Deacon's Challenge No. 19 Answer

The literature (particularly American literature) often contains analytical data presented in units other than SI units. Convert the following results to SI units: (atomic mass C=12, O=16, N=14, H=1, Ca=40)

a) Express 99 mg/dL plasma glucose as mmol/L glucose
b) Express 14 mg/dL BUN (Blood urea nitrogen) as mmol/L urea
c) Express 2.50 mEq/L plasma ionized calcium as mmol/L

MRCPath, May 2002

a) $\text{Concentration (mmol/L)} = \frac{\text{Concentration (mg/L)}}{\text{MW}}$

Given concentration of glucose = 99 mg/dL = 990 mg/L (since 1 dL = 100 mL)

MW glucose ($C_6H_{12}O_6$) = (6 x 12) + (12 x 1) + (6 x 16) = 180

Therefore, concentration of glucose = $\frac{990}{180}$ = **5.5 mmol/L**

b) BUN = blood urea nitrogen

Concentration of BUN (mmol/L) = $\frac{\text{Concentration of BUN (mg/L)}}{\text{MW of nitrogen}}$

Given concentration of BUN = 14 mg/dL = 140 mg/L (since 1 dL = 100 mL)

MW nitrogen (N_2) = 2 x 14 = 28

Therefore, concentration of BUN (mmol/L) = $\frac{140}{28}$ = 5.0 mmol/L

Since one molecule of urea [formula $CO(NH_2)_2$] contains one molecule (or 2 atoms) of nitrogen then the urea concentration also equals **5.0 mmol/L**

c) Calcium is a divalent cation formed by the loss of two electrons from calcium:

$Ca \longrightarrow Ca^{++} + 2\,e^-$

Therefore each molecule of calcium contains 2 equivalents

i.e. 1 mmol/L = 2 mEq/L
and 1 mEq/L = $\frac{1}{2}$ mmol/L

So that 2.50 mEq/L = $\frac{2.50}{2}$ = **1.25 mmol/L**

Question No. 20

A new diagnostic test has been introduced into your laboratory. Only one request for this test was received in July 1998. In January 1999, 27 requests were received. For forward planning you need to be able to anticipate future demand. Assuming that the increase in number of tests is exponential, what is the predicted workload for July 1999?

MRCPath, May 1999