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A company of the LifeScience Foundation

REFERENCE NUMBER TO 10-00115

Probiotics for Cancer Treatment

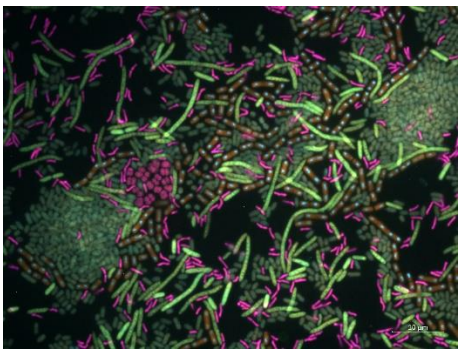
Keywords: Gut microbiota, Cancer, differentiation responder vs non-responder, prognosis treatment outcome, probiotics

INVENTION NOVELTY

The present invention relates to a method for predicting the response to cancer therapy in a human patient and improved treatment strategies for cancer based on the diversity of the gut microbiome, including suitable probiotic strains.

VALUE PROPOSITION

Cancer is one of the leading causes of mortality worldwide, with almost one in six deaths attributed to cancer. Various treatment options such as chemotherapy and immunotherapy are available, but despite recent progress, treatment outcomes are still insufficient. Several studies reported a significant correlation between gut microbiota and tumour development and the efficacy of cancer therapies. These effects are caused by a variety of mechanisms, including direct degradation of the chemotherapeutics as well as complex activation of the immune system by the microbiota. By bioinformatics analyses specific microbes associated with clinical response or lack of response to therapy were identified.



Source: Harikumar Suma / Leibniz-HKI

TECHNOLOGY DESCRIPTION

Taxonomic analysis of microbiota of cancer patients revealed differences between “Responder” (R) and “Non-Responder” (NR) patients regarding the identified bacterial groups in the gut microbiome. R showed a higher alpha diversity and significant enrichment of the phylum Bacteriodetes (FDR p= 0.031, Wilcoxon rank sum test), however, not in the baseline samples (FDR p=0.540, Wilcoxon rank sum test). In comparison, Firmicutes were more abundant in the NR group. Based on these results, a machine-learning model was developed and validated to predict treatment outcomes based on gut microbiota composition and functional metabolic repertoires of R and NR patients. In addition, an oral administration of the bacteria enriched in R patients, such as certain species of Bacteriodetes, enhanced the efficiency of cancer treatment.

COMMERCIAL OPPORTUNITY

Development of specific probiotics as cancer treatments, solely or in combination with available drugs, and a related companion diagnostic. The technology is offered for co-development or licensing.

DEVELOPMENT STATUS

Bacteroides xylanisolves and Bacteroides ovatus, microbial strains enriched in R patients, reduced tumour growth in vitro (in cancer cell lines) and in vivo in a cancer mouse model. Expanded experiments with further strains and characterization of the mechanism of action are planned.

PATENT SITUATION

A priority patent application was filed in March 2020, (US62/986,063), followed by an international (PCT) patent application in March 2021 (WO2021176036).

FURTHER READING

Heshiki, Y., Vazquez-Uribe, R., Li, J., Ni, Y., et al., (2020). Predictable modulation of cancer treatment outcomes by the gut microbiota. Microbiome, 8(1). doi:10.1186/s40168-020-00811-2

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