



NDA 021648/S-008

**SUPPLEMENT APPROVAL**

Roxane Laboratories, Inc.  
Attention: Mr. Gregory M. Hicks  
Assoc. Director, Drug Regulatory Affairs &  
Medical Affairs  
1809 Wilson Road  
Columbus, OH 43228

Dear Mr. Hicks:

Please refer to your Supplemental New Drug Application (sNDA) dated and received February 3, 2015, submitted under section 505(b)(1) of the Federal Food, Drug, and Cosmetic Act (FDCA) for Digoxin 0.05 mg/mL Oral Solution USP.

This supplemental new drug application provides for labeling revised as follows (additions are marked as underlined text and deletions are marked as ~~strickthrough text~~):

- 1. In **HIGHLIGHTS/DRUG INTERACTIONS**, the following text was deleted from the second bullet:

~~There are numerous drug interactions associated with digoxin. The potential for drug-drug interactions must be considered prior to and during drug therapy. See full prescribing information for a complete listing of pharmacokinetic (7.2) (12.3) and pharmacodynamic interactions (7.3)(7.2, 7.3, 12.3)~~

- 2. Under **DRUG INTERACTIONS**, the following text was added:

Digoxin has a narrow therapeutic index, increased monitoring of serum digoxin concentrations and for potential signs and symptoms of clinical toxicity is necessary when initiating, adjusting, or discontinuing drugs that may interact with digoxin. Prescribers should consult the prescribing information of any drug which is co-prescribed with digoxin for potential drug interaction information.

- 3. Under **DRUG INTERACTIONS/ Pharmacokinetic Drug Interactions**, the following text was added/deleted to/from the table:

<b>Digoxin concentrations increased <math>\rightarrow</math> greater than 50%</b>			
	Digoxin Serum Concentration Increase	Digoxin AUC Increase	Recommendations
Amiodarone	70%	NA	Measure serum digoxin concentrations before
Captopril	58%	39%	

<u>Clarithromycin</u>	<u>NA</u>	<u>70%</u>	initiating concomitant drugs. Reduce digoxin dose by approximately 30% to 50% <u>or by modifying the dosing frequency</u> and continue monitoring.
<u>Dronedaron</u>	<u>NA</u>	<u>150%</u>	
<u>Gentamicin</u>	<u>129-212%</u>	<u>NA</u>	
<u>Erythromycin</u>	<u>100%</u>	<u>NA</u>	
<u>Itraconazole</u>	<u>80%</u>	<u>NA</u>	
<u>Lapatinib</u>	<u>NA</u>	<u>180%</u>	
Nitrendipine	57%	15%	
Propafenone	NA	60-270%	
Quinidine	100%	NA	
Ranolazine	50%	NA	
Ritonavir	NA	86%	
Telaprevir	50%	85%	
Tetracycline	100%	NA	
Verapamil	50-75%	NA	
<b>Digoxin concentrations increased &lt; less than 50%</b>			
<u>Atorvastatin</u>	<u>22%</u>	<u>15%</u>	Measure serum digoxin concentrations before initiating concomitant drugs. Reduce digoxin dose by approximately 15% to 30% <u>or modify the dosing frequency</u> and continue monitoring.
Carvedilol	16%	14%	
<u>Conivaptan</u>	<u>33%</u>	<u>43%</u>	
Diltiazem	20%	NA	
<u>Indomethacin</u>	<u>40%</u>	<u>NA</u>	
<u>Nefazodone</u>	<u>27%</u>	<u>15%</u>	
Nifedipine	45%	NA	
<u>Propantheline</u>	<u>24%</u>	<u>24%</u>	
<u>Quinine</u>	<u>NA</u>	<u>33%</u>	
Rabeprazole	29%	19%	
<u>Saquinavir</u>	<u>27%</u>	<u>49%</u>	
<u>Spirolactone</u>	<u>25%</u>	<u>NA</u>	
Telmisartan	20-49%	NA	
<u>Ticagrelor</u>	<u>31%</u>	<u>28%</u>	
Tolvaptan	30%	20%	
<u>Trimethoprim</u>	<u>22-28%</u>	<u>NA</u>	
<b>Digoxin concentrations increased, but magnitude is unclear</b>			

