

- ...is a well person
- ...is a person with a disease
- ...is a negative test result
- ...is a positive test result

and therefore...

- ...is a well person who tests negative (a true negative)
- ...is a person with a disease who tests positive (a true positive)
- ...is a well person who tests positive (a false positive)
- ...is a person with a disease who tests negative (a false negative)

**Fig 1** Key to symbols

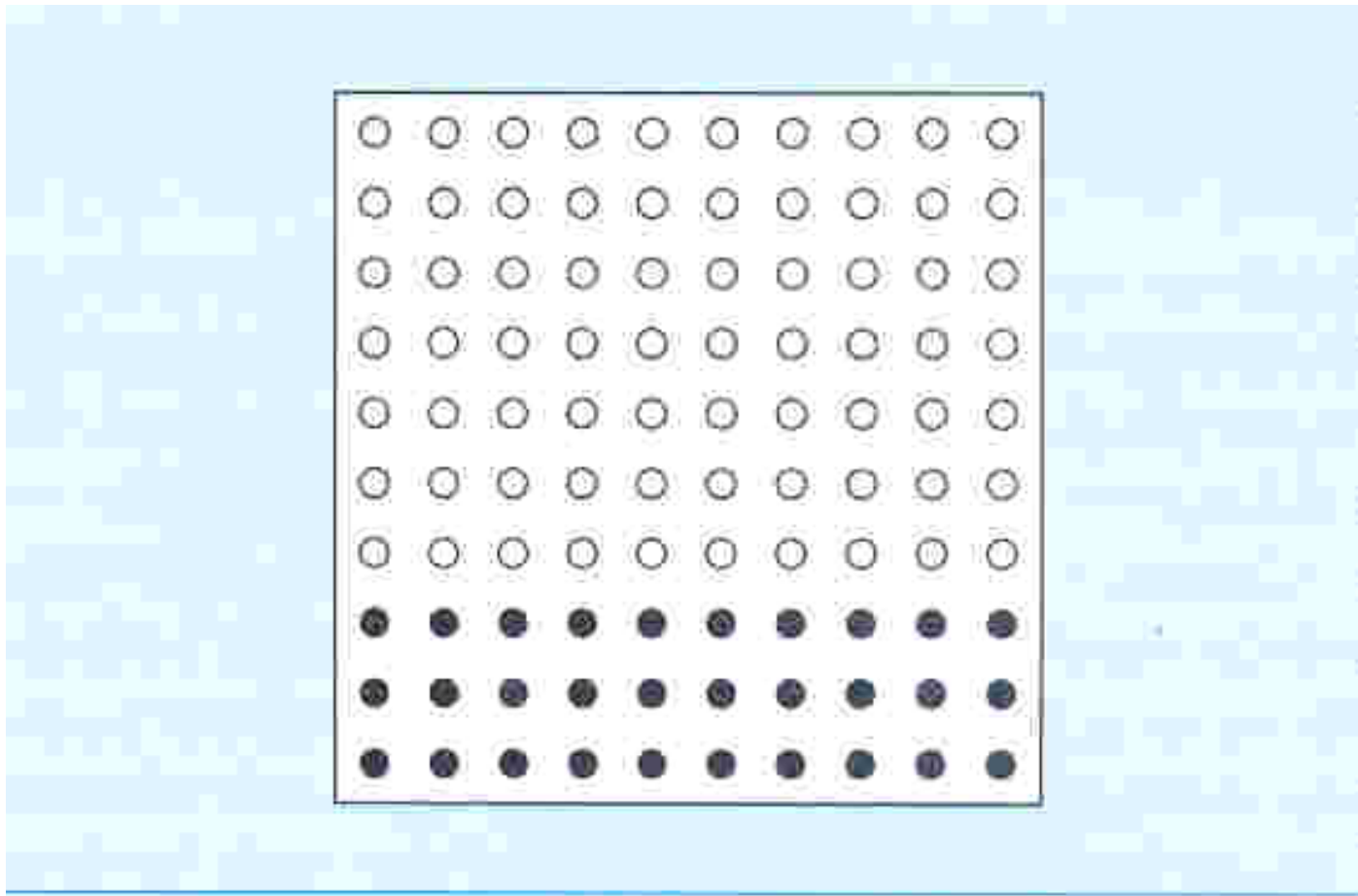
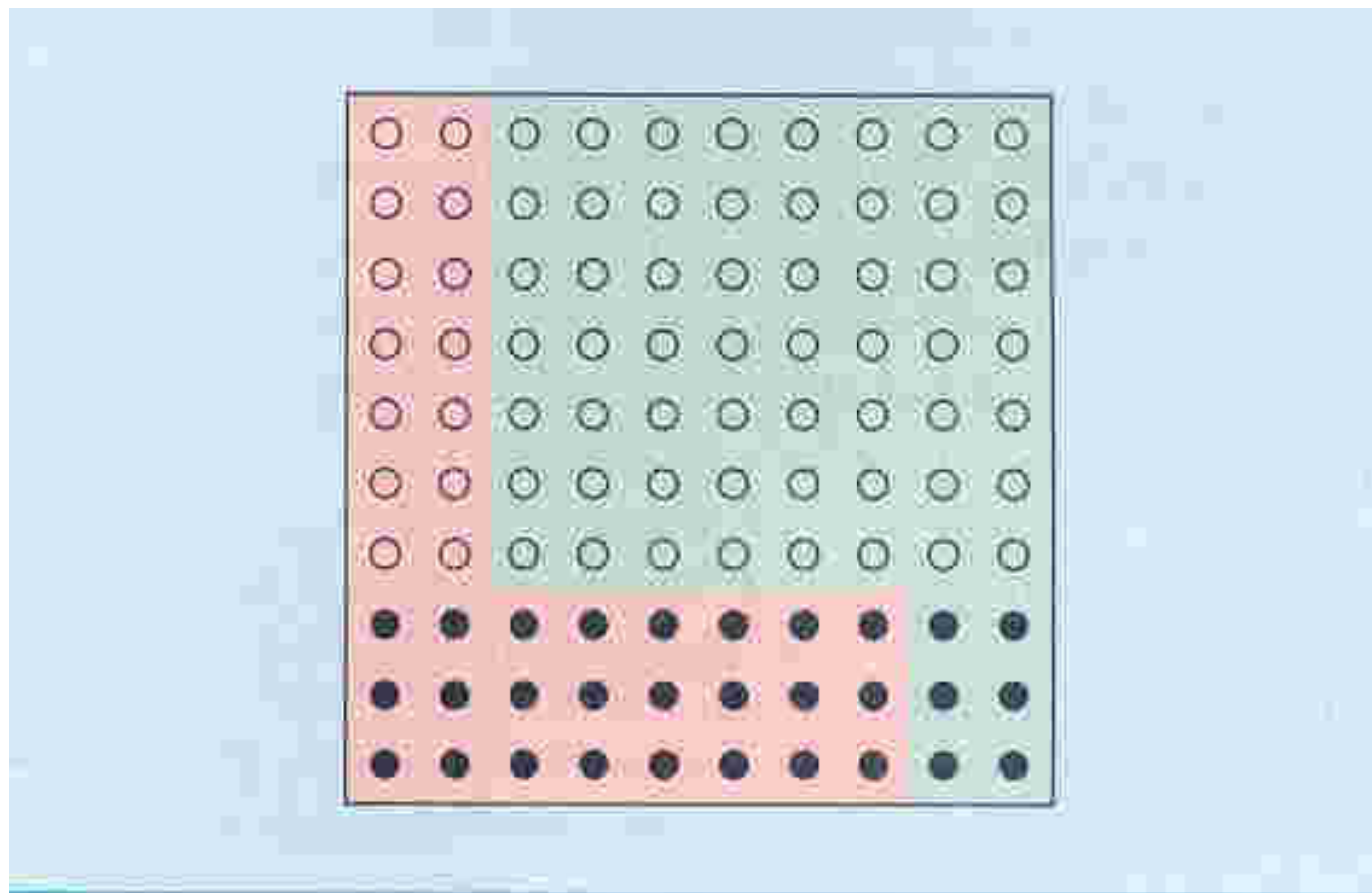


