Measurement of Exhaled Nitric Oxide (FeNO)

Measurement of the Fraction of Exhaled Nitric Oxide (FeNO)

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1. Procedure description

The FeNO test analyzes a biomarker in exhaled air and is used in the diagnosis of different airway diseases.

Exhaled Nitric Oxide (NO) is considered an important signaling molecule for biological functions. It has multiple roles in the airway that vary from an endogenous modulator of the airway to a mediator in inflammatory and immunomodulatory processes.

The FeNO test is a test that gives information helpful in assessing the inflammation of the airways. In this process, the fraction of nitric oxide present in the exhalation of a subject is measured. Nitric Oxide is a biomarker related with the endotype Th2-high, which is the most common endotype that can be found in allergic and non-allergic asthmatics. It is a slightly more common phenotype in severe asthma. 50% of mild to moderate asthmatic patients have this phenotype.

1. Procedure description

What are the procedural steps involved?

1. The healthcare professional selects the operation mode in the FeNO analyzer. The test can be performed on children (older than 4 years old), who must exhale for six seconds or on adults, who must exhale for 10 seconds, both with a constant flow of 50ml/s.*

2. The patient inhales either ambient air or through the mouthpiece*.

3. The patient exhales through the mouthpiece of the device.

4. Once the exhalation has been done, the results are obtained in a period of 5-60 seconds (depending on the FeNO device).

5. The healthcare professional interprets the recorded results.

*The exhalation time and the way in which the pre-exhalation is performed depends on the FeNO measuring device used.

1. Procedure description

Is it only used in the inpatient setting or is it also used in the outpatient setting?

It depends on the country.

There are some countries where the procedure is only carried out in the inpatient setting, however there are others, such as the U.S., where the procedure is performed in the outpatient setting.

Additionally, as the testing can be performed along with a spirometry test, it can also be performed in the home environment. If performed at home, the patient has to be adequately trained and the device has to be certified for use by lay persons.

1. Procedure description

What are the indications for FeNO testing?

FeNO testing is used mainly in the diagnosis of asthma; however, this procedure can be used for other purposes. Once asthma has been diagnosed, and the patient is following a treatment with inhaled corticoids (ICS), the FeNO test is also useful in evaluating ICS responsiveness and the dosing of the treatment. FeNO testing can also highlight if the patient is not properly following their treatment. Finally, if the patient is taking the correct dose, is performing the inhalation correctly and the treatment adherence is adequate, the FeNO test can be used to select patients that could benefit from additional biologics treatments[1].

In fact, there are some drugs, such as DUPIXENT® (dupilumab), that require a FeNO value in order to be prescribed[2].

[1] An Official ATS Clinical Practice Guideline: Interpretation of Exhaled Nitric Oxide Levels (FENO) for Clinical Applications. Raed A. Dweik, Peter B. Boggs, Serpil C. Erzurum, Charles G. Irvin, Margaret W. Leigh, Jon O. Lundberg Anna-Carin Olin, Alan L. Plummer, D. Robin Taylor, on behalf of the American Thoracic Society Committee on Interpretation of Exhaled Nitric Oxide Levels. 602-615, s.l. : Am J Respir Crit Care Med, 2011, Vol. 184. DOI: 10.1164/rccm.912011ST
[2] Discover a path to asthma control. HCP. (n.d.). https://www.dupixenthcp.com/asthma.

2. Where would the procedure be documented in the medical record?

- In the inpatient setting, the procedure would be documented as a part of pulmonary function testing. The results may be found in the encounter notes, laboratory results, or respiratory therapy notes.

3. How will FeNO testing be identified in the medical record?

Fractional nitric oxide concentration (FeNO) in exhaled breath testing results are reported in parts per billion (ppb).

The following devices/systems have been cleared for marketing by the FDA:

- NIOX Breath Nitric Oxide Test System®
- NIOX MINO®
- Apieron INSIGHT™ eNO System
- NIOX VERO®
- RTube Exhaled Breath Condensate collection system,
- Fenom Pro™ Nitric Oxide Test

4. Why is it necessary to report this testing when performed in the inpatient setting?

Although it has been around for some time, we have observed that the FeNO test is not yet known by many physicians. The inclusion of this procedure in ICD-10-PCS could help to increase its use in the hospital setting and, of course, to improve the patient's life by performing another useful test.

In addition, there are some physicians who do not yet see the usefulness of this procedure; adding it to ICD-10-PCS might finally convince them of its real usefulness.

5. Is the procedure performed in conjunction with another procedure/technology or is it considered a standalone procedure?

In spite of being a part of the respiratory function analysis, FeNO testing can be considered as a standalone procedure since it can be performed by itself. The FeNO value can be reported without performing any additional procedures.

6. Have there been any associated complications/sequela/adverse events? If yes, how many, and what did they consist of?

The FeNO procedure is performed in a minimally invasive, innocuous and instantaneous way, at the point of care or wherever the patient is. No adverse effects or complications have been reported so far.

As it happens in every medical procedure the unique risk could come from misdiagnosis.