Macrophages of multiple hematopoietic origins reside in the developing prostate

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Tissue-resident macrophages contribute to the organogenesis of many tissues and can have specialized tissue-specific functions. Although single-cell RNA-sequencing studies of mouse and human adult prostates have revealed heterogeneous macrophage cell populations, their functions and hematopoietic cellular origins during prostate organogenesis remain uncharacterized. While androgens regulate prostate growth during puberty, androgens are considered immune suppressive. Understanding how heterogeneous populations of macrophages regulate postnatal prostate organogenesis could improve our understanding of macrophage function in prostate disease.

In this study, we characterized the localization, androgen receptor expression, and hematopoietic origin of prostate macrophages, and transiently ablated macrophages during postnatal prostate organogenesis in the mouse. We show that myeloid cells were abundant in the prostate during puberty. However, nuclear androgen receptor expression was not detected in most macrophages. We found Cx3cr1, a marker for macrophages, monocytes and dendritic cells, expressed in interstitial macrophages surrounding the prostate and associated with nerve fibers. Furthermore, we provide evidence for the co-existence of embryonic origin self-renewing tissue-resident macrophages and recruited bone-marrow monocyte origin macrophages in the prostate during puberty. Our findings suggest that prostate macrophages promote neural patterning and may shed further light on our understanding of the role of the innate immune system in prostate pathology in response to inflammation and in cancer.

Funding Acknowledgments: This work was supported by National Institutes of Health (NIH) grants R01DK134311 and R00CA194287 to M.S. P.W. was supported in part by GW SPARC and CCAS Summer Lab Internship programs. A. Pletcher was supported in part by a Luther Rice Undergraduate Research Fellowship. The GW Nanofabrication and Imaging Center was supported by NIHS10OD032420 and S10OD010710.

Conflicts of Interest: The authors report no conflicts of interest.

Reference: Feng SW, North TM, Wivell P, Pletcher A, Popratiloff A, Shibata M. Macrophages of multiple hematopoietic origins reside in the developing prostate. *Development.* 2024 Aug 15;151(16):dev203070. doi: 10.1242/dev.203070. PMID: 39082371