

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

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Introduction

It is increasingly important to be able to differentiate between eosinophilic and non-eosinophilic phenotypes in airways disease, as airways eosinophilia is a predictor of response to corticosteroids (1) and biological therapies targeting the type-2 pathways (2). Measuring airway eosinophils through an induced sputum cell differential count is the gold standard method for determining sputum eosinophilia (3). However, measurement of sputum eosinophils is not widely available in the clinical setting.

Fractional exhaled nitric oxide (FeNO) and peripheral blood eosinophils (PBE) have been shown to be useful biomarkers of eosinophilia (4). We created a composite score combining these two measurements to see whether they are a better predictor of a sputum eosinophilia than using each in isolation.

Methods

FeNO, blood and sputum measurements were obtained from patients with airways disease (asthma as per GINA and COPD as per GOLD) at stable state. Participants on oral corticosteroids were excluded. FeNO, blood eosinophil count and sputum eosinophil % 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 $\geq 3\%$.

Table 1. Blood and FeNO values used to calculate the composite score

Score	0	1	2
FeNO (ppb)	≤ 24	25-49	≥ 50
PBE ($\times 10^9/L$)	≤ 0.14	0.15-0.29	≥ 0.3

Results

161 subjects (78% asthma, 22% chronic obstructive airways disease (COPD)) had paired FeNO, PBE and sputum measurements. Baseline demographics are shown in Table 2.

Table 2: Baseline Demographics

	Asthma	COPD
Number	127	36
Age (years)	53(14)	67 (10)
BMI (kg/m^2)	29.8 (6)	26.8 (5)
Sex (% female)	58	38
Current smokers (%)	5	22
Pack Years	1.9 (20)	45 (43)
% on ICS	85	66
BDP equivalent dose (μg) for those on ICS	1200 (800)	800 (800)
PBE ($\times 10^9/L$)	0.38 (0.31)	0.19 (0.12)
FeNO (ppb)	42 (42)	18 (12)
Sputum eosinophils (%)	14 (20)	2.8 (4.7)

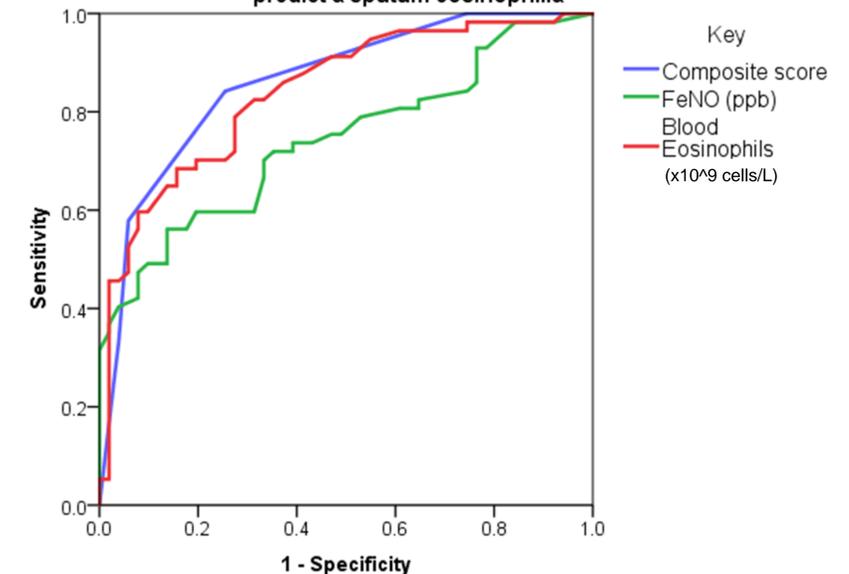
Data shown as mean (SD). BMI = Body mass index, BDP = beclomethasone dipropionate. ICS – inhaled corticosteroids.

Using the composite score to identify a sputum eosinophilia, the area under the curve (AUC, 95% confidence interval) was 0.86 (0.79-0.93). This was similar to the AUC for blood eosinophils alone, which was 0.84 (0.77-0.92). A composite score of ≥ 1 had a sensitivity of 92% and specificity of 50% for predicting a sputum eosinophil level of $\geq 3\%$. (figure 1)

Separating the cohort into asthma and COPD gave AUCs for the composite score of 0.86 (0.77-0.94) and 0.77 (0.55-0.99) respectively. Predictive ability was mostly driven by PBE in both asthma (AUC 0.83) and COPD (AUC 0.76). FeNO alone was less predictive, particularly in patients with COPD (AUC 0.5 in COPD and 0.74 in asthma).

Figure 1.

ROC curve comparing the composite score with blood eosinophils and FeNO to predict a sputum eosinophilia



Conclusions

A composite score using FeNO and PBE provided little added value over PBE alone in predicting sputum eosinophilia in an unselected population with airways disease. T

The predictive value of FeNO was less useful than PBE but was better in asthma than in COPD.

Overall, in this population, FeNO does not add anything to the peripheral blood eosinophil count when predicting sputum eosinophilia.

References and Funding

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