Deacon's Challenge No. 81 Answer

Haemochromatosis, a cause of abnormal liver function tests (LFTs), has a UK prevalence of 0.2%. Iron overload due to haemochromatosis is diagnosed by demonstrating raised serum transferrin saturation (TSat). A commoner cause of abnormal LFTs is non-alcoholic fatty liver disease (NAFLD), with a reported prevalence of 5%. Unfortunately, raised TSat has also been reported in 7.4% of patients with abnormal LFTs due to NAFLD (and there is no association between NAFLD and haemochromatosis). Assuming that there are no other causes of raised TSat, in what percentage of patients with abnormal LFTs will a raised TSat indicate haemochromatosis?

MRCPath, Spring 2007

Since raised TSat is the diagnostic standard for haemochromatosis presumably there are no false negatives and so the true positive rate (TP) is the same as the prevalence of the disease i.e. 0.2% of patients with abnormal LFTs.

Since 7.4% of the population with abnormal LFTs due to NAFLD (which constitute 5% of the population with abnormal LFTs) have raised TSat the false positive rate (FP) is

$$\frac{5 \times 7.4}{100} = 0.37\%$$

The percentage of patients with raised TSat that is due to heamochromatosis (i.e. the positive predictive value) is

$$\frac{TP \times 100}{TP + FP} = \frac{0.2 \times 100}{0.2 + 0.37} = \textbf{35\% (2 sig figs)}$$

Question 82

A man has been arrested for suspected drink-driving shortly after arriving back home. He claims to have drunk two half-litre bottles of beer in the hour previously to driving, and on returning home had drunk a double brandy (50 mL), immediately prior to being arrested and providing a blood sample.

His plasma ethanol concentration was 1.15 g/L.

The alcoholic strength of the beer was 4.0% (alcohol by volume, ABV), and the brandy was 40% (ABV). Liquid ethanol has a density of 0.789 g/mL.

The man weighs 90 Kg; the volume of distribution for ethanol is 0.68 L/Kg.

Is the man's claim credible? State any assumptions you make in your answer.

MRCPath, May 2007