Transcription of Genes Associated with Vitamin B6 Metabolism in *Elizabethkingia anophelis R26*

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GRP# 6

INTRODUCTION

Elizabethkingia Anophelis is a genus of bacteria commonly found in environments worldwide. It has been detected in soil, water, and reservoirs. *Elizabethkingia* affects many humans by causing meningitis and/or bloodstream and respiratory infections in humans with weakened immune systems (12). The Vitamin B6 Metabolism is an active protein in *Elizabethkingia.* Vitamin B6 is part of the vitamin B group. In it's active form it serves as a coenzyme in many enzyme reactions in amino acid, glucose and lipid metabolism. We looked at mRNA under 3 conditions. In our genes we found 3 of them had significant increases, 3 had significant decreases, and 1 gene had two significant increases.

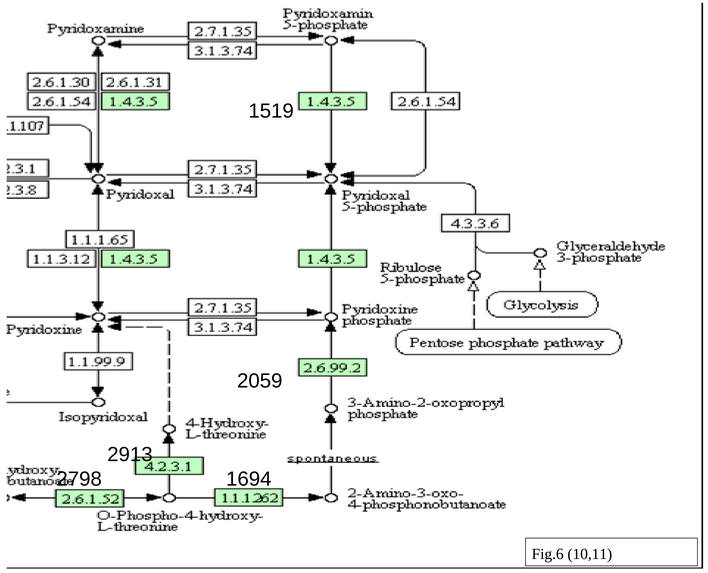


Fig.6 (10,11)

MATERIALS AND METHODS

1. Used RASTdb (2), Patric DB (1) and a BLAST site databases (6) to match sequences.
2. Used Patric DB to find all five genomes of Vitamin B6.
3. Used BLAST site to match genomes in the RAST database.
4. Used RAST database to find DNA sequences of all five genomes.
5. Used excel document to form a table of transcriptions.
- # of transcripts grown under control conditions.
- # of transcripts grown with Cefotax
- # of transcripts grown with Imnipenem
- # of transcriptions observed across all three conditions.
- Fold change in transcription in Cefotax compare to the control
- Fold change in transcription in Imn ipenem compared to the control
6. Finding genes that surrond our primary gene.

RESULTS

Referring to table 1:

- Significant upregulation by 1.6 of gene 2059 while exposed to cefotax
- Significant upregulation by 1.5 of gene 1694 while exposed to imipenem
- Significant upregulation by1.7 of gene 2798 while exposed to cefotax

In fig. 1, the gene 2060 codes for a small-condactance mechanosensitive channel, and gene 2058 codes for alpha/beta superfamily hydrolase. In fig. 2, gene 1520 codes for UPF0301 protein YqgE, and gene 1518 codes for DNA-binding protein HU-beta. In fig. 3, gene 1693 codes for riboflavin synthase, and gene 1695 codes for protein cluster. In fig. 4, gene 2914 codes for homoserine kinase, and gene 2912 codes for a hypotherical protein. In fig. 5, gene 2799 codes for ferredoxin, gene 2797 codes for D-3-phosphoglycerate dehydrogenase.

Table 1:	ID: 2059 Pyridoxine 5'-phosphate synthase	ID:1519 Pyridoxamine 5'-phosphate oxidase	ID:1694 4-hydroxythreonine-4-phosphate dehydrogenase	ID:2913 Threonine synthase	ID:2798 Phosphoserine aminotransferase
Number of transcripts under control conditions	272	17	554	1	12
Number of transcript with Cefotax	428	16	414	1	20
Number of transcript with Imipenem	214	12	822	1	10
Total number of transcripts observed across all three conditions	914	45	1790	3	42
Fold change in transcription in Cefotax compared to control	1.6	-1.1	-1.3	-1.0	1.7
Fold change in transcription in Imipenem compared to control	-1.3	-1.4	1.5	-1.0	-1.2

Fig.1 (2059)

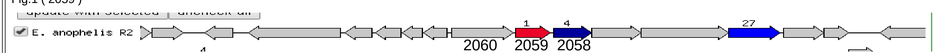


Fig.2 (1519)

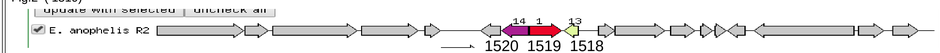


Fig.3 (1694)

Fig.4 (2913)

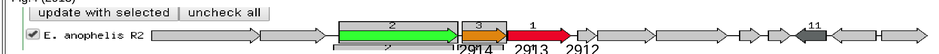
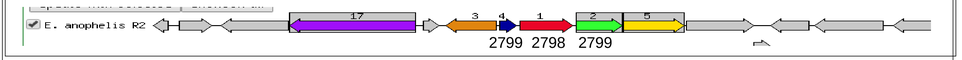


Fig.5 (2798)



ABSTRACT

Elizabethkingia anophelis R26 is a commonly found pathogen in enviroments worldwide. Due to a sudden outbreak in the United States, scientists have observed that *E.anophelis* is highly resistant to several antibiotics, making the ability to cure and prevent the diseases caused by E. anophelis , challenging.. We have investigated further into *E. anophelis*, specifically into the proteins involved with making Vitamin B6. According to the RAST database five genes are involved with sythesizing this molecule. We now present data showing that these genes demonstrated alterations in transcription when grown in the prescence of beta- lactam antiobiotics , cefotax and iminpenem. This data suggests that vitamin B6 is essential for *E.anophelis* to survive when exposed to antibiotic stress.

DISCUSSION

According to the RAST database, these five genes have been commonly known to be part of vitamin B6 metabolism(2). All of these genes code for an enzyme. Enzymse catalyze nonspontaneous chemical reations (5-9). When examining the results of the amount of transcription for each gene in each condition, three out of our five genes, 2059, 1694, and 2798, had a significant upregulation in transcrition when *E. anophelis* was grown in the presence of different antibiotics.In the presence of cefotax, genes 2059 and 2078 were upregulated,however only gene 2798 was upregulated in the presence of imipenem.This data suggests that vitamin b6 is required in order for *E.anophelis* to survive in the presence of these two antibiotics.

The results of this project can then lead to further investigation as to why vitamin B6 is essential in the presence of antibiotics. When looking at figures 1-5, the genes that are next to the genes of intrest are shown. Even though all five of our genes are linked to vitamin B6 biosynthesis, their locations within the chromosome are not revatively close to each other. Therefore, we suggest that all five of these genes that are regulated seperately.

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