Platform Development for Patient Recruitment: The Cancer Microbiome and Metabolomics ARC Pre-ARC 2018

Abstract:

Immune checkpoint inhibitors are playing a rapidly increasing role in the treatment of human malignancies. While these treatments are changing treatment paradigms, not all tumors respond to treatment and resistance generally develops over time. Recent studies in both preclinical and clinical settings have shown that the human microbiome influences response to immunotherapy. Evolving data has also shown that tryptophan metabolites regulate immune cells and antitumor immune response. These tryptophan metabolites may be derived from tumor cells or from the microbiome. Understanding associations between the microbiome, and tryptophan metabolites, and treatment response/resistance will therefore be critical to fully realizing the potential of immunotherapy.

Studies evaluating the microbiome and tryptophan metabolites in cancer patients are currently limited, and are particularly scarce in diverse patient populations. We propose to develop a microbiome and blood biobank in patients receiving ICIs at Boston Medical Center. We further propose to pilot the development of a microbiome and blood biobank in collaboration with the Uganda Cancer Institute. These resources will provide a unique platform upon which we and other investigators will be able to obtain a comprehensive understanding of associations between the microbiome, tryptophan metabolites and response to immunotherapy in diverse patient populations.

In summary, the proposed pre-ARC "Platform Development for Patient Recruitment: The Cancer Microbiome and Metabolomics" will allow us to begin the development of unique, diverse, clinically annotated biospecimen repositories that will provide a critical resource for investigators to collaboratively study the associations between the microbiome, metabolic biomarkers, and response to ICIs. In the current proposal, we will focus on assessing associations between the microbiome, tryptophan metabolites, and ICI treatment response in two tumor cohorts, both of which are prevalent at BMC and are commonly treated with ICIs: head and neck and non-small cell lung carcinoma (NSCLC) patients. We anticipate that, based on the success of this initial project, we will be able to subsequently scale our project to understand the role of microbiome and metabolism in other cancer types and IO therapies, as well as cancer treatment and prevention broadly. Our specific aims are as follows:

1. To develop a blood and microbiome biobank to explore the association between microbiome and response or resistance to checkpoint inhibitors in head and neck and NSCLC patients treated at Boston Medical Center.
2. To utilize the biobank to explore the association between circulating tryptophan metabolites and response to checkpoint inhibitors in head and neck and NSCLC patients treated at Boston Medical Center.
3. To pilot the development of a blood and microbiome biobank in collaboration with the Uganda Cancer Institute.

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