Fig 2. Hypothetical population



**Fig 3** Results of diagnostic test on hypothetical population

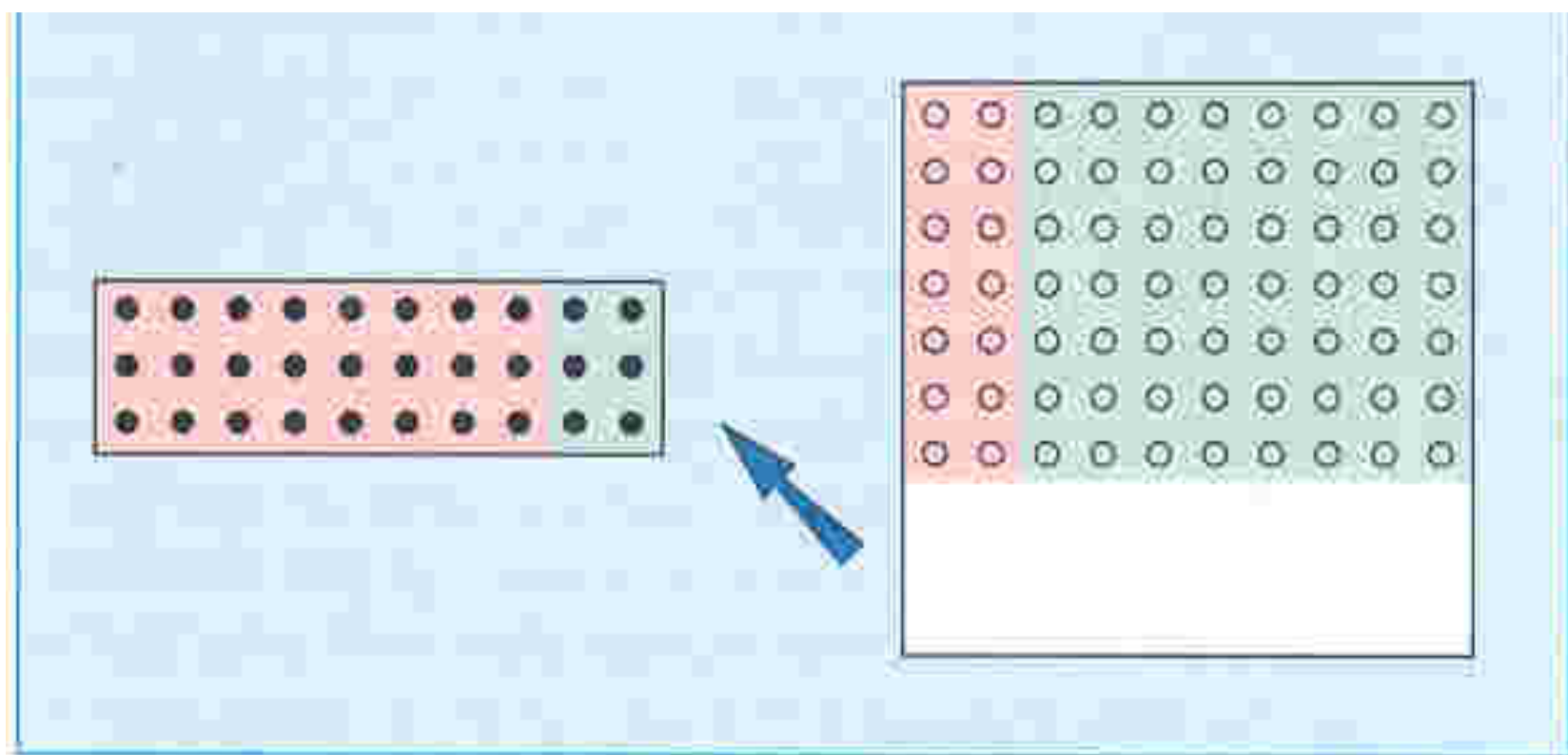
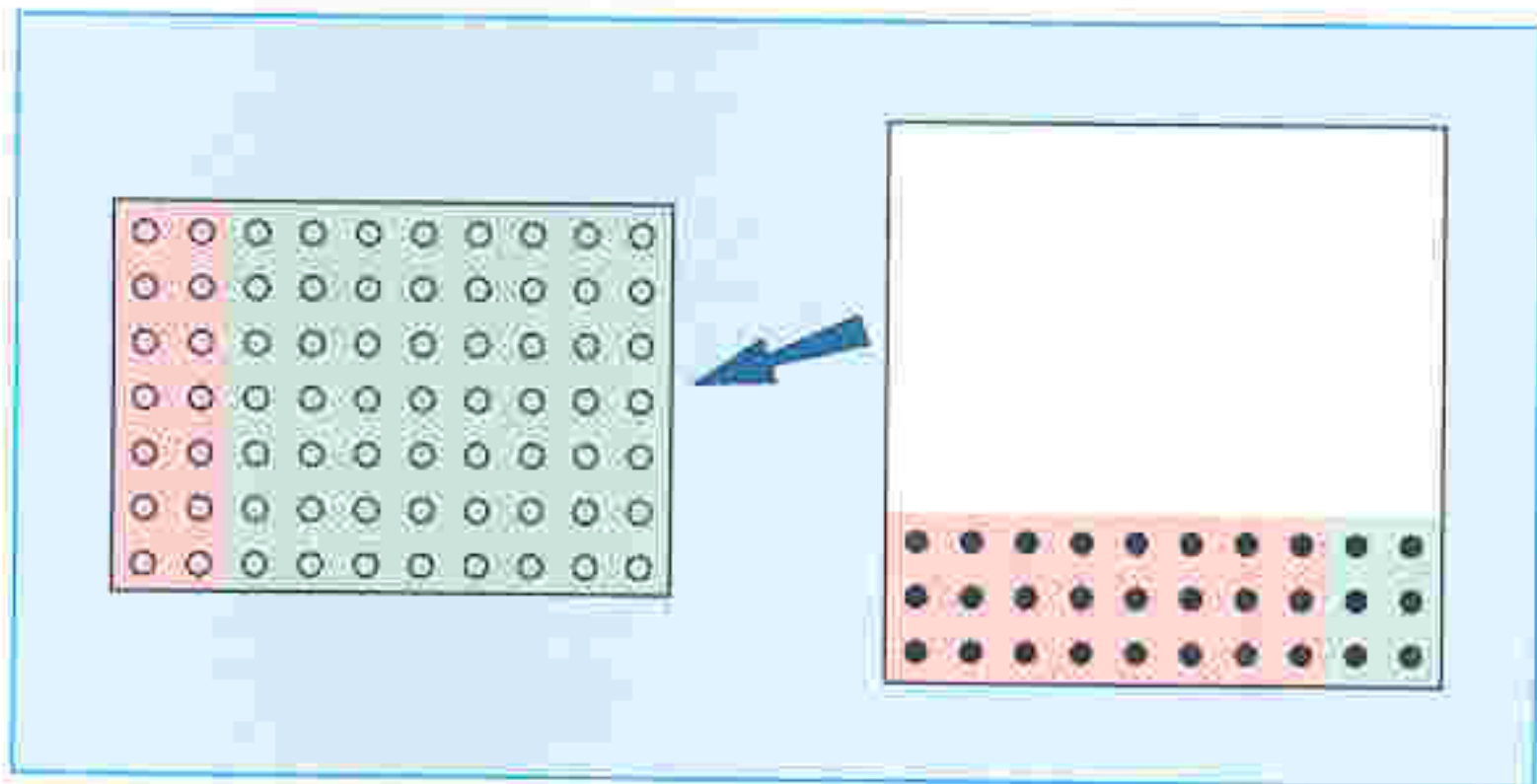


