PHA 5127 (Fall, 2008)
Case Study #4

Q1. For the following situations, indicate whether the drug is: filtered, reabsorbed, actively secreted, or reabsorbed through transporters ((Assume GFR is 130 mL min^{-1}, urine flow is 1.5 ml min^{-1})

a). A drug with fu = 0.02 and a Cl_{REN} = 20 mL min^{-1}

Cl_{REN} = 20 mL > fu*GFR=2.6 mL min^{-1} => actively secreted

b). A drug with fu = 0.40 and a Cl_{REN} = 52 mL min^{-1}

Cl_{REN} = 52 mL min^{-1} = fu*GFR=52 mL min^{-1} => filtered

c). A drug with fu = 0.60 and a Cl_{REN} = 0.9 mL min^{-1}

Cl_{REN} = 0.9 mL min^{-1}< fu*GFR=98 mL min^{-1} => reabsorbed
Cl_{REN} = 0.9 mL min^{-1}= fu*urine flow=0.9 mL min^{-1} => reabsorbed through passive diffusion

d). A drug with fu = 1.0 and a Cl_{REN} = 0.3 mL min^{-1}

Cl_{REN} = 0.3 mL min^{-1}< fu*GFR=130 mL min^{-1} => reabsorbed
Cl_{REN} = 0.3 mL min^{-1}< fu*urine flow=1.5 mL min^{-1} => reabsorbed through transporters

Q2. A male patient is 5 ft 10 inches tall, 40 years old, and weights 80 kg. His serum creatinine is 1.5 mg/dl. Please estimate his GFR.

$$IBW = 50 + 2.3 \bullet 10 = 73 kg$$

$$TBW = 80 kg < 120\% IBW \Rightarrow not\ an\ obese\ patient \therefore use\ IBW$$

$$GFR = CrCL = \frac{(140 - 40) \bullet 73}{72 \bullet 1.5} = 68 \quad ml / \min$$

Q3. Mark each of the following statements True or False.

T **F** The maximum value of renal clearance can not excess the glomerula filtration rate.

T **F** The renal clearance of a drug (as determined by filtration and reabsorbtion) always depends on the tissue binding of the drug.

T **F** Drinking a lot of water (urine flow is doubled) will increase significantly the renal clearance of aminoglycocsides.

T **F** For an acidic drug with a pka of 1.0, adjustment of the urine pH within physiological ranges will significantly change the renal clearance.

T **F** To determine the clearance of a drug, one needs to know whether the drug is a one or two compartment drug.

T **F** Since creatinine is endogenous and predominantly eliminated by kidney, its clearance is a good estimation of renal active secretion.

T **F** The larger the volume of distribution, the smaller the AUC of a given drug.

Q4. Define the term linear pharmacokinetics.

- no saturation of binding sites (linear protein binding)
- no saturation of enzymes or transporters
- CL and Vd are independent of dose
- AUC and C_t changed proportionally with drug dose change