

**CENTER FOR DRUG EVALUATION AND
RESEARCH**

APPLICATION NUMBER:

205919Orig1s000

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
Office of Medication Error Prevention and Risk Management**

Proprietary Name Review

Date: December 20, 2013

Reviewer: Tingting Gao, PharmD
Division of Medication Error Prevention and Analysis

Team Leader: Yelena Maslov, PharmD
Division of Medication Error Prevention and Analysis

Drug Name and Strength: Purixan (Mercaptopurine) Oral Suspension
2,000 mg per 100 mL (20 mg/mL)

Application Type/Number: NDA 205919

Applicant/Sponsor: Nova Laboratories Limited

OSE RCM #: 2013-2568

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

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1 INTRODUCTION

This review evaluates the proposed proprietary name, Purixan, from a safety and promotional perspective. The sources and methods used to evaluate the proposed name are outlined in the reference section and Appendix A respectively.

1.1 BACKGROUND

The Applicant submitted a request for proprietary name and an assessment of Proprietary Name with Results from Trademark Search and Computer Search on November 4, 2013.

1.2 PRODUCT INFORMATION

The following product information is provided in the November 4, 2013 proprietary name submission.

- Intended Pronunciation: Pure-ee-zan
- Active Ingredient: Mercaptopurine
- Indication of Use: in pediatric patients for maintenance therapy of acute lymphatic leukemia as part of a combination regimen.
- Route of Administration: Oral
- Dosage Form: Oral Suspension
- Strength: 2,000 mg per 100 mL (20 mg/mL)
- Dose and Frequency: 1.5 to 2.5 mg/kg/day
- How Supplied: 100 mL bottle
- Storage: 15° to 25°C (59°F to 77°F) in a dry place

2 RESULTS

The following sections provide information obtained and considered in the overall evaluation of the proposed proprietary name.

2.1 PROMOTIONAL ASSESSMENT

The Office of Prescription Drug Promotion OPDP determined the proposed name is acceptable from a promotional perspective. DMEPA and the Division of Hematology Products (DHP) concurred with the findings of OPDP's promotional assessment of the proposed name.

2.2 SAFETY ASSESSMENT

The following aspects were considered in the safety evaluation of the name.

2.2.1 United States Adopted Names (USAN) Search

DMEPA searched the United States Adopted Name (USAN) stem list on November 14, 2013 and did not identify that a USAN stem is present in the proposed proprietary name.

2.2.2 Components of the Proposed Proprietary Name

The Applicant indicated in their submission that the proposed name, Purixan, is derived from two components: the prefix 'Puri' is derived from the purine root, and the suffix 'xan' is derived from Xanthine (a chemical derivative of purine). Moreover, the Applicant proposes spelling 'PuriXan', with the use of a capital letter 'X'. Thus, in our evaluation of the name, we considered the fact that in the marketplace, the name may be spelled with the letter 'X' capitalized or in lower case letter 'x'.

2.2.4 FDA Name Simulation Studies

Sixty-four practitioners participated in DMEPA's prescription studies. The interpretations did not overlap with any currently marketed products nor did the misinterpretations sound or look similar to any currently marketed products or any products in the pipeline. . In the written outpatient study, 18 of 25 participants correctly interpreted the prescription. Common misinterpretations in the written outpatient study were substitution of 'Puri-' for 'Pem-', or 'Peni'. In the written inpatient study, 21 of 22 participants correctly interpreted the prescription. One misinterpretations in the written inpatient study were substitution of 'Puri-' for 'Puiv-'. In the voice study, none of the 17 participants correctly interpreted the prescription. Common misinterpretations in the voice study include: 'Puri-' for 'Piri-', or 'Pure-'. We have considered these variations in our look-alike and sound-alike searches and analysis (see Appendix B). See Appendix C for the complete listing of interpretations from the verbal and written prescription studies.

2.2.5 Comments from Other Review Disciplines at Initial Review

In response to the OSE, November 15, 2013 e-mail, the Division of Hematology Products (DHP) did not forward any comments or concerns relating to the proposed proprietary name at the initial phase of the review.

