One of the greatest challenges to achieving our goal in diagnosis of diagnostic accuracy in every given, individual patient regardless of presentation of a disease is posed by the widely varying presentations of a given disease in different patients. For example, acute myocardial infarction (MI) occurs in a 40 year old healthy woman with highly uncharacteristic chest pain (1) indicating a highly atypical presentation of acute MI. It occurs as well in a 65 year old man with multiple cardiac risk factors presenting with highly characteristic chest pain which indicates a highly typical presentation of acute MI.

We note a presentation or a prior probability based on it is not employed as prior evidence for a disease in practice, for it were, it would lead to diagnostic error in a patient with atypical presentation due to the low prior probability being interpreted as prior evidence against the disease which may not then be suspected.

In practice, as we have discussed elsewhere (2), a suspected disease is formulated as a diagnostic hypothesis without any prior evidence for or against it regardless of its presentation (prior probability).

It is this step which enables testing of a suspected disease regardless of its prior probability leading to an accurate inference if the disease is present.

We shall now discuss Step 2 (testing of a suspected disease) in the process of diagnosis in practice.

As a suspected disease is a diagnostic hypothesis, the purpose of testing is to generate a result which shall prove the diagnostic hypothesis to be correct or not, that is to establish if the suspected disease is present or not in a patient.

A test which is employed in practice to evaluate a suspected disease as a diagnostic hypothesis has certain characteristic features as follows:

First of all, the test is such that it is usually capable of generating a result which indicates a characteristic, almost a defining feature of the suspected disease being evaluated. For example, an EKG performed to evaluate acute MI is capable of generating acute ST elevation EKG changes which represent acute myocardial
injury, which is a key feature of acute MI. Similarly, a chest CT angiogram performed to evaluate pulmonary embolism is capable of demonstrating partial or total occlusion of one or more pulmonary arterial vessels, which is a defining feature of pulmonary embolism.

The information that a test result conveys to us about a suspected disease is represented by a likelihood ratio (LR). In general, a test result with LR greater than 10 (3) is considered highly informative from which we infer a diagnostic hypothesis to be correct in any patient regardless of prior probability of suspected disease with a high degree of diagnostic accuracy in practice. For example, the diagnostic accuracy of acute MI from acute ST elevation EKG changes, LR 13 (4) in patients with varying prior probabilities is 85 percent (5).

We shall discuss Step 3 (inferring a tested disease) in diagnosis in practice in our next paper.

References

2. Jain BP. A discussion of Step 1 (suspecting a disease) in diagnosis in practice. Posted on Discussion Board, Society to Improve Diagnosis In Medicine, Nov 20, 2019.