The role of IGF2, DRD4 and 5-HTTLPR genes in the development of eating disorders

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Introduction

Many risk factors have been suggested for the development of certain conditions such as eating disorders; and genetic factors are believed to play an essential role among other factors. However, individual contributions by these factors including the genetics have yet to be characterized and described; although three genes such as insulin-like growth factor (IGF2), serotonin transporter-linked polymorphic region (5-HTTLPR) and dopamine receptor D4 (DRD4), are believed to play a central role.

Purpose

The purpose of this study is to determine the expression and the cause of the alteration in expression in IGF2, 5-HTTLPR and DRD4 genes. We postulate that the role of IGF2, DRD4 and 5-HTTLPR genes in the development of eating disorders is a result of changes in expression levels of these genes. We hypothesize that the results that we will acquire from the RT-qPCR will demonstrate that there is an evident change in the methylation status on the promoter regions of the selected genes. A hypomethylation or hypermethylation status will translate into an increase or decrease in the expression of the genes. Thus, a resulting disequilibrium in the products of the genes will demonstrate that the methylation status of the promoter region could be a factor in the development in conditions such as eating disorders.

Research in Progress

1. Primer Design
   a. Acquire FASTA sequences for the genes of interest
   b. Locate CpG islands
   c. Design primers within CpG islands using PrimerQuest and analyse them using OligoAnalysar

2. DNA Extraction
   a. Acquire blood sample
   b. DNA isolation through repeated steps of phenol/chloroform application, centrifugation and aspiration of the organic phase
   c. Determine DNA concentration using Nano drop

3. Gel Electrophoresis
   a. Fill the electrophoresis bath with agarose gel (loaded with ethidium bromide)
   b. Load samples and ladders into the wells
   c. Run the gel
   d. Analyse the gel under UV light

Methods

RNA extraction from blood samples
Run RT-qPCR for methylation on DNA
Run RT-qPCR for expression on RNA
Analyse results

Summary

We hypothesized that the results that we will acquire from the RT-qPCR will demonstrate that there is an evident change in the methylation status on the promoter regions of the selected genes. A hypomethylation or hypermethylation status will translate into an increase or decrease in the expression of the genes. Thus, a resulting disequilibrium in the products of the genes will demonstrate that the methylation status of the promoter region could be a factor in the development in conditions such as eating disorders.

Future Applications

Epigenetic therapy is techniques or drugs that are used to treat medical conditions. Epigenome-influencing techniques and drugs that target specific enzymes involved in the epigenetic regulation of gene expression are often used. We aspire that our research will have future applications for the treatment of eating disorders in the field of epigenetic therapy.

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Materials

1. Primer design software
2. Primers
3. Blood samples from patients with eating disorders
4. DNA extraction materials
5. Electrophoresis bath
6. Thermal cycler

5. Electrophoresis bath
6. Thermal Cycler

Sources