Clinical Chemistry

Association of Blood Eosinophil and Blood Neutrophil Counts with Asthma Exacerbations in the Copenhagen General Population Study

Article: Signe Vedel-Krogh, et al.
Association of Blood Eosinophil and Blood Neutrophil Counts with Asthma Exacerbations in the Copenhagen General Population Study
Clin Chem 2017;63:823-832.
http://clinchem.aaccjnls.org/content/63/4/823

Guest: Dr. Borge Nordestgaard is Chief Physician in Clinical Biochemistry at Copenhagen University Hospital and clinical professor at U. of Copenhagen, Denmark.

Bob Barrett: This is a podcast form *Clinical Chemistry* sponsored by the Department of Laboratory Medicine at Boston Children's Hospital. I'm Bob Barrett.

Asthma is a chronic inflammatory lung disease that affects an estimated 300 million people worldwide, including 25 million in the United States. There are currently no definitive diagnostic tests for asthma. Diagnosis is based on history and tests of respiratory function.

There are also several subtypes of asthma which may be difficult to identify and make it harder to treat. The inflammatory process of asthma involves many cell types, including eosinophils and neutrophils. Early evidence suggests an increased presence of these cells and sputum and circulation may convey asthma severity and risk for exacerbations.

Sputum analysis is limited by the time and costs involved, therefore further investigations into blood biomarkers for asthma are warranted. The April 2017 issue of *Clinical Chemistry* includes original research evaluating whether high blood eosinophils and neutrophils counts are associated with the risk of exacerbations among self-reported asthmatics from the general population.

Dr. Borge Nordestgaard, senior author of that article joins us in this podcast. Dr. Nordestgaard is Chief Physician in Clinical Biochemistry at Copenhagen University Hospital and a clinical professor at University of Copenhagen in Denmark.

Dr. Nordestgaard, what are the most common reasons for elevated blood eosinophil and neutrophil counts?

Dr. Nordestgaard: In general practice, when blood eosinophils are elevated, you would think of something with allergic disease and this is particularly relevant in asthma. And then neutrophil counts would typically be elevated if you have bacterial infections. Of course you can have also leukemia in either of these cells, but the two other ones, allergic disease and bacterial infections, are the most common.

Bob Barrett: In patients with asthma, sometimes the eosinophils and neutrophils are counted in sputum. So, why is your study focused on blood eosinophil and neutrophil counts?

Dr. Nordestgaard: It's much more difficult to measure eosinophils and neutrophils in sputum, although you would think this is the most relevant thing to do when you look at lung disease. However, there is a lot of research trying to see if you can actually associate blood eosinophil and neutrophil counts in the blood with what you have in sputum because the blood tests are much more accurate and much more easily accessible than those in sputum.

Bob Barrett: Doctor, you found that high blood eosinophil and neutrophil counts may reflect airway inflammation and that inflammatory patterns of these markers are associated with risk for asthma exacerbations. How does this information advance what is known in this area and what are the future clinical implications?

Dr. Nordestgaard: I mean, there is something in the literature about that. When you have high eosinophils and asthma, or you could say this special type of asthma with high eosinophils in the lungs, then you have even higher risk of exacerbation. What is new in our study is that, out of a large general population study of more than 80,000 individuals, we found approximately 5,000 with self-reported asthma, and there we could see that eosinophils were good at predicting asthma exacerbations, both moderate exacerbations and very severe exacerbations leading to hospitalization.

However, we also found that neutrophils for those with moderate exacerbations was also very important in predicting, so you could say that blood eosinophils were best at predicting the severe exacerbations, those leading to hospitalization, whereas neutrophils were actually better at predicting the more moderate exacerbation, those just being treated by your general practitioner.

You could say, would it have future implications? Well, something very new has happened in asthma treatment, namely that if you have asthma with high eosinophil counts, then you can use a special new treatment called IL-5 therapy. It's actually a new generation of biological humanized monotone antibodies that target IL-5s. It is very important for eosinophilic asthma, and therefore by being able to measure not only blood eosinophils but blood neutrophils, this might give clinicians a very good handle to follow how does patients react to this medication, which of course is a very expensive medication.

So, you could suddenly see the laboratory medicines likely will have more, whole blood counts, particularly with the eosinophils, in asthmatic patients in the future.

Bob Barrett: Well, finally, doctor, in a single person with asthma, are blood eosinophil and neutrophil counts stable over time?

Dr. Nordestgaard: It's usually the type of questions that you get that you can't depend on something like that, so it might change two weeks later, but we actually assessed that in our study. We assessed approximately 250 individuals that had suffered with asthma and then we have eosinophil and neutrophil counts, 10 years apart, and very interestingly, those that at the first examination had high eosinophils, on average, they also had high eosinophils at the second examination, and vice versa for those with low levels. It's rather stable. Of course there are some, what's called regression towards the mean, but this is seen for all blood tests too and we found the same for neutrophils, people that are stable, there are some that have high levels and sometimes low levels, and those are the same people that have high and low levels 10 years later.

Bob Barrett: Dr. Borge Nordestgaard is Chief Physician in Clinical Biochemistry at Copenhagen University Hospital and a clinical professor at University of Copenhagen in Denmark. He's been our guest in this podcast from *Clinical Chemistry*. I'm Bob Barrett. Thanks for listening.