

## Case Study for Math Calculations

MR is a 74 y/o male who presented with persistent mild cough, concerning for recurrent sinus malignancy. Work-up revealed a new malignancy: T4N1 non-small cell lung cancer. The plan is to begin definitive chemoradiotherapy. He is now presenting to you for his first dose of chemo. You obtain the following information:

- Weight: 77 kg
- Height: 5'9"
- BP: 149 / 65    P: 71    RR: 18    T: 97.8 F

| <b>Lab Test</b>      | <b>MR's Lab Values</b>       | <b>Reference Range</b>                |
|----------------------|------------------------------|---------------------------------------|
| <b>CBC</b>           |                              |                                       |
| WBC                  | 6.3 x 10 <sup>3</sup> /cu mm | (3.8 - 10.6 x 10 <sup>3</sup> /cu mm) |
| Differential:        |                              |                                       |
| Basophils            | 0 %                          | (0 - 1%)                              |
| Eosinophils          | 3.8 %                        | (0 - 6%)                              |
| Lymphocytes          | 14 %                         | (13 - 44%)                            |
| Monocytes            | 9.5 %                        | (4 - 13%)                             |
| Neutrophils:         |                              |                                       |
| Bands                | 0%                           | (0%)                                  |
| Segmented            | 71.3%                        | (40 - 60%)                            |
| Platelets            | 302 K                        | (156 - 369K)                          |
| Hgb                  | 8.3 gm/dl                    | (13 - 17 gm/dl)                       |
| Hct                  | 25.1 %                       | (38 - 48%)                            |
| <br><b>Chemistry</b> |                              |                                       |
| Na+                  | 139 mEq/L                    | (136 - 146)                           |
| K+                   | 3.5 mEq/L                    | (3.5 - 5.0)                           |
| Cl-                  | 109 mEq/L                    | (98 - 107)                            |
| Phos                 | 3.2 mg/dl                    | (2.5 - 4.6)                           |
| Glucose              | 145 mg/dl                    | (70 - 99)                             |
| BUN                  | 15 mg/dl                     | (8 - 26)                              |
| Cr                   | 0.9 mg/dl                    | (0.5 - 1.4)                           |
| Mg                   | 2.0 mEq/L                    | (1.6 - 2.3)                           |

**Calculate MR's ANC:**

$$\text{ANC} = \frac{(\% \text{ neutrophils} + \% \text{ bands}) \times \text{WBC}}{100}$$

Show your work:

Is patient neutropenic? (circle answer) Yes No  
If yes, who and how neutropenic is the patient?

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Let's do another:

| <b>Lab Test</b>      | <b>Lab Values</b>            | <b>Reference Range</b>                |
|----------------------|------------------------------|---------------------------------------|
| <b>CBC</b>           |                              |                                       |
| WBC                  | 0.9 x 10 <sup>3</sup> /cu mm | (3.8 - 10.6 x 10 <sup>3</sup> /cu mm) |
| <b>Differential:</b> |                              |                                       |
| Basophils            | 0 %                          | (0 - 1%)                              |
| Eosinophils          | 0 %                          | (0 - 6%)                              |
| Lymphocytes          | 2 %                          | (13 - 44%)                            |
| Monocytes            | 10 %                         | (4 - 13%)                             |
| Neutrophils:         |                              |                                       |
| Bands                | 2%                           | (0%)                                  |
| Segmented            | 84%                          | (40 - 60%)                            |
| Platelets            | 10 K                         | (156 -369K)                           |
| Hgb                  | 7.8 gm/dl                    | (13 - 17 gm/dl)                       |
| Hct                  | 22 %                         | (38 - 48%)                            |

**Calculate ANC:**

$$\text{ANC} = \frac{(\% \text{ neutrophils} + \% \text{ bands}) \times \text{WBC}}{100}$$

Show your work:

Is patient neutropenic? (circle answer) Yes No  
If yes, who and how neutropenic is the patient?

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The physician orders weekly nab-paclitaxel (Abraxane) 40mg/m<sup>2</sup> and carboplatin (Paraplatin) with an AUC 2 for the patient to receive with CRT. The physician calculates MR's drug doses at:

- nab-paclitaxel (Abraxane): 75 mg
- carboplatin (Paraplatin): 207 mg

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

**Calculate MR'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:

**Calculate MR's nab-paclitaxel dose:**

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

Show your work:

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:

The safe administration range is \_\_\_\_\_ mg - \_\_\_\_\_ mg.

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

**Calculate MR's carboplatin dose:**

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

Calvert Formula

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

Show your work:

**What would MR's carboplatin dose be if he were a female? \_\_\_\_\_**

Show your work: