Effects of Fatty Acids from Coconut and Olive Oil on Expression of the HMG1 Gene and Feeding Behavior in Tetrahymena thermophila

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Introduction

- The unicellular, eukaryotic ciliate Tetrahymena thermophila (T. thermophila) is a popular model organism in molecular biology.
- HMG1 is the gene that codes for HMG-CoA Reductase, which functions in the biosynthetic pathways of sterols in T. thermophila.
- Inclusion of external fatty acids in T. thermophila environment has previously been shown to decrease cholesterol levels.
- Coconut oil is highly saturated whereas olive oil is relatively low in saturation.
- Hypothesis: If T. thermophila are exposed to saturated fats and unsaturated fats, they will exhibit a respectively higher and lower expression of HMG1 and they will selectively ingest unsaturated versus saturated fats when observed during a feeding behavioral assay.

Methods

- Primer synthesis: Primers for HGM1 were designed using IDT Oligoanalyzer software.
- Culturing: T. thermophila cultures were maintained in NEFF media. Upon experimentation, all cultures were transferred into SPP media. One experimental group was exposed to 5% coconut oil by volume and the other was exposed to 5% olive oil by volume.
- RNA extraction: RNA was extracted using Qiagen’s RNeasy Mini Kit.
- Reverse transcription: cDNA was synthesized using RevertAid SYBR Master Mix and primers targeting HMG1 and BTU1
- Feeding Habits were analyzed by a Feeding Assay using 1% India Ink.

Results

- There was no significant difference in cultures were
- Primer synthesis:
- HMG1
- Hypothesis:
- T. thermophila
- Feeding Habits
- The results disagreed with our hypothesis on
- Culturing:
- The feeding assay was inconclusive, each
- The feeding assay results disagreed with our
- Inclusion of external fatty acids in
- RNeasy
- in
- Sanil
- CoCconut oil is highly saturated whereas
- Control

Conclusions

- The feeding assay was inconclusive, each group exhibited similar feeding behaviors (p-values > 0.297).
- There was a significant difference in expression of HMG1 between coconut oil-exposed and control in T. thermophila. (p=0.04976)
- There was no significant difference in expression of HMG1 between olive oil-exposed and control in T. thermophila. (p=0.297)
- The results disagreed with our hypothesis on gene expression under the influence of saturated fats but failed to produce statistically relevant evidence for unsaturated fats.
- The feeding assay results disagreed with our hypothesis on selective feeding behavior.

References


Acknowledgements

Thank you to our faculty advisor, Dr. Stefanie Otto-Hitt for her guidance on this project. This study was funded in part by a supplies grant from the Ciliate Genomics Consortium.