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“Investigating the role of serotonin receptor 2c in regulating helminth-induced inflammation.”

by
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Thursday, December 7th, 2023
11:00 A.M.
Cancer Center G1196

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ABSTRACT

A growing body of literature has begun to reveal that neuropeptides and neurotransmitters released in highly innervated peripheral tissues operate as critical regulators of helminth-induced inflammation. Helminth parasites, such as hookworms, can affect several host tissues, including the lung, where they promote strong type 2 cytokine responses that support worm clearance and simultaneously initiate pulmonary wound healing. Our work, and that of others, has recently identified monocyte-derived alveolar macrophages (Mo-AMs) with an alternatively activated, or M2, phenotype as critical regulators of these host protective responses. Mo-AMs populate the lung in response to hookworm-induced inflammation and take on a highly activated M2 phenotype compared to tissue-derived AMs. Further, our work has shown that Mo-AMs change phenotypically the longer they persist in the lung, while they receive tissue-derived signals that suppress their highly activated state. Despite these advances, whether neuron-associated factors participate in this tissue imprinting process remains unknown. To address this, we performed transcriptional profiling of lung macrophage populations following infection with the hookworm Nippostrongylus brasiliensis (Nb) and investigated their expression of various receptors for neuron-derived molecules. Interestingly, Mo-AMs were found to gradually acquire high levels of the serotonin receptor 2C (5HTR2c) after entering the lung microenvironment. Serotonin (also known as 5HT) is a neurotransmitter that plays important roles in myriad biological functions beyond its well described roles in the central nervous system. However, whether 5HTR2c-derived signals regulate the activation of monocyte-derived macrophages is unclear. Our work indicates that macrophages lacking 5HTR2c are less able to promote the wound-healing functions needed to mitigate helminth-induced tissue damage. Collectively, this work suggests that 5HT may operate to fine-tune helminth-induced M2 response and provides additional insight into the neuron-associated factors that regulate macrophage responses in the lung.