Abstract & Introduction

Health Concerns

Increasing the risk of developing esophageal and head and neck cancer.\(^{[3-10]}\) Thus, our project aims to produce recombinant ALDH2 to decrease levels of acetaldehyde in the upper digestive tract region. We envision delivery of ALDH2 as a purified protein or in consumer-friendly probiotics.

What is ALDH2 Deficiency?

ALDH2 deficiency is a genetic condition that leads to the accumulation of acetaldehyde, a toxic byproduct of alcohol metabolism. ALDH2 deficiency, the result of a point mutation in the ALDH2 gene, produces a less efficient ALDH2 enzyme, leading to an accumulation of acetaldehyde and the subsequent flushing response.\(^{[1-10]}\) While about 8% of the global population is ALDH2 deficient, in our home, Taiwan, approximately 47% of the population carries this genetic mutation—the highest percentage in the world!\(^{[2]}\) Studies show that ALDH2 deficiency greatly increases the risk of developing esophageal and head and neck cancer.\(^{[1-10]}\) Thus, our project aims to produce recombinant ALDH2 to decrease levels of acetaldehyde in the upper digestive tract region.

GOAL

Our goal is to reduce salivary acetaldehyde levels and the resulting increased cancer risks of ALDH2 deficiency by delivering functional ALDH2 in a candy that will remain in the mouth.

Human Practices

RESEARCH
Dr. Che-Hong Chen
TAIES Public Opinion
Stanford ALDH2 Researcher
Taiwan Alcohol Intolerance

RAISING AWARENESS

Common Misconceptions
Healthy Liver Fast Metabolism
High Blood Pressure

Media

POLICY CHANGE

Dr. Cheng-Hua Lee
Deputy Director General
Ministry of Health and Welfare

Alcohol Warning Labels

Method of application?
A combined 82% preferred either probiotics or oral medication

PRODUCT DESIGN

Survey Results

Yakult

Dr. Ying Chieh Tsai

Founder of Taiwan
Association of Lactic Bacteria

References and Acknowledgements


MARKETING PLAN

02 Market Analysis
Our product directly reduces cancer risks by supplying ALDH2 enzyme (which will also reduce flushing).

04 Product Testing: ALDH2*1-EcN Candy
ALDH2*1 Probiotic Candy

EcN should be added to the candy at temperatures below 60°C.

EcN should be put in one candy and not released at 0°C.

03 Proof of Concept: Making Probiotic EcN Candy

Production of Candy

Product Testing: ALDH2*1-EcN Candy

EcN should be added to the candy at temperatures below 60°C.

EcN should be put in one candy and not released at 0°C.

01 Information for Manufacturers and Consumers

GOALS
1. How much ALDH2 should be put into each probiotic candy?
2. How much ALDH2 should be consumed?

Method of application?
A combined 82% preferred either probiotics or oral medication

Left: Figure 3-6. Oral (Acetaldehyde) changes over alcohol consumption for different ALDH2 genotypes. Based on literature values of oral (Ethanol) and oral (Acetaldehyde). ADH reaction rates, and experimental values for our ALDH2 reaction rates, we created a software to model sequential enzymatic reactions.

Below: Figure 3-7. We adjusted [Acetaldehyde] until homozygous mutants process acetaldehyde at wild type ALDH2 levels. Here, an additional 0.13 μM ALDH2 matches wild type activity.