2.2.6 Failure Mode and Effects Analysis of Similar Names

Appendix B lists possible orthographic and phonetic misinterpretations of the letters appearing in the proposed proprietary name, PuriXan. Table 1 lists the names with orthographic, phonetic, or spelling similarity to the proposed proprietary name, PuriXan identified by the primary reviewer, the Expert Panel Discussion (EPD), and other review disciplines. Table 1 also includes the names identified from the Applicant's an assessment of Proprietary Name with Results from Trademark Search and Computer Search not identified by DMEPA and require further evaluation.

Table 1: Collective List of Potentially Similar Names (DMEPA, Expert Panel Discussion (EPD), Other Disciplines, and External Name Study)					
<i>Name</i>	<i>Source</i>	<i>Name</i>	<i>Source</i>	<i>Name</i>	<i>Source</i>
Look Similar					
Abraxane	EPD	Percodan	EPD	Primaxin	EPD
Aurigen	EPD	(b) (4)	EPD	Pure-Gar	EPD
Benzac	EPD	Periactin	EPD	(b) (4)	EPD
Duraclon	EPD	Peridex	EPD	Purilon	EPD
(b) (4)	EPD	Permax	EPD	Puritron	EPD
Fulixan	EPD	Pexeva	EPD	Rituxan	EPD
Narixan	EPD	Prandin	EPD	Turixin	EPD
Peranex HC	EPD	Preven	EPD	Unixan	EPD
Sound Similar					
Prudoxin	EPD	Purigan	EPD	Taractan	External
Trioxin	External	Noroxin	External	Tolectin	External
Torecan	External	Furoxone	External		
Look and Sound Similar					
Duraxin	Primary SE	Perestan	EPD	Peroxin	Primary SE
Piroxicam	EPD	Puricin	EPD	Neurexan	EPD/External
Prolixin	EPD/External				

Our analysis of the 39 names contained in Table 1 considered the information obtained in the previous sections along with their product characteristics. We determined 39 names will not pose a risk for confusion as described in Appendices D through E.

2.2.7 Communication of DMEPA's Analysis at Midpoint of Review

DMEPA communicated our findings to the Division of Hematology Products (DHP) via e-mail on December 19, 2013. At that time we also requested additional information or concerns that could inform our review. Per e-mail correspondence from DHP on December 20, 2013, they stated no additional concerns with the proposed proprietary name, Purixan.

3 CONCLUSIONS

The proposed proprietary name is acceptable from both a promotional and safety perspective.

If you have further questions or need clarifications, please contact Sonny Saini, OSE project manager, at 301-796-0532.

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3.1 COMMENTS TO THE APPLICANT

We have completed our review of the proposed proprietary name, Purixan, and have concluded that this name is acceptable. However, presentation of PuriXan with the capital letter 'X' within the name is unacceptable. Capitalization of the letters or letter strings within a name, also known as Tall Man lettering, is typically reserved for differentiating known look-alike and sound-alike established name pairs or in rare circumstances for proprietary names to help reduce the risk of wrong drug name errors.¹ Since Purixan is not a name that has been involved in drug name confusion or wrong drug errors, the capitalization of the letter 'X' is inappropriately applied. Therefore, we request you display the name as 'Purixan' with a lower case 'x' on all labels and labeling.

If any of the proposed product characteristics as stated in your November 4, 2013 submission are altered, the name must be resubmitted for review.

¹ Cohen, MR. Medication Errors, 2nd ed., American Pharmacists Association, Washington, D.C., 2007, p. 89-90.

4 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. This database also lists the orphan drugs.

4. *FDA Document Archiving, Reporting & Regulatory Tracking System [DARRTS]*

DARRTS is a government database used to organize Applicant and Sponsor submissions as well as to store and organize assignments, reviews, and communications from the 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. *U.S. Patent and Trademark Office* (<http://www.uspto.gov>)

USPTO provides information regarding patent and trademarks.

