

## Interpretation of the Area Under the Receiver Operating Characteristic Curve

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Dear editor,

In medicine, it is very important to be able to intervene in diseases with early and correct diagnosis. In recent years, there has been an increasing interest in medical decision-making methods and the applications of these methods find a wide place in the medical literature. Most of the studies on diagnostic tests are devoted to investigating the reliability of these methods and comparing the methods. Diagnostic test is a general name given to evaluation methods based on laboratory techniques, clinical observations or specific instrument measurements used to identify a disease. It is aimed to distinguish between sick and healthy individuals by using various diagnostic methods and the results of laboratory tests (1).

In order to analyze the results of a diagnostic test comprehensively and reliably, the actual level of effectiveness of the diagnostic test must first be checked. There are many statistical decision-making methods used for this purpose today. ROC (Receiver Operating Characteristic) curve is the most widely used method for these purposes. In order to examine and interpret the results of the diagnostic test, the actual diagnostic results of the cases on which the test was applied should be known. For the actual diagnosis, the gold standard method should be used, which is accepted to give accurate results in determining the same disease. gold standard; The clinical process functions as surgical confirmation, autopsy and, in some cases, the consultation of a specialist (2).

The area under the ROC curve determines the accuracy of the test in distinguishing between patients and non-patients. The size of the area under the ROC curve indicates the statistical significance of the discrimination ability of the diagnostic test studied (2). The expected value of the area under the ROC curve is 0.50 when the diagnostic test being studied has no discrimination ability. This value represents random. That is, the area under the curve of the non-diagnostic test is 0.50. If it is a perfect test, with zero false positives and zero false negatives, the value of the field would be 1.00. If the value under the curve is 0.90-1.00, it is excellent, 0.80-0.90 is good, 0.70-0.80 is medium, 0.60-.070 is weak, 0.50-0.60 is unsuccessful (3). Researchers often make mistakes in interpreting these values (4). Researchers do not have to know advanced statistics. Statistical counseling can be obtained, especially in medical studies, but researchers should master basic statistical information such as the interpretation of the area under the ROC curve.

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## References

1. Zou KH, O'Malley AJ, Mauri L. Receiver-operating characteristic analysis for evaluating diagnostic tests and predictive models. *Circulation*. 2007 Feb 6;115(5):654-7
2. Dirican A. Evaluation of the diagnostic test's performance and their comparisons. *Cerrahpaşa J Med*. 2001; 32: 25-30
3. Tape TG, Interpreting Diagnostic Tests, University of Nebraska Medical Center, Area Under the Curve <http://gim.unmc.edu/dxtests/roc3.htm> (Last access date: 31.03.2022).
4. Özdemir S, Kokulu K. Re-Prealbumin: A New Biomarker for Predicting Prognosis in Patients with Severe COVID-19. *J Coll Physicians Surg Pak*. 2021;31(supp3):163.