# CENTER FOR DRUG EVALUATION AND RESEARCH

***APPLICATION NUMBER:***

**022519Orig1s000**

# PROPRIETARY NAME REVIEW(S)

**Department of Health and Human Services**

**Public Health Service**

**Food and Drug Administration**

**Center for Drug Evaluation and Research**

**Office of Surveillance and Epidemiology**

| | |
|---|---|
| Date: | March 9, 2011 |
| Application Type/Number: | NDA 022519 |
| Through: | Zachary Oleszczuk, Pharm.D., Team Leader<br>Carol Holquist, R.Ph., Director<br>Division of Medication Error Prevention and Analysis |
| From: | Yelena Maslov, Pharm.D., Safety Evaluator<br>Division of Medication Error Prevention and Analysis |
| Subject: | Proprietary Name Review |
| Drug Name(s): | Duexis (Ibuprofen and Famotidine) Tablets 800 mg/26.6 mg |
| Applicant: | Horizon Pharmaceuticals |
| OSE RCM #: | 2010-2156 |

***** This document contains proprietary and confidential information that should not be released to the public.*****

## 1 INTRODUCTION

This re-assessment of the proposed proprietary name, Duexis, responds to the anticipated approval of NDA 022519 within 90 days from the date of this review. The Division of Medication Error Prevention and Analysis (DMEPA) found the proposed proprietary name, Duexis, conditionally acceptable in OSE Review #2010-1524, dated October 7, 2010.

## 2 METHODS

For the proposed proprietary name, Duexis, DMEPA's safety evaluators search a standard set of databases and information sources (See Section 5) to identify names with orthographic and/or phonetic similarity to the proposed name that have been approved since the completion of the previous OSE proprietary name review. The safety evaluator did not re-evaluate the names identified in OSE Review #2010-1524, because the product characteristics for Duexis remained the same. For this name re-assessment, we use the same search criteria outlined in OSE Review #2010-1524, for the proposed proprietary name Duexis. Additionally, DMEPA searches the USAN stem list to determine if the name contains any USAN stems as of the last USAN updates. DMEPA bases the overall risk assessment on the findings of a Failure Mode and Effect Analysis (FMEA) of the proposed proprietary name, and focuses on the avoidance of medication errors.

## 3 RESULTS

The safety evaluator searches of the databases listed in Section 5 identified four additional names (n=4) that were thought to look like or sound like Duexis. The three names that were thought to look like Duexis are (b) (4), (b) (4), and (b) (4). The name, (b) (4), was thought to sound like Duexis. Our Failure Mode and Effect Analysis determined that the names identified would not cause confusion that would result in medication errors for the reasons listed in Appendices A and B. Additionally, DMEPA safety evaluators did not identify any United States Adopted Names (USAN) stems in the proposed proprietary name as of February 28, 2011.

## 4 CONCLUSIONS AND RECOMMENDATIONS

The Proprietary Name Risk Assessment indicates that the proposed name, Duexis, is not vulnerable to name confusion that could lead to medication errors, nor is the name considered promotional. Thus, the Division of Medication Error Prevention and Analysis (DMEPA) has no objection to the proposed proprietary name, Duexis, for this product at this time.

DMEPA considers this a final review; however, if approval of the NDA is delayed beyond 90 days from the date of this review, DGP should notify DMEPA because the proprietary name must be re-reviewed prior to the new approval date.

***This document contains proprietary and confidential information that should not be released to the public.***

## 5 REFERENCES


1. ***Maslov, Yelena OSE Review #2010-1524: Proprietary Name Review for Duexis. October 7, 2010***.

2. ***Drugs@FDA (http://www.accessdata.fda.gov/scripts/cder/drugsatfda/index.cfm)***

   Drugs@FDA contains most of the drug products approved since 1939. The majority of labels, approval letters, reviews, and other information are available for drug products approved from 1998 to the present. Drugs@FDA contains official information about FDA approved brand name, generic drugs, therapeutic biological products, prescription and over-the-counter human drugs and discontinued drugs and "Chemical Type 6" approvals.

3. ***USAN Stems (http://www.ama-assn.org/ama/pub/category/4782.html)***

   USAN Stems List contains all the recognized USAN stems.

4. ***Division of Medication Error Prevention and Analysis proprietary name requests***

   This is a list of proposed and pending names that is generated by the Division of Medication Error Prevention and Analysis from the Access database/tracking system.

**Appendix A: Names of the product that have never been marketed**

| Proprietary Name | Similarity to Duexis | Status of a Product Name |
|---|---|---|
| | | (b) (4) |

**Appendix B: Names of the products with no overlap in dose and/or strength**

| Product name with potential for confusion | Similarity to Duexis | Dosage Form and Strength | Usual Dose (If applicable) |
|---|---|---|---|
| Duexis (Ibuprofen and Famotidine) | N/A | Tablet: Ibuprofen 800 mg and Famotidine 26.6 mg | Take 1 tablet orally three times a day. Could be ordered on 'as needed' basis |
| | | | (b) (4) |

*** This document contains proprietary and confidential information that should not be released to public

---

**This is a representation of an electronic record that was signed electronically and this page is the manifestation of the electronic signature.**

---

/s/

---

YELENA L MASLOV
03/09/2011

ZACHARY A OLESZCZUK
03/09/2011

CAROL A HOLQUIST
03/09/2011

**Department of Health and Human Services**

**Public Health Service**

**Food and Drug Administration**

**Center for Drug Evaluation and Research**

**Office of Surveillance and Epidemiology**

| | |
|---|---|
| Date: | October 7, 2010 |
| Application Type/Number: | NDA 022519 |
| Through: | Zachary Oleszczuk, Pharm.D., Team Leader<br>Denise Toyer, Pharm.D., Deputy Director<br>Carol Holquist, R.Ph., Director<br>Division of Medication Error Prevention and Analysis |
| From: | Yelena Maslov, Pharm.D., Safety Evaluator<br>Division of Medication Error Prevention and Analysis |
| Subject: | Proprietary Name Review |
| Drug Name(s): | Duexis (Ibuprofen and Famotidine) Tablets 800 mg/26.6 mg |
| Applicant: | Horizon Pharmaceuticals |
| OSE RCM #: | 2010-1524 |

***** This document contains proprietary and confidential information that should not be released to the public.*****

# CONTENTS

## EXECUTIVE SUMMARY

This review summarizes the Division of Medication Error Prevention and Analysis (DMEPA) proprietary name risk assessment for Duexis (Ibuprofen and Famotidine) Tablets 800 mg/26.6 mg (NDA022519). Our evaluation indicates that the proprietary name Duexis is potentially vulnerable to confusion that could lead to medication errors with another proposed proprietary name for a pending application within the Agency (b) (4) (NDA 022522). At this time the acceptability of the proposed proprietary name, Duexis, is dependent on which application is approved first. If Duexis is approved for marketing first, we will request the Applicant for (b) (4) seek an alternative name for that product.

The proposed proprietary name must be re-reviewed upon 90 days before approval of the NDA. If any of the proposed product characteristics as stated in this review are altered, DMEPA rescinds this finding and the name must be resubmitted for review. The conclusions upon re-review are subject to change.

## 1 BACKGROUND

### 1.1 INTRODUCTION

This review responds to a request from Horizon Pharmaceuticals dated July 9, 2010, for an assessment of the proposed proprietary name, Duexis, regarding potential name confusion with other proprietary or established drug names in the usual practice setting.

### 1.2 PRODUCT INFORMATION

Duexis (Ibuprofen and Famotidine) Tablets are indicated for the reduction of the risk of development of ibuprofen-associated upper gastroinstestinal ulcers in patients who require use of ibuprofen. The recommended dose is one tablet administered orally three times a day.

Duexis will be a prescription product available as light blue tablets with "HZT" embossed on each tablet. Duexis will be supplied in a plastic bottle containing 90 tablets.

## 2 METHODS AND MATERIALS

Appendix A describes the general methods and materials used by the Division of Medication Error Prevention and Analysis (DMEPA) when conducting a proprietary name risk assessment for all proprietary names. Sections 2.1, 2.2 and, 2.3 identify specific information associated with the methodology for reviewing the proposed proprietary name, Duexis.

