

A simple calculation using routine blood test results can identify eosinophilic asthma patients

Complete blood count (CBC) with differential, a standard test that enumerates different types of white cells in peripheral blood, is often performed during routine patient visits in clinics and hospitals. The test can be used to differentiate between normal condition in healthy people and infection and inflammation in patients. Results of CBC with differential show absolute counts of total white blood cell (WBC) and its constituents: eosinophils, lymphocytes, neutrophils, basophils, and monocytes.

Abnormally high levels of eosinophils in peripheral blood of asthma patients have been associated with a type of severe asthma. Although severe asthma patients constitute only 5-10% of total asthmatic population, higher frequency of asthma attacks and hospitalizations in such patients consume a disproportionate amount of financial resources available for treatment and healthcare.

It is generally believed that approximately half of the severe asthma patients have elevated eosinophils and constitute an “eosinophilic phenotype”. Carefully controlled research undertakings in specialized academic laboratories have shown that the best way to identify such patients is by enumerating eosinophils in their induced sputum. Asthma patients with two percent or more eosinophils in induced sputum are considered to be “eosinophilic” and the sputum induction method is considered to be the gold standard. However, because of logistical difficulty in inducing sputum from patients and strict quality requirements for accurately counting cell types, the method is considered impractical for routine clinical use. Research has shown that there is some association between eosinophil cell counts in peripheral blood and induced sputum of patients. Because eosinophilic asthma patients can benefit from corticosteroids (which also have undesirable side effects) and eosinophil-targeting novel biologics, different cutoffs of eosinophil cell counts in peripheral blood have been proposed in the scientific literature to identify the “eosinophilic” asthma phenotype. Proposed cutoffs in eosinophil cell counts generally range from 150 cells/uL to 400 or more cells/uL. Because treatment targeting of specific drugs will depend upon whether or not a patient exceeds a predetermined critical threshold of blood eosinophil count, the absolute number of cells used to define the threshold will be important.

In a recently published paper, Khatry et al have argued that biases in measurement arising from degradation of blood samples and differences in instruments used for cell counting can affect accuracy of eosinophilic vs. non-eosinophilic classification of the asthma phenotype when absolute cells counts are used with a predetermined critical threshold. The authors have proposed a simple solution, which they have demonstrated to be more accurate than using a predetermined fixed cutoff in eosinophil counts. Their method, called the ELEN Index, utilizes ratios of eosinophil/lymphocyte (EL) and eosinophil/neutrophil (EN) measured in routine CBC with no predetermined cutoff. The two ratios are used together in a simple algorithm, which can be calculated by hand or programmed into a computer, to derive two scores. A probabilistic decision

rule for classifying an asthma patient as either “eosinophilic” or “non-eosinophilic” phenotype is based on the two calculated scores. Because ratios of cell types are used instead of absolute cell counts, there is intrinsic measurement calibration so that the results are less affected by potential biases arising from sample degradation or variations in measuring instruments. The ELEN Index is easy to calculate and has potential for use in the clinic to identify eosinophilic asthma patients.

Publication

[Discriminating sputum-eosinophilic asthma: Accuracy of cutoffs in blood eosinophil measurements versus a composite index, ELEN.](#)

Khatry DB, Gossage DL, Geba GP, Parker JM, Jarjour NN, Busse WW, Molfino NA
J Allergy Clin Immunol. 2015 Sep