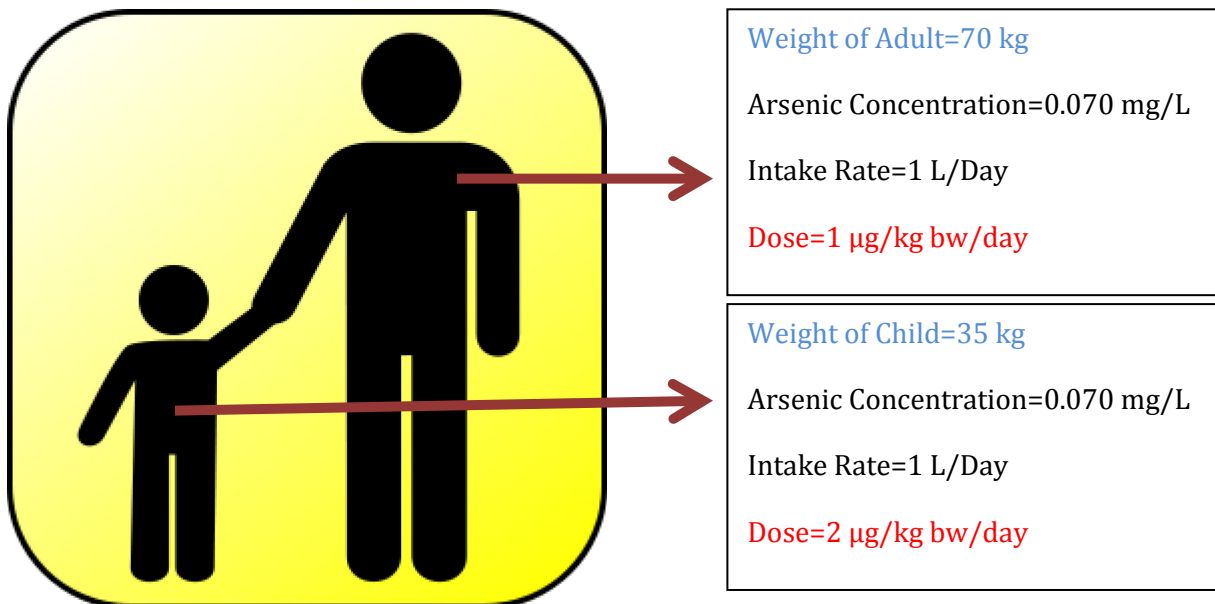


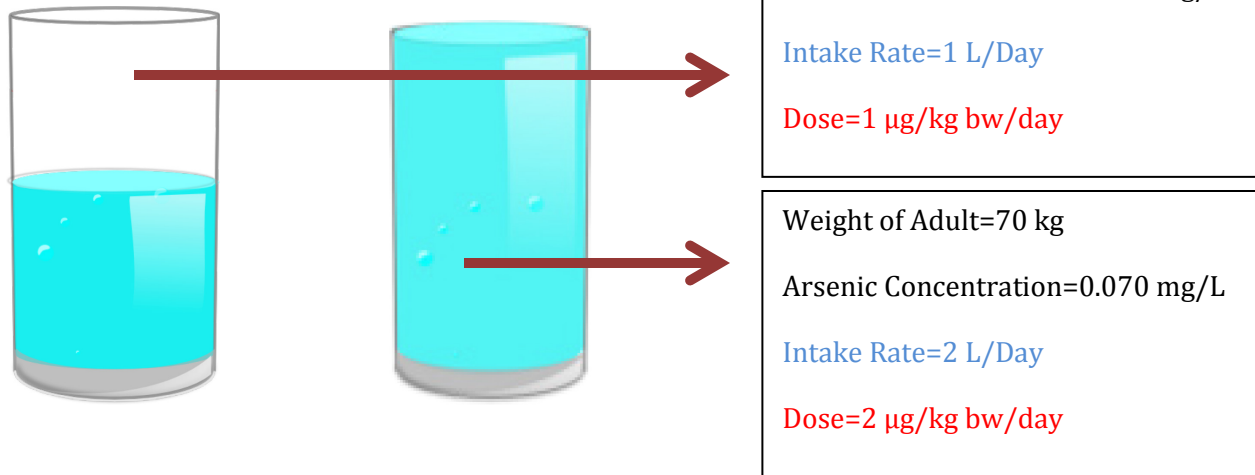
## Tutorial: How do changes in body weight, intake rate and concentration impact dose?

**Body weight:** Two individuals weighing 35 kg and 70 kg consume 4 glasses of water ( $0.250 \text{ L} \times 4 \text{ glasses} = 1 \text{ L}$ ) containing arsenic at  $0.070 \text{ mg/L}$ . Thus, each of them consumes the same amount of arsenic ( $0.070 \text{ mg/L} \times 1 \text{ L} = 0.070 \text{ mg}$ ). Yet on a  $\text{mg/kg}$  body weight basis, the person weighing 35 kg consumes twice as much arsenic as the person weighing 70 kg (i.e.  $0.070 \text{ mg} \div 35 \text{ kg} = 0.002 \text{ mg/kg bw/day}$  or  $2 \text{ } \mu\text{g/kg bw/day}$  versus  $0.070 \div 70 \text{ kg} = 0.001 \text{ mg/kg bw/day}$  or  $1 \text{ } \mu\text{g/kg bw/day}$ ).