### 2.1 SEARCH CRITERIA

For this review, particular consideration was given to drug names beginning with the letter 'D' when searching to identify potentially similar drug names, as 75% of the confused drug names reported by the USP-ISMP Medication Error Reporting Program involve pairs beginning with the same letter.[1,2]

To identify drug names that may look similar to Duexis, the DMEPA safety evaluators also consider the orthographic appearance of the name on the lined and unlined orders. Specific attributes taken into consideration include the length of the name (six letters), upstrokes (one, the first letter 'D', even if scripted in a lower case), down strokes (none), cross-strokes (one, the

---

*** This document contains proprietary and confidential information that should not be released to the public

[1] Institute for Safe Medication Practices. Confused Drug name List (1996 2006). Available at http://www.ismp.org/Tools/confuseddrugnames.pdf

[2] Kondrack, G and Dorr, B. Automatic Identification of Confusable Drug Names. Artificial Intelligence in Medicine (2005)

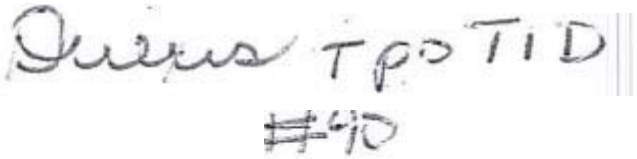
lower case letter 'x'), and dotted letters (one, 'i'). Additionally, several letters in the proposed name Duexis may be vulnerable to ambiguity when scripted (See Appendix B). As such, the DMEPA staff also considers these alternate appearances when identifying drug names that may look similar to Duexis.

When searching to identify potential names that may sound similar to Doo-EX-IS, the DMEPA staff searches for names with similar number of syllables (three), stresses (DU-e-xis, Du-E-xis, or Du-e-XIS), and placement of vowel and consonant sounds. Additionally, DMEPA staff considers that pronunciation of part of the name can vary (Appendix B). The Applicant's intended pronunciation [Doo-ex-is] was also taken into consideration, as it was included in the Proprietary Name Review Request. Moreover, names are often mispronounced or spoken with regional accents and dialects, so other pronunciations of the names are considered.

### 2.2 FDA PRESCRIPTION ANALYSIS STUDIES

In order to evaluate the potential for misinterpretation of the proposed proprietary name in handwriting and verbal communication of the name, the following inpatient and verbal orders were communicated during FDA prescription studies conducted on July 27, 2010.

**Figure 1: Duexis Prescription Study:**

| Handwritten Requisition Medication Order | Verbal Prescription |
|---|---|
| Medication Order<br>  <br> | Duexis 1 tablet by mouth use as directed |
| Outpatient Prescription<br>  <br> | |

### 2.3 EXTERNAL PROPRIETARY NAME RISK ASSESSMENT

For this product, the Applicant submitted an external evaluation of the proposed proprietary name conducted by (b) (4). The Division of Medication Error Prevention and Analysis conducts an independent analysis and evaluation of the data provided, and responds to the overall finding of the assessment. When the external proprietary name risk assessment identifies potentially confusing names that were not captured in DMEPA's database searches or in the Expert Panel Discussion, these names are included in the Safety Evaluator's Risk Assessment and analyzed independently by the Safety Evaluator to determine if the potentially confusing name could lead to medication errors in the usual practice settings.

After the Safety Evaluator has determined the overall risk associated with the proposed name, the Safety Evaluator compares the findings to their overall assessment with the findings of the proprietary name risk assessment submitted by the Applicant. The Safety Evaluator then determines whether the Division's risk assessment concurs or differs with the findings. When the

proprietary name risk assessments differ, the Division of Medication Error Prevention and Analysis provides a detailed explanation of these differences.

# 3 RESULTS

## 3.1 DATA BASE AND INFORMATION SOURCES

The DMEPA safety evaluators searches yielded a total of twenty nine names (n=29) as having some similarity to the name Duexis

Twenty four (n=24) of the twenty nine names were thought to look like Duexis. These names are (b) (4), Duet, Didrex, Duomax, Claravis, Duetact, Ranexa, Droxia, Doxil, Climara/Climara Pro, Clinimix, Duoneb, Denavir, Diovan, Orencia, Dexone/Dexone LA, Eraxis, Cleocin, Deenar, Deconex, Quixin, Floxin, Omnaris, and Genexis.

The remaining five (n=5) of the twenty nine names were though to look and sound like Duexis. These names are Duac/Duac CS, (b) (4), Dex-Tuss/Dex-Tuss DM, Dexis, and Biaxin.

Additionally, DMEPA's safety evaluators did not identify any United States Adopted Names (USAN) stems in the proposed proprietary name as of September 15, 2010.

## 3.2 EXPERT PANEL DISCUSSION

The Expert Panel reviewed the pool of names identified by DMEPA staff (see Section 3.1 above) and noted no additional names thought to have orthographic or phonetic similarity to Duexis.

DDMAC had no concerns regarding the proposed name from a promotional perspective, and did not offer any additional comments relating to the proposed name.

## 3.3 FDA PRESCRIPTION STUDIES ANALYSIS

A total of thirty six practitioners responded to the prescription analysis studies. None of the responses overlapped with other drug names. Eleven respondents interpreted the proposed name correctly as 'Duexis', with correct interpretation occurring with inpatient orders (n=5), outpatient orders (n=3), and voice prescription studies (n=3). The most common misinterpretation of the remaining 25 prescriptions occurred with misinterpreting the letter string'-ue-' as '-ir-'(n=5) and '-re-' (n=2). See Appendix C for the complete listing of interpretations from the verbal and written prescription studies.

## 3.4 EXTERNAL PROPRIETARY NAME RISK ASSESSMENT

In the proposed name risk assessment submitted by the Applicant, (b) (4) found the proposed proprietary name Duexis acceptable. The (b) (4) did not identify any names that may be vulnerable to potential confusion with the proposed name, Duexis. Thus, (b) (4) concluded that *Duexis has low vulnerability of confusion and/or patient harm from a safey prospective.*

## 3.5 COMMENTS FROM DIVISION OF GASTROINTESTINAL DRUG PRODUCTS

### *3.5.1 Initial Phase of Review*

In response to OSE email on September 16, 2010, Division of Gastroenterology Products (DGP) did not have any comments or concerns regarding the proposed proprietary name at the initial point of review.

### *3.5.2 Midpoint of Review*

DMEPA notified DGP during a review team meeting on September 15, 2010 that the proprietary name, Duexis, is vulnerable to confusion that could lead to medication errors with (b) (4), a

*** This document contains proprietary and confidential information that should not be released to the public

proposed proprietary name of a pending NDA (022522) under the review within the Agency, due to orthographic and phonetic similarities as well as shared product characteristics. DGP concurred with our assessment during the meeting. Additionally, DMEPA sent a follow-up email on regarding this issue on September 17. Per email correspondence on September 28, 2010, DGP indicated that they *do not have any objections* to our assessment.

### 3.6 SAFETY EVALUATOR RISK ASSESSMENT OF PROPOSED PROPRIETARY NAME

The primary Safety Evaluator identified eight additional names (n=8), which were thought to look or sound similar to Duexis and represent a potential source of drug name confusion.

These eight names were thought to look like Duexis. These names are (b) (4), Drinex, Tenex, Dulera, Nexium, Bumex, Depen, and Pexeva.

Thus, total of thirty seven names (n=37) were evaluated for the potential similarity to the proposed name Duexis. Eleven (n=11) of the 37 names were eliminated from the further analysis for the following reasons: six names (n=6) lack orthographic and/or phonetic similarity, one name (n=1) is not a drug, but a medical product, two names (n=2) were found in Micromedex and USPTO databases, but no information was founding any of the commonly used databases, one name (n=1) was withdrawn from the United States market, and one name (n=1) was found unacceptable by DMEPA and has never been marketed (See Appendices A through H).

Failure Mode and Effect Analysis (FMEA) was then applied to determine of the proposed proprietary name could potentially be confused with the remaining twenty six names (n=26) and, thereby, lead to medication errors. This analysis determined that the name similarity between Duexis was unlikely to result in medication errors with twenty-five of these twenty-six names for the reasons presented in Appendices I through K. However, this analysis also determined that Duexis is vulnerable to name confusion that may lead to medication errors with the remaining product, (b) (4) ***, which is currently under review by the Agency.

## 4 DISCUSSION

This proposed name, Duexis, was evaluated from a safety and promotional perspective based on the product characteristics provided by the Applicant.

### 4.1 PROMOTIONAL ASSESSMENT

DDMAC did not find the name, Duexis, promotional. DMEPA and DGP concurred with this finding.

