Update to: Application of Bayesian decision-making to laboratory testing for Lyme disease and comparison with testing for HIV

Michael J Cook¹
Basant K Puri²

¹Independent researcher, Highcliffe, UK; ²Department of Medicine, Hammersmith Hospital, Imperial College London, London, UK

Correspondence: Michael J Cook
39, Merley Drive, Highcliffe BH23 5BN,
Dorset, UK
Tel +44 1425 270 832
Email mcook98@msn.com

In our recent Bayesian analysis paper, false-negative results were compared between Lyme disease and HIV using a recommended test algorithm.¹ When the two-tier test methodology for Lyme disease was compared with HIV two-stage testing, false negatives could be more than 500 times higher for Lyme disease testing.

The two-stage HIV test was designed to be used if an initial test was negative and there was symptomatic or subjective evidence that HIV infection could be present. The method reduces the chance of negative results resulting from determinate or random errors encountered in sampling and medical laboratory practice.

Based on the very high sensitivity and specificity of HIV tests, an updated methodology recommends that a second test of negative samples should not be carried out.² A second test is recommended for positive samples, not as a two-tier confirmatory test as with Lyme disease but to identify the HIV-1 or HIV-2 antibody/antigen type.

The last column of Table 1 demonstrates that when false-negative tests are compared between the two-tier test for Lyme disease and a single HIV test, false negatives are still up to more than 500 times higher for Lyme disease testing.

Table 1 Comparison of false-negative probabilities for LD and HIV testing: clinical samples

	LD testing (test dependence 0.63)				HIV disease testing (test dependence 0.950)				False negative ratio	
	Test sensitivity		Probability of a false-negative result		Test sensitivity		Probability of a false-negative result		Two-tier LD and two-stage HIV	Two-tier LD and single HIV test
LD stage	First-tier test	Second-tier test	First-tier test	Second-tier test	First stage	Second stage	Single-stage HIV test	Second-stage HIV test		
Acute	20.4%	21.2%	79.6%	85.6%	98.6%	98.6%	1.40%	1.33%	64	61
Early intermediate	30.4%	31.5%	69.6%	77.3%	98.9%	98.9%	1.10%	1.05%	74	70
Convalescent	37.2%	38.6%	62.8%	71.3%	99.4%	99.4%	0.60%	0.57%	125	119
Late intermediate	45.5%	47.3%	54.5%	63.3%	99.7%	99.7%	0.30%	0.29%	222	211
Neuro/arthritis	53.1%	55.2%	46.9%	55.7%	99.9%	99.9%	0.100%	0.095%	586	557

Abbreviations: LD, Lyme disease; Neuro, neurological.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Cook MJ, Puri BK. Application of Bayesian decision-making to laboratory testing for Lyme disease and comparison with testing for HIV Application of Bayes to Lyme disease testing. *Int J Gen Med*. 2017;10:113–123.
2. Centers for Disease Control and Prevention. *Laboratory testing for the diagnosis of HIV infection updated recommendations*; 2014:1–68. Available from: <http://dx.doi.org/10.15620/cdc.23447>. Accessed June 28, 2017.

International Journal of General Medicine

Publish your work in this journal

The International Journal of General Medicine is an international, peer-reviewed open-access journal that focuses on general and internal medicine, pathogenesis, epidemiology, diagnosis, monitoring and treatment protocols. The journal is characterized by the rapid reporting of reviews, original research and clinical studies across all disease areas.

Submit your manuscript here: <https://www.dovepress.com/international-journal-of-general-medicine-journal>

Dovepress

The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.