8. ***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.
9. ***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.
10. ***Access Medicine*** (www.accessmedicine.com)
Access Medicine® from McGraw-Hill contains full-text information from approximately 60 titles; it includes tables and references. Among the titles are: Harrison's Principles of Internal Medicine, Basic & Clinical Pharmacology, and Goodman and Gilman's The Pharmacologic Basis of Therapeutics.
11. ***USAN Stems*** (<http://www.ama-assn.org/ama/pub/about-ama/our-people/coalitions-consortiums/united-states-adopted-names-council/naming-guidelines/approved-stems.shtml>)
USAN Stems List contains all the recognized USAN stems.
12. ***Red Book*** (www.thomsonhc.com/home/dispatch)
Red Book contains prices and product information for prescription, over-the-counter drugs, medical devices, and accessories.
13. ***Lexi-Comp*** (www.lexi.com)
Lexi-Comp is a web-based searchable version of the Drug Information Handbook.
14. ***Medical Abbreviations*** (www.medilexicon.com)
Medical Abbreviations dictionary contains commonly used medical abbreviations and their definitions.
15. ***CVS/Pharmacy*** (www.CVS.com)
This database contains commonly used over the counter products not usually identified in other databases.
16. ***Walgreens*** (www.walgreens.com)
This database contains commonly used over the counter products not usually identified in other databases.
17. ***Rx List*** (www.rxlist.com)
RxList is an online medical resource dedicated to offering detailed and current pharmaceutical information on brand and generic drugs.

18. Dogpile (www.dogpile.com)

Dogpile is a [Metasearch](#) engine that searches multiple search engines including Google, Yahoo! and Bing, and returns the most relevant results to the search.

19. Natural Standard (<http://www.naturalstandard.com>)

Natural Standard is a resource that aggregates and synthesizes data on complementary and alternative medicine.

APPENDICES

Appendix A

FDA's Proprietary Name Risk Assessment considers the promotional and safety aspects of a proposed proprietary name. The promotional review of the proposed name is conducted by OPDP. OPDP evaluates proposed proprietary names to determine if they are overly fanciful, so as to misleadingly imply unique effectiveness or composition, as well as to assess whether they contribute to overstatement of product efficacy, minimization of risk, broadening of product indications, or making of unsubstantiated superiority claims. OPDP provides their opinion to DMEPA for consideration in the overall acceptability of the proposed proprietary name.

The safety assessment is conducted by DMEPA. DMEPA staff search a standard set of databases and information sources to identify names that are similar in pronunciation, spelling, and orthographically similar when scripted to the proposed proprietary name. Additionally, we consider inclusion of USAN stems or other characteristics that when incorporated into a proprietary name may cause or contribute to medication errors (i.e., dosing interval, dosage form/route of administration, medical or product name abbreviations, names that include or suggest the composition of the drug product, etc.). 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.²

Following the preliminary screening of the proposed proprietary name, DMEPA gathers to discuss their professional opinions on the safety of the proposed proprietary name. This meeting is commonly referred to the Center for Drug Evaluation and Research (CDER) Expert Panel discussion. DMEPA also considers other aspects of the name that may be misleading from a safety perspective. DMEPA staff conducts a prescription simulation studies using FDA health care professionals. When provided, DMEPA considers external proprietary name studies conducted by or for the Applicant/Sponsor and incorporates the findings of these studies into the overall risk assessment.

The DMEPA primary reviewer assigned to evaluate the proposed proprietary name 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 misleading nature of the proposed proprietary name with a focus on the avoidance of medication errors.

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. DMEPA considers the product characteristics associated with the proposed product throughout the risk assessment because the product characteristics of the

² National Coordinating Council for Medication Error Reporting and Prevention. <http://www.nccmerp.org/aboutMedErrors.html>. Last accessed 10/11/2007.