Alprazolam, Azithromycin, <del>Clarithromycin</del> , Cyclosporine, Diclofenac, Diphenoxylate, Epoprostenol, <del>Erythromycin</del> , Esomeprazole, <u>Ibuprofen</u> , <del>Indomethacin</del> , Itraconazole, Ketoconazole, Lansoprazole, Metformin, Omeprazole, <del>Propranolol</del> , <del>Spironolactone</del>	Measure serum digoxin concentrations before initiating concomitant drugs. Continue monitoring and reduce digoxin dose as necessary.
<b>Digoxin concentrations decreased</b>	
Acarbose, Activated Charcoal, Albuterol, Antacids, <u>certain cancer chemotherapy or radiation therapy</u> , <del>Anticancer drugs</del> , <del>Bupropion</del> , Cholestyramine, Colestipol, Exenatide, Kaolin-pectin, Meals High in Bran, Metoclopramide, Miglitol, Neomycin, <u>Penicillamine</u> , <u>Phenytoin</u> , Rifampin, <del>Salmeterol</del> , St. John's Wort, Sucralfate, Sulfasalazine	Measure serum digoxin concentrations before initiating concomitant drugs. Continue monitoring and increase digoxin dose by approximately 20% to 40% as necessary.
<b>No significant Digoxin concentrations changes</b>	
Please refer to section 12.3 for a complete list of drugs which were studied but reported no significant changes on digoxin exposure.	No additional actions are required

4. Under **CLINICAL PHARMACOLOGY/Pharmacokinetics**, the following text was deleted:

*Drug-drug Interactions:* Based on literature reports no significant changes in digoxin exposure were reported when digoxin was co-administered with the following drugs: alfuzosin, aliskiren, amlodipine, aprepitant, argatroban, aspirin, atorvastatin, benazepril, bisoprolol, black cohosh, bosentan, candesartan, citalopram, clopidogrel, colesevelam, dipyridamole, disopyramide, donepezil, doxazosin, dutasteride, echinacea, enalapril, eprosartan, ertapenem, escitalopram, esmolol, ezetimibe, famciclovir, felodipine, finasteride, flecainide, fluvastatin, fondaparinux, galantamine, gemifloxacin, grapefruit juice, irbesartan, isradipine, ketorolac, levetiracetam, levofloxacin, lisinopril, losartan, lovastatin, meloxicam, mexilitine, midazolam, milk thistle, moexipril, montelukast, moxifloxacin, mycophenolate, nateglinide, nesiritide, nicardipine, nisoldipine, olmesartan, orlistat, pantoprazole, paroxetine, perindopril, pioglitazone, pravastatin, prazosin, procainamide, quinapril, raloxifene, ramipril, repaglinide, rivastigmine, rofecoxib, ropinirole, rosiglitazone, rosuvastatin, sertraline, sevelamer, simvastatin, sirolimus, solifenacin, tamsulosin, tegaserod, terbinafine, tiagabine, tielopidine, tigecycline, topiramate, toremide, tramadol,trandolapril, triamterene, trospium, trovafloxacin, valacyclovir, valsartan, varenicline, voriconazole, zaleplon, and zolpidem.

5. Under **PATIENT COUNSELING INFORMATION**, the following text was deleted from the 1<sup>st</sup>, 2<sup>nd</sup>, 7<sup>th</sup>, and 8<sup>th</sup> bullets:

- Advise patients that digoxin is a ~~cardiac glycoside~~ used to treat heart failure and heart arrhythmias.
- Instruct patients to take this medication as directed ~~by their physician~~.
- ~~Suggest to~~ Instruct the patient to monitor and record their heart rate and blood pressure daily.
- Instruct patients to use the calibrated dropper to measure their digoxin dose and to avoid less precise measuring tools, such as teaspoons. For doses less than 0.2 mL, provide another measuring syringe ~~should be provided~~ to the patient for accurate dosing, since the provided calibrated dropper is not appropriate to measure doses less than 0.2 mL.

