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Project Title

Mechanisms of Dendritic Cell Cancer surveillance during Lung Metastasis

Type of Cancer

Not Site-Specific Cancer

Area of Research

Cancer Progression and Metastasis

Cancer metastasis – the spread of a tumor from the primary site to other organs – is a leading cause of cancer-related deaths. For example, melanoma and breast cancer patients with non-metastatic disease have 5-year survival rates near 100%, but these rates drop below 30% when these cancers spread. The lung is one of the most frequent sites of metastasis. The Headley lab recently identified a specific kind of immune cell, type 1 conventional dendritic cells (cDC1), as key suppressors of lung metastasis, but we still do not fully understand how they block metastatic disease. Most lung cDC1 are situated around airways to patrol for and defend against inhaled bacteria and viruses. Metastatic tumor cells, however, enter the lungs through the blood, not airways.

I have identified a novel subset of lung cDC1 that rapidly detects bloodborne tumor cells within the first hours of lung metastasis and appear capable of activating other tumor-killing immune cells called NK cells. We hypothesize that early metastatic detection by this unique blood-surveilling cDC1 subpopulation is critical for initiating downstream anti-metastatic immune responses and limiting disease. In the proposed research, I will use preclinical model systems to comprehensively profile when and where blood-surveilling cDC1 detect metastatic tumor cells, what factors they produce in response to tumor cell detection, and how they interact with and influence NK cells during the earliest phases of lung metastasis. Further, I will determine how selectively increasing or decreasing the frequency of this newly discovered lung cDC1 subpopulation impacts metastatic outcome. Results of this research will shed light on how cDC1 detect and suppress metastasis in the lungs and will be a first step toward developing new therapies designed to improve cDC1 anti-metastatic function and ultimately prevent or reduce metastasis in cancer patients.

Picture Coming Soon

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