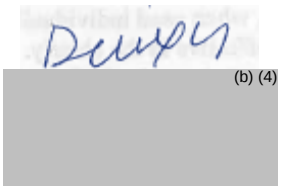
### 4.2 SAFETY ASSESSMENT

DMEPA determined that Duexis is vulnerable to name confusion that may lead to medication errors with the remaining product, (b) (4) *** (NDA 022522), which is currently under review by the Agency (b) (4)*** (Roflumilast) Tablets 500 mcg is indicated to reduce exacerbations of chronic obstructive pulmonary disease associated with chronic bronchitis and should be administered orally once daily. The (b) (4)** PDUFA goal date on 02/28/2011.

*** This is proprietary and confidential information that should not be released to the public.

### *4.2.1 Look-Alike and Sound-Alike Similarities to* (b) (4)

The orthographic similarity between Duexis and (b) (4) stems from the fact that (b) (4)



The phonetic similarity between Duexis and (b) (4) stems from the fact that (b) (4)

In addition to the orthographic and phonetic similarities, Duexis and (b) (4) share overlapping product characteristics that may increase the potential for confusion. Duexis and (b) (4) are available in the same dosage form (tablet), in a single strength (800 mg/26.6 mg vs. 500 mcg), and administered by the same route (orally). Prescribers may omit the strength of products when writing prescriptions that are only available in a single strength, without regard to whether that product contains a single active ingredient or a combination of active ingredients. Although Duexis should be administered three times a day and (b) (4)*** should be administered once a day, the difference in the frequency of administration may not be sufficient. Both products may be prescribed with directions "use as directed". Thus, DMEPA believes that orders for "(b) (4)** 1 tablet orally as directed" may be misinterpreted as "Duexis 1 tablet orally as directed" or vise versa.

### *4.2.2 External Name Study*

We note that our assessment differs from the conclusions of (b) (4) external name review. However, the name we found likely to be confused with Duexis is a product that is still under review by the Agency and not publically available.

## 5 CONCLUSIONS AND RECOMMENDATIONS

The proprietary name risk assessment findings indicate that the proposed name, Duexis, is not promotional, but is vulnerable to name confusion that could lead to medication errors with (b) (4)*** a proposed proprietary name of a pending NDA (022522) under the review with the Agency. Therefore, at this time, the acceptability of the proposed proprietary name, Duexis, is dependent upon which application is approved first.

The proposed proprietary name, Duexis, must be re-reviewed 90 days before approval of the NDA. Additionally, if any of the proposed product characteristics as stated in this review are altered, DMEPA rescinds this finding and the name must be resubmitted for the review. The conclusions upon re-review are subject to change.

If you have any questions or need clarifications, please contact Nitin Patel, OSE Regulatory Project Manager, at 301-796-5412.

## 5.1 COMMENTS TO THE APPLICANT

We have completed our review of the proposed proprietary name, Duexis, and have concluded that it is vulnerable to name confusion that could lead to medication errors with a proposed proprietary name for a pending application. Duexis and the pending proprietary name are orthographically and phonetically similar and share overlapping product characteristics. Therefore, at this time, the acceptability of the proposed proprietary name, Duexis, is dependent upon which application is approved first. If Duexis is approved first, we will recommend the second product seek an alternate name. If the second name application is approved prior to your application, then you will be requested to submit another name.

We request that you continue to pursue alternate names in the event the other application is approved first. Additionally, you may withdraw your proposed name and submit an alternate name at this time rather than waiting on approval of the other application.

If you wish to continue to pursue the proposed name Duexis at this time, we will re-review your name 90 days prior to the approval of the NDA. If **any** of the proposed product characteristics as stated in your July 9, 2010 submission are altered prior to approval of the marketing application, the proprietary name should be resubmitted for review.

# 6 REFERENCES


***1. Micromedex Integrated Index (http://csi.micromedex.com)***

Micromedex contains a variety of databases covering pharmacology, therapeutics, toxicology and diagnostics.

***2. Phonetic and Orthographic Computer Analysis (POCA)***

POCA is a database which was created for the Division of Medication Error Prevention and Analysis, FDA. As part of the name similarity assessment, proposed names are evaluated via a phonetic/orthographic algorithm. The proposed proprietary name is converted into its phonemic representation before it runs through the phonetic algorithm. Likewise, an orthographic algorithm exists which operates in a similar fashion.

***3. Drug Facts and Comparisons, online version, St. Louis, MO (http://factsandcomparisons.com)***

Drug Facts and Comparisons is a compendium organized by therapeutic course; it contains monographs on prescription and OTC drugs, with charts comparing similar products.

***4. The Document Archiving, Reporting, and Regulatory Tracking System (DARRTS)***

DARRTS is a government database used to track individual submissions and assignments in review divisions.

***5. Division of Medication Errors Prevention and Analysis proprietary name consultation requests***

This is a list of proposed and pending names that is generated by the Division of Medication Error Prevention and Analysis from the Access database/tracking system.

***6. Drugs@FDA (http://www.accessdata.fda.gov/scripts/cder/drugsatfda/index.cfm)***

Drugs@FDA contains most of the drug products approved since 1939. The majority of labels, approval letters, reviews, and other information are available for drug products approved from 1998 to the present. Drugs@FDA contains official information about FDA approved brand

name, generic drugs, therapeutic biological products, prescription and over-the-counter human drugs and discontinued drugs and "Chemical Type 6" approvals.

***7. Electronic online version of the FDA Orange Book (http://www.fda.gov/cder/ob/default.htm)***

The FDA Orange Book provides a compilation of approved drug products with therapeutic equivalence evaluations.

***8. U.S. Patent and Trademark Office (http://www.uspto.gov)***

USPTO provides information regarding patent and trademarks.

***9. Clinical Pharmacology Online (www.clinicalpharmacology-ip.com)***

Clinical Pharmacology contains full monographs for the most common drugs in clinical use, plus mini monographs covering investigational, less common, combination, nutraceutical and nutritional products. It also provides a keyword search engine.

***10. Data provided by Thomson & Thomson's SAEGIS ™ Online Service, available at (www.thomson-thomson.com)***

The Pharma In-Use Search database contains over 400,000 unique pharmaceutical trademarks and trade names that are used in about 50 countries worldwide. The data is provided under license by IMS HEALTH.

***11. Natural Medicines Comprehensive Databases (www.naturaldatabase.com)***

Natural Medicines contains up-to-date clinical data on the natural medicines, herbal medicines, and dietary supplements used in the western world.

***12. Stat!Ref (www.statref.com)***

Stat!Ref contains full-text information from approximately 30 texts; it includes tables and references. Among the database titles are: Handbook of Adverse Drug Interactions, Rudolphs Pediatrics, Basic Clinical Pharmacology, and Dictionary of Medical Acronyms Abbreviations.

***13. USAN Stems (http://www.ama-assn.org/ama/pub/category/4782.htmL)***

USAN Stems List contains all the recognized USAN stems.

***14. Red Book Pharmacy's Fundamental Reference***

Red Book contains prices and product information for prescription, over-the-counter drugs, medical devices, and accessories.

***15. Lexi-Comp (www.lexi.com)***

Lexi-Comp is a web-based searchable version of the Drug Information Handbook.

***16. Medical Abbreviations Book***

Medical Abbreviations Book contains commonly used medical abbreviations and their definitions.

## APPENDICES

**Appendix A:**

FDA's Proprietary Name Risk Assessment considers the potential for confusion between the proposed proprietary name and the proprietary and established names of drug products existing in the marketplace and those pending IND, NDA, BLA, and ANDA products currently under review by the Center. DMEPA defines a medication error as any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. [3]

For the proposed proprietary name, DMEPA staff search a standard set of databases and information sources to identify names with orthographic and phonetic similarity and hold a Center for Drug Evaluation and Research (CDER) Expert Panel discussion to gather professional opinions on the safety of the proposed proprietary name. DMEPA staff also conducts internal CDER prescription analysis studies. When provided, DMEPA considers external prescription analysis study results and incorporate into the overall risk assessment.

The Safety Evaluator assigned to the Proprietary Name Risk Assessment is responsible for considering the collective findings, and provides an overall risk assessment of the proposed proprietary name. DMEPA bases the overall risk assessment on the findings of a Failure Mode and Effects Analysis (FMEA) of the proprietary name, and focuses on the avoidance of medication errors.