Fig 4 Sensitivity of test



**Fig 5** Specificity of test

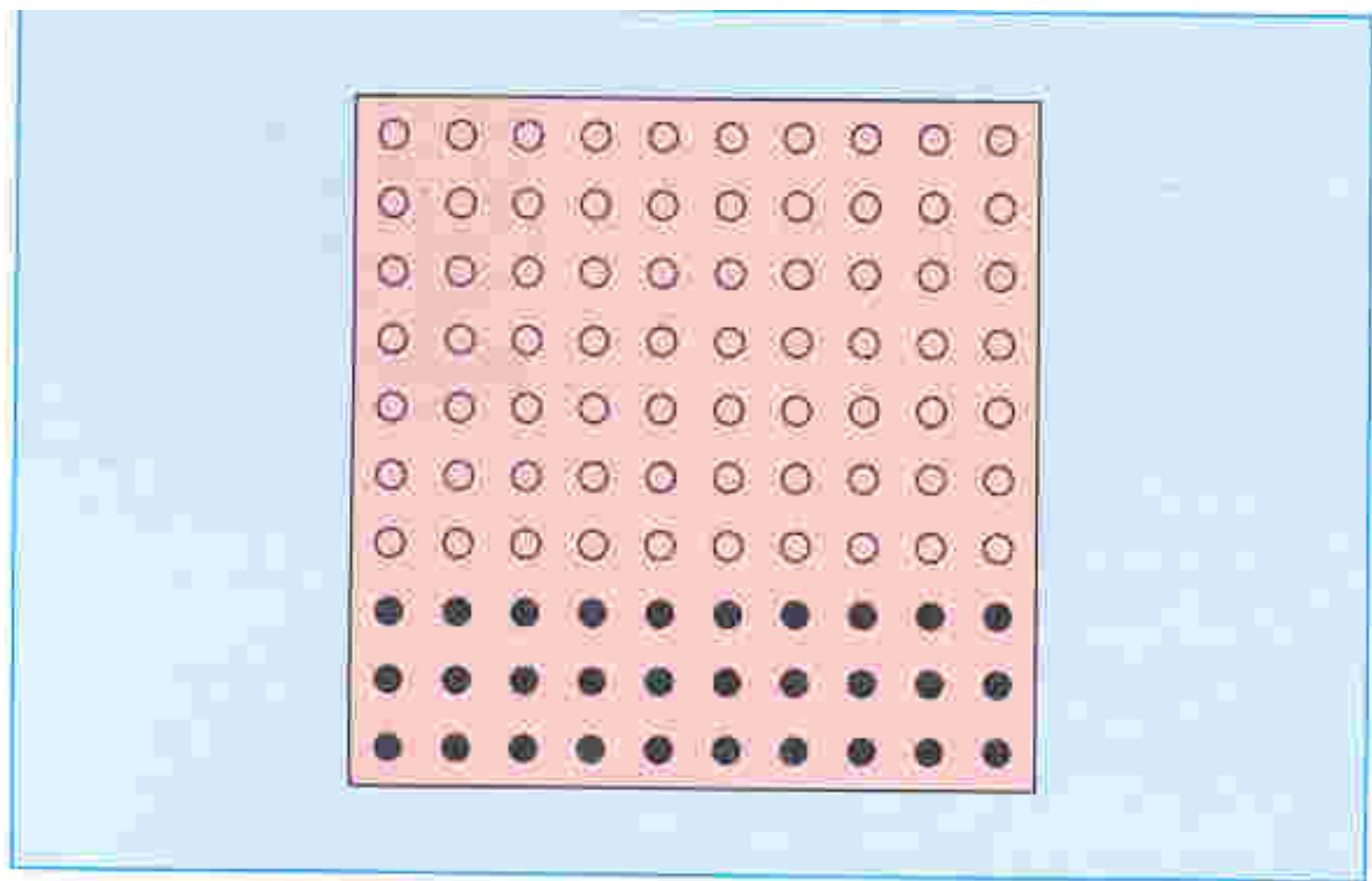


