

# TWO-STEP FAGAN NOMOGRAM

## A Graphical Tool to Interpret a Diagnostic Test Result Without Calculation

### What's a nomogram?

A nomogram is a convenient graphical tool to compute an outcome from one or several parameters without using a calculator or a computer. A secondary purpose of using a nomogram is to explore the relationship and the impact of the parameters on the outcome. In the first half of the 20th century, nomograms were very popular; however, with the development of new technologies, the art of nomography has slowly faded.

### Who is Fagan?

Dr. Terrence J. Fagan is a medical practitioner that published the original nomogram for interpreting a diagnostic test result in 1975 in the New England Journal of Medicine ([link](#)). Fagan's nomogram is commonly used as a tool to teach bedside test interpretation and is frequently reported in evidence-based medicine textbooks.

### What does the original Fagan nomogram do?

Fagan's nomogram allows to calculate the probability of a patient having a condition of interest given a test result (i.e. post-test probability) by entering the Likelihood Ratio of the test result and the probability of the individual having the condition before the test was run (pre-test probability). If the likelihood ratio of a test is not available, it will need to be calculated beforehand which makes Fagan's nomogram less convenient for routine use.

### What does the updated Two-step Fagan nomogram offer?

After 38 years, the initial step to compute the Likelihood Ratio from the diagnostic sensitivity and specificity has been integrated into the original Fagan nomogram. The resulting two-step nomogram allows the user, be it a clinician or researcher, to quickly interpret the outcome of a test without using any in silico support.

### How do I use the updated Two-step Fagan nomogram?

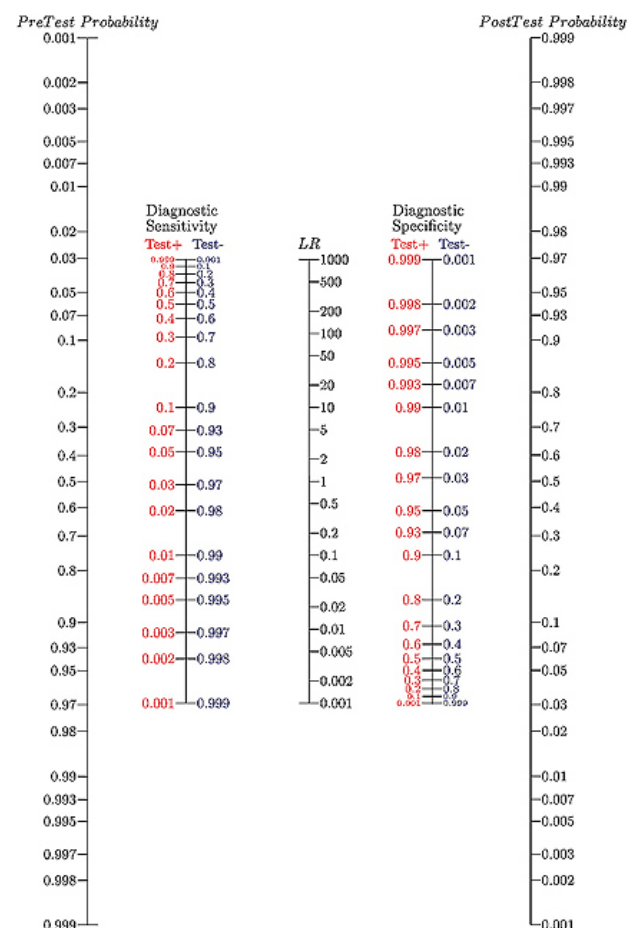
#### Step One - Calculation of the LR of a given test result

- 1.1 If the test result is **positive**, use the **red scale** on the diagnostic sensitivity and specificity axes, and if the test result is **negative**, use the **blue scale**.
- 1.2 Draw a line from the sensitivity to the specificity estimate of the test.
- 1.3 The intersection of the line with the central LR axis provides the likelihood ratio of the test result observed (see interpretation of the Likelihood Ratio below).

#### Step Two - Calculation of the post-test probability

The second step corresponds to the original use of the Fagan nomogram.

- 2.1 Draw a second line from the best estimate of the pre-test probability on the far left axis through the previously obtained estimate of the likelihood ratio on the central axis.
- 2.2 The intercept of this line with the far right axis provides the corresponding post-test probability of the individual.