FMEA is a systematic tool for evaluating a process and identifying where and how it might fail. [4] DMEPA uses FMEA to analyze whether the drug names identified with orthographic or phonetic similarity to the proposed proprietary name could cause confusion that subsequently leads to medication errors in the clinical setting. DMEPA uses the clinical expertise of its staff to anticipate the conditions of the clinical setting where the product is likely to be used based on the characteristics of the proposed product.

In addition, the product characteristics provide the context for the verbal and written communication of the drug names and can interact with the orthographic and phonetic attributes of the names to increase the risk of confusion when there is overlap or, in some instances, decrease the risk of confusion by helping to differentiate the products through dissimilarity. Accordingly, the DMEPA staff considers the product characteristics associated with the proposed drug throughout the risk assessment because the product characteristics of the proposed may provide a context for communication of the drug name and ultimately determine the use of the product in the *usual* clinical practice setting.

Typical product characteristics considered when identifying drug names that could potentially be confused with the proposed proprietary name include, but are not limited to; established name of the proposed product, proposed indication of use, dosage form, route of administration, strength, unit of measure, dosage units, recommended dose, typical quantity or volume, frequency of administration, product packaging, storage conditions, patient population, and prescriber population. Because drug name confusion can occur at any point in the medication use process, DMEPA staff considers the potential for confusion throughout the entire U.S. medication use process, including drug procurement, prescribing and ordering, dispensing, administration, and monitoring the impact of the medication.[5] DMEPA provides the product characteristics considered for this review in section one.

---

[3] National Coordinating Council for Medication Error Reporting and Prevention. http://www.nccmerp.org/aboutMedErrors.htmL. Last accessed 10/11/2007.

[4] Institute for Healthcare Improvement (IHI). Failure Modes and Effects Analysis. Boston. IHI:2004.

[5] Institute of Medicine. Preventing Medication Errors. The National Academies Press: Washington DC. 2006.

The Division of Medication Error Prevention and Analysis considers the spelling of the name, pronunciation of the name when spoken, and appearance of the name when scripted. DMEPA also compares the spelling of the proposed proprietary name with the proprietary and established name of existing and proposed drug products because similarly in spelled names may have greater likelihood to sound similar to one another when spoken or look similar to one another when scripted. DMEPA staff also examines the orthographic appearance of the proposed name using a number of different handwriting samples. Handwritten communication of drug names has a long-standing association with drug name confusion. Handwriting can cause similarly and even dissimilarly spelled drug name pairs to appear very similar to one another. The similar appearance of drug names when scripted has led to medication errors. The DMEPA staff applies expertise gained from root-cause analysis of such medication errors to identify sources of ambiguity within the name that could be introduced when scripting (e.g.,"T" may look like "F," lower case 'a' looks like a lower case 'u,' etc). Additionally, other orthographic attributes that determine the overall appearance of the drug name when scripted (see Table 1 below for details). In addition, the DMEPA staff compares the pronunciation of the proposed proprietary name with the pronunciation of other drug names because verbal communication of medication names is common in clinical settings. If provided, DMEPA will consider the Sponsor's intended pronunciation of the proprietary name. However, DMEPA also considers a variety of pronunciations that could occur in the English language because the Sponsor has little control over how the name will be spoken in clinical practice.

**Table 1.** Criteria used to identify drug names that look- or sound-similar to a proposed proprietary name.

| **Type of similarity** | **Considerations when searching the databases** | | |
|---|---|---|---|
| | *Potential causes of drug name similarity* | *Attributes examined to identify similar drug names* | *Potential Effects* |
| Look-alike | Similar spelling | Identical prefix<br>Identical infix<br>Identical suffix<br>Length of the name<br>Overlapping product characteristics | • Names may appear similar in print or electronic media and lead to drug name confusion in printed or electronic communication<br>• Names may look similar when scripted and lead to drug name confusion in written communication |
| | Orthographic similarity | Similar spelling<br>Length of the name<br>Upstrokes<br>Down strokes<br>Cross-strokes<br>Dotted letters<br>Ambiguity introduced by scripting letters<br>Overlapping product characteristics | • Names may look similar when scripted, and lead to drug name confusion in written communication |
| Sound- | Phonetic | Identical prefix | • Names may sound similar when |

| | | | |
|---|---|---|---|
| alike | similarity | Identical infix<br>Identical suffix<br>Number of syllables<br>Stresses<br>Placement of vowel sounds<br>Placement of consonant sounds<br>Overlapping product characteristics | pronounced and lead to drug name confusion in verbal communication |

Lastly, the DMEPA staff also considers the potential for the proposed proprietary name to inadvertently function as a source of error for reasons other than name confusion. Post-marketing experience has demonstrated that proprietary names (or components of the proprietary name) can be a source of error in a variety of ways. Consequently, DMEPA considers and evaluates these broader safety implications of the name throughout this assessment and the medication error staff provides additional comments related to the safety of the proposed proprietary name or product based on professional experience with medication errors.

### 1. Database and Information Sources

DMEPA staff conducts searches of the internet, several standard published drug product reference texts, and FDA databases to identify existing and proposed drug names that may sound-alike or look-alike to the proposed proprietary name using the criteria outlined in Section 2.1. Section 6 provides a standard description of the databases used in the searches. To complement the process, the DMEPA staff use a computerized method of identifying phonetic and orthographic similarity between medication names. The program, Phonetic and Orthographic Computer Analysis (POCA), uses complex algorithms to select a list of names from a database that have some similarity (phonetic, orthographic, or both) to the trademark being evaluated. Lastly, the DMEPA staff review the USAN stem list to determine if any USAN stems are present within the proprietary name. The individual findings of multiple safety evaluators are pooled and presented to the CDER Expert Panel.

### 2. CDER Expert Panel Discussion

DMEPA conducts an Expert Panel Discussion to gather CDER professional opinions on the safety of the proposed product and the proposed proprietary name. The Expert Panel is composed of Division of Medication Errors Prevention (DMEPA) staff and representatives from the Division of Drug Marketing, Advertising, and Communications (DDMAC). The Expert Panel also discusses potential concerns regarding drug marketing and promotion related to the proposed names.

The primary Safety Evaluator presents the pooled results of the DMEPA staff to the Expert Panel for consideration. Based on the clinical and professional experiences of the Expert Panel members, the Panel may recommend the addition of names, additional searches by the primary Safety Evaluator to supplement the pooled results, or general advice to consider when reviewing the proposed proprietary name.

### 3. FDA Prescription Analysis Studies

Three separate studies are conducted within the Centers of the FDA for the proposed proprietary name to determine the degree of confusion of the proposed proprietary name with marketed U.S. drug names (proprietary and established) due to similarity in visual appearance with handwritten prescriptions or verbal pronunciation of the drug name. The studies employ healthcare

professionals (pharmacists, physicians, and nurses), and attempts to simulate the prescription ordering process. The primary Safety Evaluator uses the results to identify orthographic or phonetic vulnerability of the proposed name to be misinterpreted by healthcare practitioners.

In order to evaluate the potential for misinterpretation of the proposed proprietary name in handwriting and verbal communication of the name, inpatient medication orders and/or outpatient prescriptions are written, each consisting of a combination of marketed and unapproved drug products, including the proposed name. These orders are optically scanned and one prescription is delivered to a random sample of the 123 participating health professionals via e-mail. In addition, a verbal prescription is recorded on voice mail. The voice mail messages are then sent to a random sample of the participating health professionals for their interpretations and review. After receiving either the written or verbal prescription orders, the participants send their interpretations of the orders via e-mail to DMEPA.

### 4. Comments from the OND review Division or Generic drugs

DMEPA requests the Office of New Drugs (OND) or Office of Generic Drugs (OGD) Regulatory Division responsible for the application for their comments or concerns with the proposed proprietary name and any clinical issues that may impact the DMEPA review during the initial phase of the name review. Additionally, when applicable, at the same time DMEPA requests concurrence/non-concurrence with DDMAC's decision on the name. The primary Safety Evaluator addresses any comments or concerns in the safety evaluator's assessment.

The OND or OGD Regulatory Division is contacted a second time following our analysis of the proposed proprietary name. At this point, DMEPA conveys their decision to accept or reject the name. The OND or OGD Regulatory Division is requested to concur/not concur with DMEPA's final decision.

