Chapter 7: Methods of Calculation for Individualized Drug Dosing

OTHER

Body Surface Area by Square Root

1. Order: cyclophosphamide $500 \text{ mg/m}^2$ in 500 mL of normal saline solution (NSS) over 90 minutes
   Patient height and weight: 5 ft 10 in, 142 lb
   Drug available: cyclophosphamide 100 mg dilute with 5 mL of sterile water; yields 20 mg/mL
   a. What is the patient’s body surface area (BSA) ($\text{m}^2$)?
   b. What is the total dose?
   c. How many milliliters should you prepare?

   ANS:
   
   
   $\sqrt{\frac{70 \times 142}{3131}} = 1.78 \text{ m}^2$

   a.

   b. $500 \text{ mg/m}^2 \times 1.78 \text{ m}^2 = 890 \text{ mg}$

   c. FE: $890 \text{ mg}/100 \text{ mg} \times 5 \text{ mL} = 44.5 \text{ mL}$

   OR

   $BF \times V = \frac{890 \text{ mg}}{100 \text{ mg}} \times 5 \text{ mL} = 44.5 \text{ mL}$

2. Order: cisplatin $50 \text{ mg/m}^2$ in 500 mL of NSS intravenously over 90 minutes

   a. What is the patient’s BSA ($\text{m}^2$)?
   b. What is the total dose?
   c. How many milliliters should you prepare?

   ANS:

   a.
For Questions 3 through 18, use the square root method and/or nomogram. Note discrepancies between methods.

### Question 3
Give dacarbazine 250 mg/m²/day 5 days. Patient height: 5 ft 10 in Patient weight: 173 lb What is the daily dose with:

a. square root method?
b. nomogram?

ANS:

a. 

\[
BF \times \frac{D}{H} = \frac{91.5 \text{ mg}}{100 \text{ mg}} \times 100 = 91.5 \text{ mL}
\]
b. Height 70 in, weight 173 lb, intersects 2.02

\[ 250 \text{ mg/m}^2/\text{day} \times (2.02)^2 \text{ m}^2 = 505 \text{ mg/day} \]

4. Give 5-fluourouracil 450 mg/m$^2$/wk. Patient height: 5 ft 6 in Patient weight: 210 lb What is the weekly dose with:
   a. square root method?
   b. nomogram?

ANS:

\[ \sqrt{\frac{66 \times 210}{3131}} = \sqrt{4.4267} = 2.10 \text{ m}^2 \]

\[ 450 \text{ mg/m}^2/\text{wk} \times 2.10 \text{ m}^2 = 945 \text{ mg/wk} \]

b. Height 66 in, weight 210 lb, intersects 2.04 m$^2$

\[ 450 \text{ mg/m}^2/\text{wk} \times 2.04 \text{ m}^2 = 920 \text{ mg/wk} \]

5. Give leucovorin 200 mg/m$^2$/wk. Patient height: 5 ft 6 in Patient weight: 210 lb What is the weekly dose with:
   a. square root method?
   b. nomogram?

ANS:

\[ 80 \text{ kg} \times 2.2 = 176 \text{ lb} \]

\[ \sqrt{\frac{66 \times 210}{3131}} = \sqrt{4.4267} = 2.10 \text{ m}^2 \]

a. 

\[ 200 \text{ mg/m}^2/\text{wk} \times 2.10 \text{ m}^2 = 420 \text{ mg/wk} \]

b. Height 66 in, weight 210 lb, intersects 2.04 m$^2$

\[ 200 \text{ mg/m}^2/\text{wk} \times 2.04 \text{ m}^2 = 408.00 \text{ mg/wk} \]

6. Give cisplatin 30 mg/m$^2$/day 3 days. Patient height: 70 in Patient weight: 80 kg What is the daily dose with:
   a. square root method?
   b. nomogram?

