

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

SALIX PHARMACEUTICALS, LTD.;
SALIX PHARMACEUTICALS, INC.;
BAUSCH HEALTH IRELAND LTD.;
ALFASIGMA S.P.A.,

Plaintiffs,

v.

NORWICH PHARMACEUTICALS, INC.,

Defendant.

Civil Action No. 20-430-RGA

TRIAL OPINION

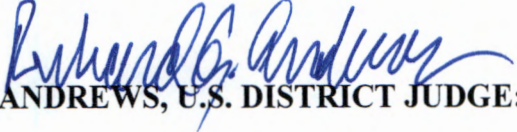
Jack B. Blumenfeld, Karen Jacobs, Cameron P. Clark, MORRIS, NICHOLS, ARSHT & TUNNELL LLP, Wilmington, DE; Scott K. Reed, Steven C. Kline, Shannon K. Clark, Daniel A. Apgar, Alexis M. McJoynt, Damien N. Dombrowski, Becky E. Steephenson, VENABLE LLP, New York, NY.

Attorneys for Plaintiffs.

Karen E. Keller, Nathan R. Hoeschen, SHAW KELLER LLP, Wilmington, DE; Matthew J. Becker, Stacie L. Ropka, Matthew S. Murphy, Chad A. Landmon, Rebecca L. Clegg, AXINN, VELTROP & HARKRIDER LLP, Hartford, CT; Aziz Burgy, AXINN, VELTROP & HARKRIDER LLP, Washington, DC; Richardo S. Camposanto, AXINN, VELTROP & HARKRIDER LLP, San Francisco, CA.

Attorneys for Defendant.

August 10, 2022


ANDREWS, U.S. DISTRICT JUDGE:

Salix sued Norwich for infringement of twenty-six patents that cover Salix’s branded Xifaxan (rifaximin) 550 mg tablets. (D.I. 59 ¶¶ 12, 41). Before trial, Salix narrowed its case to U.S. Patent Nos. 7,612,199, 7,902,206 (“the Polymorph Patents”), 8,642,573, 9,421,195, 10,335,397 (“the HE Patents”), 8,309,569, and 10,765,667 (“the IBS-D Patents”). In March 2022, I held a four-day bench trial. (D.I. 168–172, hereinafter “Tr.”).

I. BACKGROUND

Norwich submitted an Abbreviated New Drug Application (ANDA) to the Food and Drug Administration (FDA) for approval to market a generic version of Xifaxan. Salix alleges infringement under § 271(e)(2)(A) of the Patent Act. 35 U.S.C. §271(e)(2)(A). Norwich counters that the asserted patents are invalid.

In 2004, the FDA approved Xifaxan (rifaximin) 200 mg tablets to treat travelers’ diarrhea. (D.I. 155 ¶ 9). On March 24, 2010, the FDA approved Xifaxan (rifaximin) 550 mg tablets to reduce the risk of overt hepatic encephalopathy (“HE”) recurrence in adults. (*Id.* ¶10). On May 27, 2015, the 550 mg tablets were approved to treat irritable bowel syndrome with diarrhea (“IBS-D”) in adults. (*Id.* ¶11). The asserted patents cover a polymorphic form of rifaximin and methods of treating HE and IBS-D in adults.

II. LEGAL STANDARD

A. Infringement

A patent is directly infringed when a person “without authority makes, uses, offers to sell, or sells any patented invention, within the United States . . . during the term of the patent” 35 U.S.C. § 271(a). A two-step analysis is employed in making an infringement determination. *See Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995) (en banc), *aff’d*,

517 U.S. 370 (1996). First, the court must construe the asserted claims to ascertain their meaning and scope. *See id.* The trier of fact must then compare the properly construed claims with the accused infringing product. *See id.* This second step is a question of fact. *See Bai v. L & L Wings, Inc.*, 160 F.3d 1350, 1353 (Fed. Cir. 1998).

“Under § 271(b), whoever actively induces infringement of a patent shall be liable as an infringer.” *Warner-Lambert Co. v. Apotex Corp.*, 316 F.3d 1348, 1363 (Fed. Cir. 2003). To prevail on a theory of induced infringement, a plaintiff must prove (1) direct infringement and (2) “that the defendant possessed specific intent to encourage another’s infringement and not merely that the defendant had knowledge of the acts alleged to constitute infringement.” *Vanda Pharm. Inc. v. West-Ward Pharm. Int’l Ltd.*, 887 F.3d 1117, 1129 (Fed. Cir. 2019) (quoting *DSU Med. Corp. v. JMA Co.*, 471 F.3d 1293, 1306 (Fed. Cir. 2006)).

