

JULY 2007
QUESTION 21

Compare and contrast the cardiovascular effects of an induction dose of propofol and ketamine

	Propofol	Ketamine
Mechanism	Agonist at GABA _A receptor modulating its inhibitory actions. May have Na and Ca channel blocking activity. 5HT may also play a role (antiemetic).	Non competitive antagonist at NMDA receptor reducing its excitatory actions. Cardiovascular effects are due to inhibition of catecholamine reuptake and potentiation of noradrenaline release
Induction dose	2 mg/kg	2 mg/kg
Cardiovascular		
TPR / MAP	total peripheral resistance is reduced by release of NO leading to a fall in MAP of 15-40% during induction	Increased secondary to SNS release of catecholamines
Contractility	possibly very minor negative inotrope	-ve inotrope SNS outflow leads to observed +ve inotropy (if catecholamines exhausted -ve effects)
Preload	decreased preload due to impaired venous return	increased preload due to SNS mediated venoconstriction
Afterload	afterload decreased due to lower TPR	increased due to increased TPR
Heart rate	Does not change due to impaired baroreceptor responses	will increase due to catecholamines, baroreceptor responses are usually impaired
Myocardial O ₂ demand	Decreases and may therefore be useful in patients with IHD	Increases and therefore should be used with caution in patients with IHD
Conduction	Does not cause arrhythmias	arrhythmias are uncommon
Summary	Overall there is a decrease in stroke volume, and because the HR is unchanged this is characterised by a decreased CO. These changes are exacerbated in the critically unwell, elderly, hypovolaemic and those with LV dysfunction. Decreased O ₂ demand results in its cardioprotective properties but decreased blood flow to regional circulations may be problematic.	The effects of increased catecholamine release lead to increased cardiac output and MAP. In states of catecholamine exhaustion ketamine may cause a profound hypotension. It generally increases blood flow to regional circulations but the increased O ₂ demand may cause issues in cardiac and neurosurgical patients.