March 2011
QUESTION 16

Compare and contrast the pharmacology of morphine, fentanyl and remifentanil.

	Morphine	Fentanyl	Remifentanil
Pharmaceutical	Is a natural opioid from the papaver somniferum plant	Is a synthetic opioid	Is a synthetic opioid
Pharacodynamics Mechanism	All three drugs are act primarily via agonism of the mu opioid receptor which is located peripherally and centrally in the spine and brain.		
Effects	They reduce pain without affecting touch and temperature sensation. Opioids specifically target slow pain. Fentanyl also has some noradrenaline and serotnin action and may be excitatory centrally.		
Side effects	Neuro decreased consciousness, reduced cough reflex, miosis Cardio effects blunting of baroreceptor reflexes, vasodilation Respiratory effects direct reduction in respiratory drive and indirect via obtundation Gastro effects reduced gut motility, CTZ activation causing n+v, constipation,		
Pharmacokinetics Absorption	Poor bioavilability 30% Dose 5-10mg titrate effect (relative potency 1)	Poor oral bioavilability 30% skin bioavailability >90% (3/7) Dose 50-100mcg titrate effect (relative potency 50-100)	IV only Dose 50-100mcg titrate effect (relative potency 50-100)
Distribution	moderate Vd 3-4L/kg relative lipid solubility 1 pKa 8.0 (75% ionised) slow redistribution	moderate Vd 3-4L/kg relative lipid solubility 500 pKa 8.4 (95% ionised) rapid redistribution (lipid sol)	small Vd 0.3L/kg relative lipid solubility 50 pKa 7.1 (30% ionised) rapid redistribution (pKa/lipid)
Metabolism	Hepatic metabolism Moderate clearance	Hepatic metabolism Slow clearance	Plasma esterase metabolism Rapid clearance
Excretion	Half time 2-4hrs Excreted in urine	Demonstrates context sensitive half time increases with infusion Excreted renally	Short half time (minutes) Independent hepatic/renal Excreted in urine