## 5. Safety Evaluator Risk Assessment of the Proposed Proprietary Name

The primary Safety Evaluator applies his/her individual expertise gained from evaluating medication errors reported to FDA, conducts a Failure Mode and Effects Analysis, and provides an overall risk assessment of name confusion. Failure Mode and Effects Analysis (FMEA) is a systematic tool for evaluating a process and identifying where and how it might fail.[6] When applying FMEA to assess the risk of a proposed proprietary name, DMEPA seeks to evaluate the potential for a proposed proprietary name to be confused with another drug name because of name confusion and, thereby, cause errors to occur in the medication use system. FMEA capitalizes on the predictable and preventable nature of medication errors associated with drug name confusion. FMEA allows the Agency to identify the potential for medication errors due to orthographically or phonetically similar drug names prior to approval, where actions to overcome these issues are easier and more effective than remedies available in the post-approval phase.

In order to perform an FMEA of the proposed name, the primary Safety Evaluator must analyze the use of the product at all points in the medication use system. Because the proposed product is has not been marketed, the primary Safety Evaluator anticipates the use of the product in the usual practice settings by considering the clinical and product characteristics listed in Section one. The Safety Evaluator then analyzes the proposed proprietary name in the context of the usual practice setting and works to identify potential failure modes and the effects associated with the failure modes.

In the initial stage of the Risk Assessment, the Safety Evaluator compares the proposed proprietary name to all of the names gathered from the above searches, Expert Panel Discussion, and prescription studies, external studies, and identifies potential failure modes by asking:

[6] Institute for Healthcare Improvement (IHI). Failure Mode and Effects Analysis. Boston. IHI:2004.

***"Is the proposed proprietary name convincingly similar to another drug name, which may cause practitioners to become confused at any point in the usual practice setting?"***

An affirmative answer indicates a failure mode and represents a potential for the proposed proprietary name to be confused with another proprietary or established drug name because of look- or sound-alike similarity. If the answer to the question is no, the Safety Evaluator is not convinced that the names posses similarity that would cause confusion at any point in the medication use system, thus the name is eliminated from further review.

In the second stage of the Risk Assessment, the primary Safety Evaluator evaluates all potential failure modes to determine the likely *effect* of the drug name confusion, by asking:

***"Could the confusion of the drug names conceivably result in medication errors in the usual practice setting?"***

The answer to this question is a central component of the Safety Evaluator's overall risk assessment of the proprietary name. If the Safety Evaluator determines through FMEA that the name similarity would not ultimately be a source of medication errors in the usual practice setting, the primary Safety Evaluator eliminates the name from further analysis. However, if the Safety Evaluator determines through FMEA that the name similarity could ultimately cause medication errors in the usual practice setting, the Safety Evaluator will then recommend the use of an alternate proprietary name.

DMEPA will object to the use of proposed proprietary name when the primary Safety Evaluator identifies one or more of the following conditions in the Risk Assessment:

a. DDMAC finds the proposed proprietary name misleading from a promotional perspective, and the Review Division concurs with DDMAC's findings. The Federal Food, Drug, and Cosmetic Act provides that labeling or advertising can misbrand a product if misleading representations are made or suggested by statement, word, design, device, or any combination thereof, whether through a PROPRIETARY name or otherwise [21 U.S.C 321(n); See also 21 U.S.C. 352(a) & (n)].

b. DMEPA identifies that the proposed proprietary name is misleading because of similarity in spelling or pronunciation to another proprietary or established name of a different drug or ingredient [CFR 201.10.(C)(5)].

c. FMEA identifies the potential for confusion between the proposed proprietary name and other proprietary or established drug name(s), and demonstrates that medication errors are likely to result from the drug name confusion under the conditions of usual clinical practice.

d. The proposed proprietary name contains an USAN (United States Adopted Names) stem.

e. DMEPA identifies a potential source of medication error within the proposed proprietary name. For example, the proprietary name may be misleading or, inadvertently, introduce ambiguity and confusion that leads to errors. Such errors may not necessarily involve confusion between the proposed drug and another drug product.

If DMEPA objects to a proposed proprietary name on the basis that drug name confusion could lead to medication errors, the primary Safety Evaluator uses the FMEA process to identify strategies to reduce the risk of medication errors. DMEPA is likely to recommend that the Sponsor select an alternative proprietary name and submit the alternate name to the Agency for DMEPA to review. However, in rare instances FMEA may identify plausible strategies that could reduce the risk of medication error of the currently proposed name. In that instance, DMEPA may be able to provide the Sponsor with recommendations that reduce or eliminate the potential for error and, thereby, would render the proposed name acceptable.

In the event that DMEPA objects to the use of the proposed proprietary name, based upon the potential for confusion with another proposed (but not yet approved) proprietary name, DMEPA will provide a contingency objection based on the date of approval. Whichever product, the

Agency approves first has the right to use the proprietary name, while DMEPA will recommend that the second product to reach approval seek an alternative name.

The threshold set for objection to the proposed proprietary name may seem low to the Sponsor. However, the safety concerns set forth in criteria a through e are supported either by FDA regulation or by external healthcare authorities, including the Institute of Medicine (IOM), World Health Organization (WHO), the Joint Commission, and the Institute for Safe Medication Practices (ISMP). These organizations have examined medication errors resulting from look- or sound-alike drug names and called for regulatory authorities to address the issue prior to approval. Additionally, DMEPA contends that the threshold set for the Proprietary Name Risk Assessment is reasonable because proprietary drug name confusion is a predictable and a preventable source of medication error that, in many instances, the Agency and/or Sponsor can identify and rectify prior to approval to avoid patient harm.

Furthermore, post-marketing experience has demonstrated that medication errors resulting from drug name confusion are notoriously difficult to rectify post-approval. Educational and other post-approval efforts are low-leverage strategies that have had limited effectiveness at alleviating medication errors involving drug name confusion. Sponsors have undertaken higher-leverage strategies, such as drug name changes, in the past but at great financial cost to the Sponsor and at the expense of the public welfare, not to mention the Agency's credibility as the authority responsible for approving the error-prone proprietary name. Moreover, even after Sponsors' have changed a product's proprietary name in the post-approval phase, it is difficult to eradicate the original proprietary name from practitioners' vocabulary, and as a result, the Agency has continued to receive reports of drug name confusion long after a name change in some instances. Therefore, DMEPA believes that post-approval efforts at reducing name confusion errors should be reserved for those cases in which the potential for name confusion could not be predicted prior to approval. . (See Section 4 for limitations of the process).

If DMEPA objects to a proposed proprietary name on the basis that drug name confusion could lead to medication errors, the primary Safety Evaluator uses the FMEA process to identify strategies to reduce the risk of medication errors. DMEPA is likely to recommend that the Sponsor select an alternative proprietary name and submit the alternate name to the Agency for DMEPA to review. However, in rare instances FMEA may identify plausible strategies that could reduce the risk of medication error of the currently proposed name. In that instance, DMEPA may be able to provide the Sponsor with recommendations that reduce or eliminate the potential for error and, thereby, would render the proposed name acceptable.

In the event that DMEPA objects to the use of the proposed proprietary name, based upon the potential for confusion with another proposed (but not yet approved) proprietary name, DMEPA will provide a contingency objection based on the date of approval. Whichever product, the Agency approves first has the right to use the proprietary name, while DMEPA will recommend that the second product to reach approval seek an alternative name.

**Appendix B: Letters with possible orthographic or phonetic misinterpretation**

| Letters in Name, Duexis | Scripted may appear as | Spoken may be interpreted as |
|---|---|---|
| Capital 'D' | 'O', 'T', 'B', 'N' | 'B', 'T" |
| Lower case 'd' | 'cl', 'a' | 't', 'b' |
| Lower case 'u' | 'n', 'y', 'v', 'w', '4' | Any vowel |
| Letter string 'e' | 'a', 'i', 'l', 'p', 'o' | Any vowel |
| Lower case 'x' | 'a', 'f', 'k', 'n', 'p', 'r', 't', 'v', or 'y' | 'ks', 'kz', 's', or 'z' |
| Lower case 'i' | 'e', 'c' | 'y', 'e' |
| Lower case 's' | 'G', 'g', 'n', 'c', 'z', '5' | 'x', 'z' |

