

Caco-2 specific miRNA-mRNA interaction network construction:

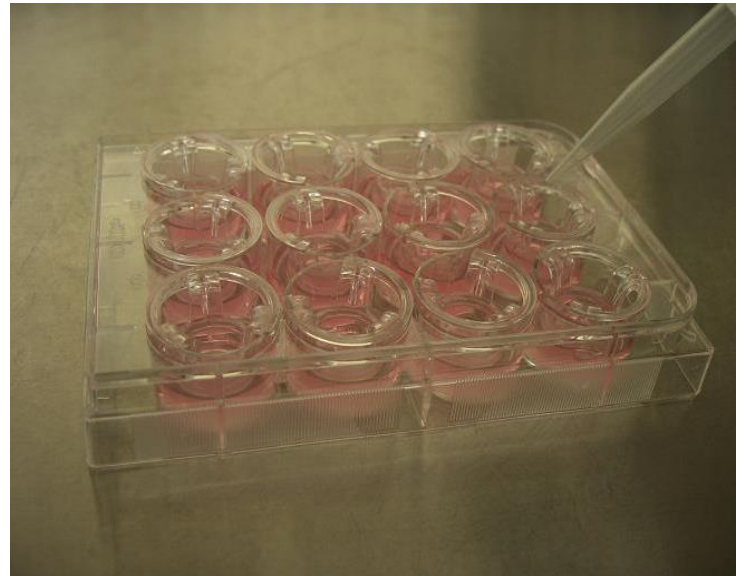
Key words:

Caco-2, miRNA, Clostridium toxins, RNAseq, microarray, gene expression, regulatory networks.

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 the Food Quality and Health Effects and the Computational Systems Biology labs, we use Caco-2 cell lines as a model for intestinal epithelia. These cells behave 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. As a consequence, we have a **large dataset of microarrays** with gene expression profiles of Caco-2 exposures to different food substances.



miRNAs (microRNA) are small nucleotide sequences that are known to deprecate gene expression by either silencing genes through the formation of RNA-induced silencing complex (RISC) or by post-transcriptional regulatory processes.

Project Description:

The intestinal pathogen Clostridium affects its host by producing toxin A and B that affects gut enterocytes to dissociate from each other causing leakage of the gut. Toxins A, B and A+B together have been exposed to enterocytes and subsequently cells were harvested for RNA isolation. These now have been analysed by microarray, RNAseq and miRNA analysis.

In this project, the student is expected to analyse the gene and miRNA expression, construct a Caco-2 specific miRNA-mRNA interaction network using the dataset we have and integrating data from some popular miRNA targets databases..

Requirements

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

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