

# Deacon's Challenge

## No 120 - Answer

Use the following data (obtained on paired specimens) to calculate the percentage of filtered urea reabsorbed by the renal tubules:

Plasma urea	=	7.5 mmol/L
Urine urea	=	360 mmol/L
Plasma creatinine	=	150 µmol/L
Urine creatinine	=	12 mmol/L

Let:	$U_{Ur}$	=	urine urea concentration	=	360 mmol/L
	$P_{Cr}$	=	plasma creatinine concentration	=	150 µmol/L
	$U_{Cr}$	=	urine creatinine concentration	=	12 mmol/L = 12,000 µmol/L
	$P_{Ur}$	=	plasma urea concentration	=	7.5 mmol/L

The fraction of filtered urea which is excreted i.e.  $FE_{Ur}$  is:

$$FE_{Ur} = \frac{\text{Rate of urinary urea excretion}}{\text{Rate of urea filtration}}$$

Since: rate of urinary urea excretion =  $U_{Ur} \times V$

where  $V$  = urine flow rate (L/min)

and: rate of urea filtration =  $GFR \times P_{Ur}$

then: 
$$FE_{Ur} = \frac{U_{Ur} \times V}{GFR \times P_{Ur}}$$

$GFR$  is unknown so use creatinine clearance as the nearest estimate available:

$$GFR = \frac{U_{Cr} \times V}{P_{Cr}}$$

Substitute for  $GFR$  into the expression for  $FE_{Ur}$ :

$$FE_{Ur} = \frac{U_{Ur} \times V \times P_{Cr}}{U_{Cr} \times V \times P_{Ur}}$$

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Since the  $V$  terms cancel this becomes:

$$FE_{Ur} = \frac{U_{Ur} \times P_{Cr}}{U_{Cr} \times P_{Ur}}$$

Substitute these values to calculate  $FE_{Ur}$  remembering to multiply the urine creatinine by 1000 to convert it to µmol/L (the same units as used for plasma creatinine):

$$FE_{Ur} = \frac{360 \times 150}{12000 \times 7.5} = 0.6$$

If 0.6 of filtered urea is excreted then  $1 - 0.6 = 0.4$  of filtered urea is reabsorbed.

Therefore percentage of filtered urea reabsorbed by tubules =  $0.4 \times 100 = 40\%$  ■

## Question 121

A patient in your local lipid clinic had a serum total cholesterol concentration of 7.2 mmol/L. He was treated with a statin; and 3 months later his serum cholesterol concentration is 6.0 mmol/L. Given that the controls for your cholesterol assay run standard deviations of 0.041, 0.062 and 0.094 mmol/L at 2.7, 4.3 and 6.7 mmol/L respectively, and that the intra-individual biological variation of serum cholesterol concentration is quoted as 5.4%, determine whether this represents a significant change in his serum cholesterol.

FRCPath, Autumn 2010

## ACB West Midlands Region Scientific Meeting

### The Request - Report Cycle

Wednesday 8th June 2011

Research Park Conference Centre, Birmingham

10.00-10.40 Registration & Coffee  
10.40-10.45 Introduction and Welcome

#### Morning Session

10.45	Request – Report Cycle Overview	Dr Jonathan Kay
11.45	Requesting	Dr Rick Jones
12.30	Lunch	

#### Afternoon Session

13.30	Demand Management	Dr Owen Driskoll
14.10	Shared Care Pathway	Dr Nigel Lawson
14.50	Data Visualisation	Craig Webster
15.30	Pathology Reporting – The Patient Perspective	Neil Formstone
15.50	Pathology Reporting – Safety and Escalation	TBA
16.20	Close	

Full details and instructions for registration may be found at  
**[www.acbwm.org.uk](http://www.acbwm.org.uk)**