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. DMEPA considers how these product characteristics may or may not be present in communicating a product name throughout the medication use system. Because drug name confusion can occur at any point in the medication use process, DMEPA 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.³

The DMEPA considers the spelling of the name, pronunciation of the name when spoken, and appearance of the name when scripted. DMEPA compares the proposed proprietary name with the proprietary and established name of existing and proposed drug products and names currently under review at the FDA. DMEPA 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. DMEPA examines the phonetic similarity using patterns of speech. 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. The orthographic appearance of the proposed name is evaluated using a number of different handwriting samples. DMEPA applies expertise gained from root-cause analysis of postmarketing 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).

³ Institute of Medicine. Preventing Medication Errors. The National Academies Press: Washington DC. 2006.

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		
	<i>Potential Causes of Drug Name Similarity</i>	<i>Attributes Examined to Identify Similar Drug Names</i>	<i>Potential Effects</i>
Look-alike	Similar spelling	Identical prefix Identical infix Identical suffix Length of the name Overlapping product characteristics	<ul style="list-style-type: none"> Names may appear similar in print or electronic media and lead to drug name confusion in printed or electronic communication Names may look similar when scripted and lead to drug name confusion in written communication
	Orthographic similarity	Similar spelling Length of the name/Similar shape Upstrokes Down strokes Cross-strokes Dotted letters Ambiguity introduced by scripting letters Overlapping product characteristics	<ul style="list-style-type: none"> Names may look similar when scripted, and lead to drug name confusion in written communication
Sound-alike	Phonetic similarity	Identical prefix Identical infix Identical suffix Number of syllables Stresses Placement of vowel sounds Placement of consonant sounds Overlapping product characteristics	<ul style="list-style-type: none"> Names may sound similar when pronounced and lead to drug name confusion in verbal communication

Lastly, DMEPA 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 searches 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. A standard description of the databases used in the searches is provided in the reference section of this review. To complement the process, the DMEPA uses 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, DMEPA reviews 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. DMEPA also evaluates if there are characteristics included in the composition that may render the name unacceptable from a safety perspective (abbreviation, dosing interval, etc.).

2. Expert Panel Discussion

DMEPA gathers CDER professional opinions on the safety of the proposed product and discussed the proposed proprietary name (Expert Panel Discussion). The Expert Panel is composed of Division of Medication Errors Prevention (DMEPA) staff and representatives from the Office of Prescription Drug Promotion (OPDP). We also consider input from other review disciplines (OND, ONDQA/OBP). 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 database and information searches to the Expert Panel for consideration. Based on the clinical and professional experiences of the Expert Panel members, the Panel may recommend additional 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 Simulation 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 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 record their interpretations of the orders which are recorded electronically.

4. Comments from Other Review Disciplines

DMEPA requests the Office of New Drugs (OND) and/or Office of Generic Drugs (OGD), ONDQA or OBP for their comments or concerns with the proposed proprietary name, ask for 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 OPDP's decision on the name. The primary Safety Evaluator addresses any comments or concerns in the safety evaluator's assessment.

The OND/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 provide any further information that might inform DMEPA's final decision on the proposed name.

Additionally, other review disciplines opinions such as ONDQA or OBP may be considered depending on the proposed proprietary name.

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, considers all aspects of the name that may be misleading or confusing, conducts a Failure Mode and Effects Analysis, and provides an overall decision on acceptability dependent on their 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.⁴ 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

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

characteristics listed in Section 1.2 of this review. 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:

“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? And are there any components of the name that may function as a source of error beyond sound/look-alike?”

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 or because of some other component of the name. If the answer to the question is no, the Safety Evaluator is not convinced that the names possess 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.

Moreover, 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 Overall Risk Assessment:

- a. OPDP finds the proposed proprietary name misleading from a promotional perspective, and the Review Division concurs with OPDP’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 but involve a naming characteristic that when incorporated into a proprietary name, may be confusing, misleading, cause or contribute to medication errors.

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 generally recommends that the Sponsor select an alternative proprietary name and submit the alternate name to the Agency for 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 Applicant/Sponsor. However, the safety concerns set forth in criteria a through e above 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, confusing, or misleading 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 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.