ANS:

\[ \sqrt{\frac{70 \times 176}{3131}} = \sqrt{3.93} = 1.98 \text{ m}^2 \]

\[ 30 \text{ mg/m}^2/\text{day} \times 1.98 \text{ m}^2 = 59.4 \text{ mg/day} \]

a. 80 kg 2.2 = 176 lb
b. Height 70 in, weight 80 kg, intersects 2.08 m
30 mg/m²/day 2.08 m² = 62.4 62 mg/day

7. Give cisplatinum 80 mg/m²/wk. Patient height: 6 ft 2 in Patient weight: 186 lb
What is the weekly dose with:
a. square root method?
b. nomogram?

ANS:
a. \(\sqrt{\frac{74 \times 186}{3131}} = \sqrt{4.39} = 2.09 \text{ m}^2\)
80 mg/m²/wk 2.09 m² = 167.2 mg/wk
b. Height 74 in, weight 186 lb, intersects 2.10 m²
80 mg/m²/wk 2.10 m² = 168 170 mg/wk

8. Give etoposide 120 mg/m²/wk. Patient height: 74 in Patient weight: 70 kg
What is the weekly dose with: a. square root method? b. nomogram?

ANS:
a. 70 kg 2.2 = 154 lb
\(\sqrt{\frac{74 \times 154}{3131}} = \sqrt{3.639} = 1.90 \text{ m}^2\)
120 mg/m²/wk 1.90 m² = 228 mg/wk
b. Height 74 in, weight 70 kg, intersects 2.06 m²
120 mg/m²/wk 2.06 m² = 247.2 250 mg/wk

9. Give Cytoxan 600 mg/m²/wk. Patient height: 70 in Patient weight: 85 kg
What is the weekly dose with: a. square root method? b. nomogram?

ANS:
a. 85 kg 2.2 = 187 lb
\(\sqrt{\frac{70 \times 187}{3131}} = \sqrt{4.18} = 2.04 \text{ m}^2\)
600 mg/m²/wk 2.04 m² = 1224 or 1225 mg/wk
b. Height 70 in, weight 85 kg, intersects 2.08 m²
600 mg/m²/wk 2.08 m² = 1248 1250 mg/wk
10. Give Adriamycin $60 \text{ mg/m}^2/wk$.
   Patient height: 70 in
   Patient weight: 80 kg
   What is the weekly dose with: a. square root method?
   b. nomogram?

   ANS:
   a. $80 \text{ kg} \times 2.2 = 176 \text{ lb}$
   
   $$\sqrt{\frac{70 \times 176}{3131}} = \sqrt{3.93} = 1.98 \text{ m}^2$$
   
   $60 \text{ mg/m}^2/wk \times 1.98 \text{ m}^2 = 118 \text{ mg/wk}$

   b. Height 70 in, weight 85 kg, intersects 2.08 m$^2$
   
   $60 \text{ mg/m}^2/wk \times 2.08 \text{ m}^2 = 124.8 \text{ mg/wk}$

11. Give vincristine $2 \text{ mg/m}^2/week$.
   Patient height: 62 in
   Patient weight: 75 kg
   What is the weekly dose with: a. square root method?
   b. nomogram?

   ANS:
   a. $75 \text{ kg} \times 2.2 = 165 \text{ lb}$
   
   $$\sqrt{\frac{62 \times 165}{3131}} = \sqrt{3.26} = 1.80 \text{ m}^2$$
   
   $2 \text{ mg/m}^2/wk \times 1.80 \text{ m}^2 = 3.6 \text{ mg/wk}$

   b. Height 62 in, weight 75 kg, intersects 1.78 m$^2$
   
   $2 \text{ mg/m}^2/wk \times 1.78 \text{ m}^2 = 3.56 \text{ mg/wk}$

12. Give mitomycin $15 \text{ mg/m}^2/week$.
   Patient height: 65 in
   Patient weight: 64 kg
   What is the weekly dose with: a. square root method? b. nomogram?