Fig 6: Test with 100% sensitivity

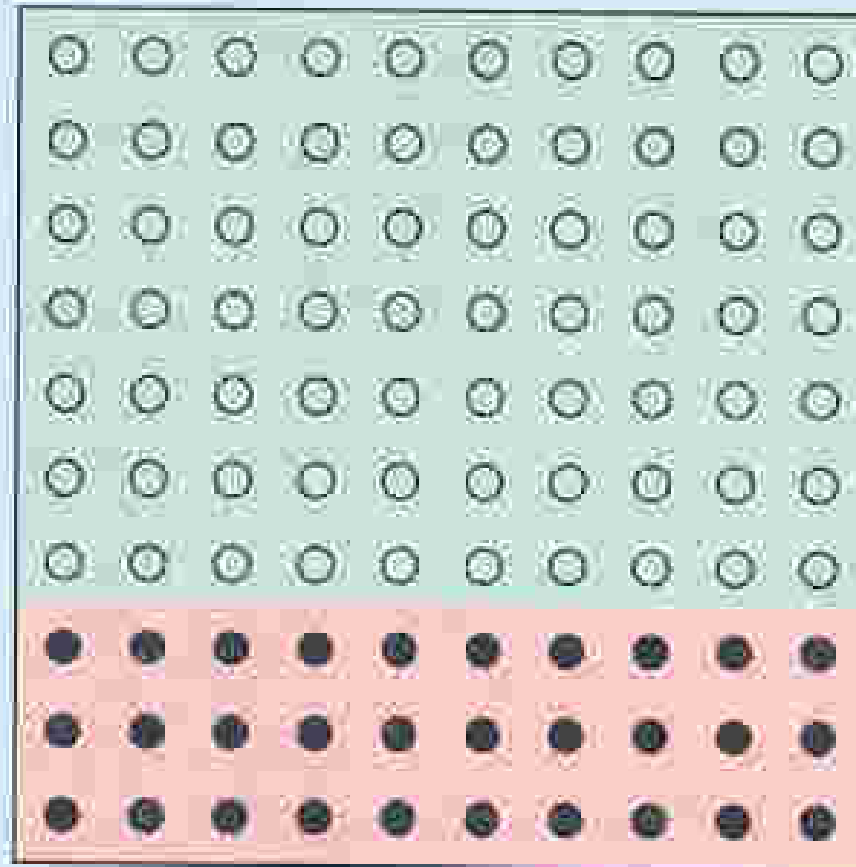
