

POLICY TITLE	MEASUREMENT OF EXHALED NITRIC OXIDE AND EXHALED BREATH CONDENSATE IN THE DIAGNOSIS AND MANAGEMENT OF ASTHMA AND OTHER RESPIRATORY DISORDERS
POLICY NUMBER	MP-4.038

Original Issue Date (Created):	2/1/2016
Most Recent Review Date (Revised):	7/17/2018
Effective Date:	9/1/2018

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I. POLICY

Measurement of exhaled nitric oxide is considered **investigational** in the diagnosis and management of asthma and other respiratory disorders including but not limited to chronic obstructive pulmonary disease and chronic cough as there is insufficient evidence to support a conclusion concerning the health outcomes or benefits associated with this procedure.

Measurement of exhaled breath condensate is considered **investigational** in the diagnosis and management of asthma and other respiratory disorders including but not limited to chronic obstructive pulmonary disease and chronic cough as there is insufficient evidence to support a conclusion concerning the health outcomes or benefits associated with this procedure.

II. PRODUCT VARIATIONS

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This policy is applicable to all programs and products administered by Capital BlueCross unless otherwise indicated below.

FEP PPO - The FEP program dictates that all drugs, devices or biological products approved by the U.S. Food and Drug Administration (FDA) may not be considered investigational. Therefore, FDA-approved drugs, devices or biological products may be assessed on the basis of medical necessity.

III. DESCRIPTION/BACKGROUND

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ASTHMA

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Asthma is characterized by airway inflammation that leads to airway obstruction and hyperresponsiveness, which in turn lead to characteristic clinical symptoms including wheezing, shortness of breath, cough, and chest tightness.

Management

Guidelines for the management of persistent asthma stress the importance of long-term suppression of inflammation using steroids, leukotriene inhibitors, or other anti-inflammatory drugs. Existing techniques for monitoring the status of underlying inflammation have focused on bronchoscopy, with lavage and biopsy, or analysis by induced sputum. Given the cumbersome nature of these techniques, the ongoing assessment of asthma focuses not on the status of the underlying chronic inflammation, but rather on regular assessments of respiratory parameters such as forced expiratory volume in 1 second (FEV1) and peak flow. Therefore, there has been interest in noninvasive techniques to assess the underlying pathogenic chronic inflammation as reflected by measurements of inflammatory mediators.

Fractional Exhaled Nitric Oxide and Exhaled Breath Condensate

Two proposed strategies are the measurement of FeNO and the evaluation of EBC. NO is an important endogenous messenger and inflammatory mediator that is widespread in the human body, functioning, for example, to regulate peripheral blood flow, platelet function, immune reactions, and neurotransmission and to mediate inflammation. While the role of NO in asthma pathogenesis is still under investigation, patients with asthma have been found to have high levels of FeNO, which decreases with treatment with corticosteroids. In biologic tissues, NO is unstable, limiting measurement. However, in the gas phase, NO is fairly stable, permitting its measurement in exhaled air. FeNO is typically measured during single breath exhalations. First, the subject inspires NO-free air via a mouthpiece until total lung capacity is achieved, followed immediately by exhalation through the mouthpiece into the measuring device. Several devices measuring FeNO are commercially available in the United States. According to a 2009 joint statement by ATS and European Respiratory Society, there is a consensus that the fractional concentration of FeNO is best measured at an exhaled rate of 50 mL per second (FeNO 50 mL/s) maintained within 10% for more than 6 seconds at an oral pressure between 5 and 20 cm H₂O.¹ Results are expressed as the NO concentration in parts per billion (ppb), based on the mean of 2 or 3 values.

EBC consists of exhaled air passed through a condensing or cooling apparatus, resulting in an accumulation of fluid. Although EBC is primarily derived from water vapor, it also contains aerosol particles or respiratory fluid droplets, which in turn contain various nonvolatile inflammatory mediators, such as cytokines, leukotrienes, oxidants, antioxidants, and various other markers of oxidative stress. There are a variety of laboratory techniques to measure the components of EBC, including such simple techniques as pH measurement, to the more sophisticated gas chromatography/mass spectrometry or high performance liquid chromatography, depending on the component of interest.