   ANS:
   a. $64 \text{ kg} \times 2.2 = 140.8 \text{ or } 141 \text{ lb}$
   
   $$\sqrt{\frac{65 \times 141}{3131}} = \sqrt{2.927} = 1.71 \text{ m}^2$$
   
   $15 \text{ mg/m}^2/wk \times 1.71 \text{ m}^2 = 25.6 \text{ or } 26 \text{ mg/wk}$

   b. Height 65 in, weight 64 kg, intersects 1.75 m$^2$
   
   $15 \text{ mg/m}^2/wk \times 1.75 \text{ m}^2 = 26.25 \text{ mg/wk}$

13. Give mitoxantrone $12 \text{ mg/m}^2/day$ 3 days.
   Patient height: 5 ft 8 in
   Patient weight: 150 lb
   What is the daily dose with:
   a. square root method?
b. nomogram?

\[ \sqrt{\frac{68 \times 150}{3131}} = \sqrt{\frac{120}{3131}} = 1.8 \text{ m}^2 \]

ANS:

\[ \sqrt{\frac{62 \times 130}{3131}} = \sqrt{\frac{22}{3131}} = 1.6 \text{ m}^2 \]

a. 

12 mg/m\(^2\)/day \(1.80 \text{ m}^2\) = 21.6 or 22 mg/day

b. Height 68 in, weight 150 lb, intersects 1.85 m\(^2\)

12 mg/m\(^2\)/day \(1.85 \text{ m}^2\) = 22 mg/day

14. Give cytosine arabinoside 100 mg/m\(^2\)/day 7 days.

Patient height: 5 ft 2 in

Patient weight: 130 lb What is the weekly dose with:

a. square root method?

b. nomogram?

ANS:

\[ \sqrt{\frac{62 \times 130}{3131}} = \sqrt{2.57} = 1.6 \text{ m}^2 \]

a.

100 mg/m\(^2\)/day \(1.6 \text{ m}^2\) = 160 mg/day

b. Height 62 in, weight 130 lb, intersects 1.65 m\(^2\)

100 mg/m\(^2\)/day \(1.65 \text{ m}^2\) = 165 mg/day

15. Give methotrexate 3.3 mg/m\(^2\)/day 7 days.

Patient height: 72 in

Patient weight: 82 kg What is the daily dose with:

a. square root method?

b. nomogram?

ANS:

\[ \sqrt{\frac{72 \times 180.4}{3131}} = \sqrt{4.148} = 2 \text{ m}^2 \]

3.3 mg/m\(^2\)/day \(2 \text{ m}^2\) = 6.6 mg/day

b. Height 72 in, weight 82 kg, intersects 2.10 m\(^2\)

3.3 mg/m\(^2\)/day \(2.10 \text{ m}^2\) = 6.9 mg/day

16. Give prednisone 60 mg/m\(^2\)/day 7 days. Patient height: 72 in
Patient weight: 84 kg What is the daily dose with: a. square root method? b. nomogram?

ANS:

a. $84 \text{ kg}^{2.2} = 184.8 \text{ or } 185 \text{ lb}$

$$\sqrt{\frac{72 \times 185}{3131}} = \sqrt{4.25} = 2.06 \text{ m}^2$$

$60 \text{ mg/m}^2/\text{day}$ $2.06 \text{ m}^2 = 123.7 \text{ or } 124 \text{ mg/day}$

b. Height 72 in, weight 84 kg, intersects $2.10 \text{ m}$

$60 \text{ mg/m}^2/\text{day}$ $2.10 \text{ m}^2 = 126 \text{ mg/day}$

17. Give idarubicin hydrochloride $12 \text{ mg/m}^2/\text{day}$ 3 days. Patient height: 60 in
Patient weight: 60 kg
What is the daily dose with:

a. square root method? b. nomogram?

ANS:

a. $60 \text{ kg}^{2.2} = 132 \text{ lb}$

$$\sqrt{\frac{60 \times 132}{3131}} = \sqrt{2.529} = 1.59 \text{ m}^2$$

$12 \text{ mg/m}^2/\text{day}$ $1.59 \text{ m}^2 = 19.1 \text{ or } 19 \text{ mg/day}$

b. Height 60 in, weight 60 kg, intersects $1.60 \text{ m}$

$12 \text{ mg/m}^2/\text{day}$ $1.60 \text{ m}^2 = 19.2 \text{ mg/day}$

18. Give cytarabine $100 \text{ mg/m}^2/\text{day}$ 7 days. Patient height: 64 in
Patient weight: 65 kg
What is the daily dose with: a. square root method? b. nomogram?

