**DIGOXIN TOXICITY**

**Purpose Statement**

The purpose of this home study is to review the indications for digoxin, symptoms of toxicity, and how to manage patients who are digoxin toxic.

**Target Audience**

This home study was designed for the novice critical care or telemetry nurse; however, other health care professionals are invited to complete this packet.

**Content Objectives**

1. List the indications for digoxin use.
2. Identify the physical symptoms of toxicity.
3. Identify cardiac rhythm disturbances that may occur with toxicity.
4. Describe initial management of digitalis toxicity.
5. Describe management of digitalis toxicity with Digibind®.

**Disclosures**

In accordance with ANCC requirements governing approved providers of education, the following disclosures are being made to you prior to the beginning of this educational activity:

**Requirements for successful completion of this educational activity:**

In order to successfully complete this activity you must read the home study, complete the post-test and evaluation, and submit them for processing.

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As required by ANCC, this continuing education activity must carry an expiration date. The last day that post tests will be accepted for this edition is December 31, 2017—your envelope must be postmarked on or before that day.

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Contact Hour Information

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<th>For completing this Home Study and evaluation, you are eligible to receive:</th>
<th>1.0 MN Board of Nursing contact hours / 0.83 ANCC contact hours</th>
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Criteria for successful completion: You must read the home study packet, complete the post-test and evaluation, and submit them to TCHP for processing.

The Twin Cities Health Professionals Education Consortium is an approved provider of continuing nursing education by the Wisconsin Nurses Association, an accredited approver by the American Nurses Credentialing Center’s Commission on Accreditation.

Please see the last page of the packet before the post-test for information on submitting your post-test and evaluation for contact hours.
THERAPEUTIC USE OF DIGOXIN

What is digoxin?
Digoxin is one of the most commonly used drugs in the United States. Historically, there are records of digoxin being used in Egyptian and Roman times, and digoxin toxicity has been documented since the 18th century.

Digoxin is classified as a cardiotonic steroid or a cardiac glycoside. It is derived from the common foxglove plant (digitalis purpurea or lanae). The indications for digoxin use are:

- chronic atrial fibrillation
- atrial flutter
- paroxysmal atrial tachycardia (PAT)
- left ventricular dysfunction (congestive heart failure)

How does a cardiac glycoside work?
Cardiac cells are stimulated by the movement of sodium, potassium, and calcium into and out of the cell via the ATP pump. Cardiac glycosides attach to the ATP pump, not allowing sodium out of the cell as quickly as before. When sodium can't get out, calcium continues to move into the cell.

That's all well and good, but what does it mean? The end effects of these changes on the Na-K-ATP pump are to:

1. Increase the force and velocity of myocardial cell contraction (positive inotropic action)
2. Decrease the response of the baroreceptors to blood pressure changes through the sympathetic nervous system and renin-angiotension-aldosterone systems (neurohormonal deactivating effect)
3. Slow the heart rate (vagomimetic action)
4. Slow the rate of conduction through the AV node (vagomimetic action)

In a therapeutic dosage, the effects of digoxin include:

- Decreased heart rate
- Decreased AV conduction rate
- Increased myocardial contractility
What herb/plants are cardiac glycosides?
Oleander, foxglove, yew berry, lily of the valley, dogbane, Siberian ginseng, and red squill all contain cardiac glycosides. Adults and children can be exposed to one of these herbs through:
- drinking water contaminated by one of these herbs
- eating food that has one of the herbs mixed in
- eating any part of one of these herbs (leaves, stems, sap, etc…) or
- inhaling the smoke from burning some of these herbs

I thought digoxin was going the way of the dinosaur -- what happened?
A very large, randomized study was done on the use of digoxin in heart failure in 1997. The research project, called the "Digitalis Investigation Group," studied 6,800 patients with congestive heart failure who had an ejection fraction of 45% or less (normal is >50%). Approximately half of the study participants received digoxin; the other half received a placebo. The results of the study showed that while there was no change in mortality, patients on digoxin (often combined with other drugs, such as ACE inhibitors), had fewer hospitalizations for heart failure.¹

Because of this study, as well as long-time familiarity with the drug, digoxin is continuing to be prescribed and used by patients.

What is the normal blood level for digoxin?
There is a narrow therapeutic range for digoxin -- which means that the patient can easily have too much or too little of the drug on board. The general rule is that the therapeutic level is between 0.8 - 2.0 ng/mL, although patients have been toxic below 0.8 and have been fine slightly above 2.0 ng/mL.