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Assignment 8

Lets say we have a population of 10,000 people, and so 1% of the population being infected means that 100 people are infected. A sensitivity of 98% means that our test is able to detect 98% of people with the disease and the test misses 2% of the people who have the disease. Similarly, with a specificity of 96%, it means that 96% of the people who test for negative are actually negative and 4% get a false positive. If we do the math then we out of the 9900 people with negative test results, about 9504 (96%) of them are truly negative and 396 of them test positive for a disease that they don't have.

What is important to us is mainly out of the people who tested positive, how many actually have the disease

	disease	Non disease	total
positive	A(true positive) 98	B(false positive) 396	494 Test positive
negative	C(false negative) 2	D(True negative) 9504	9506 Teast negative
	100 with the disease	9900 without the disease	total

With the test being wrong 398 times out of 10,000 and preferably with want this number to be less than 100 for it to be significant in statistical terms. It would be even better if it was less than 50 so in order for that to happen the prevalence obviously cannot be 1%. Lets try halving it to 0.5 % and see what we get

	disease	Non disease	total
positive	A(true positive) 49	B(false positive) 398	447 Test positive
negative	C(false negative) 1	D(True negative) 9552	9553 Teast negative
	50 with the disease	9950 without the disease	total

As we can see we get a worse result in 399 out of 10,000 times the test is wrong. Lets go way in the opposite way with 30% prevalence

	disease	Non disease	total
positive	A(true positive) 2940	B(false positive) 280	3220 Test positive
negative	C(false negative) 60	D(True negative) 6720	6780 Teast negative
	3000 with the disease	7000 without the disease	total

So even at a crazy 30% disease prevalence these test results would not be acceptable to me

If we go to 90%

	disease	Non disease	total
positive	A(true positive) 8820	B(false positive) 40	3220 Test positive
negative	C(false negative) 180	D(True negative) 960	1140 Teast negative
	9000 with the disease	1000 without the disease	total

If we go 90% the amount of times that the test is wrong is 220 which is still not close to 100. So as a result of this analysis I have concluded that **no percentage of prevalence can make this test acceptable according to statistical standards**