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Clinical Uses of FeNO and EBC

Measurements of FeNO have particularly been associated with an eosinophilic asthma phenotype. Eosinophilic asthma is a subtype of severe asthma associated with sputum and serum eosinophilia, along with later-onset asthma.² Until recently, most asthma management strategies did not depend on the recognition or diagnosis of a particular subtype. However, 2 anti-interleukin 5 inhibitors have been approved by the Food and Drug Administration (FDA) for the treatment of severe asthma with an eosinophilic phenotype, mepolizumab³ and reslizumab.⁴ An anti-interleukin 4 and 13 monoclonal antibody has also been shown to improve uncontrolled asthma, with the greatest improvement observed in the subgroup of patients with the highest blood eosinophil count.⁵

Measurement of NO and EBC has been investigated in the diagnosis and management of asthma. Potential uses in the management of asthma include assessing response to anti-inflammatory treatment, monitoring compliance with treatment, and predicting exacerbations. Aside from asthma, they have also been proposed in the management of patients with chronic obstructive pulmonary disease, cystic fibrosis, allergic rhinitis, pulmonary hypertension, and primary ciliary dyskinesia.

Regulatory Status

In 2003, the Nitric Oxide Monitoring System (NIOX®; Aerocrine, Sweden; acquired by Circassia Pharmaceuticals, Oxford, U.K.) was cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process for the following indication:

“[Measurements of the fractional nitric oxide (NO) concentration in expired breath (FE-NO)] provide the physician with means of evaluating an asthma patient's response to anti-inflammatory therapy, as an adjunct to established clinical and laboratory assessments in asthma. NIOX should only be used by trained physicians, nurses and laboratory technicians. NIOX cannot be used with infants or by children approximately under the age of 4, as measurement requires patient cooperation. NIOX should not be used in critical care, emergency care or in anesthesiology.”

In March 2008, the NIOX MINO was cleared for marketing. The main differences between this new device and the NIOX are that the NIOX MINO is handheld and portable and that it is not suitable for children younger than age 7 years. In November 2014, the NIOX VERO, which differs from prior devices in terms of its battery and display format, was cleared for marketing by FDA. FDA product code: MXA.

The RTube™ Exhaled Breath Condensate collection system (Respiratory Research) and the ECoScreen EBC collection system (CareFusion, Germany) are registered with FDA as a class I devices that collect expired gas. Respiratory Research has a proprietary gas-standardized pH assay, which, when performed by the company, is considered a laboratory-developed test.

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IV. RATIONALE

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SUMMARY OF EVIDENCE

For individuals who have suspected asthma or suspected eosinophilic asthma who receive measurement of FeNO, the evidence includes multiple retrospective and prospective studies of diagnostic accuracy, along with systematic reviews of those studies. Relevant outcomes are test accuracy and validity, symptoms, change in disease status, morbid events, and functional outcomes. There is a large volume of reports on the sensitivity and specificity of FeNO in asthma diagnosis. The available evidence is limited by variability in FeNO cutoff levels used to diagnose asthma, and by variability in sensitivity and specificity for asthma diagnosis. The accuracy of the cutoffs recommended by the American Thoracic Society guidelines has not been evaluated in the diagnosis of asthma. Also, no studies were identified that evaluated whether the use of FeNO improved the accuracy of asthma diagnosis compared with clinical diagnosis. For the use of FeNO in the diagnosis of eosinophilic asthma, using the criterion standard of sputum eosinophilia, the diagnostic accuracy is moderate. The evidence is insufficient to determine the effect of the technology on health outcomes.

For individuals who have asthma who receive medication management directed by FeNO, the evidence includes multiple randomized controlled trials and systematic reviews of those trials. Relevant outcomes are symptoms, change in disease status, morbid events, and functional outcomes. The available randomized controlled trials evaluating the use of FeNO tests for the management of patients have not consistently found improvement in health outcomes. Two Cochrane reviews from 2016, one on adults and the other on children, found FeNO-guided asthma management reduced the number of individuals who had more than 1 exacerbation, but had no impact on day-to-day symptoms. The evidence is insufficient to determine the effect of the technology on health outcomes.

For individuals who have suspected or confirmed respiratory disorders other than asthma who receive measurement of FeNO, the evidence includes a crossover trial and observational studies. Relevant outcomes are test accuracy and validity, symptoms, change in disease status, morbid events, and functional outcomes. The available evidence assessing the use of FeNO for respiratory disorders other than asthma is limited by heterogeneity in the conditions evaluated and uncertainty about the potential clinical use. The evidence is insufficient to determine the effect of the technology on health outcomes.

For individuals who have suspected or confirmed respiratory disorders who receive measurement of EBC, the evidence includes observational studies reporting on the association between various EBC components and disease severity. Relevant outcomes are test accuracy and validity, symptoms, change in disease status, morbid events, and functional outcomes. There is considerable variability in the particular EBC components measured and criteria for standardized measurements. Also, there is limited evidence on the use of EBC for

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determining asthma severity, diagnosing other respiratory conditions, or guiding treatment decisions for asthma or other respiratory conditions. The evidence is insufficient to determine the effect of the technology on health outcomes.

