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“Obesity Modulates Gut Microbiome in Triple Negative Breast Cancer”

Triple-negative breast cancer (TNBC) is an aggressive form of breast cancer with a high recurrence rate. Obesity leads to an increased incidence and worse prognosis of TNBC through various proposed mechanisms including increased inflammation, reactive oxygen species, leptin, and hyperinsulinemia. The constitution of the gut microbiome plays an important role in the progression of disease and obesity, as imbalances, called dysbiosis, can lead to inflammation and increased fat content. Therefore, maintaining a healthy gut microbiome would be beneficial for the prevention of inflammation and obesity. There is debate on what constitutes a “healthy” gut microbiome, and the connection between the gut microbiome, obesity, and TNBC has not been defined. This study aims to enhance the knowledge of the obese gut microbiome in TNBC in order to improve therapeutic outcomes.

FVB female mice were fed control vs “Western diet” [diet-induced obesity, Adjusted calories diet: 42% from fat, High sucrose (34% by weight)] for sixteen weeks. Then, C0321 Mouse TNBC cells (1 Million) were injected into mammary fat pad (with Matrigel) of syngeneic FVB mice, and the tumor was allowed to grow for 3 weeks. Tumors were collected for downstream processing and gut samples were collated for Microbiome analysis (16s rRNA sequencing and metagenomics). Microbiome analysis was done at Microbiome Insights in Canada.

Our results suggested that alpha diversity of microbes decreased with obesity. Metagenomic analysis of taxonomic groups revealed a domination of *Verrucomicrobia* in obese mice, followed by *Firmicutes* and *Bacteroidetes*, and obesity was the only factor that significantly accounted for variation of taxonomic groups. In contrast to the results of taxonomic profiles, the analysis of variation of functional profiles showed that obesity status, tumor presence, and the obesity:tumor interaction were significant in explaining the variation of profiles, with obesity having the strongest correlation. This study revealed a strong correlation between obesity and the gut microbiome, but further research is needed to understand the role of TNBC on the gut microbiome.