologia e Genética (BEG) - Universidade Federal de Santa Catarina (UFSC)

² Mestranda em Biologia Celular e do Desenvolvimento (UFSC), bolsista FAPESC, giuliakatia@gmail.com.

³ Doutoranda em Biologia Celular e do Desenvolvimento (UFSC), bolsista CAPES, helo.bio@gmail.com.

⁴ Doutoranda em Biologia Celular e do Desenvolvimento (UFSC), bolsista CAPES, thaly_pg@hotmail.com.

⁵ Acadêmica do Curso de Graduação em Ciências Biológicas (UFSC), bolsista PIBIC, troppmair.sofia@gmail.com.

⁶ Doutor colaborador em pesquisa no Laboratório de Reprodução e Desenvolvimento Animal (LRDA).

⁷ Docente do Programa de Pós-Graduação em Biologia Celular e do Desenvolvimento (PPGBCD). Departamento de Biologia Celular, Embriologia e Genética (BEG). Universidade Federal de Santa Catarina (UFSC). Laboratório de Reprodução e Desenvolvimento Animal (LRDA), evelise.nazari@ufsc.br.

Introduction

The high levels of ultraviolet B (UVB) radiation recorded in southern Brazil are related to the ozone layer depletion and elicit attention to the global climate changes. This radiation reaches transparent freshwater environments, where the prawns *Macrobrachium olfersii* live and reproduce. These prawns are essential for maintaining the cycling of organic matter and energy in freshwater ecosystems. Thus, changes caused by UVB radiation in *M. olfersii* populations may compromise the integrity of these natural environments. In addition, it is important to note that UVB radiation also has enough energy to penetrate the tissues and cells of adult animals, larvae and embryos, causing changes in cellular organelles. The mitochondria, responsible for the energy production in animal cells, are an important target of this radiation. Previous studies have shown that the UVB radiation was able to alter the morphology and the functional integrity of this organelle. Thus, mitophagy is a mechanism of mitochondrial quality control, which involves the detection of dysfunctional mitochondria, autophagosome recruitment and degradation by autophagic processes.

Objective

The aim of this study was to investigate the effects of UVB radiation on the expression of mitophagy related genes, which contributes to mitochondrial integrity in *M. olfersii* embryonic cells.



Tipo de trabalho: RESUMO SIMPLES (MÁXIMO 2 PÁGINAS)

Methods

Adults of *M. olfersii* were collected in the Lagoa do Peri in the Ilha de Santa Catarina and maintained in aquarium to obtain ovigerous females in the LRDA, - IBAMA (Permanent authorization nº 15294-1/2008). Embryos in the early stage of morphogenesis and organogenesis were irradiated for 30 minutes with irradiance of 310 mW/cm², in order to simulate the natural UVB irradiation. After 6 hours of irradiation procedure, embryos were analyzed. The identification of the genes associated with mitophagy (*PINK1*, *PRKN*, *MAP1LC3* and *SQSTM1*) and inner and outer mitochondrial membrane (*OPA1* and *TOMM20*) were found in the transcriptome analysis of the *M. olfersii* embryos, and the cDNA synthesis was used to analyze the gene expression through the RT-qPCR, using *Rpl8* as reference gene. Data were analyzed by Student's *t*-test for independent samples, differences between groups were considered significant when $p < 0.05$.

Results

The *PINK1*, *PRKN*, *SQSTM1*, *MAP1LC3*, *TOMM20* and *OPA1* genes were identified in the *M. olfersii* transcriptome and compared to sequences from other species using the *tBlastN* (e-value $< e^{-5}$) algorithm. After 6 hours of exposure to UVB radiation, transcript levels of these genes showed a significant increase when compared to the non-irradiated embryos. This increase of the analyzed genes indicates the activation of mitophagy, as a form of quality control of damaged mitochondria through their removal by autophagosomes.

Conclusion

The transcriptional analysis showed the activation of mitophagy related genes in the embryos of *M. olfersii*, 6 hours after UVB radiation exposure. This result indicates changes in gene activity, possibly in order to maintain the fine control of the mitochondrial network. In addition, this study contributes to the understanding of the molecular responses of mitochondria of embryonic cells against to UVB exposure.

Keywords

Embryo; Mitochondria; Radiation Exposure.

Acknowledgment

CAPES, FAPESC, CNPq and LAMEB/UFSC.