

Chapter 7: Methods of Calculation for Individualized Drug Dosing

OTHER

Body Surface Area by Square Root

1. Order: cyclophosphamide 500 mg/m² 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) (m²)?
 - b. What is the total dose?
 - c. How many milliliters should you prepare?

ANS:

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

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

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

OR

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

2. Order: cisplatin 50 mg/m² in 500 mL of NSS intravenously over 90 minutes
Patient height and weight: 5 ft 6 in, 160 lb
Drug available: cisplatin 100 mg/100 mL
 - a. What is the patient's BSA (m²)?
 - b. What is the total dose?
 - c. How many milliliters should you prepare?

ANS:

$$\text{a. } \sqrt{\frac{66 \times 160}{3131}} = 1.83 \text{ m}^2$$

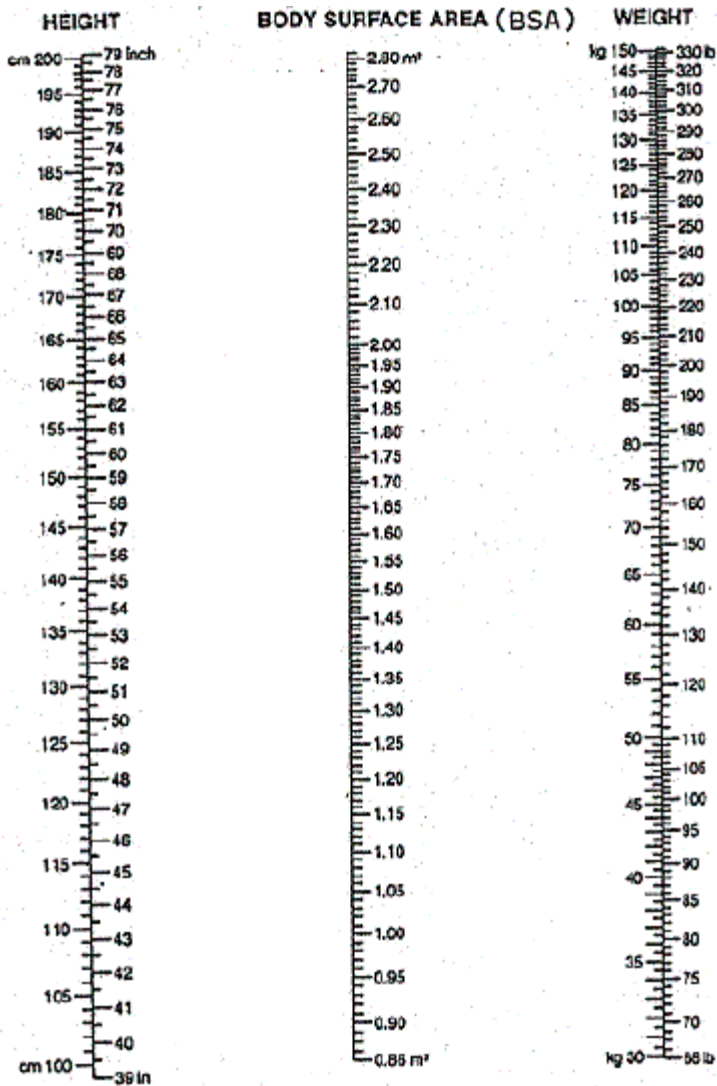
$$\text{b. } 50 \text{ mg} \times 1.83 \text{ m}^2 = 91.5 \text{ mg}$$

$$\text{c. FE: } 91.5 \text{ mg}/100 \text{ mg} \times 100 \text{ mL} = 91.5 \text{ mL or } 92 \text{ mL}$$

OR

$$\text{BF: } \frac{D}{H} \times V = \frac{91.5 \text{ mg}}{100 \text{ mg}} \times 100 = 91.5 \text{ mL}$$

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



3. Give dacarbazine $250 \text{ mg/m}^2/\text{day} \times 5 \text{ days}$.
 Patient height: 5 ft 10 in
 Patient weight: 173 lb
 What is the daily dose with:
 a. square root method?
 b. nomogram?