Appendix B: Potential orthographic or phonetic misinterpretation of the letters in the name PuriXan

Letters in Name PuriXan	Scripted May Appear as	Spoken May Be Interpreted as
Capital 'P'	D, R	B, T
Lower case 'p'	yn, ys, g, j, l, q, d, r	b
Lower case 'u'	n, y, v, w, Any Vowel	
Lower case 'r'	s, n, e, ,v	
Lower case 'i'	e, l	y
Capital case 'X'	d, f, K,P, t, U, V, Y	KS, KZ, S, Z
Lower case 'x'	a, d, skinny f, k, n, p, r, t, v, y	ks, kz, s, z
Lower case 'a'	el, ci, cl, d, o, u	any vowel
Lower case 'n'	m, u, x, r, h, s	dn, gn, kn, mn, pn
Letter strings in Name PuriXan	Scripted May Appear as	Spoken May Be Interpreted as
ri	n, m	
xan		ven, vent, than, san
uri	em	
ur	en, er	

Appendix C: Prescription Simulation Samples and Results

Figure 1. PuriXan Study (Conducted on November 14, 2013)

Handwritten Requisition Medication Order	Verbal Prescription
<p><u>Medication Order:</u></p> <p><i>Purixan 45mL PO daily</i></p>	<p>PuriXan</p> <p>Give 2 mL by mouth daily</p> <p># 60 mL</p>
<p><u>Outpatient Prescription:</u></p> <p><i>Purixan</i></p> <p><i>Give 2mL po daily</i></p> <p><i>#60mL</i></p>	

FDA Prescription Simulation Responses (Aggregate 1 Rx Studies Report)

192 People Received Study

64 People Responded

Study Name: PuriXan

Total	25	17	22	
INTERPRETATION	OUTPATIENT	VOICE	INPATIENT	TOTAL
???	0	1	0	1
PAREVAM	0	1	0	1
PEERIVAN	0	1	0	1
PEMXAN	1	0	0	1
PENIXAN	1	0	0	1
PERESAN	0	1	0	1
PEREVAN	0	1	0	1
PEREVEN	0	1	0	1
PERIEZAN	0	1	0	1
PERIVENT	0	1	0	1
PERIXAN	2	0	0	2
PIREVAN	0	1	0	1
PIRIVAN	0	2	0	2
PUIVXAN	0	0	1	1

PURE XAN	1	0	0	1
PUREVAN	0	2	0	2
PURI XAN	2	0	0	2
PURITHAN	0	1	0	1
PURIVAN	0	1	0	1
PURIXAN	18	0	21	39
TERIVAN	0	1	0	1
TERRIVEN	0	1	0	1

Appendix D: Proprietary names not likely to be confused or not used in usual practice settings for the reasons described.

No.	Proprietary Name	Active Ingredient	Similarity to PuriXan	Failure preventions
1	PuriXan	Mercaptopurine	Look and Sound alike	This name is the subject of this review.
2	Abraxane	Paclitaxel	Look alike	The pair have sufficient orthographic differences
3	Aurigen	Allopurinol	Look alike	The pair have sufficient orthographic differences
4	Benzac	Benzoyl Peroxide	Look alike	The pair have sufficient orthographic differences
5	Duraclon	Clonidine	Look alike	The pair have sufficient orthographic differences
6	(b) (4)	Clobetasol propionate	Look alike	The pair have sufficient orthographic differences
7	Fulixan	Diflorasone Diacetate	Look alike	International name in Spain
8	Narixan	Pseudoephedrine Hydrochloride	Look alike	International name in Italy
9	Neurexan	Avena Sativa, Coffea, Passiflora Incarnata, Zincum Valerianicum	Look alike	The pair have sufficient orthographic differences
10	Peranex	Hydrocortisone Acetate, Lidocaine Hydrochloride	Look alike	The pair have sufficient orthographic differences
11	Percodan	Oxycodone and Aspirin	Look alike	The pair have sufficient orthographic differences

