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Brief Correspondence

Exhaled nitric oxide (eNO) in the evaluation and treatment of mild intermittent asthma

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Abstract

Background: We evaluated the utility of exhaled nitric oxide (eNO) as a biomarker in the diagnosis and management of asthma by comparing eNO with clinical history, asthma control test (ACT), and FEV1% in 10 subjects with mild intermittent asthma before and after treatment with an inhaled corticosteroid.

Findings: Subjects were age 18-45 with a baseline FEV1% ≥ 70, physician diagnosed asthma for at least 1 year, had a positive methacholine challenge and were not receiving treatment with a daily controller therapy. They were started on fluticasone propionate 220 mcg, 2 puffs inhaled twice a day and returned in 2-4 weeks for repeat ACT, spirometry and eNO. Prior to initiation of inhaled fluticasone therapy subjects had an average FEV1%= 80.4% ± 11.4, ACT= 15.6 ± 5.4, and eNO= 57.3 ± 48.8. Following treatment with fluticasone 220mcg for 2-4 weeks the subjects had the following averages: FEV1%= 79.3 ± 25.7, ACT= 19.1 ± 4.2, eNO= 17.8 ± 6.7. The only change that was significant was the decrease in the level of eNO (p=0.03). There was no significant change in FEV1% (p= 0.87) or ACT score (p= 0.69) with fluticasone propionate therapy.

Conclusions: eNO appears to be a sensitive biomarker in mild intermittent asthmatics treated with an inhaled corticosteroid and future studies should be conducted to evaluate the role of eNO in asthma diagnosis and medication compliance.

Keywords: Exhaled Nitric Oxide (eNO); Biomarkers; Asthma;Compliance; Fluticasone propionate

Abbreviations

ACT : Asthma Control Test
eNO : Exhaled Nitric Oxide
FEV1% : Forced Expiratory Volume in 1 second %

Introduction

Asthma is traditionally diagnosed and managed based on clinical history and pulmonary function testing and in recent years there has been an effort to develop biomarkers to aid in the diagnosis and management. Exhaled nitric oxide (eNO) is a biomarker that is gaining popularity for use in clinical practice [1-5]. In this study we evaluated the utility of this biomarker in the diagnosis and management of asthma by comparing eNO with clinical history, asthma control test (ACT), and FEV1% in 10 subjects with mild intermittent asthma.

Results and Discussion

We recruited subjects with mild intermittent asthma by history, on no daily controller medications. Subjects were age 18-45 with a baseline FEV1% ≥ 70, physician diagnosed asthma for at least 1 year, a lifetime tobacco smoking history of <10 pack years, not receiving treatment with a controller therapy such as inhaled corticosteroids or leukotriene receptor antagonists. Visit 1 consisted of taking a clinical history, ACT, spirometry and a methacholine challenge. Methacholine challenge was considered positive if there was a 20% drop in FEV1% at a dose that was less than or equal to 8 mg/ml inhaled methacholine. Subjects were seen again within 5 days for visit 2 which consisted of eNO measurements and patients were then started on fluticasone propionate 220 mcg, 2 puffs inhaled twice a day and returned in 2-4 weeks for visit number 3 which consisted of repeat ACT, spirometry and eNO. The study was approved by the Western Institutional Review Board (WIRB Protocol #20091455) and all subjects were consented prior to enrollment.

We enrolled 10 subjects (7 males), average 30.3 years of age, with mild intermittent asthma by history and positive methacholine challenge. Prior to initiation of inhaled fluticasone therapy subjects had an average FEV1%= 80.4% ± 11.4, ACT= 15.6 ± 5.4, and eNO= 57.3 ± 48.8. Following treatment with fluticasone 220mcg for 2-4 weeks the subjects had the following averages: FEV1%= 79.3 ± 25.7, ACT= 19.1 ± 4.2, eNO= 17.8 ± 6.7. The only change that was significant was the decrease in the level of eNO (p=0.03) (Table 1). There was no significant change in FEV1% (p= 0.87) or ACT score (p= 0.69) after initiation of fluticasone propionate therapy. We performed a linear regression model and found a significant inverse relationship between the change in eNO and change in ACT score over the study period (p=0.03), i.e. as eNO decreased the subject's ACT scores increased significantly.

Table 1	Pre-treatment	Post-treatment	P value
FEV1%	80.4±11.7	79.3±25.7	0.87
Asthma Control Test (ACT)	15.6±5.4	19.1±4.2	0.69
eNO	57.3±48.8	17.8±6.7	0.03†

† Statistically significant

Conclusion

In this study we enrolled mild intermittent asthmatics not on daily asthma controller therapy to evaluate the effect of an inhaled corticosteroid on FEV1%, ACT, and eNO. There was a significant decrease in post-treatment eNO levels in these patients after a short course of treatment with an inhaled corticosteroid. There was a non-significant increase in ACT scores and no change in FEV1% after treatment. These findings indicate that eNO is a sensitive biomarker of asthma status in this patient population, and more sensitive than FEV1, which is the standard commonly used to determine drug effectiveness and clinical responsiveness. Future studies are indicated to evaluate the role of eNO in asthma diagnosis and medication compliance.

Competing interests

The authors declare that they have no competing interests.

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