In a Hatch-Waxman case, a plaintiff “can satisfy its burden to prove the predicate direct infringement by showing that if the proposed ANDA product were marketed, it would infringe the [asserted patent].” *Vanda*, 887 F.3d at 1130. For method-of-treatment patents, if an ANDA applicant’s “proposed label instructs users to perform the patented method . . . , the proposed label may provide evidence of [the ANDA applicant’s] affirmative intent to induce infringement.” *AstraZeneca LP v. Apotex, Inc.*, 633 F.3d 1042, 1060 (Fed. Cir. 2010). “When proof of specific intent depends on the label accompanying the marketing of a drug inducing infringement by physicians, the label must encourage, recommend, or promote infringement.” *Vanda*, 887 F.3d at 1129 (cleaned up).

B. Obviousness

A patent is invalid as obvious under 35 U.S.C. § 103 if “the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was

made.” *Kahn v. Gen. Motors Corp.*, 135 F.3d 1472, 1479 (Fed. Cir. 1998). “Obviousness is a question of law based on underlying factual findings: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the art; and (4) objective considerations of nonobviousness.” *In re Morsa*, 713 F.3d 104, 109 (Fed. Cir. 2013) (citations omitted).

To show a patent is obvious, a party “must demonstrate by clear and convincing evidence that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.” *InTouch Techs., Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1347 (Fed. Cir. 2014) (cleaned up). The overall inquiry into obviousness, though, must be “expansive and flexible.” *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415 (2007). In conducting the obviousness analysis, “a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.* at 418.

C. Written Description

The written description “must clearly allow persons of ordinary skill in the art to recognize that the inventor invented what is claimed.” *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed.Cir.2010) (en banc) (cleaned up). The test is whether the disclosure “conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Id.* This requires an “objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art.” *Id.*

D. Indefiniteness

35 U.S.C. § 112 requires that claims “particularly point[] out and distinctly claim[] the subject matter.” The claims, viewed in light of the specification and prosecution history, must

“inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910 (2014). “While a claim employing a term of degree may be definite where it provides enough certainty to one of skill in the art when read in the context of the invention, a term of degree that is purely subjective and depends on the unpredictable vagaries of any one person’s opinion is indefinite.” *Intell. Ventures I LLC v. T-Mobile USA, Inc.*, 902 F.3d 1372, 1381 (Fed. Cir. 2018) (cleaned up).

III. THE POLYMORPH PATENTS

The Polymorph Patents claim polymorphic forms of rifaximin. Plaintiffs assert two such claims. Asserted Claim 4 of the ’199 patent states:

4. Rifaximin in polymorphic form β , wherein the rifaximin has x-ray powder diffraction pattern peaks at about 5.4°; 9.0°; and 20.9° 2 θ and wherein the rifaximin has a water content of greater than 5%.

Asserted Claim 36 of the ’206 patent depends on claim 34:

34. A solid pharmaceutical composition comprising rifaximin in polymorphic Form β and a pharmaceutically acceptable excipient or carrier, wherein the rifaximin Form β has x-ray powder diffraction pattern peaks at about 5.4°; 9.0°; and 20.9° 2- θ .

36. The pharmaceutical composition of claim 34, wherein the rifaximin Form β has a water content of between about 4.5% to about 40%.

A. Findings of Fact

1. If approved, Norwich’s ANDA product will infringe the asserted claims of the Polymorph Patents.
2. The priority date of the asserted polymorph claims is November 7, 2003.
3. A person of skill in the art (a “POSA”) would have had a B.S. in chemistry, chemical engineering, or a related discipline with at least 3 years’ experience in the pharmaceutical industry related to API manufacturing, crystallization, characterization, or evaluation of solid state forms. Or a POSA would have had an advanced degree with less or no experience.

