Gene expression in human epithelial host cells during giardiasis

Giardia intestinalis (*G. duodenalis* or *G.lamblia*) is a protozoan parasite of the family of *Diplomonadida*. Infection of humans with *G. intestinalis* can lead to the disease giardiasis that is characterized mainly by diarrhea, fatigue and malabsorption. However, some infected individuals stay asymptomatic. Every year there are approximately 280 million cases of human giardiasis worldwide. This high prevalence, especially in developing countries, and its impact on development of children motivated the World Health Organisation's to include giardiasis into the Neglected Disease Initiative. Up to date, little is known about the mechanism through which *Giardia* causes disease and why many infected people stay asymptomatic. It is known that humans get infected by ingesting water or food contaminated with *Giardia* cysts. Upon passage through the stomach, cysts release the vegetative state of the parasite, quickly dividing trophozoites. These attach to the upper intestinal epithelium and thereby cause diarrhea. Migrating further down in the intestine, trophozoites undergo encystation and cysts will be released in the feces of infected individuals, closing the cycle of infection.

In order to explore what is happening during *Giardia* infection, we designed an *in vitro* system to study interactions between intestinal epithelial from a cell line and the parasite *Giardia intestinalis* isolate WB. In previous studies, data was generated from high throughput sequencing of RNA (termed RNA sequencing) collect during interaction between *Giardia* trophozoites and human colon carcinoma cells. In my degree project, I selected 10 genes involved in different processes in cells such as chemotaxis, apoptosis, reactive oxygen species metabolism, and immune response from the RNA sequencing data to verify their expression at the RNA level by a method called RT-qPCR, after setting up new *in vitro* interactions. I found that some genes' expression changed in intestinal cells after 1.5 hours of interaction with *G. intestinalis*. I also observed that some genes seemed not to change a lot or are even down-regulated at this time point. I further look at earlier time points of interaction, uncovering a more dynamic genes expression change for all the selected genes upon interaction with *G. intestinalis*. The experiment resented in this report generated results consistent with previous findings about *G. intestinalis* being able to induce changes in the expression of genes involved in immune response regulation. Moreover genes involved in stress response and DNA damage were also found to be dynamically regulated during these interactions.

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