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12	Perestan	Casanthranol and docusate potassium	Look and sound alike	The pair have sufficient orthographic and phonetic differences.
13	(b) (4)	Tramadol	Look alike	The pair have sufficient orthographic differences
14	Periactin	Cyproheptadine	Look alike	The pair have sufficient orthographic differences
15	Peridex	Chlorhexidine Gluconate	Look alike	The pair have sufficient orthographic differences
16	Permax	Pergolide	Look alike	The pair have sufficient orthographic differences
17	Peroxin	Benzoyl Peroxide	Look and sound alike	Name identified in Micromedex database. Unable to find product characteristics in commonly used drug databases.
18	n/a	Piroxicam	Look and sound alike	The pair have sufficient orthographic and phonetic differences.
19	Prandin	Repaglinide	Look alike	The pair have sufficient orthographic differences
20	Prudoxin	Doxepin	Sound alike	The pair have sufficient phonetic differences
21	Pure-Gar	Garlic	Look alike	The pair have sufficient orthographic differences
22	Puricin	Allopurinol	Look and sound alike	International name in Thailand
23	Purigan	Allopurinol	Sound alike	International name in Greece
24	Purilon	Hydrogel Dressing	Look alike	International name in Belgium, France, and Germany. Not a drug product.
25	Puritron	Multi-ingredients, herbal supplement	Look alike	Name identified in Micromedex database. Unable to find product characteristics in commonly used drug databases.
26	Turixin	Mupirocin	Look alike	International name in Germany
27	UniXan	Theophylline	Look alike	International name in Denmark

28	(b) (4)	Pegloticase	Look alike	(b) (4) was the alternative name submitted for (b) (4) (pegloticase) in OSE #2008-148. Since (b) (4) was found acceptable under IND 10122, (b) (4) was not reviewed.
29	Trioxin	Chloroxylenol, Benzocaine, Hydrocortisone Acetate	Sound alike	The pair have sufficient phonetic differences
30	Noroxin	Norfloxacin	Sound alike	The pair have sufficient phonetic differences
31	Taractan	Chlorprothixene	Sound alike	This product was withdrawn from the market in 1997.
32	Torecan	Thiethylperazine	Sound alike	The pair have sufficient phonetic differences
33	Furoxone	Furazolidone	Sound alike	The pair have sufficient phonetic differences
34	Tolectin	Tolmetin	Sound alike	The pair have sufficient phonetic differences

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Appendix E: Risk of medication errors due to product confusion minimized by dissimilarity of the names and/ or use in clinical practice for the reasons described.

	<p>Proposed name: PuriXan (Mercaptopurine) Dosage form and Strength(s): Oral Suspension: 2,000 mg per 100 mL (20 mg/mL) Usual dose: 1.5 to 2.5 mg/kg/day daily</p>	<p>Failure Mode: Incorrect Product Ordered/ Selected/Dispensed or Administered because of Name confusion Causes (could be multiple)</p>	<p>Prevention of Failure Mode In the conditions outlined below, the following combination of factors, are expected to minimize the risk of confusion between these two names</p>
<p>1</p>	<p>Prolixin [discontinued] (Fluphenazine Hydrochloride) Dosage form and Strength(s): Oral concentrate: 5 mg/mL Oral elixir: 2.5 mg/5 mL Injection: 2.5 mg/mL Oral tablet: 1 mg, 2.5 mg, 5 mg, 10 mg Usual dose: Oral: 1 to 40 mg/day in divided doses at 6- to 8-hour internals. IM: 1.25 mg to 10 mg/day in divided doses at 6- to 8-hour internals.</p>	<p>Orthographic similarity: Both have two upstrokes if the letter ‘X’ in PuriXan is written in uppercase letter ‘X’ and ends with the letter ‘n’. Additionally, the letter string ‘xan’ in PuriXan can be scripted to look similar to the letter string ‘xin’ in Prolixin. Usual dose: Since PuriXan is given as a weight-based dosing to pediatric patients and has an achievable dose of 1 mg to 40 mg, there is an overlap in dose with Prolixin 1 to 40 mg.</p>	<p>Orthographic difference: Prolixin has an upstroke letter ‘l’ in the 4th position, which is absent in Purixan if the letter ‘X’ in PuriXan is written in lowercase letter ‘x’. Additionally, the letter string ‘uri’ in PuriXan does not look similar to the letter string ‘ro’ in Prolixin when scripted.</p>

