Final exam of clinical pharmacokinetics

Final exam

# Clinical pharmacokinetics

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***I: write briefly about the following:***

1) Clinical application of pharmacokinetics in clinical practice.

The application of pharmacokinetic methods to drug therapy in patient care. It also involves multidisciplinary approach to individually optimized dosing strategies based on the patient's disease state and patient- specific consideration.

Clinical practice.

i) Select appropriate drug for a clinical indication.

ii) Select appropriate dose

(1) Consider pathophysiologic process in patient such as hepatic or renal dysfunction.

(2) Consider developmental and maturational changes in organ system and the subsequent effect on PK and PD.

iii) Select appropriate formulation and route of administration.

(1) Determine anticipated length of therapy.

(2) Monitor for efficacy and toxicity.

(3) Pharmacogenetics will play a larger role in the future.

iv) Other factors:

(1) Drug-drug interaction:

(a) Altered absorption.

(b) Inhibition of metabolism.

(c) Enhanced metabolism.

(d) Protein binding competition.

(e) Altered excretion.

(2) Drug-food interaction

(a) NG or NJ feeds: continuous or intermittent.

(b) Site of optimal drug absorption in GI tract must be considered.

2) Adjustment of dosage regimen in patient with renal disease.

If the drug is eliminated mostly by liver, no adjustment required.

If the drug is eliminated mostly by kidney, either:

Re-evaluate need for the drug and discontinue if possible.

Reduce dose.

Increase dosing interval.

Switch to a drug that is eliminated mostly by liver.

## ***II: define the following:***

1) Significance of management of drug therapy.

i) Target-effect strategy

(1) Pre-determined efficacy endpoint

(2) Titrate drug to desired effect

(a) Monitor for efficacy

(i) If plateau occurs, may need to add additional drug or choose alternative agent.

(b) Monitor for toxicity

(i) May require decrease in dose or alternative agent.

ii) Target-concentration strategy.

(1) Pre-determined concentration goal

(a) Based on population-based PK

(b) Target concentration based on efficacy or toxicity.

(2) Know the PK of the drug you are prescribing

(a) Presence of an active metabolite?

(b) Should the level of the active metabolite be measured?

(c) Zero-order or first-order.

(i) Does it change with increasing serum concentration?

(3) Critical aspects of target concentration therapy:

(a) Know indication for monitoring serum concentration, and when you don't need to monitor levels.

(b) Know the appropriate time to measure the concentration.

(c) If the serum concentration is low, know how to safely achieve the desired level.

(d) Be sure the level is not drawn from the same line in which the drug is administered.

(e) Be sure drug is administered over the appropriate time.

(f) And treat the patient not the drug level.

2) Drug-protein binding.

Reversible: hydrogen or van der wal bond (weak)

Irreversible: cause toxicity such as hepatotoxicity due to binging of acetaminophen to liver protein.

3) Importance of Cl.

It is a major determinant of $cp_{ss}$

Useful for calculating rate of drug administration (MD/DI)

Used to calculate $t_{1/2}$ and thus $t_{ss}$

Used to calculate $DI_{max}$

***III*: *Choose the correct answer*:**

A patient with acute asthma attack was to be given an IV bolus dose of asthma relieving drug followed by iv infusion, what is the iv-loading dose that achieves $cp_{target}$= 5mcg/mL

Weight = 50 kg.

Vd = 50 L

**1) What is the loading dose?**

a) 300 mg

b) 200 mg.

c) 400 mg.

d) 500 mg.

The pharmacokinetic parameters are as follows

Cp= 3 mcg/L, Cl = 12 L/hr.

Bioavailability = 0.8, Vd = 250 L,

**2) What is the oral loading dose:**

a) 500 mg.

b) 800 mg.

c) 100 mg.

d) 200 mg.

**3) What is the maintenance dose?**

a) 800 mg.
b) 1000 mg.
c) 600 mg.
d) 500 mg.

The pharmacokinetic parameters are as follows:

$Cp_{effective} > 2$ mg/l, $cp_{toxic} > 4$ mg/l, $t_{1/2} = 35$ hrs.

**4) what is the $DI_{max}$**

a) 40hrs.
b) 20 hrs.
c) 35 hrs.
d) 15 hrs.

A male patient was administered with a drug whose half-life is 10 hrs, the patient weighs 60 kg, and the iv-infusion rate was found to be 30 mg/hr, and after 8 hours his plasma level of that drug was measured and found to be 10mg/l

**5) what is the clearance?**

a) 2 L/hr.
b) 3 L/hr
c) 5 L/hr
d) 4 L/hr

**6) What is the apparent volume of distribution:**

a) 37 L
b) 43 L
c) 35 L
d) 45 L

**7) What is the $t_{ss}$:**

a) 20 hrs.
b) 30 hrs.
c) 40 hrs.
d) 50 hrs.

**8) Clinical pharmacokinetic models are used for:**

a) Predict plasma, tissue, and urine concentration after any dosage regimen
b) To determine an optimal dosage regimen for each patient individually.
c) To predict the accumulation of drug or metabolite in the body.

d) All of the above.

**9) Clinical pharmacokinetic models are used for:**

a) To correlate plasma drug concentration to pharmacology or toxicology.
b) To determine the difference in the rate or extent of availability of different drugs (bioequivalence).
c) To explain drug interaction.
d) All of the above.

**10) The relation between clearance and half-life is:**

a) If clearance increases, $t_{1/2}$ decreases.
b) If clearance decreases, $t_{1/2}$ decreases.
c) None of the above.
d) All of the above.