ANS:

a.
$$\sqrt{\frac{70 \times 173}{3131}} = \sqrt{3.8677} = 1.96 \text{ m}^2$$

$250 \text{ mg/m}^2/\text{day} \times 1.96 \text{ m}^2 = 490 \text{ mg/day}$

b. Height 70 in, weight 173 lb, intersects 2.02 m^2
 $250 \text{ mg/m}^2/\text{day} \times 2.02 \text{ m}^2 = 505 \approx 500 \text{ mg/day}$

4. Give 5-fluorouracil $450 \text{ mg/m}^2/\text{wk}$.
 Patient height: 5 ft 6 in
 Patient weight: 210 lb
 What is the weekly dose with:

- a. square root method?
- b. nomogram?

ANS:

$$a. \sqrt{\frac{66 \times 210}{3131}} = \sqrt{4.4267} = 2.10 \text{ m}^2$$

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

$$b. \text{ Height 66 in, weight 210 lb, intersects } 2.04 \text{ m}^2$$

$$450 \text{ mg/m}^2/\text{wk} \times 2.04 \text{ m}^2 = 918 \approx 920 \text{ mg/wk}$$

5. Give leucovorin 200 mg/m²/wk.
Patient height: 5 ft 6 in
Patient weight: 210 lb
What is the weekly dose with:
 - a. square root method?
 - b. nomogram?

ANS:

$$80 \text{ kg} \times 2.2 = 176 \text{ lb}$$

$$a. \sqrt{\frac{66 \times 210}{3131}} = \sqrt{4.4267} = 2.10 \text{ m}^2$$

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

$$b. \text{ Height 66 in, weight 210 lb, intersects } 2.04 \text{ m}^2$$

$$200 \text{ mg/m}^2/\text{wk} \times 2.04 \text{ m}^2 = 408.00 \approx 400 \text{ mg/wk}$$

6. Give cisplatin 30 mg/m²/day × 3 days.
Patient height: 70 in
Patient weight: 80 kg
What is the daily dose with:
 - a. square root method?
 - b. nomogram?

ANS:

$$a. 80 \text{ kg} \times 2.2 = 176 \text{ lb}$$

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

$$30 \text{ mg/m}^2/\text{day} \times 1.98 \text{ m}^2 = 59.4 \approx 59 \text{ mg/day}$$

$$b. \text{ Height 70 in, weight 80 kg, intersects } 2.08 \text{ m}^2$$

$$30 \text{ mg/m}^2/\text{day} \times 2.08 \text{ m}^2 = 62.4 \approx 62 \text{ mg/day}$$

7. Give cisplatin 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. $\sqrt{\frac{74 \times 186}{3131}} = \sqrt{4.39} = 2.09 \text{ m}^2$

$80 \text{ mg/m}^2/\text{wk} \times 2.09 \text{ m}^2 = 167.2 \text{ mg/wk}$

b. Height 74 in, weight 186 lb, intersects 2.10 m^2

$80 \text{ mg/m}^2/\text{wk} \times 2.10 \text{ m}^2 = 168 \approx 170 \text{ mg/wk}$

8. Give etoposide $120 \text{ mg/m}^2/\text{wk}$.

Patient height: 74 in

Patient weight: 70 kg

What is the weekly dose with:

a. square root method?

b. nomogram?

ANS:

a. $70 \text{ kg} \times 2.2 = 154 \text{ lb}$

$\sqrt{\frac{74 \times 154}{3131}} = \sqrt{3.639} = 1.90 \text{ m}^2$

$120 \text{ mg/m}^2/\text{wk} \times 1.90 \text{ m}^2 = 228 \text{ mg/wk}$

b. Height 74 in, weight 70 kg, intersects 2.06 m^2

$120 \text{ mg/m}^2/\text{wk} \times 2.06 \text{ m}^2 = 247.2 \approx 250 \text{ mg/wk}$

9. Give Cytosin $600 \text{ mg/m}^2/\text{wk}$.

Patient height: 70 in

Patient weight: 85 kg

What is the weekly dose with:

a. square root method?

b. nomogram?