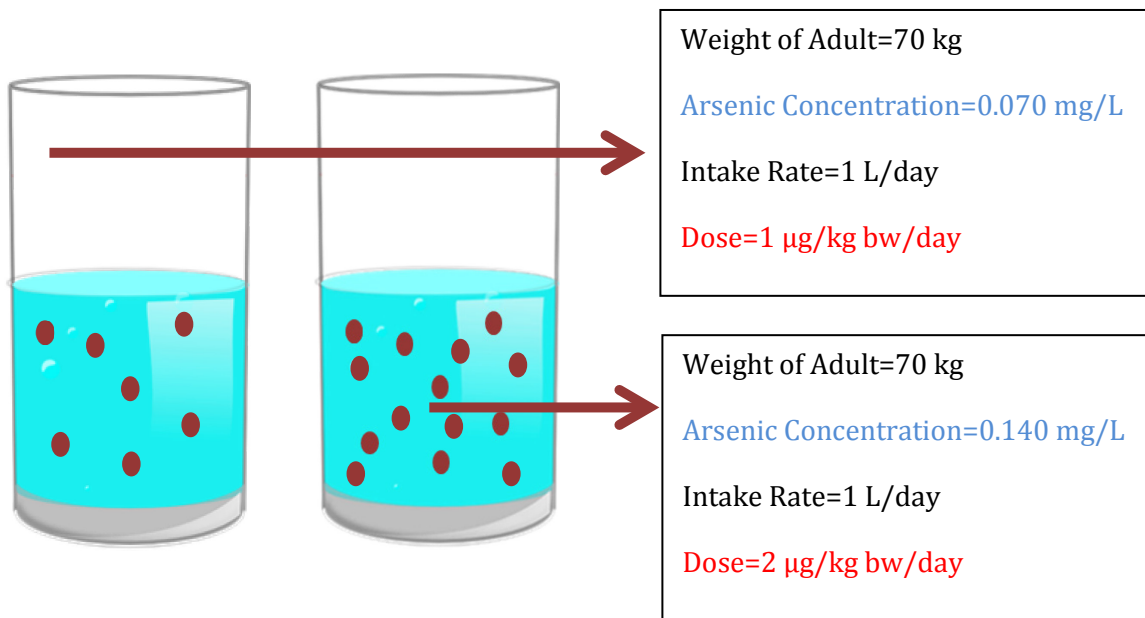
**Doubling the body weight halves the mg/kg body weight dose**

**Intake Rate:** Two 70 kg individuals consume water containing arsenic at 0.070 mg/L. One individual consumes 1 L of water, while the other consumes 2 L. The individual consuming the 2 L of water consumes twice as much arsenic as the individual consuming only 1L, assuming all the arsenic is coming only from the water and that the arsenic is uniformly distributed in the water. ( $0.070 \text{ mg/L} \times 1 \text{ L} = 0.070 \text{ mg}$  for 1 L and  $0.070 \text{ mg/L} \times 2 \text{ L} = 0.140 \text{ mg}$  for 2 L). This is reflected in the higher mg/kg body weight dose for the person consuming 2 L of water (i.e.  $0.140 \text{ mg} \div 70 \text{ kg} = 0.002 \text{ mg/kg body weight/day}$  versus  $0.070 \text{ mg} \div 70 \text{ kg} = 0.001 \text{ mg/kg bw/day}$ ).



**Doubling intake rate doubles the mg/kg body weight dose**

**Concentration:** Two 70 kg individuals consume 1 L of water containing arsenic. The concentration of arsenic in the water consumed by Person 1 is 0.070 mg/L while the concentration of arsenic consumed by person 2 is 0.140 mg/L. The individual consuming the water with twice the arsenic concentration consumed twice as much arsenic ( $0.070 \text{ mg/L} \times 1 \text{ L} = 0.070 \text{ mg}$  for Person 1 and  $0.140 \text{ mg/L} \times 1 \text{ L} = 0.140 \text{ mg}$  for Person 2). This is reflected in the higher  $\mu\text{g/kg}$  body weight dose of the person drinking water containing the higher concentration of arsenic (i.e.  $0.070 \text{ mg}$  or  $70 \mu\text{g} \div 70 \text{ kg} = 1 \mu\text{g/kg}$  body weight/day versus  $0.140 \text{ mg}$  or  $140 \mu\text{g} \div 70 \text{ kg} = 2 \mu\text{g/kg}$  body weight/day). Note that the effect of doubling concentration is the same as doubling intake rate on the  $\text{mg/kg}$  body weight total dose.



**Doubling the concentration doubles the  $\text{mg/kg}$  body weight dose**