**Appendix C: FDA Prescription study for Duexis from 07/27/2010**

Figure 1: Duexis study samples

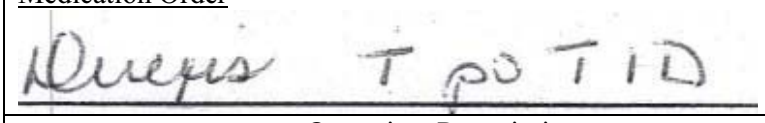
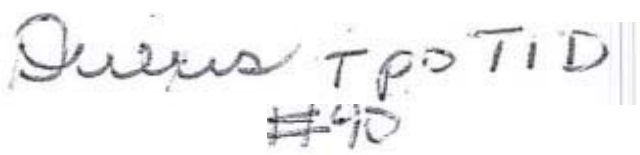
| Handwritten Requisition Medication Order | Verbal Prescription |
|---|---|
| Medication Order<br>  <br>Outpatient Prescription<br>  | Duexis 1 tablet by mouth use as directed |

Table 1: Responses to prescription study

| Inpatient Medication Order 07/27/2010 | Outpatient Prescription Order 07/27/2010 | Voice Prescription |
|---|---|---|
| Duexis | Duexis | Duexis |
| Duexis | Duresis | Trexes |
| Diresis | Dulxis | Direxis |
| Duexis | Irexis | Duexes |
| Direxis | Dueris | Duoxes |
| Direxis | Delrus | Duexes |

| | | |
|---|---|---|
| Direxis | Devris | Duexis |
| Duegis | Dreiris | Duexes |
| Duegis | Dueris | Duexis |
| Duexis | Drexis | |
| Direxis | Duexis | |
| Duexis | Dueris | |
| Direxis | Duexis | |
| | Dueris | |

**Appendix D:** Names of products that lack convincing orthographic and/or phonetic similarity

| Drug Product Name | Drug Product Name |
|---|---|
| Eraxis | Floxin |
| Clinimix | Orencia |
| Omnaris | Doxil |

**Appendix E: Medical product that is not a drug**

| Name | Similarity to Duexis | Product Description |
|---|---|---|
| Dexis | Look alike and sound alike | Digital X-ray for Dental procedures and not pursuant to a prescription |

**Appendix F: Proprietary Names found in Micromedex and United States Patent and Trademark Office (USPTO) Databases, but no product characteristics or other information was found in any of the commonly used databases listed in Reference Section (Section 6)**

| Proprietary Name | Similarity to Duexis | Active Ingredients | Marketed Product | Database Found |
|---|---|---|---|---|
| Genexis | Look Alike | Unknown, Dietary Supplement | Does not appear to be marketed | USPTO |
| Deenar | Look Alike | Orphenadrine HCl 15 mg Dexamethasone 0.15 mg Aluminum Aspirin 300 mg | Does not appear to be marketed | Micromedex |

**Appendix G: Name of the products withdrawn from the United States market**

| Proprietary Name | Similarity to Duexis | Status |
|---|---|---|
| Drinex (Acetaminophen 650 mg, Chlorpheniramine Maleate 4 mg, and Pseudoephedrine HCl 60 mg) tablets | Look alike | Product discontinued by the manufacturer, Breckinridge Pharmaceuticals in February 2009. This product was previously marketed over-the-counter for temporary relief of symptoms of common cold. |

**Appendix H: Name of the product that have not been approved**

| Proprietary Name | Similarity to Duexis | Status of a Product Name |
|---|---|---|
| [redacted] | | (b) (4) |

*** This document contains proprietary and confidential information that should not be released to public

**Appendix I:** **Names of the products with no overlap in dose and/or strength**

| **Product name with potential for confusion** | **Similarity to Duexis** | **Dosage Form and Strength** | **Usual Dose (If applicable)** |
|---|---|---|---|
| **Duexis (Ibuprofen and Famotidine)** | **N/A** | **Tablet: Ibuprofen 800 mg and Famotidine 26.6 mg** | **Take 1 tablet orally three times a day. Could be ordered on 'as needed' basis** |
| Bumex (Bumetanide) | Look alike | Tablet: 0.5 mg, 1 mg, 2 mg | Take 0.5 mg to 2 mg orally once daily |
| Dulera (Mometasone Furoate and Formoterol Fumarate) | Look alike | Inhalation Aerosol: 100 mcg/5 mcg and 200 mcg/5 mcg per inhalation; supplied as 120 inhalations per canister | 2 inhalations of 100 mcg /5 mcg or 200 mcg/5 mcg twice daily approximately 12 Hours apart |
| Nexium (Esomeprazole) | Look alike | Capsules, Delayed-Release<br>20 mg and 40 mg<br><br>Powder for Suspension, Delayed-Release<br>10 mg, 20 mg, 40 mg<br><br>Powder for Injection<br>20 mg and 40 mg | Capsules, Delayed-Release<br>20 mg to 40 mg orally once a day 1 hour before meals for 4 to 8 weeks<br>Powder for Suspension, Delayed-Release<br>10 mg to 40 mg orally once daily 1 hour before meals for 4 to 8 weeks<br>Powder for Injection<br>20 mg to 40 mg intravenously once daily for up to 10 days |

| | | | |
|---|---|---|---|
| Claravis<br>(Isotretinoin) | Look alike | Capsules:<br>10 mg, 20 mg, 30 mg, 40 mg | Labeled indication for treatment of severe recalcitrant cystic acne vulgaris ( nodular acne)<br>0.25 mg/kg/day to 1 mg /kg/day orally twice daily<br><br>Unlabeled Indications (Clinical Trials are ongoing) for treatment of various malignancies<br>1 mg/kg/day to 4 mg/kg /day orally divided in two doses<br>And<br>100 mg/m2/day to 200 mg/m2/day divided in two doses up to 12 courses. |
| Tenex<br>Guanfacine) | Look alike | Tablet: 1 mg and 2 mg | 1 mg to 4 mg orally once daily |
| Duetact<br>(Glimepiride and Pioglitazone) | Look alike | Tablets: 2 mg/30 mg and 4 mg/30 mg | 1 tablet of 2 mg/30 mg or 4 mg/30 mg orally once daily |
| Ranexa<br>(Ranolazine) | Look alike | Tablets, Extended Release: 500 mg and 1000 mg | 1 tablet of 500 mg or 1000 mg orally twice daily |
| Pexeva<br>(Paroxetine Mesylate) | Look alike | Tablets: 10 mg, 20 mg, 30 mg, 40 mg Base | 20 mg to 60 mg depending on indication and tolerance, orally once daily, usually in the morning |
| Climara<br>(Estradiol) | Look alike | Patch: 0.025 mg/24 hr,<br>0.0375 mg/24 hr, 0.05 mg/24 hr,<br>0.06 mg/24 hr, 0.075 mg/24hr,<br>0.1 mg/24 hr | Apply 1 patch to trunk or buttocks to be worn continuously for 1 week, replace patch once every week |
| Diovan<br>(Valsartan) | | Capsules: 80 mg and 160 mg<br><br>Tablets: 40 mg, 80 mg, 160 mg, 320 mg | Treatment of hypertension<br>80 mg to 320 mg orally once daily<br><br>Treatment of Chronic heart failure and reduction of mortality in patients with left ventricular dysfunction<br>20 mg to 160 mg orally twice daily as tolerated |
| Dexone<br>(Dexamethasone)<br><br>*Proprietary name discontinued, generic equivalent available | Look alike | Tablets: 0.5 mg, 0.75 mg, 1.5 mg, 4 mg | Various Dosing for multiple indications: 0.5 mg to 9 mg orally once daily to every 4 to 6 hours. |

| | | | |
|---|---|---|---|
| Cleocin<br>(Clindamycin)<br><br>Note: Injection and Powder for Solution may have a numeric overlap in achievable dose, thus are presented in Appendix K. | Look alike | <br><br><u>Capsules:</u> 75 mg, 150 mg, 300 mg<br><br><u>Topical Gel, Topical Lotion, Topical Solution, Topical Pledget</u>: dosage forms available as 1%<br><br><u>Vaginal Cream</u>: 2%<br><br><u>Vaginal Suppository:</u> 100 mg | Various Dosing for Multiple Infections:<br>Usual Dosing: 150 mg to 450 mg orally once a day to four times a day<br><br>Apply to affected area once daily to twice daily<br><br>Apply 1 applicatorful intravaginally every night at bedtime for 7 nights<br>Insert 1 suppository intravaginally every night at bedtime for 3 nights |
| <u>Biaxin</u><br>(Clarithromycin)<br><br><br><br><u>Biaxin XL</u><br>(Clarithromycin) | Look alike and Sound alike | <u>Biaxin</u><br>Tablets: 250 mg, 500 mg<br><br><u>Powder for Suspension:</u><br>125 mg/5 mL, 250 mg/5 mL<br><br><u>Biaxin XL:</u><br>Tablets Extended Release: 500 mg | <u>Biaxin</u><br>Adults: 250 mg to 500 mg orally twice daily for 7 to 14 days<br>Children over 6 months of age:<br>7.5 mg/kg orally every 12 hours for 7 to 14 days<br><u>Biaxin XL:</u><br>2 tablets or 500 mg orally once daily for 7 days |