ANS:

a. $85 \text{ kg} \times 2.2 = 187 \text{ lb}$

$\sqrt{\frac{70 \times 187}{3131}} = \sqrt{4.18} = 2.04 \text{ m}^2$

$600 \text{ mg/m}^2/\text{wk} \times 2.04 \text{ m}^2 = 1224 \text{ or } 1225 \text{ mg/wk}$

b. Height 70 in, weight 85 kg, intersects 2.08 m^2

$600 \text{ mg/m}^2/\text{wk} \times 2.08 \text{ m}^2 = 1248 \approx 1250 \text{ mg/wk}$

10. Give Adriamycin $60 \text{ mg/m}^2/\text{wk}$.

Patient height: 70 in

Patient weight: 80 kg

What is the weekly dose with:

a. square root method?

b. nomogram?

ANS:

a. $80 \text{ kg} \times 2.2 = 176 \text{ lb}$

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

$$60 \text{ mg/m}^2/\text{wk} \times 1.98 \text{ m}^2 = 118 \text{ mg/wk}$$

b. Height 70 in, weight 85 kg, intersects 2.08 m^2
 $60 \text{ mg/m}^2/\text{wk} \times 2.08 \text{ m}^2 = 124.8 \approx 125 \text{ mg/wk}$

11. Give vincristine $2 \text{ mg/m}^2/\text{week}$.

Patient height: 62 in

Patient weight: 75 kg

What is the weekly dose with:

- square root method?
- nomogram?

ANS:

a. $75 \text{ kg} \times 2.2 = 165 \text{ lb}$

$$\sqrt{\frac{62 \times 165}{3131}} = \sqrt{3.26} = 1.80 \text{ m}^2$$

$$2 \text{ mg/m}^2/\text{wk} \times 1.80 \text{ m}^2 = 3.6 \text{ mg/wk}$$

b. Height 62 in, weight 75 kg, intersects 1.78 m^2

$$2 \text{ mg/m}^2/\text{wk} \times 1.78 \text{ m}^2 = 3.56 \approx 3.6 \text{ mg/wk}$$

12. Give mitomycin $15 \text{ mg/m}^2/\text{week}$.

Patient height: 65 in

Patient weight: 64 kg

What is the weekly dose with:

- square root method?
- nomogram?

ANS:

a. $64 \text{ kg} \times 2.2 = 140.8$ or 141 lb

$$\sqrt{\frac{65 \times 141}{3131}} = \sqrt{2.927} = 1.71 \text{ m}^2$$

$$15 \text{ mg/m}^2/\text{wk} \times 1.71 \text{ m}^2 = 25.6$$
 or 26 mg/wk

b. Height 65 in, weight 64 kg, intersects 1.75 m^2

$$15 \text{ mg/m}^2/\text{wk} \times 1.75 \text{ m}^2 = 26.25 \approx 26 \text{ mg/wk}$$

13. Give mitoxantrone $12 \text{ mg/m}^2/\text{day} \times 3$ days.

Patient height: 5 ft 8 in

Patient weight: 150 lb

What is the daily dose with:

- square root method?
- nomogram?

ANS:

a. $\sqrt{\frac{68 \times 150}{3131}} = \sqrt{3.25} = 1.8 \text{ m}^2$

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

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

$$12 \text{ mg/m}^2/\text{day} \times 1.85 \text{ m}^2 = 22.2 \approx 22 \text{ mg/day}$$

14. Give cytosine arabinoside $100 \text{ mg/m}^2/\text{day} \times 7$ days.
 Patient height: 5 ft 2 in
 Patient weight: 130 lb
 What is the weekly dose with:
 a. square root method?
 b. nomogram?