4. The '199 patent is a continuation of, and contains substantially the same disclosures as, the '206 patent.
5. Rifaximin exists in polymorphic forms. Norwich's ANDA product comprises polymorphic form β .
6. X-ray powder diffraction (XRPD) peaks are an inherent characteristic of a polymorph. Each peak in an XRPD diffractogram is a structural element of that form. XRPD was routine as of the priority date.
7. A crystalline form of a known compound can be characterized by a subset of XRPD peaks. The subset of XRPD peaks at about 5.4° , 9.0° , and 20.9° 2θ was sufficient as of the priority date to distinguish rifaximin β from the other known rifaximin polymorphs.
8. Water content is an inherent characteristic of a crystal form that can be determined by routine testing methods such as Karl Fischer (KF) or thermogravimetric analysis (TGA).
9. Cannata, Marchi, and the Normix Label are prior art.
10. Cannata disclosed crystalline rifaximin, methods of making it, and that it had antibacterial properties.
11. The four post-filing references relied upon by Defendant's expert, Dr. Zaworotko, do not show that any of the Cannata methods produces rifaximin β every time.
12. Cannata does not inherently anticipate the asserted polymorph claims.
13. Marchi disclosed methods of preparing crystalline rifaximin, rifaximin's antibacterial properties, and that it could be used in pharmaceutical compositions with conventional pharmaceutically acceptable excipients or carriers.
14. The Normix Label describes the use of rifaximin as a pharmaceutical.

15. Cannata in view of common knowledge discloses each and every limitation of claim 4 of the '199 patent.
16. A POSA would have had a motivation to combine Cannata with commonly known testing techniques XRPD and KF or TGA because regulatory bodies instructed applicants to characterize the solubility, stability, and bioavailability of drug candidates.
17. A POSA would have had a reasonable expectation of success at characterizing the rifaximin β polymorph and arriving at the claimed XRPD peaks at about 5.4°, 9.0°, and 20.9° 2 θ and water content of greater than 5%.
18. Marchi in view of Cannata and common knowledge discloses each and every limitation of claim 36 of the '206 patent.
19. A POSA would have had a motivation to combine Cannata with Marchi in light of common knowledge.
20. A POSA would have had a reasonable expectation of success at achieving a pharmaceutical composition comprising rifaximin β and a pharmaceutically acceptable excipient or carrier.
21. All rifaximin β claim limitations are expressly disclosed in the specifications of the Polymorph Patents..

B. Infringement

Norwich admits that its ANDA Product, if approved, will infringe claim 4 of the '199 patent and claim 36 of the '206 patent. (D.I. 148, Ex. 1, ¶¶ 126, 127).

C. Invalidity

1. Inherent Anticipation

Each expert asserts that his validity analysis is not impacted by which definition of a POSA I use. (Tr. 860:7-861:8; Tr. 936:21-937:13). In view of Defendant's burden to prove invalidity by clear and convincing evidence, I will adopt Plaintiffs' definition of a POSA.

Norwich argues that U.S. Patent No. 4,557,866 (the "Cannata" reference) (JTX-37) inherently anticipates claim 4 of the '199 patent because it discloses a process that necessarily produces the claimed rifaximin β . (D.I. 176 at 32). "[A] prior art reference may anticipate without disclosing a feature of the claimed invention if that missing characteristic is necessarily present, or inherent, in the single anticipating reference." *Schering Corp. v. Geneva Pharms., Inc.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003). A disclosed process may anticipate "if it discloses in an enabling manner the production" of the claimed polymorph. *SmithKline Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1344 (Fed. Cir. 2005).

Here, the issue is whether the process disclosed by Cannata invariably produces rifaximin β . Norwich has presented the following evidence in support:

- The "Viscomi Declaration," a declaration to the PTO stating that samples of batches produced according to Cannata "are composed either of mixture of polymorph (alpha and beta, and in some case alpha and epsilon) or different polymorphs." (JTX 80 ¶ 7).
- The "Viscomi 2008" article, which Norwich's expert Dr. Zaworotko testified shows that rifaximin β is a necessary precursor to the formation of rifaximin α , δ , and ϵ . (JTX 65; Tr. 880:20-881:1, 921:24-922:6).
- The "Braga 2012" article, which describes the inherent properties of rifaximin β . (JTX 105).
- The "Bacchi 2008" article, which described rifaximin beta 4 ("RX4"), a substance the author concluded was "the so-called beta rifaximin of the literature." (DTX 43; Tr. 882:14-24). The article describes slow evaporation as the method of preparation. From this article, Dr. Zaworotko concluded, "Examples 1 and 7, at the very least, of Cannata would have . . . necessarily afforded rifaximin Beta because of the solvent system used, the method used of controlled crystallization, and the lack of drying or lack of aggressive drying." (Tr. 883:6-10).

According to this evidence, Norwich argues, “Cannata inherently produced rifaximin β every time, either directly *or as a necessary precursor* to the α , δ , and ϵ forms and mixtures disclosed in the Viscomi Declaration.” (D.I. 185 at 9).