V. DEFINITIONS

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N/A

VI. BENEFIT VARIATIONS

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The existence of this medical policy does not mean that this service is a covered benefit under the member's contract. Benefit determinations should be based in all cases on the applicable contract language. Medical policies do not constitute a description of benefits. A member's individual or group customer benefits govern which services are covered, which are excluded, and which are subject to benefit limits and which require preauthorization. Members and providers should consult the member's benefit information or contact Capital BlueCross for benefit information.

VII. DISCLAIMER

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Capital BlueCross's medical policies are developed to assist in administering a member's benefits, do not constitute medical advice and are subject to change. Treating providers are solely responsible for medical advice and treatment of members. Members should discuss any medical policy related to their coverage or condition with their provider and consult their benefit information to determine if the service is covered. If there is a discrepancy between this medical policy and a member's benefit information, the benefit information will govern. Capital BlueCross considers the information contained in this medical policy to be proprietary and it may only be disseminated as permitted by law.

VIII. CODING INFORMATION

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Note: This list of codes may not be all-inclusive, and codes are subject to change at any time. The identification of a code in this section does not denote coverage as coverage is determined by the terms of member benefit information. In addition, not all covered services are eligible for separate reimbursement.

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Investigational; therefore not covered:

CPT Codes®							
83987	95012						

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IX. REFERENCES

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1. Reddel HK, Taylor DR, Bateman ED, et al. An official American Thoracic Society/European Respiratory Society statement: asthma control and exacerbations: standardizing endpoints for clinical asthma trials and clinical practice. *Am J Respir Crit Care Med.* Jul 1 2009;180(1):59-99. PMID 19535666
2. Chung KF, Wenzel SE, Brozek JL, et al. International ERS/ATS guidelines on definition, evaluation and treatment of severe asthma. *Eur Respir J.* Feb 2014;43(2):343-373. PMID 24337046
3. Wenzel S, Castro M, Corren J, et al. Dupilumab efficacy and safety in adults with uncontrolled persistent asthma despite use of medium-to-high-dose inhaled corticosteroids plus a long-acting beta2 agonist: a randomised double-blind placebo-controlled pivotal phase 2b dose-ranging trial. *Lancet.* Jul 02 2016;388(10039):31-44. PMID 27130691
4. National Heart Lung and Blood Institute. Guidelines for the Diagnosis and Management of Asthma (EPR-3) 2007; <https://www.nhlbi.nih.gov/health-topics/guidelines-for-diagnosis-management-of-asthma>. Accessed July 17, 2018.
5. Bossuyt PM, Irwig L, Craig J, et al. Comparative accuracy: assessing new tests against existing diagnostic pathways. *Bmj.* May 6 2006;332(7549):1089-1092. PMID 16675820
6. Harnan SE, Essat M, Gomersall T, et al. Exhaled nitric oxide in the diagnosis of asthma in adults: a systematic review. *Clin Exp Allergy.* Mar 2017;47(3):410-429. PMID 27906490
7. Karrasch S, Linde K, Rucker G, et al. Accuracy of FENO for diagnosing asthma: a systematic review. *Thorax.* Feb 2017;72(2):109-116. PMID 27388487
8. Wang Z, Pianosi PT, Keogh KA, et al. The diagnostic accuracy of fractional exhaled nitric oxide testing in asthma: a systematic review and meta-analyses. *Mayo Clin Proc.* Feb 2018;93(2):191-198. PMID 29275031
9. Wang Z, Pianosi P, Keogh K, et al. The Clinical Utility of Fractional Exhaled Nitric Oxide (FeNO) in Asthma Management (Comparative Effectiveness Review No. 197). Rockville, MD: Agency for Healthcare Research and Quality; 2017.
10. Petsky HL, Kew KM, Turner C, et al. Exhaled nitric oxide levels to guide treatment for adults with asthma. *Cochrane Database Syst Rev.* Sep 01 2016;9:CD011440. PMID 27580628