ANS:

$$\text{a. } \sqrt{\frac{62 \times 130}{3131}} = \sqrt{2.57} = 1.6 \text{ m}^2$$

$$100 \text{ mg/m}^2/\text{day} \times 1.6 \text{ m}^2 = 160 \text{ mg/day}$$

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

$$100 \text{ mg/m}^2/\text{day} \times 1.65 \text{ m}^2 = 165 \text{ mg/day}$$

15. Give methotrexate $3.3 \text{ mg/m}^2/\text{day} \times 7$ days.
 Patient height: 72 in
 Patient weight: 82 kg
 What is the daily dose with:
 a. square root method?
 b. nomogram?

ANS:

$$\text{a. } 82 \text{ kg} \times 2.2 = 180.4 \text{ lb}$$

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

$$3.3 \text{ mg/m}^2/\text{day} \times 2 \text{ m}^2 = 6.6 \text{ mg/day}$$

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

$$3.3 \text{ mg/m}^2/\text{day} \times 2.10 \text{ m}^2 = 6.93 \approx 6.9 \text{ mg/day}$$

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

ANS:

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

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

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

b. Height 72 in, weight 84 kg, intersects 2.10 m^2

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

17. Give idarubicin hydrochloride $12 \text{ mg/m}^2/\text{day} \times 3$ days.
 Patient height: 60 in
 Patient weight: 60 kg

What is the daily dose with:

- square root method?
- nomogram?

ANS:

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

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

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

b. Height 60 in, weight 60 kg, intersects 1.60 m^2

$$12 \text{ mg/m}^2/\text{day} \times 1.60 \text{ m}^2 = 19.2 \approx 19 \text{ mg/day}$$

18. Give cytarabine $100 \text{ mg/m}^2/\text{day} \times 7 \text{ days}$.

Patient height: 64 in

Patient weight: 65 kg

What is the daily dose with:

- square root method?
- nomogram?

ANS:

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

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

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

b. Height 64 in, weight 60 kg, intersects 1.69 m^2

$$100 \text{ mg/m}^2/\text{day} \times 1.69 \text{ m}^2 = 169 \approx 170 \text{ mg/day}$$

19. Order: streptozocin 1000 mg/m^2 in 100 mL D₅W 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

- What is the patient's BSA (m^2)?
- What is the total dose?
- How many milliliters should you prepare?

ANS:

a. $\sqrt{\frac{62 \times 210}{3131}} = \sqrt{\frac{13020}{3131}} = \sqrt{4.158} = 2.04 \text{ m}^2$

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

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

20. Order: methotrexate $3 \text{ mg/m}^2 \text{ PO} \times 2 \text{ weekly}$

Patient's height and weight: 5 ft 2 in and 130 lb

Drug available: methotrexate tablets 2.5 mg, 5 mg, 7.5 mg

- What is the patient's BSA (m^2)?
- What is the total dose?

ANS:

$$a. \sqrt{\frac{62 \times 130}{3131}} = \sqrt{\frac{8060}{3131}} = \sqrt{2.57} = 1.60 \text{ m}^2$$

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

21. Order: sargramostim 250 mcg/m²/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
- What is the patient's BSA (m²)?
 - What is the total dose?
 - How many milliliters should you prepare?

ANS:

$$a. \sqrt{\frac{70 \times 285}{3131}} = \sqrt{\frac{19950}{3131}} = \sqrt{6.37} = 2.5 \text{ m}^2$$

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

$$c. \frac{630 \text{ mcg}}{500 \text{ mcg}} \times 1 \text{ mL} = 1.26 \text{ mL}$$

22. Order: clofarabine 52 mg/m² daily and infuse in 250 mL D₅W over 2 hours
 Patient's height and weight: 5 ft 4 in and 115 lb
 Drug available: 20 mg/20 mL
- What is the patient's BSA (m²)?
 - What is the total dose?
 - How many milliliters should you prepare?

ANS:

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

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

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