Metagenomic Analysis Unveils the Microbial Landscape of Pancreatic Tumors

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Metagenomic Analysis Unveils the Microbial Landscape of Pancreatic Tumors

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Background: The composition of resident microbes in the human body is linked to various diseases and their treatment outcomes. Although studies have identified pancreatic ductal adenocarcinoma (PDAC) associated bacterial communities in the oral and gut samples, herein we hypothesize the prevalence of microbiota in pancreatic tumor tissues is different as compared to their matched adjacent, histologically normal appearing tissues and these microbial molecular signatures can be highly useful for PDAC diagnosis/prognosis.

Methods: In this study, we performed comparative profiling of bacterial populations in pancreatic tumors and their respective adjacent normal tissues using 16S rRNA-based metagenomics analysis.

Results: This study revealed a higher abundance of Proteobacteria and Actinomycetota in tumor tissues compared to adjacent normal tissues. Interestingly, the Linear Discriminant Analysis (LDA) scores unambiguously revealed an enrichment of Delftia in tumor tissues, whereas Sphingomonas, Streptococcus, and Citrobacter exhibited depletion in tumor tissues. Furthermore, we analyzed the microbial composition between different groups of patients with different tumor differentiation stages. The bacterial genera, Delftia and Staphylococcus were very high in G1 stages (well differentiated) compared to G2 (well to moderate/moderately differentiated) and G3/G4 (poorly differentiated). However, the abundance of Actinobacter and Cloacibacterium was found to be very high in G2 and G3, respectively. Additionally, we evaluated the correlation of PD-L1 expression with the abundance of bacterial genera in tumor lesions. Our results indicated that three genus such as Streptomyces, Cutibacterium, and Delftia have a positive correlation with PD-L1 expression.

Conclusion: Collectively, these findings demonstrate that PDAC lesions harbor relatively different microbiota compared to their normal tumor-adjacent tissues, and this information might be helpful for the diagnosis and prognosis of PADC patients.