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Innate-like CD8 T cells in the teleost olfactory-CNS axis express NK cell markers and mount rapid polyclonal responses to viral antigens

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J Immunol May 1, 2020, 204 (1 Supplement) 92.42;

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Abstract

T lymphocytes can perform innate immune functions and display tissue specificity. Whereas innate T cells have been extensively studied in mammals, little is known about their presence and function in other vertebrates. Previous work in our laboratory identified a subset of TCRalpha beta T cells that rapidly infiltrate the olfactory organ of rainbow trout upon nasal vaccination. This rapid response suggested that these lymphocytes play important functions in mucosal innate immune responses. Here we report that CD8 T cells rapidly infiltrate the olfactory organ of rainbow trout not only in response

In this issue

[The Journal of Immunology](#)

Vol. 204, Issue 1 Supplement

1 May 2020

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Jump to section

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to nasal viral immunization but also in response to other nasal microbial immunizations including killed and live bacteria. Nasal delivery of PAMPs such as LPS or poly I:C did not elicit these responses. Further phenotyping of these cells using qPCR and FISH staining indicate that these innate lymphocytes are NK T cells since they express the teleost NK cell markers NCCRP1 and NITR2. Repertoire analyses of infiltrating CD8 T cells showed a public but polyclonal response with 14 amino acid long CDR3 in response to the virus. Our findings represent the first characterization of NK T cells in early vertebrates and underscore the importance of NK T cells at defending the mucosal barriers of vertebrate animals.

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Print ISSN 0022-1767 Online ISSN 1550-6606