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Eosinophils, basophils and type 2 immune microenvironments in COPD-affected lung tissue

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Highly localised Th2- and eosinophil-rich pockets were identified in COPD-affected lungs, which increased in number with increasing disease severity and included basophils. This exemplifies a novel type of heterogeneity in the immunopathology of COPD. http://bit.ly/2HexTco

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ABSTRACT Although elevated blood or sputum eosinophils are present in many patients with COPD, uncertainties remain regarding the anatomical distribution pattern of lung-infiltrating eosinophils. Basophils have remained virtually unexplored in COPD. This study mapped tissue-infiltrating eosinophils, basophils and eosinophil-promoting immune mechanisms in COPD-affected lungs.

Surgical lung tissue and biopsies from major anatomical compartments were obtained from COPD patients with severity grades Global Initiative for Chronic Obstructive Lung Disease stages I–IV; never-smokers/smokers served as controls. Automated immunohistochemistry and *in situ* hybridisation identified immune cells, the type 2 immunity marker GATA3 and eotaxins (CCL11, CCL24).

Eosinophils and basophils were present in all anatomical compartments of COPD-affected lungs and increased significantly in very severe COPD. The eosinophilia was strikingly patchy, and focal eosinophil-rich microenvironments were spatially linked with $GATA3^+$ cells, including type 2 helper T-cell lymphocytes and type 2 innate lymphoid cells. A similarly localised and interleukin-33/ST2-dependent eosinophilia was demonstrated in influenza-infected mice. Both mice and patients displayed spatially confined eotaxin signatures with $CCL11^+$ fibroblasts and $CCL24^+$ macrophages.

In addition to identifying tissue basophilia as a novel feature of advanced COPD, the identification of spatially confined eosinophil-rich type 2 microenvironments represents a novel type of heterogeneity in the immunopathology of COPD that is likely to have implications for personalised treatment.