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## What is a likelihood ratio and how do I interpret it?

The likelihood ratio reflects the **direction** and **strength** of evidence provided by a test result. It ranges from 0 to infinity.

- When  $LR > 1$ , the test result supports the **presence** of the condition of interest.
- When  $LR < 1$ , the test result supports the **absence** of the condition of interest.
- The further away the LR is from 1, the stronger the evidence.

## App

The Two-Step Fagan Nomogram is now freely available on iPhone with the [DocNomo App!](#)



## Reference

- [Caraguel CGB, Vanderstichel R. 2013 The two-step Fagan's nomogram: ad hoc interpretation of a diagnostic test result without calculation. Evid Based Med](#)

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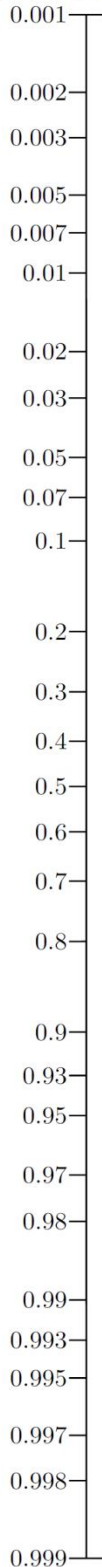


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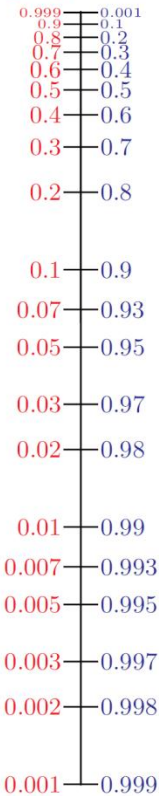
# Two-step Fagan's Nomogram

*PreTest Probability*

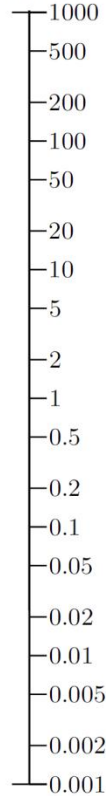


Diagnostic  
Sensitivity

Test+ Test-

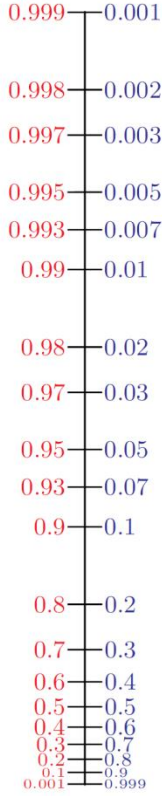


*LR*

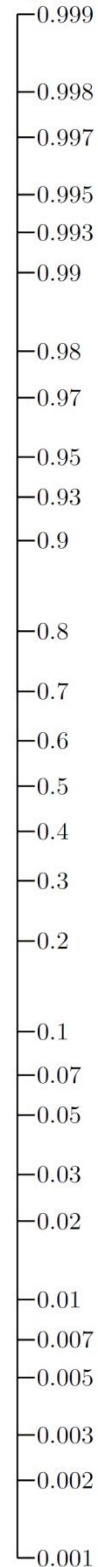


Diagnostic  
Specificity

Test+ Test-



*PostTest Probability*



## User Guide

### **Step One - Calculation of the LR of a given test result**

If the test result is **positive**, use the **red scale** on the diagnostic sensitivity and specificity axes,  
If the test result is **negative**, use the **blue scale**.

Drawn a line from the sensitivity to the specificity estimate of the test.

The intersection of the line with the central LR axis provides the likelihood ratio of the test result observed.

### **Step Two - Calculation of the post-test probability**

Drawn a second line from the best estimate of the pre-test probability on the far left axis through the previously obtained estimate of the likelihood ratio on the central axis.

The intercept of this line with the far right axis provides the corresponding post-test probability of the individual.

Reference: Caraguel CGB, Vanderstichel R. 2013 The two-step Fagan's nomogram: ad hoc interpretation of a diagnostic test result without calculation. Evid Based Med

Website: <https://sciences.adelaide.edu.au/animal-veterinary-sciences/two-step-fagan-nomogram>