	<p>Proposed name: PuriXan (Mercaptopurine) Dosage form and Strength(s): Oral Suspension: 2,000 mg per 100 mL (20 mg/mL) Usual dose: 1.5 to 2.5 mg/kg/day daily</p>	<p>Failure Mode: Incorrect Product Ordered/ Selected/Dispensed or Administered because of Name confusion Causes (could be multiple)</p>	<p>Prevention of Failure Mode In the conditions outlined below, the following combination of factors, are expected to minimize the risk of confusion between these two names</p>
2	<p>Duraxin (Acetaminophen, Salicylamide, Phenyltoloxamine Citrate) Dosage form and Strength(s): Oral capsule: 300 mg/200mg/20 mg Usual dose: Adult: 1 to 2 capsules PO every 4 hours. Maximum daily dose, 8 capsules. Children: one-half adult dose. Maximum daily dose, 4 capsules.</p>	<p>Orthographic similarity: Both names have 1 upstroke and no downstrokes if the letter 'X' in PuriXan is written in lowercase letter 'x'. Both contain the letter string 'ur' in the 2nd and 3rd position, the letter 'x' in the 5th position. Additionally, the letter string 'xan' in PuriXan can be scripted to look similar to the letter string 'xin' in Duraxin.</p>	<p>Orthographic difference: PuriXan begins with the letter 'P', which does not appear similar to the letter 'D' in Duraxin. Usual Dose: Since PuriXan is given as a weight-based dosing to pediatric patients, the dose for PuriXan must be specified based on the patient's weight.</p>
3	<p>Pexeva (Paroxetine) Dosage form and Strength(s): Oral tablet: 10 mg 20 mg, 30 mg, 40 mg Usual dose: Take 20 to 50 mg PO daily</p>	<p>Orthographic similarity: Both names have 1 upstroke and no downstrokes if the letter 'X' in PuriXan is written in lowercase letter 'x'. Both begin with the letter P and contain the letter 'x' in the infix of the name. Strength: Overlap strength of 20 mg/mL vs. 20 mg. Usual Dose: Since PuriXan is given as a weight-based dosing to pediatric patients and has an achievable dose of 20 mg to 50 mg, there is an overlap in dose with Pexeva 20 to 50 mg. Both can be given once daily.</p>	<p>Orthographic difference: The letter 'x' is located in the 5th position of the name PuriXan, and located in the 3rd position of the name Pexeva. Additionally, the letter string 'xan' in PuriXan does not appear similar to the letter string 'xeva' in Pexeva when scripted.</p>

