Deletion of Folate Biosynthesis Gene, ABZ1, Produces Transient Life-span Extension in Budding Yeast

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Abstract

Folate is a vitamin supplement used in numerous foods that is used as a co-factor in many important cellular processes. It is also utilized to reduce the incidence of neural tube defects in humans. Folate came to the attention of aging researchers when a genetic screen in the nematode, Caenorhabditis elegans, was undertaken to identify genes affecting lifespan. Long-lived nematodes were identified, but it became clear that the mutation was not in the nematode, but its food source (Wirk, 2012). Nematodes fed a strain of Escherichia coli deficient in folate biosynthesis had an increased lifespan. In addition, compounds that either inhibited folate biosynthesis or reduced its availability also increased lifespan. This research has suggested that optimum levels of folate increases longevity, while excess levels may decrease lifespan. The goal of this project was to determine the effect of one of three viable mutations in the folate biosynthesis pathway on longevity in the model organism, budding yeast.

Folate and Aging

- Cultured mutant- and wildtype yeast on solid medium for 2 days
- Incubated a single colony of mutant and wildtype yeast into liquid medium and grow for 3 days
- Transferred yeast to aging plate and grow for one week (6 inoculations per strain)

Aging Methods

Lifespan Analysis

- Growth data was collected each week for 7 weeks using a plate reader and exported into an excel spreadsheet
- Excel was used to calculate mean, standard deviation, and t-test for each week’s data
- The calculated t-test value was evaluated for significance

Graphical Analysis Results

Conclusions

- Weeks 1-4 & 7 = no significant change
- Week 5 had a significant change between pre read and post growth counts
- Mutant change in OD > wildtype change in OD
- Mutation of ABZ1 gene caused yeast to live longer

What’s Next?

- What would week 6 results have looked like?
- Repeated trials needed for clarification
- How does folate level affect other species’ lifespans?

References