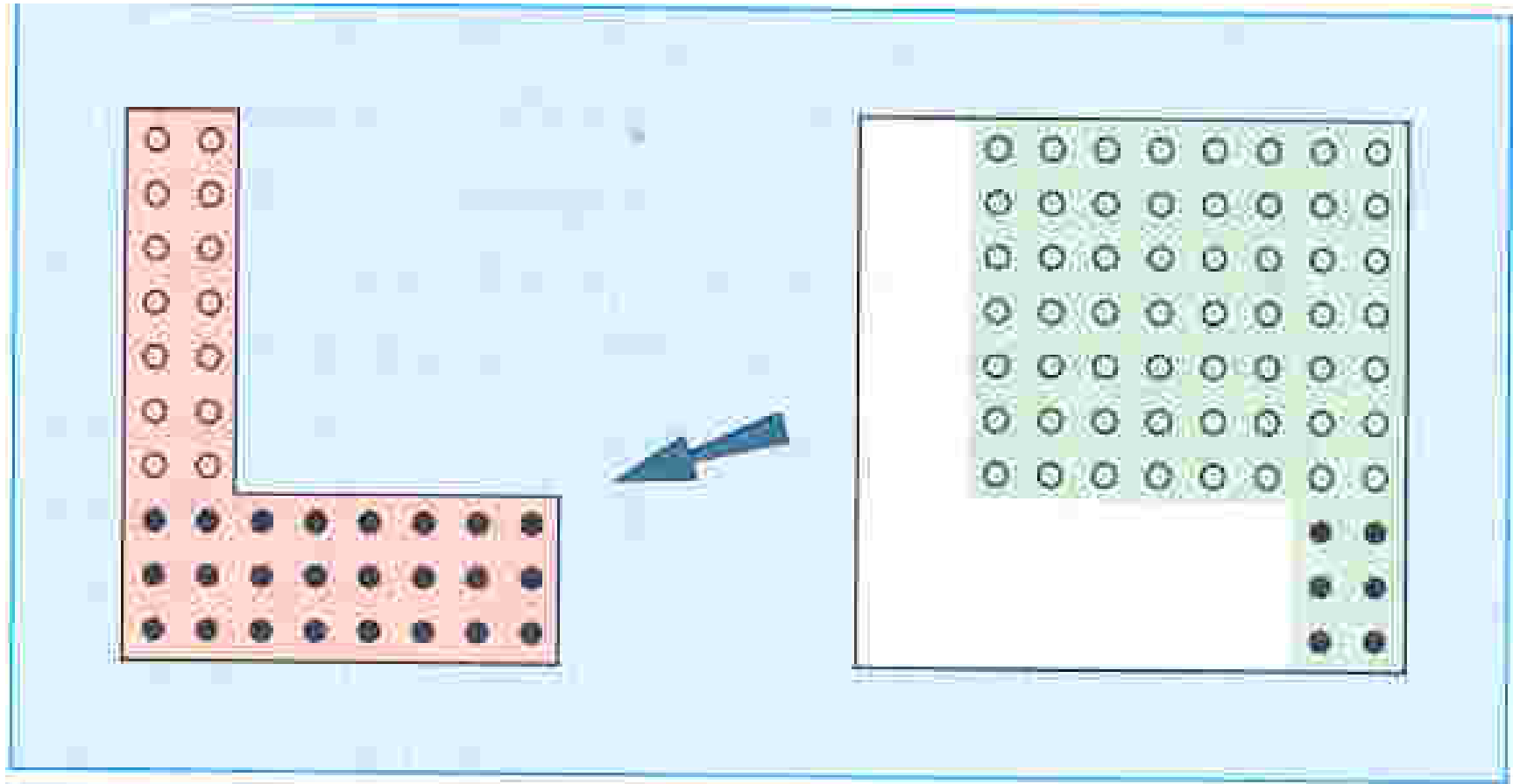
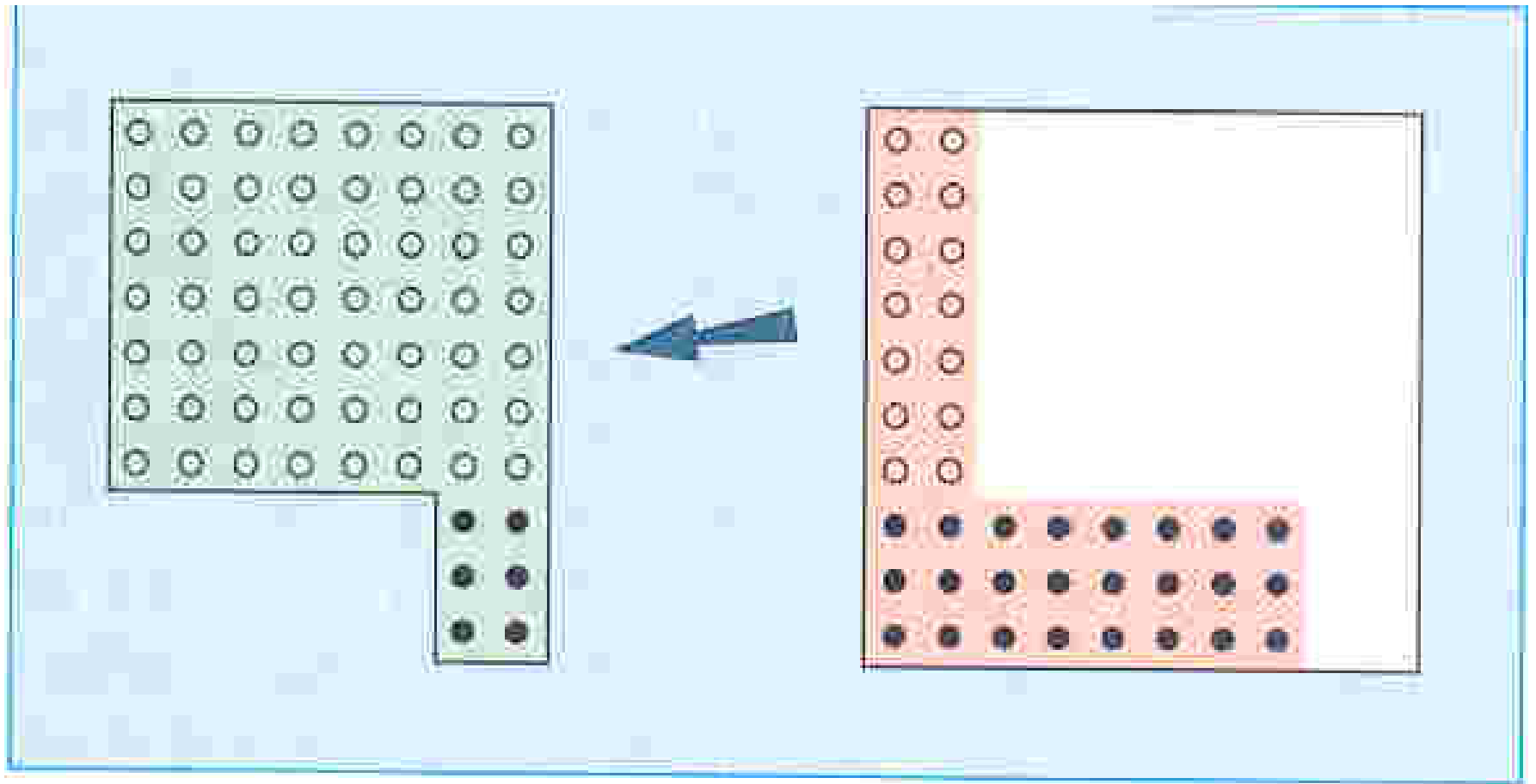


