

Algebra: Medical Technologist

Mercy Medical Center

Job Description: Performs testing on blood and body fluids to aid in diagnosis and treatment of disease.

Problem:

Creatinine is a waste product of muscle metabolism normally found at relatively constant levels in the blood. By measuring the plasma and urine levels of creatinine, in a specific period of time, the creatinine clearance or glomerular filtration rate can be calculated.

The creatinine clearance is used to determine the extent of nephron damage in known cases of renal disease, to monitor effectiveness of treatment and to determine the feasibility of administering medications which can build up to toxic levels if the glomerular filtration rate is markedly reduced.

Using a urine creatinine of 96 mg/dL (U), plasma creatinine of 1.3 mg/dL (P), and urine volume of 125 mL from a 2 hour specimen (V), calculate the glomerular filtration rate (creatinine clearance [C].)

The standard formula used to calculate the milliliters of plasma creatinine cleared per minutes [C] is: $C = UV/P$.

Where V = urine volume in milliliters per minute.

U = urine creatinine concentration in milligrams per deciliter.

P = plasma creatinine concentration in milligrams per deciliter.

Hint: Convert dL to mL

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See problem for details.

Solution:

Calculate urine volume in ml/min.

$$V = 125\text{mL}/120 \text{ min.} = 1.04 \text{ mL/min}$$

Convert U and P from dL to mL:

$$U = (96\text{mg/dL})(0.1\text{dL/mL}) = 9.6\text{mg/mL}$$

$$P = (1.3\text{mg/dL})(0.1\text{dL/mL}) = 0.13\text{mg/mL}$$

$$C = [9.6 \text{ mg/mL (U)} / 0.13 \text{ mg/mL (P)}] \times 1.04 \text{ mL/min. (V)}$$

$$C = 76.9 \text{ mL/min}$$

Teacher notes: * normal ranges for creatinine clearance: men - 107 to 139 mL/min and women - 87 to 107 mL/min