I do not think this evidence amounts to clear and convincing evidence that Claim 4 is inherently anticipated by Cannata. Norwich could have shown anticipation either because (1) as a law of nature, rifaximin α , δ , and ϵ cannot exist without having been derived from rifaximin β , or (2) a method disclosed in Cannata produces rifaximin β each and every time it is practiced. Dr. Zaworotko’s testimony did not prove either.

Dr. Zaworotko’s opinion does not clearly support the conclusion that, as a law of nature, rifaximin β is a necessary precursor to rifaximin α , δ , and ϵ . For one thing, had that been his opinion, he could have clearly stated that, and I do not think he did. (*See* Tr. at 870-884). I think Dr. Zaworotko’s opinion was relying upon the Viscomi 2008 article:

Q: Would rifaximin Beta form as a precursor to any polymorph listed in the Viscomi declaration listed at paragraph 7?

A: Yes, based upon the Viscomi 2008 article, where the effect of moisture on rifaximin crystal forms was studied and based upon the diagram [derived from Viscomi 2008] it’s clear that Beta has to be the precursor for any of the other crystal forms with lower water content.

(Tr. 921:25–922:1). This opinion appears to be based on Dr. Zaworotko’s reading of Viscomi 2008, and not a conclusion that rifaximin α , δ , and ϵ cannot exist in the world without having first been rifaximin β . I think Dr. Zaworotko stated his opinion the way he did because the “diagram” to which Dr. Zawortko refers, which is based on Figure 4 (“The relationship between the various crystal forms of rifaximin”), was not the main point of the article. The article’s purpose, consistent with its title (“Crystal forms of rifaximin and their effect on pharmaceutical properties”) was to report on a “study [] to identify the presence of crystal forms of rifaximin

and to assess their impact on parameters such as solubility, intrinsic dissolution and bioavailability.” (JTX-65 at 1074). The paper concluded, “The unexpected outcome of this study is that we have found that some crystal forms of rifaximin are significantly absorbed, while it was previously considered a non-absorbable drug. These finding[s] indicate the need of putting appropriate manufacturing and analytical procedures in place to consistently yield rifaximin of the appropriate crystalline structure.” (*Id.* at 1080). Thus, to the extent Dr. Zaworotko was offering an opinion that Viscomi 2008 is conclusive proof that rifaximin α , δ , and ϵ are necessarily derived from rifaximin β , I do not find that conclusion to be well-supported. It is not clear and convincing proof.

Thus, to show that Cannata inherently anticipates Claim 4, Norwich would need to show that every time Cannata is performed, rifaximin β is produced. Norwich has not done so.

The Viscomi Declaration does not help Norwich. It stated that among “samples of batches” produced according to Cannata, when retested in 2006, there were four batches with no rifaximin β . The four batches consisted of (1) only the “delta polymorph,” (2) only of the “epsilon form,” (3) a mixture of “the alpha and epsilon form,” and (4) a mixture of the “alpha and delta forms,” respectively. (JTX-80, ¶7; *see* Tr. 949:8-12).

Although Viscomi 2008 states that the “method of production of rifaximin” was disclosed in European Patent No. 161534, the counterpart to Cannata, Salix has persuasively argued that Viscomi 2008 discloses steps that are more specific than what Cannata describes. (*See* JTX 105 at 6404 n.3; JTX 65 at 1074 & 1074 n.29; Tr. 874:16-25).

In Viscomi 2008, the reaction step for preparing wet rifaximin describes (1) heating the reaction mixture to 50°C for 5 hours, then cooling it to 20°C; (2) adding a mixture of 0.1 moles of ascorbic acid and 2.5 moles of concentrated hydrochloric acid in 220 mL of 58% ethyl alcohol

in water over 30 minutes; and (3) adding concentrated hydrochloric acid dropwise until pH 2.0 is reached. (Tr. 951:8-13; JTX 65 at 1074). Cannata has none of these details. (Tr. 951:13-17). The crystallization step in Viscomi is also described with more precision than in Cannata. (Tr. 951:18–952:2).

Similarly, Bacchi 2008 discloses a process that does not precisely match Cannata's examples 1 and 7. Bacchi describes using a "slow evaporation" process while Cannata does not mention evaporation. (DTX 43 at 1734; Tr. 949:20-22). Furthermore, the Cannata examples crystallize rifaximin from a 7:3 ethanol to water mixture, whereas Bacchi does not disclose any ethanol to water ratio. (Tr. 949:15-23; Tr. 953:2-954:3).