Fig 7 Perfect test

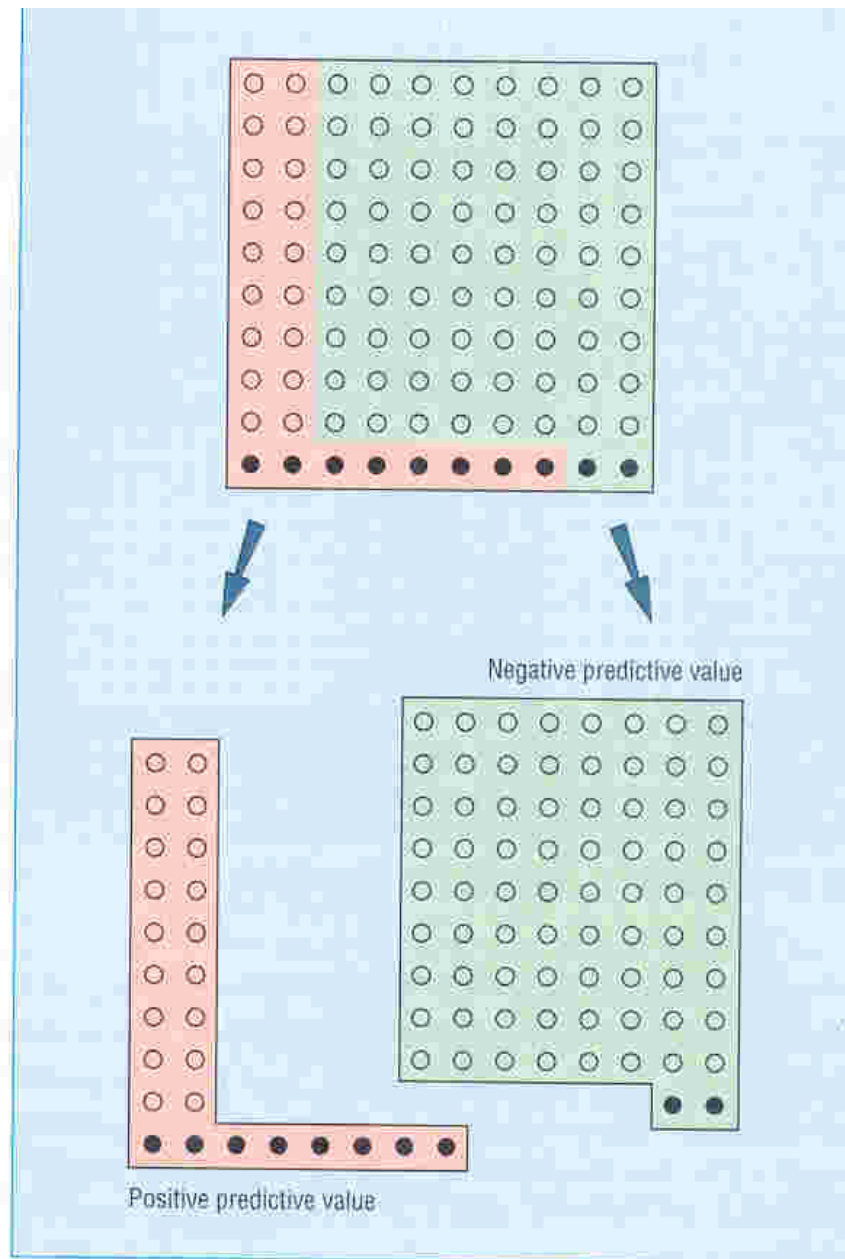


**Fig 8** Positive predictive value

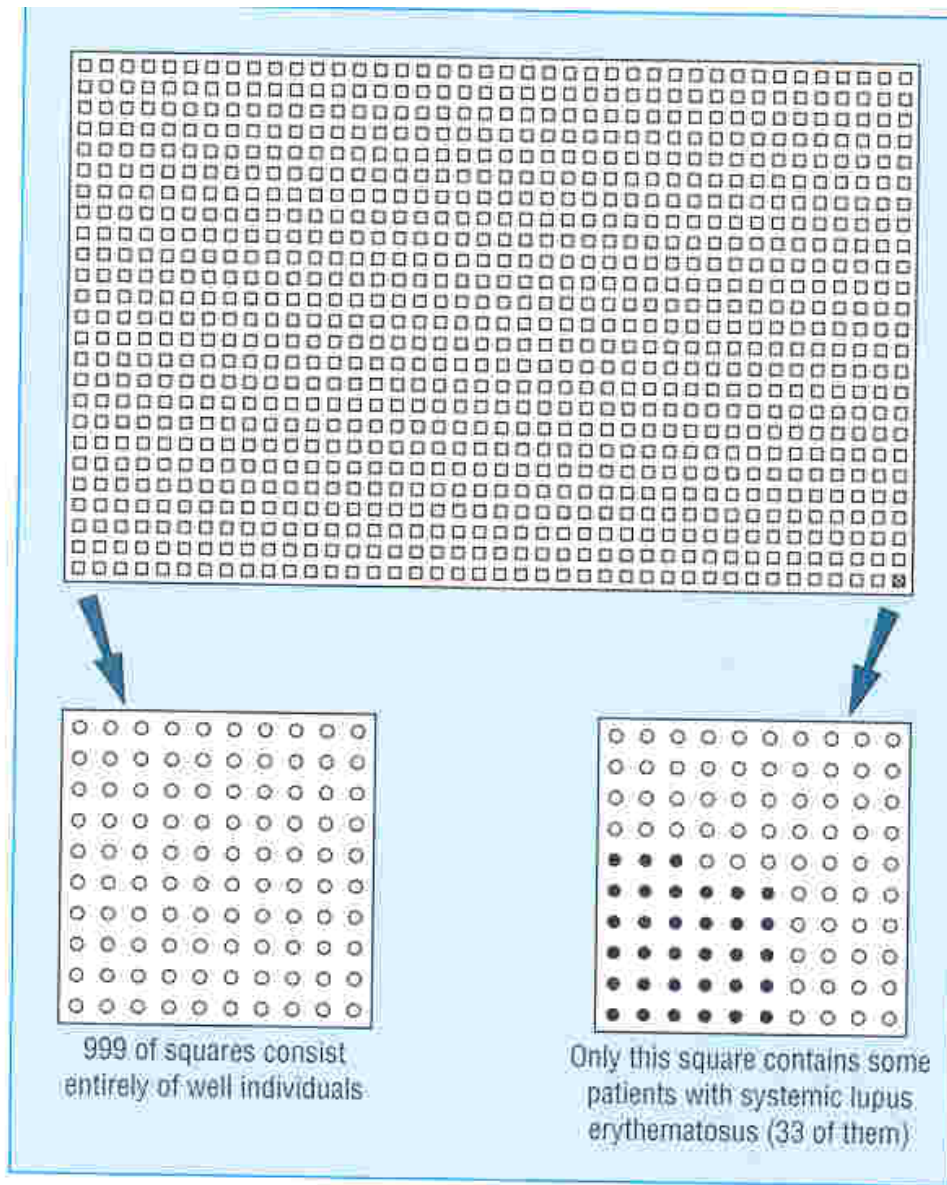




