

RGH Pharmacy E-Bulletin

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A joint initiative of the Patient Services Section and the Drug and Therapeutics Information Service of the Pharmacy Department, Repatriation General Hospital, Daw Park, South Australia. The RGH Pharmacy E-Bulletin is distributed in electronic format on a weekly basis, and aims to present concise, factual information on issues of current interest in therapeutics, drug safety and cost-effective use of medications.

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Digoxin toxicity

Digoxin is a derivative of *digitalis lanata* (foxglove leaves). It exerts a positive inotropic effect by reversibly inhibiting the sodium-potassium adenosine triphosphatase (Na-K ATPase) pump. This results in an increase in intracellular sodium content which in turn increases the intracellular calcium leading to an increase in myocardial contractility. Digoxin also causes AV nodal blockade by increasing vagal activity via its action on the central nervous system.

Digoxin toxicity occurs more frequently in the elderly due to decreased volume distribution secondary to reduced muscle mass and decreased clearance secondary to renal impairment. The risk of digoxin toxicity is increased when taken together with verapamil, amiodarone, spironolactone, flecainide and quinidine due to increased digoxin concentration. If amiodarone is added, the dose of digoxin should be halved. Electrolyte disturbances such as hypokalaemia, hypomagnesaemia and hypocalcaemia potentiate digoxin toxicity. Hypothyroidism also prolongs the effect of digoxin.

Clinically significant digoxin toxicity is normally associated with serum levels >2 ng/mL but may occur with lower concentrations if any of the conditions listed above are present. Signs and symptoms of digoxin toxicity include anorexia, nausea, vomiting, weight loss, delirium, visual disturbances (unusual color vision with a tendency to yellow-green coloring), blurred vision, hallucinations and arrhythmias such as bradycardia, AV block, SA arrest and ventricular arrhythmias.

Management of digoxin toxicity includes discontinuation of digoxin, correction of electrolyte disturbances, and the administration of atropine, lignocaine or phenytoin (depending on types of arrhythmias present.) Cardiac pacing and the administration of digoxin specific antibody (Fab) fragments (Digibind®, DigiFab®) may be required. Digoxin specific antibody fragments are indicated for the management of severe, life-threatening digoxin toxicity which is manifested by ventricular tachycardia, ventricular fibrillation, severe sinus bradycardia and second or third degree heart block not responsive to atropine. This products is also indicated for patients who have ingested more than 10 mg of digoxin, or if the steady state digoxin concentration is above 10 ng/mL (which often results in cardiac arrest). A progressive rise of serum potassium associated with digoxin toxicity also suggests the possibility of impending cardiac arrest and thus the administration of digoxin specific antibody fragments is also indicated if the potassium concentration is greater than 5mmol/L. Since the effects of repeated exposures are unknown, the antibody is not recommended for use in minor cases of digoxin toxicity.

The dosage of Digibind® is variable according to the amount of digoxin ingested and can be estimated from either the plasma digoxin concentration or number of tablets ingested. Specific dosage guidelines can be found in the product information. Digibind® is available in Australia as a 38 mg injection vial (each vial binds 500mcg of digoxin). The product acts by binding to digoxin molecules and rendering them unavailable for binding at their site of actions in the body. Improvement of signs and symptoms of digoxin toxicity should be seen within 30 minutes or less after administration. During and after administration of digoxin specific antibody fragments, blood pressure, ECG and potassium levels should be monitored closely.

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FOR FURTHER INFORMATION – CONTACT THE PHARMACY DEPARTMENT ON 82751763 or email: chris.alderman@rgh.sa.gov.au
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