6. The revision date was updated.

There are no other changes from the last approved package insert.

We have completed our review of this supplemental application, as amended, and it is approved, effective on the date of this letter, for use as recommended in the enclosed, agreed-upon labeling text.

### **CONTENT OF LABELING**

As soon as possible, but no later than 14 days from the date of this letter, submit the content of labeling [21 CFR 314.50(1)] in structured product labeling (SPL) format using the FDA automated drug registration and listing system (eLIST), as described at <http://www.fda.gov/ForIndustry/DataStandards/StructuredProductLabeling/default.htm>. Content of labeling must be identical to the enclosed labeling (text for the package insert), with the addition of any labeling changes in pending “Changes Being Effected” (CBE) supplements, as well as annual reportable changes not included in the enclosed labeling.

Information on submitting SPL files using eLIST may be found in the guidance for industry titled “SPL Standard for Content of Labeling Technical Qs and As” at <http://www.fda.gov/downloads/DrugsGuidanceComplianceRegulatoryInformation/Guidances/UCM072392.pdf>.

The SPL will be accessible from publicly available labeling repositories.

Also within 14 days, amend all pending supplemental applications for this NDA, including CBE supplements for which FDA has not yet issued an action letter, with the content of labeling [21 CFR 314.50(1)(1)(i)] in MS Word format, that includes the changes approved in this supplemental application, as well as annual reportable changes and annotate each change. To facilitate review of your submission, provide a highlighted or marked-up copy that shows all changes, as well as a clean Microsoft Word version. The marked-up copy should provide appropriate annotations, including supplement number(s) and annual report date(s).

### **PROMOTIONAL MATERIALS**

You may request advisory comments on proposed introductory advertising and promotional labeling. To do so, submit the following, in triplicate, (1) a cover letter requesting advisory comments, (2) the proposed materials in draft or mock-up form with annotated references, and (3) the package insert(s) to:

Food and Drug Administration  
Center for Drug Evaluation and Research  
Division of Drug Marketing, Advertising, and Communications  
5901-B Ammendale Road  
Beltsville, MD 20705-1266

You must submit final promotional materials and package insert(s), accompanied by a Form FDA 2253, at the time of initial dissemination or publication [21 CFR 314.81(b)(3)(i)]. Form FDA 2253 is available at <http://www.fda.gov/opacom/morechoices/fdaforms/cder.html>; instructions are provided on page 2 of the form. For more information about submission of promotional materials to the Division of Drug Marketing, Advertising, and Communications (DDMAC), see <http://www.fda.gov/AboutFDA/CentersOffices/CDER/ucm090142.htm>.

All promotional materials that include representations about your drug product must be promptly revised to be consistent with the labeling changes approved in this supplement, including any new safety information [21 CFR 314.70(a)(4)]. The revisions in your promotional materials should include prominent disclosure of the important new safety information that appears in the revised package labeling. Within 7 days of receipt of this letter, submit your statement of intent to comply with 21 CFR 314.70(a)(4) to the address above or by fax to 301-847-8444.

### **REPORTING REQUIREMENTS**

We remind you that you must comply with reporting requirements for an approved NDA (21 CFR 314.80 and 314.81).

If you have any questions, please call:

Lori Anne Wachter, RN, BSN  
Regulatory Project Manager for Safety  
(301) 796-3975

Sincerely,

*{See appended electronic signature page}*

Mary Ross Southworth, PharmD.  
Deputy Director for Safety  
Division of Cardiovascular and Renal Products  
Office of Drug Evaluation 1  
Center for Drug Evaluation and Research

ENCLOSURE:  
Content of Labeling

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**This is a representation of an electronic record that was signed electronically and this page is the manifestation of the electronic signature.**  
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/s/  
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MARY R SOUTHWORTH  
07/28/2015