

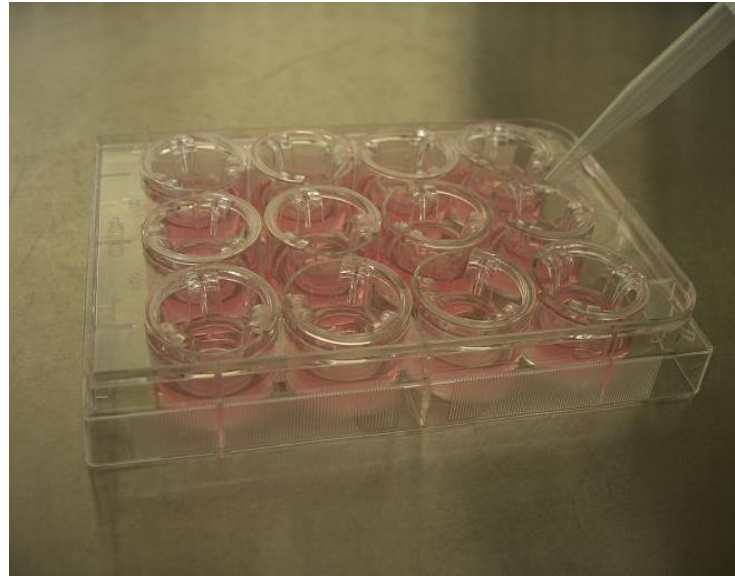
qPCR Gene Targets Identification for Salmonella exposure of Caco-2 cells:

Key words:

Caco-2, Microarray, Salmonella, Intestinal Epithelial cells, qPCR, pathway analysis, gene targets, Bi-clustering, Differential gene expression.

Introduction:

Epithelial cells that cover the small and large intestine (IECs) perform a complex function in the human gut. The small Intestinal Epithelial Cells help in digestion and also absorption of nutrients from the digested food, act as barriers that prevent pathogens detoxify potential toxic substances and thereby play an important role in immune defence. The function of large Intestinal epithelial cells are absorbing water and acting as a fermenter for bacterial fermentation of waste food materials. In our lab (biology part), we use Caco-2 (Colon cancer) cell lines as a model for intestinal epithelia. These cells have a special property of behaving like colon epithelial cells when they're grown for 7 days and like small intestinal epithelial cells when they're grown for 21 days. Our lab exposes these cells to food substances for studying their effects on small intestinal epithelia (Caco-2 grown for 21 days). As a consequence, we have a **large dataset of microarrays** that contain gene expression profiles of Caco-2 exposures to different food substances.



Project Description:

Salmonella is the agent responsible for Typhoid fever that kills up to 600,000 people a year. But it is also a virulent pathogen known for food poisoning. Chicken or pigs are often carriers of this bacteria that later on will contaminate the meat and make it dangerous for human consumption. As the main entrance of Salmonella into the host occurs mostly via the Intestinal Epithelial cells (IECs) of the ileum, we chose Caco-2, as well as piglets ileum tissue, to study its mechanisms. Very well studied already, this pathogen is used to assess the well-being of intestinal cells. There is lot of data already available and new array datasets are to be found in order to select the best markers that will specifically reveal the effect of those food products in the context of a Salmonella infection. Ultimately, the project would expand from Caco-2 specific gene targets to find equivalent gene targets in pig intestinal cell lines (e.g. [IPEC-1 and IPEC-J2](#)) and eventually in pig tissue itself. The penultimate goal of this project is to show the health effects of the food compounds in preventing entry of Salmonella and/or supporting its clearance from the contaminated tissue.

For the student, he/she is expected to use a collection of Caco-2 microarray data and use or modify an existing algorithm (based on biclustering and Differential Gene Expression) to identify gene targets that can be used in qPCR to study the therapeutic effects of food products.

Requirements

Basic knowledge of any of the following: R, Python or Matlab

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