

Case Study for Math Calculations

JK is a 62 y/o female who noted a nodule in her breast 4 weeks ago. Work-up revealed breast cancer with the sentinel lymph node dissection positive for malignant cells. The plan is to begin chemotherapy at this time. She is now presents to you for her first dose of chemo. You obtain the following information:

- Weight: 122 kg
- Height: 5'5"
- BP: 160 / 98 P: 68 RR: 20 T: 37.4 C

Lab Test	JK's Lab Values	Reference Range
CBC		
WBC	5.5 x 10 ³ /cu mm	(4.3 - 10.8 x 10 ³ /cu mm)
Differential:		
Basophils	0 %	(0 -1%)
Eosinophils	0 %	(1 -3%)
Lymphocytes	40 %	(20 - 40%)
Monocytes	3 %	(4 - 8%)
Neutrophils:		
Bands	2%	(0%)
Segmented	55%	(40 - 60%)
Platelets	250 K	(200 -400K)
Hgb	12 gm/dl	(13 - 18 gm/dl)
Hct	35 %	(37 - 48%)
Chemistry		
Na+	140 mEq/L	(135 - 145)
K+	3.5 mEq/L	(3.5 - 5.0)
Cl-	100 mEq/L	(95 - 106)
Phos	3.8 mg/dl	(3.0 - 4.5)
Glucose	106 mg/dl	(70 - 110)
BUN	10 mg/dl	(8 - 25)
Cr	0.8 mg/dl	(0.6 - 1.5)
Mg	1.7 mEq/L	(1.5 - 2.0)

Calculate JK's ANC:

$$\text{ANC} = (\% \text{ neutrophils} + \% \text{ bands}) \times \text{WBC}$$

Show your work:

$$\begin{aligned} \text{ANC} &= (0.55 + 0.02) \times 5500 \\ &= 0.57 \times 5500 \\ &= 3,135 \end{aligned}$$

The physician orders paclitaxel (Taxol) 135mg/m² and carboplatin (Paraplatin) with an AUC 4. The physician calculates JK's drug doses at:

- paclitaxel (Taxol): 330 mg
- carboplatin (Paraplatin): 660 mg

The physician hand you JK's orders to check. You must calculate JK's drug doses for paclitaxel and carboplatin.

Calculate JK's BSA:

$$\text{Pounds} = \text{Kg} \times 2.2$$

$$\text{Kilograms} = \text{lbs} \div 2.2$$

$$\text{Inches} = \text{cm} \div 2.54$$

$$\text{centimeters} = \text{in} \times 2.54$$

$$\text{BSA (m}^2\text{)} = \sqrt{\frac{(\text{inches}) \times \text{weight (lbs)}}{3131}}$$

$$\sqrt{\frac{\text{height (cm)} \times \text{weight (Kg)}}{3600}}$$

Show your work:

$$\begin{aligned} \text{lbs} &= 122 \times 2.2 \\ &= 268.4 \end{aligned}$$

$$\begin{aligned} \text{cm} &= 65 \times 2.54 \\ &= 165.1 \end{aligned}$$

$$\text{BSA} = \sqrt{\frac{65 \times 268.4}{3131}}$$

$$\text{BSA} = \sqrt{\frac{165.1 \times 122}{3600}}$$

$$= \sqrt{\frac{17446}{3131}}$$

$$= \sqrt{\frac{20142.2}{3600}}$$

$$= \sqrt{5.572}$$

$$= \sqrt{5.595}$$

$$= 2.36$$

$$= \sqrt{2.37}$$

Calculate JK's paclitaxel dose:

$$\text{Drug dose} = \text{ordered dose} \times \text{BSA}$$

Show your work:

$$\begin{aligned} \text{Paclitaxel dose} &= 135 \times 2.36 \\ &= 318.6 \end{aligned} \quad \text{OR} \quad \begin{aligned} &= 135 \times 2.37 \\ &= \textcircled{319.95} \end{aligned}$$

Approx dose (320 mg)

You determine that your dose is not the same as the dose the physician ordered. You must follow the 10% rule to determine if the written dose (dose calculated by the physician) is safe to administer.

Calculate the 10% rule:

Method 1:

$$\text{Upper Limit} = \text{your dose} \times 1.10$$

$$\text{Lower Limit} = \text{your dose} \times 0.90$$

Method 2:

$$10\% = \text{your dose} \times 0.1$$

$$\text{Upper Limit} = \text{your dose} + 10\%$$

$$\text{Lower limit} = \text{your dose} - 10\%$$

Show your work:

Method 1:

$$\begin{aligned} \text{UL} &= 320 \times 1.10 \\ &= \textcircled{352} \end{aligned}$$

$$\begin{aligned} \text{LL} &= 320 \times .90 \\ &= \textcircled{288} \end{aligned}$$

Method 2

$$\begin{aligned} 10\% &= 320 \times 0.1 \\ &= 32 \end{aligned}$$

$$\begin{aligned} \text{UL} &= 320 + 32 = \textcircled{352} \\ \text{LL} &= 320 - 32 = \textcircled{288} \end{aligned}$$

The safe administration range is 288 mg - 352 mg.

Is the physician's dose safe to administer (circle your answer) Yes No

Calculate JK's carboplatin dose:

$$\text{Female CrCl} = \left(\frac{(140 - \text{age}) \times \text{Weight in Kilograms}}{72 \times \text{Serum Creatinine}} \right) \times 0.85$$

Calvert Formula

$$\text{Dose in mg} = \text{AUC} \times (\text{CrCl} + 25)$$

Show your work:

$$\text{CrCl} = \left(\frac{(140 - 62) \times 122}{72 \times 0.8} \right) \times 0.85$$

$$= \left(\frac{78 \times 122}{57.6} \right) \times 0.85$$

$$= \left(\frac{9516}{57.6} \right) \times 0.85$$

$$\Rightarrow 165.20833 \times 0.85$$

$$= 140.43 \quad \# \text{ note: estimated GFR (CrCl) is not capped at } 125 \text{ mL/min in this example}$$

$$\text{Carbo dose} = 4 \times (140.43 + 25)$$

$$= 4 \times 165.43$$

$$= \underline{661.72}$$

$$\text{Male} = 4 \times (165.21 + 25)$$

$$= 4 \times 190.21$$

$$= \underline{760.84}$$

What would JK's carboplatin dose be if she were a male? 760.84