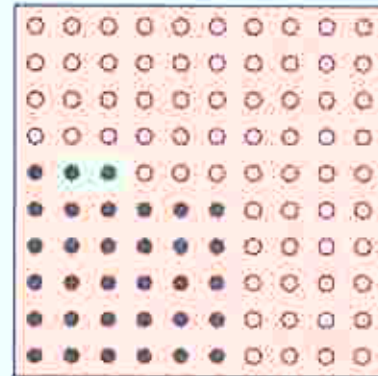
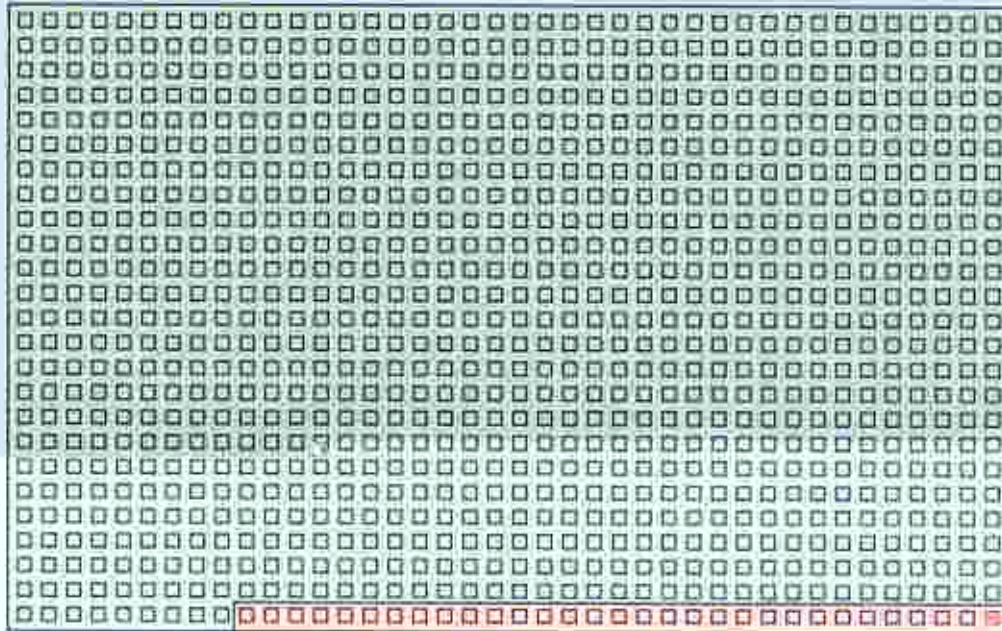
**Fig 9** Negative predictive value