**Appendix J: Single Strength Products with Differentiating Product Characteristics**

| Product name with potential for confusion | Similarity to Duexis | Dosage form/ Strength | Usual Dose | Other Differentiating Product Characteristics |
|---|---|---|---|---|
| **Duexis (Ibuprofen and Famotidine)** | **N/A** | **Tablet: Ibuprofen 800 mg and Famotidine 26.6 mg** | **Take 1 tablet orally three times a day. Could be ordered on 'as needed' basis** | |
| [redacted] | | | | (b) (4) |
| Climara Pro (Estradiol and Levonorgestrel) | Look alike | Patch: Estradiol 0.045 mg/24 hr and Levonorgestrel 0.015 mg/24 hr | Apply to lower abdomen to be worn continuously for 1 week, replace patch once every week | Dosage Form<br>Tablet vs. patch<br><br>Route of Administration<br>Oral vs. topical<br><br>Frequency of Administration<br>Three times a day vs. once every week |
| Duoneb (Albuterol and Ipratropium Bromide) | Look alike | Solution for Inhalation: Albuterol 3 mg/3mL and Ipratropium Bromide 0.5 mg/3mL | Nebulize one 3 mL vial four times a day with up to additional 2 doses of 3 mL vials allowed per day | Dosage Form<br>Tablet vs. Solution for Inhalation<br><br>Route of Administration<br>Oral vs. oral inhalation<br><br>Frequency of Administration<br>Three times a day vs. four to six times a day as needed |

*** This document contains proprietary and confidential information that should not be released to public

| | | | | |
|---|---|---|---|---|
| Denavir<br>(Pencyclovir) | Look alike | Topical Cream: 1% | Apply to affected skin every 2 hours while awake for 4 days beginning within 1 hour of onset of symptoms | <u>Dosage Form</u><br>Tablet vs. topical cream<br><br><u>Route of Administration</u><br>Oral vs. topical<br><br><u>Frequency of Administration</u><br>Three times a day vs. every 2 hours while awake for 4 days |
| Duac<br>(Benzoyl Peroxide and Clindamycin Phosphate)<br><br>Duac CS<br>(Benzoyl Peroxide and Clindamycin Phosphate with Cleanser) | Look alike<br><br>Look alike and sound alike | Gel: Benzoyl Peroxide 5% and Clindamycin 1%<br>45 gm tube<br><br>Care System Kit: Benzoyl Peroxide 5% , Clindamycin 1% 45 gm Topical gel, and 106.6 mL Cleanser Lotion | Apply once daily in the evening | <u>Dosage Form</u><br>Tablet vs. topical gel<br><br><u>Route of Administration</u><br>Oral vs. topical<br><br><u>Frequency of Administration</u><br>Three times a day vs. once daily in the evening |
| Dex-Tuss<br>(Codeine Phosphate and Guaifenesin)<br><br>Dex-Tuss DM<br>(Dextromethorphan Hydrobromide and Guaifenesin) | Look alike and Sound alike | Solution: Codeine Phosphate 10 mg and Guaifenesin 300 mg per 5mL of solution<br><br>Dextromethorphan Hydrobromide 10 mg and Guaifenesin 300 mg per 5 mL of solution | 1.25 mL to 5 mL( ¼ to 1 teaspoonful) orally every 4 to 6 hours as needed<br><br>2.5 mL to 15 mL (½ teaspoonful to 3 teaspoonfuls) orally every 4 to 6 hours as needed | <u>Orthographic</u><br>1 upstroke and 1 dotted letter vs. 2 upstrokes and no dotted letters. Additionally, letter string '-xis' looks different from the letter string '-tuss'<br><br><u>Dosage Form</u><br>Tablet vs. Oral Solution<br><br><u>Usual Dose with Dex-Tuss</u><br>1 tablet vs. 1.25 mL to 5 mL (¼ to 1 teaspoonful)<br><br><u>Usual Dose with Dex-Tuss DM</u><br>1 tablet vs 2.5 mL to 15 mL (½ teaspoonful to 3 teaspoonfuls)<br><br><u>Frequency of Administration</u><br>Three times a day vs. every 4 to 6 hours |

**<u>Appendix K:</u> Potentially confusing names with overlap in strength, but analysis indicates low potential for confusion**

| **Failure Mode: Name Confusion** | **Causes (can be multiple)** | **Rationale for Failure Mode Prevention** |
|---|---|---|
| **Duexis ( Ibuprofen and Famotidine) Tablets 800 mg/26.6 mg** | **N/A** | **1 tablet orally three times a day** |
| Droxia<br>(Hydroxyurea)<br><br><u>Dosage Form</u><br>Capsule<br><br><u>Strength</u><br>200 mg, 300 mg, 400 mg<br><br><u>Route of Administration</u><br>Oral<br><br><u>Usual Dose</u><br><u>Leukemias</u><br>For WBC >100,000/$mm^3$, 50 mg/kg to 75 mg/kg orally once daily<br>WBC < 100, 000/$mm^3$, 10 mg/kg to 30 mg /kg orally once daily.<br><br><u>Solid Tumors, depending on the tumor origin:</u><br>80 mg/kg orally every third day or 20-30 mg/kg orally once daily<br><br>And<br><br>1500 mg/$m^2$ to 3000 mg /$m^2$ orally as a single dose every 4 to 6 weeks<br><br>*Safety and efficacy in children has not been established | <u>Orthographic</u><br>Both names contain six letters, one upstroke, and start with the letter 'D'. The letter string '-xis' in the name Duexis may be scripted similarly to the corresponding letter string '-xia' in the name Droxia. Both names have dotted letter '-i-' in the same position. The letter string '-ue-' in the name Duexis may be scripted similarly to the letter string '-ro-'<br><br><u>Dosage Form</u><br>Both products are oral solid dosage forms (tablets vs. capsules)<br><br><u>Route of Administration</u><br>Both products are administered orally<br><br><u>Prescribed Dose</u><br>Possible Numerical Overlap in dose of 800 mg (800 mg of Dorxia for a 40 kg patient vs. 800 mg/26.6 mg of Duexis) | Differences in product characteristics minimize the likelihood of medication errors in the usual practice settings<br><br><u>Usual Dose</u><br>It would not be typical for a prescriber to write only one active ingredient of a single strength combination product. It is more likely the prescriber will omit the strength or will write the strength for both ingredients.<br><br><u>Frequency of Administration</u><br>Duexis is administered three times a day whereas Droxia should be administered once daily or every third day depending on the indication and the dose tolerated. |

| | | |
|---|---|---|
| Cleocin<br>(Clindamycin)<br><br>Dosage Form and Strength<br>**Injection (150 mg/mL)** available as:<br>150 mg/mL, 300 mg/2 mL, 600 mg/4 mL, 900 mg/6 mL<br><br>**Injection: 300 mg/50 mL (6 mg/mL)** available as:<br>600 mg/50 mL (12 mg/mL), 900 mg/50 mL (15 mg/mL)<br><br>**Powder for Solution:**<br>75 mg/5mL<br><br>Route of Administration<br>Injections: Intravenously or intramuscularly<br><br>Powder for Solution: Orally<br><br>Usual Dose<br>Usual Dosing: 150 mg to 450 mg once a day to four times a day<br><br>Note: due to no overlap in strengths or doses between the Cleocin capsules and Duexis tablets, Cleocin capsules description is placed in Appendix I | Orthographic<br>Both names contain one upstroke in the beginning of the name and dotted letter 'i' in similar positions. Additionally, if the letters 'd' and 'c' are scripted in a lower case,then the letter strings 'du-' in Duexis and 'cle-' in Cleocin may appear similar when scripted. Also, letter strings '-is' in Duexis and '-in' in Cleocin may appear similar when scripted as well.<br><br>Route of Administration<br>Duexis and Cleocin powder for solution are administered orally<br><br>Prescribed Dose<br>Possible Numerical Overlap in dose of 800 mg (800 mg of Cleocin vs. 800 mg/26.6 mg of Duexis)<br><br>Frequency of Administration<br>Both products may be administered multiple times a day. | Orthographic differences in the names combined in addition to differences in product characteristics minimize the likelihood of medication errors in the usual practice settings<br><br>Orthographic<br>Duexis contains a cross-stroke letter 'x' whereas Cleocin does not. Additionally, the letter string '-ex-' lacks similarity with the letter string '-oc-' when scripted as well.<br><br>Dosage Form<br>Because Cleocin is available in multiple dosage forms, health care practitioners need to define which dosage form they would like to be dispensed to a patient<br><br>Strength<br>Duexis is available in one strength whereas Cleocin Injection is available in several strengths. |