ANS:

a. $65 \text{ kg}^{2.2} = 143 \text{ lb}$

$$\sqrt{\frac{64 \times 143}{3131}} = \sqrt{2.92} = 1.7 \text{ m}^2$$

$100 \text{ mg/m}^2/\text{day}$ $1.7 \text{ m}^2 = 170 \text{ mg/day}$

b. Height 64 in, weight 60 kg, intersects $1.69 \text{ m}$

$100 \text{ mg/m}^2/\text{day}$ $1.69 \text{ m}^2 = 169 \text{ mg/day}$

19. Order: streptozocin $1000 \text{ mg/m}^2$ in 100 mL D:W over 2 hours
Patient’s height and weight: 5 ft 2 in and 210 lb
Drug available: streptozocin 1 g powdered vial, reconstitute with 9.5 mL NS; yields 100 mg/mL.

a. What is the patient’s BSA (m$^2$)?
b. What is the total dose?
c. How many milliliters should you prepare?

ANS:
\[
\sqrt{\frac{62 \times 210}{3131}} = \sqrt{\frac{13,020}{3131}} = \sqrt{4.158} = 2.04 \text{ m}^2
\]

b. 2.04 m$^2 \times 1000 \text{ mg/m}^2 = 2040 \text{ mg}$

BF: $\frac{D}{H} \times V = \frac{2040 \text{ mg}}{100 \text{ mg} \times 1 \text{ mL}} = 20.4 \text{ mL}$

c.

20. Order: methotrexate 3 mg/m$^2$ PO 2 weekly
   Patient’s height and weight: 5 ft 2 in and 130 lb
   Drug available: methotrexate tablets 2.5 mg, 5 mg, 7.5 mg.
   a. What is the patient’s BSA (m$^2$)?
   b. What is the total dose?

ANS:
\[
\sqrt{\frac{62 \times 130}{3131}} = \sqrt{\frac{8060}{3131}} = \sqrt{2.57} = 1.6 \text{ m}^2
\]

b. 1.6 m$^2 \times 3 \text{ mg/m}^2 = 4.80 \text{ mg}$ or 5 mg tablet twice a week

21. Order: sargramostim 250 mcg/m$^2$/day, dilute in 50 mL and infuse over 2 hours
   Patient’s height and weight: 5 ft 10 in and 215 lb
   Drug available: sargramostim 500 mcg/mL
   a. What is the patient’s BSA (m$^2$)?
   b. What is the total dose?
   c. How many milliliters should you prepare?

ANS:
\[
\sqrt{\frac{70 \times 285}{3131}} = \sqrt{\frac{19,950}{3131}} = \sqrt{6.37} = 2.5 \text{ m}^2
\]

b. 2.52 m$^2 \times 250 \text{ mcg/m}^2 = 630 \text{ mcg}$

\[
\frac{630 \text{ mcg}}{500 \text{ mcg}} \times 1 \text{ mL} = 1.26 \text{ mL}
\]
22. Order: clofarabine $52 \text{ mg/m}^2$ daily and infuse in 250 mL D\(_5\)W over 2 hours
   Patient’s height and weight: 5 ft 4 in and 115 lb
   Drug available: 20 mg/20 mL
   a. What is the patient’s BSA ($\text{m}^2$)?
   b. What is the total dose?
   c. How many milliliters should you prepare?

ANS:
   a. $\sqrt{\frac{64 \times 115}{3131}} = \sqrt{\frac{7360}{3131}} = \sqrt{2.35} = 1.53 \text{ m}^2$

   b. $1.53 \text{ m}^2 \times 52 \text{ mg/m}^2 = 79.56 \text{ mg or 80 mg}$

   c. $\frac{80 \text{ mg}}{20 \text{ mg}} \times 20 \text{ mL} = 80 \text{ mL}$