

Deacon's Challenge

No 188 - Answer

The table shows data for two urinary screening tests for the detection of phaeochromocytoma:

Test	Sensitivity (%)	Specificity (%)
VMA	96.7	99.1
Total metanephrines	100	98

The prevalence of phaeochromocytoma in a hypertensive population is known to be 0.5%.

For a hypertensive individual calculate the probability of phaeochromocytoma being present:

- Before either test is performed
- If the VMA test is positive
- If the total metanephrine test is positive

- The pre-test probability of disease is simply the prevalence expressed as an absolute value i.e. 0.005
- The probability of a positive test result indicating the presence of disease is simply the ratio of true positives (TP) to all positive results (TP + FP):

$$\text{Probability of disease if result positive} = \frac{\text{TP}}{\text{TP} + \text{FP}}$$

Values for TP and FP can be calculated from sensitivity, specificity and prevalence. For simplicity it is probably easiest to work with a hypothetical large population e.g. 1,000,000

For a population of 1,000,000 the prevalence becomes $1,000,000 \times 0.5/100 = 5,000$

Since 96.7% (the sensitivity) of these individuals will give a positive VMA test

$$\text{TP} = 5,000 \times 96.7/100 = 4,835$$

For a population of 1,000,000 the number without disease is $1,000,000 - 5,000 = 995,000$ and since the specificity (the percentage of these disease-free individuals giving a negative result) is 99.1%

$$\text{TN} = 995,000 \times 99.1/100 = 986,045$$

And the remainder will have positive (FP) results $= 995,000 - 986,045 = 8,995$

Therefore probability of phaeochromocytoma if VMA is positive $= \frac{\text{TP}}{(\text{TP} + \text{FP})}$

$$\frac{4,835}{(4,835 + 8,995)} = \frac{4,835}{13,830} = 0.35 \text{ (to 2 sig figs)}$$

Issue 645 | February 2017 | ACB News

Practice FRCPath Style Calculations | 25

- Similarly for the total metanephrine test:

$$\text{TP} = 5,000 \times 100/100 = 5,000$$

$$\text{TN} = 995,000 \times 98/100 = 975,100$$

$$\text{FP} = 995,000 - 975,100 = 19,900$$

Probability of phaeochromocytoma if total metanephrine test is positive

$$= \frac{5,000}{(5,000 + 19,900)} = \frac{5,000}{24,900} = 0.20 \text{ (to 2 sig figs)}$$

Question 189

A 44-year old woman, who suffered a miscarriage of pregnancy four days previously, was found to have a serum β -HCG concentration of 658 IU/L. Given that the half-life of β -HCG at more than 48-hours after termination of pregnancy is 56 hours, in how many days time would you expect her serum β -HCG concentration to reach a level of 5 IU/L?

FRCPath, Autumn 2015

IDK® Bile Acids
in-vitro determination of bile acids in stool

- photometric determination of total free bile acids
- no exposure to radiation
- non-invasive assay for routine use in differential diagnosis of chronic diarrhoea
- determination of bile acids in faeces for a successful therapy

Comprehensive set of stool parameters available
Colorectal cancer prevention | Inflammatory bowel diseases | Intestinal barrier and enzyme status
Food intolerance | Infectious diseases

Produced by: www.immunodiagnostik.com

In UK distributed by: **BIOHIT HealthCare**
Innovating for Health
www.biohithealthcare.co.uk