The Role of Fractional Exhaled Nitric Oxide in Asthma Management

Karen H. Calhoun, MD

KEYWORDS

• Fractional exhaled nitric oxide • Allergic inflammation • Asthma management
• Lung function

KEY POINTS

- Clinical management of asthma is challenging, and measuring exhaled nitric oxide can provide another type of data to assist in meeting this challenge.
- Fractional exhaled nitric oxide (FeNO) is relatively easy to perform, and the equipment is not forbiddingly expensive.
- FeNO provides a complement to traditional measures of asthma control and can help guide diagnostic and treatment choices.

FENO: WHY SHOULD I CARE?

Short answer: *It may help manage your asthmatic patients.*

The challenges of asthma care include[1]: Does this patient have asthma (**Figs. 1** and **2**)?[2] How severe is the asthma?[3] What medications will help this patient most?[4] Is this patient improving or getting worse?[5] Is this patient compliant with his/her medications?[6] Is this patient at current risk for an asthma exacerbation?

Traditional methods for answering these questions include symptom questionnaires, peak flow measurements, spirometry, eosinophil count in induced sputum, bronchoalveolar lavage (BAL) fluid or biopsy,[1] and spirometric methacholine challenge. The problems with these methods are subjectivity (questionnaire), dependence on patient voluntary performance (peak flow, spirometry, and methacholine challenge), invasiveness (induced sputum, BAL, and biopsy), and time and complexity of performing them (all except questionnaires and peak flow). There is, therefore, a continual search for quick and easy objective measurements to help with asthma diagnosis and management.

Department of Otolaryngology - Head & Neck Surgery, Wexner Medical Center, The Ohio State University College of Medicine, Columbus, OH, USA
E-mail address: karen.calhoun@osumc.edu

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Abbreviations	
AR	Allergic rhinitis
BAL	Bronchoalveolar lavage
BHR	Bronchial hyperreactivity
COPD	Chronic obstructive pulmonary disease
EIB	Exercise-induced bronchospasm
FeNO	Fractional exhaled nitric oxide
FEV_1	Forced expiratory volume in the first second of expiration
ICS	Inhaled corticosteroid
NAR	Nonallergic rhinitis
NO	Nitric oxide
NOS	Nitric oxide synthase
PEF	Peak expiratory flow
SAR	Seasonal allergic rhinitis

WHAT IS FENO?

Short answer: *FeNO is a marker for eosinophilic inflammation in the lungs.*

FeNO a marker for inflammation that can be measured in the exhaled breath. Human airways respond to inflammation by producing nitric oxide (NO) via nitric oxide synthase (NOS). NOS2A isoform is produced by cells in the bronchial wall, and this mechanism overproduces NO when there is eosinophilic inflammation.[2,3] It is being investigated as an objective measure to assist with asthma management.

The first machines for measuring exhaled NO depended on chemiluminescence analyzers and were fairly large and nonportable. Currently, most clinical offices in the

Fig. 1. Front view of the NIOX MINO with its touchscreen showing the cloud graphic.