Bronchial provocation test and exhaled nitric oxide

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In diagnosing allergic respiratory diseases, such as asthma and eosinophilic bronchitis, a variety of tests are being employed for detection of airflow limitation, airway hyperresponsiveness (AHR) and airway inflammations, which are characteristics of airway diseases. Of these, bronchial provocation test and measurement of fractional exhaled nitric oxide (FeNO) have been widely used for the confirmation of the diagnosis of asthma and other allergic respiratory diseases.

Since AHR is one of the key features of asthma, determination of the presence of AHR has been included in the objective methods in the diagnosis of asthma. Bronchial provocation tests are performed for assessment AHR. Contrary to bronchodilator reversibility tests, which are useful in patients with current symptoms and decreased lung function, bronchial provocation tests are usually done in patients with minimal symptoms and normal lung function. Various stimuli have been used for bronchial provocation and classified into direct and indirect stimuli. The direct stimuli, including methacholine and histamine, act directly on airway smooth muscle. The indirect stimuli act by causing the release of endogenous mediators that cause the airway smooth muscle. Currently, the methacholine inhalation bronchial provocation tests are most commonly performed. For inhalation of methacholine, both 2-minute tidal breathing method and 5 deep breath inhalation via dosimeter are usually used. The provocative concentration causing a 20% fall in FEV1 (PC20) is calculated for the determination of the results. Positive bronchial provocation tests are sensitive for the diagnosis of asthma. However, AHR may be present in patients without asthma, such as allergic rhinitis and chronic obstructive pulmonary disease (COPD).

FeNO is one of the useful markers of airway inflammation. It detects NO in exhaled breath, which is increased along airway inflammation such as asthma. While there are a few tests assessing airway inflammation in noninvasive manners, FeNO has many advantages in that it can be measured easily and repeatedly in very short time with accuracy. In addition, it reflects eosinophilic airway inflammation with significant correlation with eosinophilia in bronchial biopsy and sputum. Two types of NO analyzers are

used, stationary chemiluminescence NO analyzers and electrochemical analyzer. The use of FeNO is useful in screening and diagnosis of asthma, prediction of steroid response, estimation of treatment response, and assessment of asthma control. Furthermore, a dose of medication can be titrated based on FeNO. The measurement of FeNO can play a complementary role in asthma management along with pulmonary function test and airway hyperresponsiveness. In addition to asthma, FeNO may be used for diagnosis of COPD and chronic cough. With the advent of new and cheap NO analyzer in near future, the use of FeNO could be introduced in the routine practice of asthma.

In the upcoming era of precise medicine, determination of the presence and severity of AHR and airway inflammation would be more greatly appreciated in terms of diagnosis, phenotyping, and monitoring of asthma. In this regards, standardized and replicable objective tests should be incorporated into best clinical practice in asthma.