| | | |
|---|---|---|
| Depen<br>(Penicillamine)<br><br>Dosage From<br>Tablet<br><br>Strength<br>250 mg<br><br>Route of Administration<br>Oral<br><br>Usual Dose<br>1 tablet<br><br>Frequency of Administration<br>Once daily to four times daily | Orthographic<br>Both names start with the letter 'D' and contain 1 upstroke. Additionally, the letter string '-is' and the letter '-x-' in Duexis may be scripted similarly to the letter '-n' and '-p-' in the name Depen respectively.<br>Dosage Form<br>Both products are available only as tablets<br><br>Strength<br>Both products are available as single strength products. Thus, practitioners may omit the strength when writing a prescription.<br><br>Usual Dose<br>Both products are administered as 1 tablet<br><br>Frequency of Administration<br>Both products may be administered three times a day | Orthographic differences in the names minimize the likelihood of medication errors in the usual practice settings<br><br>Orthographic<br>The proposed name Duexis contains 6 letters and no down strokes whereas the name Depen contains five letters and 1 down stroke. Additionally, the letter '-u-' in Duexis is wide; thus, making the name Duexis appear wider than the name Depen. The name Duexis also contains a dotted letter '-i-' |
| Quixin (Levofloxacin)<br><br>Dosage From<br>Ophthalmic Solution<br><br>Strength<br>0.5%<br><br>Route of Administration<br>Ophthalmic<br><br>Usual Dose<br>1 to 2 drops<br><br>Frequency of Administration<br>Day 1 and 2: every 2 hours while awake, up to 8 times per day<br>Day 3 through 7: every 4 hours while awake, up to 4 times a day | Orthographic<br>Both names contain 6 letters, and 1 upstroke. The letter strings '-ue-' and '-xis' in the name Duexis may be scripted similarly to the corresponding letter strings '-ui-' and '-xin' in Quixin<br><br>Strength<br>Since both products are only available in single strength, a prescriber may omit the strength of each product on a prescription<br><br>Dose, Route and Frequency of Administration<br>Both products may be prescribed as "use as directed" | Orthographic differences in the names combined in addition to differences in product characteristics minimize the likelihood of medication errors in the usual practice settings<br><br>Orthographic<br>The first letter 'D' in Duexis is orthographically different from the first letter 'Q' in Quixin when scripted.<br>The name Duexis contains one dotted letter '-i-' vs. the name Quixin contains two dotted letters '-i-'.<br><br>Dosage Form<br>Tablets vs. Ophthalmic Solution<br><br>Quantity Prescribed<br>Duexis will usually scripted in quantities exceeding #1 (usually #90) whereas Quixin is scripted in quantities of #1 |

| | | |
|---|---|---|
| Duet<br>(Prenatal Multivitamins and Minerals with Iron and Folic Acid)<br><br>Dosage From<br>Tablets<br><br>Route of Administration<br>Oral<br><br>Usual Dose<br>1 tablet<br><br>Frequency of Administration<br>Once a day | Orthographic<br>Both names start with the letter string 'Due-'<br><br>Strength<br>Since both products are only available in single strength, a prescriber may omit the strength on the prescription.<br><br>Dosage form<br>Both products ate tablets<br><br>Route of Administration<br>Both products are administered orally<br><br>Usual Dose<br>Both products are administered as 1 tablet | Orthographic differences in the names combined in addition to differences in product characteristics minimize the likelihood of medication errors in the usual practice settings<br><br>Orthographic<br>Duexis contains 6 letters, whereas Duet contains only 4 letters; thus, making the name Duet visually shorter than the name Duexis when scripted. Additionally, Duexis contains 1 upstroke and one dotted letter '-i-', whereas Duet contains two upstrokes and no dotted letters.<br><br>Frequency of Administration<br>Duexis is administered three times a day whereas Duet should be administered once daily |
| Didrex<br>(Benzphetamine)<br><br>Dosage From<br>Tablets<br><br>Strength<br>50 mg<br><br>Route of Administration<br>Oral<br><br>Usual Dose<br>½ to 1 tablet<br><br>Frequency of Administration<br>Once daily up to three times daily | Orthographic<br>Both names contain 6 letters and start with the letter 'D-'. Additionally both names contain dotted letter '-i-'<br><br>Strength<br>Since both products are only available in single strength, a prescriber pmay omit the strength on the prescription.<br><br>Dosage From<br>Both products are tablets<br><br>Route of Administration<br>Both products are administered orally<br><br>Usual Dose<br>Both products can be administered as 1 tablet<br><br>Frequency of Administration<br>Both products can be administered as three times a day | Orthographic differences in the names minimize the likelihood of medication errors in the usual practice settings<br><br>Orthographic<br>Although both products contain one dotted letter '-i-' is it located in different positions (fifth letter vs. second letter). Duexis contains 1 upstroke whereas Didrex contains two upstrokes. Additionally, the letter string '-xis' in Duexis is orthographically different from the corresponding letter string '-rix' when scripted. |

| | | |
|---|---|---|
| Duomax<br>(Guaifenesin and Phenylephrine HCl)<br><br>Dosage From<br>Tablets<br><br>Strength<br>Guaifenesin 1200 mg and Phenylephrine HCl 40 mg<br><br>Route of Administration<br>Oral<br><br>Usual Dose<br>½ to 1 tablet<br><br>Frequency of Administration<br>Every 12 hours (Twice daily) | Orthographic<br>Both names contain 6 letters, 1 upstroke and start with the letter string 'Du-'. In addition, letter 'e' in Duexis may be scripted to look similar to the letter 'o' in Duomax.<br><br>Strength<br>Since both products are only available in single strength, prescriber may omit the strength on the prescription.<br><br>Dosage From<br>Both products are tablets<br><br>Route of Administration<br>Both products are administered orally<br><br>Usual Dose<br>Both products can be administered as 1 tablet<br><br>Frequency of Administration<br>Both products have to be administered multiple times a day | Orthographic differences in the names minimize the likelihood of medication errors in the usual practice settings<br><br>Orthographic<br>Although both names contain 6 letter, letters '-m-' and '-o-' in the name Duomax are wide; thus, making the name seem wider than the name Duexis. Additionally, the name Duexis contains a dotted letter '-i-', and the letter string '-xis' appears different from the letter string '-max' when scripted. |
| Deconex<br>(Guaifenesin and Phenylephrine HCl)<br><br>Dosage From<br>Tablets<br><br>Strength<br>Guaifenesin 900 mg and Phenylephrine HCl 30 mg<br><br>Route of Administration<br>Oral<br><br>Usual Dose<br>½ to 1 tablet<br><br>Frequency of Administration<br>Every 12 hours (Twice daily) | Orthographic<br>Both contain 1 upstroke and start with the letter 'D-'. In addition, letter string '-ec-' in Deconex may be scripted to look similar to the letter '-u-' in Duexis<br><br>Strength<br>Since both products are only available in single strength, prescriber may omit the strength on the prescription.<br><br>Dosage From<br>Both products are tablets<br><br>Route of Administration<br>Both products are administered orally<br><br>Usual Dose<br>Both products can be administered as 1 tablet<br><br>Frequency of Administration<br>Both products have to be administered several times a day | Orthographic differences in the names minimize the likelihood of medication errors in the usual practice settings<br><br>Orthographic<br>The name Duexis contains 6 letters, whereas the name Deconex contains 7 letters. Additionally, the name Duexis contains a dotted letter '-i-', and the letter string '-xis' does not look similar to the letter string '-nex' when scripted. |

---

**This is a representation of an electronic record that was signed electronically and this page is the manifestation of the electronic signature.**

---

/s/

---

YELENA L MASLOV
10/07/2010

ZACHARY A OLESZCZUK
10/07/2010

DENISE P TOYER
10/07/2010

CAROL A HOLQUIST
10/07/2010