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11. *Petsky HL, Kew KM, Chang AB. Exhaled nitric oxide levels to guide treatment for children with asthma. Cochrane Database Syst Rev. Nov 09 2016;11:Cd011439. PMID 27825189*
12. *Honkoop PJ, Loijmans RJ, Termeer EH, et al. Symptom- and fraction of exhaled nitric oxide-driven strategies for asthma control: A cluster-randomized trial in primary care. J Allergy Clin Immunol. Mar 2015;135(3):682-688.e611. PMID 25174865*
13. *Powell H, Murphy VE, Taylor DR, et al. Management of asthma in pregnancy guided by measurement of fraction of exhaled nitric oxide: a double-blind, randomised controlled trial. Lancet. Sep 10 2011;378(9795):983-990. PMID 21907861*
14. *Morten M, Collison A, Murphy VE, et al. Managing Asthma in Pregnancy (MAP) trial: FENO levels and childhood asthma. J Allergy Clin Immunol. Mar 8 2018. PMID 29524536*
15. *Szeffler SJ, Martin RJ, King TS, et al. Significant variability in response to inhaled corticosteroids for persistent asthma. J Allergy Clin Immunol. Mar 2002;109(3):410-418. PMID 11897984*
16. *Smith AD, Cowan JO, Brassett KP, et al. Exhaled nitric oxide: a predictor of steroid response. Am J Respir Crit Care Med. Aug 15 2005;172(4):453-459. PMID 15901605*
17. *Knuffman JE, Sorkness CA, Lemanske RF, Jr., et al. Phenotypic predictors of long-term response to inhaled corticosteroid and leukotriene modifier therapies in pediatric asthma. J Allergy Clin Immunol. Feb 2009;123(2):411-416. PMID 19121860*
18. *Anderson WJ, Short PM, Williamson PA, et al. Inhaled corticosteroid dose response using domiciliary exhaled nitric oxide in persistent asthma: the FENOtype trial. Chest. Dec 2012;142(6):1553-1561. PMID 23364390*
19. *Visitsunthorn N, Prottasan P, Jirapongsananuruk O, et al. Is fractional exhaled nitric oxide (FeNO) associated with asthma control in children? Asian Pac J Allergy Immunol. Sep 2014;32(3):218-225. PMID 25268339*
20. *Wilson E, McKeever T, Hargadon B, et al. Exhaled nitric oxide and inhaled corticosteroid dose reduction in asthma: a cohort study. Eur Respir J. Dec 2014;44(6):1705-1707. PMID 25142486*
21. *Phipatanakul W, Mauger DT, Sorkness RL, et al. Effects of age and disease severity on systemic corticosteroid responses in asthma. Am J Respir Crit Care Med. Jun 1 2017;195(11):1439-1448. PMID 27967215*
22. *Price DB, Buhl R, Chan A, et al. Fractional exhaled nitric oxide as a predictor of response to inhaled corticosteroids in patients with non-specific respiratory symptoms and insignificant bronchodilator reversibility: a randomised controlled trial. Lancet Respir Med. Jan 2018;6(1):29-39. PMID 29108938*
23. *Korevaar DA, Westerhof GA, Wang J, et al. Diagnostic accuracy of minimally invasive markers for detection of airway eosinophilia in asthma: a systematic review and meta-analysis. Lancet Respir Med. Apr 2015;3(4):290-300. PMID 25801413*

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24. Westerhof GA, Korevaar DA, Amelink M, et al. Biomarkers to identify sputum eosinophilia in different adult asthma phenotypes. *Eur Respir J.* Sep 2015;46(3):688-696. PMID 26113672
25. Chou KT, Su KC, Huang SF, et al. Exhaled nitric oxide predicts eosinophilic airway inflammation in COPD. *Lung.* Aug 2014;192(4):499-504. PMID 24816967
26. Gao J, Zhang M, Zhou L, et al. Correlation between fractional exhaled nitric oxide and sputum eosinophilia in exacerbations of COPD. *Int J Chron Obstruct Pulmon Dis.* Apr 27 2017;12:1287-1293. PMID 28490872
27. Oishi K, Hirano T, Suetake R, et al. Exhaled nitric oxide measurements in patients with acute-onset interstitial lung disease. *J Breath Res.* Jun 29 2017;11(3):036001. PMID 28660859
28. Guilleminault L, Saint-Hilaire A, Favelle O, et al. Can exhaled nitric oxide differentiate causes of pulmonary fibrosis? *Respir Med.* Nov 2013;107(11):1789-1796. PMID 24011803
29. Boon M, Meyts I, Proesmans M, et al. Diagnostic accuracy of nitric oxide measurements to detect primary ciliary dyskinesia. *Eur J Clin Invest.* May 2014;44(5):477-485. PMID 24597492
30. Dummer JF, Epton MJ, Cowan JO, et al. Predicting corticosteroid response in chronic obstructive pulmonary disease using exhaled nitric oxide. *Am J Respir Crit Care Med.* Nov 1 2009;180(9):846-852. PMID 19661244
31. Prieto L, Bruno L, Gutierrez V, et al. Airway responsiveness to adenosine 5'-monophosphate and exhaled nitric oxide measurements: predictive value as markers for reducing the dose of inhaled corticosteroids in asthmatic subjects. *Chest.* Oct 2003;124(4):1325-1333. PMID 14555562
32. Kunisaki KM, Rice KL, Janoff EN, et al. Exhaled nitric oxide, systemic inflammation, and the spirometric response to inhaled fluticasone propionate in severe chronic obstructive pulmonary disease: a prospective study. *Thorax.* Apr 2008;63(2):55-64. PMID 19124359
33. Davis MD, Montpetit A, Hunt J. Exhaled breath condensate: an overview. *Immunol Allergy Clin North Am.* Aug 2012;32(3):363-375. PMID 22877615
34. Effros RM, Su J, Casaburi R, et al. Utility of exhaled breath condensates in chronic obstructive pulmonary disease: a critical review. *Curr Opin Pulm Med.* Mar 2005;11(2):135-139. PMID 15699785
35. Hunt J. Exhaled breath condensate: an overview. *Immunol Allergy Clin North Am.* Nov 2007;27(4):587-596; v. PMID 17996577
36. Kazani S, Israel E. Exhaled breath condensates in asthma: diagnostic and therapeutic implications. *J Breath Res.* Dec 2010;4(4):047001. PMID 21383487
37. Liu J, Thomas PS. Exhaled breath condensate as a method of sampling airway nitric oxide and other markers of inflammation. *Med Sci Monit.* Aug 2005;11(8):MT53-62. PMID 16049390

