# SHOULD WE BELIEVE THE LEGEND OF FIXED SENSITIVITY? THE DIAGNOSTICS COLLABORATION

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## Introduction

Empirical evidence has shown how the overall low methodological rigor of published diagnostic test accuracy studies alters estimates of sensitivity and specificity.[1] Features related to the study population, setting or test protocol typically impact on estimates of diagnostic test accuracy as well.[2] Although potential sources of bias and variation are well established, an international group of experts continues to notice an erroneous but widespread myth that estimates of sensitivity and specificity are fixed properties.

## Objective

To boost the knowledge and correct use of estimates of diagnostic test accuracy and to increase the understanding of studies evaluating diagnostic, prognostic, or predictive medical tests in general.

## Methods

Setting up a not-for-profit international collaboration open to passionate persons that either develop, evaluate, approve, use, interpret, or undergo medical tests. Organising in-person and remote meetings to identify main issues to be improved in the field of medical testing and to jointly develop a roadmap on actions to be undertaken to demystify common misconceptions using low-cost methods while obtaining optimal scientific, societal, and economic impacts.

## Results

In October 2023 an international group of methodologists, clinicians, philosophers, and biostatisticians gathered in Rotterdam the Netherlands to discuss myths around medical tests, their impact, and their origin. During a two-day meeting in June 2024, part of this group met in Exeter (UK), with young investigators joining remotely. We discussed how misconceptions can lead to wrongly designed diagnostic test accuracy studies, erroneous interpretation of study findings and even inadequate decisions to use or reimburse medical tests for certain groups of individuals. The Table describes the output of the Exeter meetings for one of the myths to be busted with a selection of actions to be taken. The group, which was

coined *the Diagnostics Collaboration,* recorded about 10 videos already, which are currently being prepped for publication. URL links to these videos will be shared at the SISMEC congress.

**Table.** Actions and measure to optimize impact for a selected myth

| **Myth to be busted:** Sensitivity & Specificity are fixed properties | |
|---|---|
| **Action** | **Selection of Measures to optimize Impact** |
| 1. Production of a series of short myth busting videos to be posted on youtube. | • Barrier free open access videos, easily accessible, short, and digestible<br>• Grouped, Tagged and Recognizable using the logo of the Diagnostics cooperation.<br>• Active dissemination of the links to videos in our global network<br>• Using examples from different (para)medical areas including laboratory medicine.<br>• Videos produced for different target groups, such as general public, students, teachers or researchers |
| 2. Gathering existing short videos that adequately explain concepts, the use and interpretation of sensitivity and specificity | • We will develop a roadmap with a clear structure that allows users to easily locate all videos created by members of the Diagnostics Collaboration and other contributors.<br>• Videos from external contributors will undergo a quality assessment to ensure clarity and adequacy. |
| 3. Setting up of a short scientific project evaluating how sensitivity and specificity are described in commonly used textbooks to teach clinical epidemiology and biostatistics and how this can be improved | • Publication (open source) of the qualitative review on the findings with constructive suggestions for improvement<br>• Contacting the editors of the textbooks, searching for a dialogue to positively influence future updates of the textbooks |
| 4. Setting up a short survey to evaluate how university lecturers across selected countries teach concepts of sensitivity and specificity | • Publishing a manuscript describing the results or the survey (open source), ensuring the results cannot be associated with specific lecturers or their affiliations. Compiling a list of recommendations. |
| 5. Extension of a philosophical analyses of the origin of the concepts of sensitivity and specificity, how it changed over time and how it evolved to common misconceptions.[3] | • Publication of the findings<br>• Dissemination of findings to distinct target audiences as historical insights inform which actions are best taken to bust the myths |

## Conclusions

There are important misconceptions about the use, evaluation, and interpretation of medical tests, including the myth that estimates of sensitivity and specificity are fixed. Downstream consequences of such misconceptions can lead to research waste and suboptimal or inadequate testing strategies, which may impact on treatment decisions and health related outcomes. An international group of dedicated experts has joint efforts to reach a wide audience and boost their knowledge on medical tests, with the target to positively impact on the evaluation of medical test and all related downstream consequences.

1. Rutjes AW, Reitsma JB, Di Nisio M, et al. Evidence of bias and variation in diagnostic accuracy studies. CMAJ. 2006 Feb 14;174(4):469-76
2. Whiting PF, Rutjes AW, Westwood ME, et al. A systematic review classifies sources of bias and variation in diagnostic test accuracy studies. J Clin Epidemiol. 2013 Oct;66(10):1093-104.
3. Binney N, Hyde C, Bossuyt PM. On the Origin of Sensitivity and Specificity. Ann Intern Med., 2021 Mar;174(3):401-407.