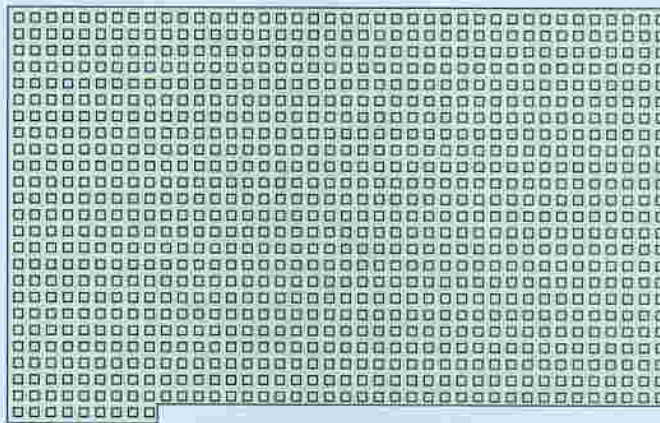


**Fig 10** Results of testing population with disease prevalence of 10%



**Fig 11** Prevalence of systemic lupus erythematosus





No of true negatives = 96 900:

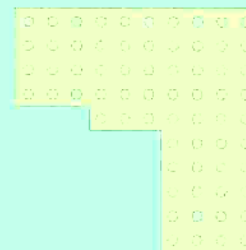
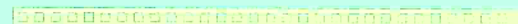
No of false negatives = 2 

$$\begin{aligned} \text{Negative predictive value} &= \frac{96\,900}{96\,900 + 2} \\ &= 99.99\% \end{aligned}$$

No of true positives = 31



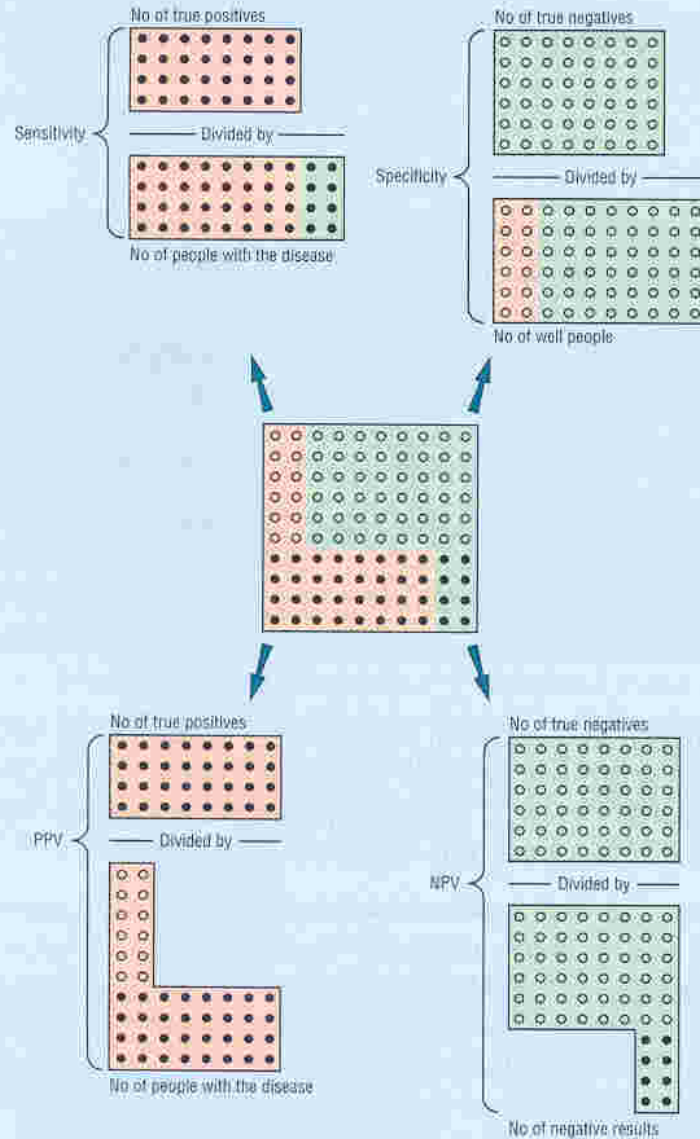
No of false positives = 3067



$$\begin{aligned} \text{Positive predictive value} &= \frac{31}{31 + 3067} \\ &= 1\% \end{aligned}$$

Fig 12 (top) Results of antibody nuclear test in systemic lupus erythematosus. (bottom) negative and positive predictive values

## Summary points



- For a given test, the lower the prevalence of the disease, the lower the positive predictive value
- Since most diseases have a low prevalence in the general population, even a test with an apparently good sensitivity and specificity (>90%) may have a very low positive predictive value
- However, if this test is applied to a person with symptoms or signs of the disease, the positive predictive value will be higher, as that person is from a population with a higher prevalence of the disease