

Lesson 8.1: Body Mass Index and other Health Numbers

Theme: Health and Risk

- (1) Recall Deurenberg and Weststrate's formula for estimating body fat percentages as discussed in the lesson.

Men's Adult Body Fat % = $1.2 \text{ BMI} + 0.23 \text{ Age} - 16.2$.

Women's Adult Body Fat % = $1.2 \text{ BMI} + 0.23 \text{ Age} - 5.4$.

Using these formulas, consider how these mathematical models work in the following scenarios.

- (a) If Pexdro keeps his BMI constant over time, what will happen to his estimated body fat percentage? Check one.

- ☐ the Body fat percentage will increase
☐ the Body fat percentage will decrease
☐ the Body fat percentage will stay the same

- (b) If Yamana and Snyder are twin sister and brother, respectively. If they have the same height and weight, who will have a greater estimated body fat percentage? Check one.

- ☐ Yamana
☐ Snyder

- (c) This year, Nisheidi increased her BMI by 1 from last year. She also got one year older. Which increase, age or BMI, will have a greater impact on her estimated body fat percentage?

- ☐ Increased age by 1 year
☐ Increased BMI by 1 point

- (2) Many pediatric dosages of drugs should be based on the child's surface area. The Mosteller formula¹ is often used for this purpose. To determine the surface area (in square meters), the child's height (in inches) and weight (in pounds) are multiplied together; this number is divided by 3131 and then a square root is taken of the result.

- (a) Use this to find the surface area of a child who is 4 feet tall and weighs 75 pounds. Note: You will need to first convert the height into just inches.

- (b) To get the dosage of an allergy medicine for a child, the following formula is used:

$$D \uparrow \frac{25 * A}{1.73} \text{ mg}$$

where A is the body surface area. Calculate the dosage of this allergy medicine for this child.

- (c) One practitioner forgets to convert the feet to inches and uses "4" in the equation for height. What surface area did this practitioner calculate?

1 Mosteller RD: Simplified Calculation of Body Surface Area. *N Engl J Med* 1987 Oct 22;317(17):1098 (letter)

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- (d) What was the resulting dose from making this error?
- (e) What do you think would be the result of the mis-calculated prescription?

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