RESEARCH LETTER

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

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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 stage | 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 |
	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

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