Warren central honey badgers

Mercury detection

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Introduction/ Background

Mercury exposure is a huge problem in many parts of the world. People are most often being exposed to it through contaminated water supplies. Too much mercury can cause many different harmful symptoms. Our goal is to create a mercury detector in order to help alleviate this problem.

We are using Saccharomyces cerevisiae yeast as a tool to detect mercury. In yeast, there are a number of transcription factors and genes that respond to oxidative stress and toxic metals. The yes associated protein (YAP) family is a family of transcription factors that is involved with oxidative stress regulation and redox homeostasis. They affect a number of genes, but we are focusing on GSH1 and GSH2. These genes are involved in the glutathione pathway. Glutathione is an antioxidant that protects the cell from oxidative stress.

In order to detect mercury, we are using several biological parts included in the BioBrick. The Kozak + mCherry translational unit is being used to give off a red fluorescent glow when the mercury is detected. In the plasmid, we will include the GSH2 promoter and the ADH1 terminator.

protocols

Competent cells-There are several ways to prepare competent cells for plasmid DNA

Transformation- This is the chemical method. Advantages are that it's simple to Complete, requires no special equipment and gives good transformation efficiencies. Disadvantages are that the efficiency is somewhat lower (vs. electroporation). In general It is best to use this when the transformation efficiencies is not the problem, otherwise You might want to use and make the competent cells for electroporation.

Bacterial transformation- The purpose of this technique is to introduce a foreign plasmid into bacteria and to use that bacteria to amplify the plasmid in order to make large quantities of it.

Restriction digest- A restriction digest is a procedure used in molecular biology to prepare DNA for analysis or other processing.

Biobuilding –

operon:A unit made up of linked genes that is thought to regulate other genes responsible for protein synthesis

Gene expression: conversion of the information encoded in a gene first into messenger RNA and then to a protein

results

Unfortunately, our group did not ascertain viable results. After ligation, our lab group was expecting to see bacterial growth. However, growth was not evident which led to inconclusive results. Error either occurred during plasmid extraction or during bacterial transformation. Due to time constraints, future experimentation will have to wait.

discussion

Exposure to mercury is a widespread problem that affects many people all over the world. Most people ingest mercury through water sources. Mercury in water can arise from runoff from farms, chemical and industrial plants, household products in the trash, and sewage. Three types of mercury can adversely affect humans. Elemental, inorganic, and methyl mercury can all harm humans if ingested. Inorganic mercury is the most common form in drinking water and can cause kidney damage if enough is taken in. Methyl mercury is found in fish and humans can be exposed if they eat too much mercury-containing fish. Mercury ingestion can cause both acute and chronic symptoms.

By creating a mercury detector, we would be able to improve the health of great populations all over the world. It would be a much more convenient, simp way of testing water supplies for mercur contamination.

Partnership

iGEM provides a unique partnership between New England BioLabs which supplies necessary reagents to create the machines (called Bio Bricks) and high school classrooms. This limits the need for private or personal funding and increases access to necessary reagents.

Acknowledgements

We would like to thank Dr. Mark Goebl and Kristin Chun for their valuable contributions to this project including providing our yeast strain, speaking with students, and help with troubleshooting protocols. Funding for this project was provided through an NSF GK-12 Fellowship.