Aminophylline Intravenous for Adults

Who can administer

May be administered by registered competent doctor or nurse/midwife

Important information

- **Loading dose only given if** patient not previously on oral theophylline or aminophylline (but see Further information below)
- See monitoring requirements below
- To avoid excessive dosage in **obese** patients, dose should be calculated on the basis of ideal body weight for height (patient is obese if actual body weight is 20% or more above ideal body weight or BMI > 30) (ref 1)
- There are numerous important **interactions** - check latest BNF
- For Y-site compatibility see below

Available preparations

Aminophylline 250mg per 10ml ampoule

Reconstitution

Already in solution

Draw up using a 5 micron filter needle

Infusion fluids

Sodium Chloride 0.9% or Glucose 5%

Methods of intravenous administration

Slow intravenous injection/Intermittent intravenous infusion (loading dose only) (ref 2)

- Add required dose to 100ml infusion fluid and give over **at least 20 minutes**
- Maximum recommended rate **25mg/minute**
- **Fluid restricted: can be administered undiluted, ideally via central line** (ref 2)

Continuous intravenous infusion (administer using an electronically controlled infusion device)

- Add required dose to a suitable volume of infusion fluid e.g. 500mg to 500ml = 1mg/ml
- Administer at a rate as per 'dose' below
- **Fluid restricted: can be administered undiluted, ideally via central line**(ref 2)

Dose in adults

Usual dose

Loading dose first (if appropriate)

- Loading doses must **NOT** be given to patients already taking oral theophylline or aminophylline (but

see Further information below)
- Doses should be based on **ideal body weight** for height - see Important information
- Give 6mg per kg (usually 250 to maximum 500mg), followed by maintenance dose.
- If patient experiences acute adverse reactions while loading dose is being given, the infusion may be stopped for 5 to 10 minutes, or administered at a slower rate [ref 3]

Maintenance dose

- Doses should be based on ideal body weight for height - see Further information

Patient	Maintenance dose FIRST 12 hours	Maintenance dose BEYOND first 12 hours
Healthy, NON-smokers	0.7mg/kg/hour	0.5mg/kg/hour - adjusted according to plasma theophylline concentrations
ELDERLY patients	0.6mg/kg/hour	0.3mg/kg/hour - adjusted according to plasma theophylline concentrations
Congestive HEART FAILURE/LIVER FAILURE	0.5mg/kg/hour	0.1 to 0.2mg/kg/hour - adjusted according to plasma theophylline concentrations
Young adult SMOKERS	1mg/kg/hour	0.8mg/kg/hour - adjusted according to plasma theophylline concentrations

Monitoring

- The half-life is approx. 8.7 hours (range 7 to 9 hours) (non-smoking, otherwise healthy asthmatic patient)
- In patients with **impaired hepatic or renal function**, the half-life may be prolonged
- In **cigarette smokers**, the half life may be reduced
- Monitor **potassium -** may cause hypokalaemia
- Monitor ECG, heart rate and blood pressure [ref 2]
- **Desired levels:** 10 to 20 microgram/mL [ref 3]
- Adverse drug reactions may occur within the range of 10 to 20mg/L. Levels above 20mg/L are more likely to be associated with adverse effects
- Take serum level **30 minutes after the loading dose** has been given ('post-loading dose level')
- Start the continuous infusion once the loading dose is complete, and recheck level after 12 hours- (to determine if levels are increasing or decreasing from post-loading dose level)
- Adjust infusion rates according to the following table [ref 4]

Serum theophylline concentration (micrograms per ml)	Dosage adjustment (ADULT PATIENTS)
less than 9.9	Increase infusion rate by 25% if symptoms **are not controlled** and current dosage is tolerated. Recheck levels after 24 hours
10 to 14.9	Maintain infusion rate if symptoms are controlled and current dosage is tolerated. If symptoms are not controlled and dosage is tolerated, consider addition of additional agents Recheck levels after 24 hours
15 to 19.9	Some references suggest a 10% reduction in infusion rate to provide greater margin of safety even if current dosage is tolerated. Alternatively, maintain infusion rate if symptoms are controlled and current dosage is tolerated. Recheck levels after 24 hours
20 to 24.9	Decrease infusion rate by 25% even if no adverse reactions are present. Recheck levels after 24 hours
25 to 30	Stop infusion for 24 hours. If symptomatic consider whether treatment for overdose is indicated Subsequently decrease infusion rate by at least 25% even if no adverse effects are present Recheck levels after 24 hours
Greater than 30	Stop infusion and treat overdose if indicated If therapy is resumed, decrease subsequent infusion rate by at least 50%. Recheck levels after 24 hours
Dose adjustment and/or serum theophylline levels are indicated whenever adverse effects are present, or interacting drugs are commenced or discontinued.	

Further information

- **Loading doses:** Ideally the loading dose would be deferred until serum theophylline levels are known. If this is not possible, and if the clinical situation requires that the drug be given, a dose of 3.1mg/kg of aminophylline may be considered, on the basis that it is likely to increase the serum theophylline concentration by about 5 mcg/L when administered as a loading dose
- Patients on intravenous aminophylline need careful monitoring and nursing attention
- Rapid administration has been associated with **acute hypotension, arrhythmias and convulsions**
- Concurrent use of other xanthine derivatives are contraindicated due to the risk of toxicity
- Each 0.5mg/kg aminophylline administered as a loading dose gives rise to a 1mcg/ml increase in serum concentrations of theophylline
- Patient is obese if actual body weight is 20% or more above ideal body weight or BMI > 30 [ref 3]
  Ideal body weight (IBW) calculations
- **Male** 50kg + (2.3 x inches over 5 feet) **or** 50kg + (0.9 x cm over 152 cm)
- **Female** 45.5kg + (2.3 x inches over 5 feet) **or** 45.5kg + (0.9 x cm over 152 cm)

Storage

Store below 25^{0}C

References

1: Sanford guide to antimicrobial therapy 2011 (information on obesity extrapolated from data on antimicrobials)

2: Injectable medicines guide Medusa, accessed online 20/01/22

3: SPC Mercury pharmaceuticals October 2020

4: Uptodate: accessed 20/01/22

5: UK SPC ADVANZ pharmaceuticals October 2020

Therapeutic classification

Bronchodilator - Theophylline

BNF
Airway disease, obstructive