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38. Thomas PS, Lowe AJ, Samarasinghe P, et al. Exhaled breath condensate in pediatric asthma: promising new advance or pouring cold water on a lot of hot air? a systematic review. *Pediatr Pulmonol.* May 2013;48(5):419-442. PMID 23401497
39. Aldakheel FM, Thomas PS, Bourke JE, et al. Relationships between adult asthma and oxidative stress markers and pH in exhaled breath condensate: a systematic review. *Allergy.* Jun 2016;71(6):741-757. PMID 26896172
40. Liu L, Teague WG, Erzurum S, et al. Determinants of exhaled breath condensate pH in a large population with asthma. *Chest.* Feb 2011;139(2):328-336. PMID 20966042
41. Navratil M, Plavec D, Bulat Lokas S, et al. Urates in exhaled breath condensate as a biomarker of control in childhood asthma. *J Asthma.* Nov 11 2014:1-37. PMID 25387148
42. Antus B, Barta I, Kullmann T, et al. Assessment of exhaled breath condensate pH in exacerbations of asthma and chronic obstructive pulmonary disease: A longitudinal study. *Am J Respir Crit Care Med.* Dec 15 2010;182(12):1492-1497. PMID 20656939
43. National Institute for Health and Care Excellence (NICE). Asthma: diagnosis, monitoring and chronic asthma management [NG80]. 2017; <https://www.nice.org.uk/guidance/ng80>. Accessed July 17, 2018.
44. Dweik RA, Boggs PB, Erzurum SC, et al. An official ATS clinical practice guideline: interpretation of exhaled nitric oxide levels (FENO) for clinical applications. *Am J Respir Crit Care Med.* Sep 1 2011;184(5):602-615. PMID 21885636
45. Committee on Standards for Developing Trustworthy Clinical Practice Guidelines, Board on Health Care Services. *Clinical Practice Guidelines We Can Trust.* Washington, DC: National Academies Press; 2011.
46. Dinakar C, Chipps BE. Clinical tools to assess asthma control in children. *Pediatrics.* Jan 2017;139(1). PMID 28025241
47. Global Strategy for Asthma Management and Prevention (GINA). 2018; <http://ginasthma.org/>. Accessed July 17, 2018
48. Blue Cross Blue Shield Association Medical Policy Reference Manual. 2.01.61, *Measurement of Exhaled Nitric Oxide and Exhaled Breath Condensate in the Diagnosis and Management of Respiratory Disorders.* June 2018.

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MP 4.038	CAC 9/29/15 New policy BCBSA adopted. Both measurement of exhaled nitric oxide and exhaled breath condensate are consider investigational in the diagnosis and management of asthma and other respiratory disorders. FEP variation added. Coding added.
	CAC 11/29/16 Consensus review. Rational and references updated. No change to policy statements. Coding reviewed. Variation reformatting.

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	11/17/2017 Consensus review. Appendix added. Description/Background, Rationale, and Reference sections updated.
	7/17/18 Consensus. No change to policy statements. Rationale condensed. Appendix deleted. References updated.

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