TY4 Retrotransposon Presence in Yeast Strains

Maria Walters, Dr. Eric Gillock
FHSU Department of Biological Sciences

Abstract

Yeast is used in everyday life. It is important to understand the genetic components of yeast. In various laboratory yeast strains, there are findings of TY1, TY2, and TY3. TY1 through TY3 have been well studied, while TY4 and TY5 are retroelements that have yet to be thoroughly studied. It is known that TY4 is found at only one to three copies per haploid genome.

TY4 is a retrotransposon, which shares similarities with retroviruses, making it essential to study its presence in yeast. This study aims to evaluate the prevalence of TY4 among lab strains, brewing strains, and baking strains of yeast.

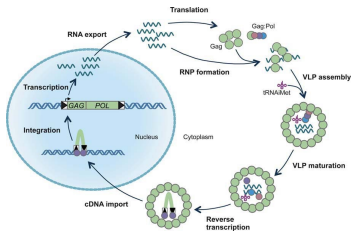


Figure 1:TY4 Retrotransposon life cycle.

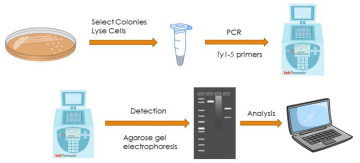
References

Agnes M. Hug, Horst Feldmann, Yeast Retrotransposon Ty4: The Majority of the Rare Transcripts Lack a U3-R Sequence, *Nucleic Acids Research*, Volume 24, Issue 12, 1 June 1996, Pages 2338–2346, https://doi.org/10.1093/nar/24.12.2338

Janetzky B, Lehle L. Ty4, a new retrotransposon from Saccharomyces cerevisiae, flanked by tau-elements. J Biol Chem. 1992 Oct 5;267(28):19798-805. PMID: 1328182.

Khehra N, Padda IS, Swift CJ. Polymerase Chain Reaction (PCR) [Updated 2023 Mar 6]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK589663/

Methodology



PCR Primers	
TY4	Fwd: 5' TCAGACAGACGCCATCATCA Rev: 5' GGCCTAAGTTCCCTATTTGGT

Yeast was grown in YPD petri dishes. Heat popping was done to lyse the cells releasing the genome. The genome was used as the template for PCR. TY4 primers were designed from Saccharomyces Genome Database (shown above). Once PCR was complete a gel electrophoresis was performed. Analysis was then done by comparing strands to DNA ladder.

Conclusion/Discussion

Out of 16 different yeast strains, TY4 only showed up in 7 strains indicating a 44% prevalence in the tested strains. The table under the results section presents the strains in which TY4 was present and absent in.

There are at least 1,500 recognized yeast strains. From our experiment we can determine TY4 has a low prevalence in various yeast, but more research must be conducted to truly determine TY4 prevalence.

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Results

Yeast Strain	TY4 Presence
S288C	Present (positive control)
NCYC1363	Absent (negative control)
71B	Absent
D47	Absent
RC212	Absent
Fleischmann's Bread Machine Yeast	Present
9763	Present
4098	Absent
18824	Present
NCYC79	Present
QA23	Present
GVFR	Absent
GVAD	Absent
BY4741	Present
9080	Absent
Kr A.D	Absent
Kr F.R	Absent
S. kudriavzevii	Present

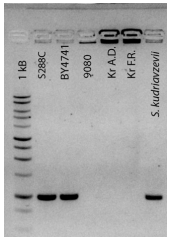

Figure 3:Gel Electrophoresis showing Ty4 presence in BY4741, and S.kudriavzevil.