	<p>Proposed name: PuriXan (Mercaptopurine) Dosage form and Strength(s): Oral Suspension: 2,000 mg per 100 mL (20 mg/mL) Usual dose: 1.5 to 2.5 mg/kg/day daily</p>	<p>Failure Mode: Incorrect Product Ordered/ Selected/Dispensed or Administered because of Name confusion Causes (could be multiple)</p>	<p>Prevention of Failure Mode In the conditions outlined below, the following combination of factors, are expected to minimize the risk of confusion between these two names</p>
4	<p>Preven [discontinued] (Ethinyl estradiol and levonorgestrel) Dosage form and Strength(s): Oral tablet: 0.05 mg-0.25 mg Usual dose: Take the first dose as soon as possible but within 72 hours of unprotected intercourse. Take the second dose of two pills 12 hours later.</p>	<p>Orthographic similarity: Both names have 1 upstroke and no downstrokes if the letter 'X' in PuriXan is written in lowercase letter 'x'. Both begin with the letter P and ends with the letter 'n'. Strength: Both are single strength and can be omitted.</p>	<p>Orthographic difference: The letter string 'urixa' in PuriXan does not appear similar to the letter string 'reve' in Preven when scripted. Usual dose: The dose for PuriXan must be specified because it has a weight-based dosing, whereas Preven can be written as 'UAD'.</p>
5	<p>Primaxin (Imipenem and Cilastatin) Dosage form and Strength(s): Injection, powder for reconstitution: 250mg/250mg per vial, 500mg/500mg per vial Usual dose: 250-1000 mg IV every 6-8 hours</p>	<p>Orthographic similarity: Both names have 1 upstroke and no downstrokes if the letter 'X' in PuriXan is written in lowercase letter 'x'. Both begin with the letter P and ends with the letter 'n'. Additionally, the letter string 'xan' in PuriXan can be scripted to look similar to the letter string 'xin' in Primaxin. Usual Dose: Since PuriXan is given as a weight-based dosing to pediatric patients and has an achievable dose of 25 mg to 100 mg, there is a numerical similarity in dose with Primaxin 250 mg to 1000 mg.</p>	<p>Orthographic difference: Primaxin has a four-letter string 'rima' between the letter 'P' and the letter 'x', giving the name a longer shape, whereas PuriXan only has a three-letter string 'uri' between the letter 'P' and the letter 'x', thus giving the name a shorter shape. Additionally, the letter string 'rixa' in PuriXan does not look like the letter string 'max' in Primaxin.</p>

	<p>Proposed name: PuriXan (Mercaptopurine) Dosage form and Strength(s): Oral Suspension: 2,000 mg per 100 mL (20 mg/mL) Usual dose: 1.5 to 2.5 mg/kg/day daily</p>	<p>Failure Mode: Incorrect Product Ordered/ Selected/Dispensed or Administered because of Name confusion Causes (could be multiple)</p>	<p>Prevention of Failure Mode In the conditions outlined below, the following combination of factors, are expected to minimize the risk of confusion between these two names</p>
<p>6</p>	<p>Rituxan (Rituximab) Dosage form and Strength(s): Solution for Injection: 10 mg/mL Usual dose: Non-Hodgkin's Lymphoma: 375 mg/m² once weekly for 4 or 8 doses. Chronic Lymphocytic Leukemia: 375 mg/m² once day prior to the initiation of FC chemotherapy, then 500 mg/m² on Day 1 of cycles 2–6 (every 28 days). As a Component of Zevalin®: 250 mg/m² within 4 hours prior to the administration of Indium-111-(In-111-) Zevalin and within 4 hours prior to the administration of Yttrium-90- (Y-90-) Zevalin. Rheumatoid Arthritis: give two 1000 mg intravenous infusions separated by 2 weeks</p>	<p>Orthographic similarity: Both names have 7 letters in the name and ends with the letter string ‘xan’. Strength: Both are single strength and can be omitted. Usual Dose: PuriXan has an achievable dose of 37.5 mg, which is numerical similar to Rituxan 375 mg/m².</p>	<p>Orthographic difference: Rituxan contain an upstroke letter ‘t’ in the 3rd position, which is absent in PuriXan. Additionally, the letter string ‘Puri’ does not look similar to the letter ‘Ritu’ when scripted.</p>

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/s/

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12/23/2013

**Department of Health and Human Services
Public Health Service
Food and Drug Administration
Center for Drug Evaluation and Research
Office of Surveillance and Epidemiology
Office of Medication Error Prevention and Risk Management**

Proprietary Name Review

Date: September 10, 2013

Reviewer: Kevin Wright, PharmD
Division of Medication Error Prevention and Analysis

Team Leader: Yelena Maslov, PharmD
Division of Medication Error Prevention and Analysis

Deputy Director: Kellie Taylor, PharmD, MPH
Division of Medication Error Prevention and Analysis

Drug Name and Strength: (b) (4) (Mercaptopurine) Oral Suspension
2,000 mg per 100 mL (20 mg/mL)

Application Type/Number: IND 112823
NDA 205919

Applicant/Sponsor: Nova Laboratories Limited

OSE RCM #: 2013-729 (IND)
2013-1746 (NDA)

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