

Title: Does a composite score combining blood eosinophils and exhaled nitric oxide (FeNO) accurately predict a sputum eosinophilia?

Background: FeNO and blood eosinophils are related to the sputum eosinophil count, regarded as a gold standard marker of eosinophilic airway inflammation and corticosteroid responsive airways disease. However, measurement of sputum eosinophils is not widely available in the clinical setting.

Aim: To see if using a composite score of FeNO and a peripheral blood eosinophil count is an accurate predictor of sputum eosinophilia.

Methods: Blood, sputum and FeNO measurements were obtained from patients with airways disease. The blood eosinophil count, sputum eosinophil % and FeNO were measured at the same visit and a composite score of blood eosinophils and FeNO was calculated using the values in Table 1. Receiver operator characteristics (ROC) curves were drawn to investigate the ability to predict a sputum eosinophilia of 3% or more.

Table 1: Composite score

Score	0	1	2
FeNO	0-25	25-50	50+
Blood eosinophil count	0-0.14	0.15-0.29	0.3+

Results: 246 subjects (52% asthma, 48% COPD) had paired blood, FeNO and sputum measurements. When using the composite score the area under curve (AUC) (95% CI) was 0.8 (0.74-0.87). Blood eosinophils predicted a sputum eosinophilia with AUC (95 % CI) of 0.75 (0.68-0.82). When the cohort was separated into asthma and COPD the AUC for patients with asthma using the composite score increased to (95% CI) 0.86 (0.77-0.94) while for patients with COPD it fell to (95% CI) 0.64 (0.49-0.78). Most of the predictive ability of the score was driven by blood eosinophils in asthma (AUC x) and COPD (AUC y). FeNO alone was less predictive, particularly in patients with COPD (AUC x vs y in asthma and COPD)

The composite score of 1 gives a sensitivity of 87% and a specificity of 54% for predicting a sputum eosinophil level of  $\geq 3\%$  in airways disease. A blood eosinophilia of 0.15 gives a sensitivity of 87% and a specificity of 54%.

Conclusion: A composite score using FeNO and blood eosinophils to predict a sputum eosinophilia provides no additional predictive value over blood eosinophils alone in an unselective population with airway disease. FeNO was a poor marker of a raised sputum eosinophil count in patients with COPD.