Ultimately, it appears that Cannata left certain steps up to the discretion of the chemist preparing the rifaximin. To show that Cannata invariably produces rifaximin β , Norwich would have needed to show that, no matter how the chemist exercised his or her discretion, rifaximin β would be produced. I do not think Norwich has done so. "Experiments that do not follow the prior art procedure alleged to inherently anticipate cannot show inherent anticipation." *Merck & Cie v. Watson Lab 'ys, Inc.*, 125 F. Supp. 3d 503, 513 (D. Del. 2015) (cleaned up), *rev'd on other grounds*, 822 F.3d 1347 (Fed. Cir. 2016).

Thus, I find that Norwich has not shown by clear and convincing evidence that claim 4 of the '199 patent is inherently anticipated by Cannata.

2. Obviousness

Norwich contends that claim 4 of the '199 patent is obvious over Cannata in view of common knowledge. (D.I. 176 at 34–35). Norwich contends that claim 36 of the '206 patent is obvious over Cannata in view of the Normix Label and common knowledge or over Marchi in view of Cannata and common knowledge. (*Id.* at 35).

A POSA would have understood from Cannata that rifaximin exists in crystalline form and that rifaximin has “outstanding antibacterial properties.” (JTX 37 at 3:10–16, 5:21–36). Norwich argues this knowledge would motivate a POSA to “identify the characteristics of the obtained rifaximin” using “routine methods.” (D.I. 176 at 35). Furthermore, Norwich argues that a POSA would recognize “that the crystallization solvent used by Cannata included water, which could lead to hydrate formation, and thus [the POSA] would have been motivated to analyze the effect of water on the crystalline form using conventional methods.” (*Id.*). A POSA could have performed a “routine humidity experiment . . . in one day and detected rifaximin β .” (*Id.*).

The Court of Appeals considered the obviousness of a polymorph patent in *Grunenthal GmbH v. Alkem Labs. Ltd.*, 919 F.3d 1333, 1336 (Fed. Cir. 2019). The *Grunenthal* patent claimed Form A of tapentadol hydrochloride characterized by its XRPD peaks. *Id.* The *Grunenthal* defendant, Alkem, argued that the claim was obvious in light of prior art that disclosed a Form B of tapentadol hydrochloride. *Id.* at 1337.

Alkem’s prior art references included (1) the prior art patent that described a crystalline form of tapentadol hydrochloride (later called “Form B”) and (2) an article that “outlines a number of variables that may be adjusted during the recrystallization process to determine whether polymorphism occurs in a compound.” *Id.* at 1337, 1341. The “polymorphism of tapentadol hydrochloride was unknown at the time of filing the [asserted patent],” and “Form B was the only crystal structure . . . known in the art at the time.” *Id.* at 1341.

The Court of Appeals found that the article did not provide “guidelines regarding which [variables] are likely to result in polymorphs of particular compounds.” *Id.* at 1342. Thus, the article did little more than tell a POSA to “vary all parameters or try each of numerous possible

choices until one possibly arrived at a successful result,” which does not provide a reasonable expectation of success. *Id.* (quoting *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1365 (Fed. Cir. 2007)).

Here, the prior art includes Cannata, which discloses processes for preparing a crystalline form of rifaximin. As in *Grunenthal*, rifaximin’s polymorphism was unknown as of the priority date. In *Grunenthal*, however, the prior art patent was known to produce a particular form—Form B—of tapentadol hydrochloride. Here, by contrast, no rifaximin had been publicly characterized as a particular form as of the priority date.

I think the evidence is clear and convincing that a POSA would have been motivated to characterize the rifaximin produced by the Cannata processes. Cannata disclosed that rifaximin had strong antibacterial properties and low bioavailability, motivating a POSA to evaluate the substance as a potential drug candidate. (JTX 37 at 3:10-16; JTX 94 at 6-7; Tr. 869:16–870:4; Tr. 891:16-892:12). The FDA encouraged, if not required, that the solid forms of a drug substance be well-characterized during drug development, including as to the properties of solubility, stability, and bioavailability. (DTX 315-35; Tr. 892:13-894:7). XRPD profiling was the predominant method for identifying crystalline materials. (DTX 315-38; Tr. 894:23-895:12). FDA guidance required “appropriate manufacturing and control procedures” when manufacturing and storing the drug substance could result in a hydrated drug substance. (DTX 315-39; Tr. 895:13–24). Because the Cannata process for preparing rifaximin used water, a POSA would know about the potential for a hydrate to form, and be motivated to perform routine testing (e.g., KF or TGA) for water content and hydration formation. (DTX 317-19; JTX 54 at 182; Tr. 888:3-890:5; DTX 315-39).

I think the evidence shows that a POSA would have a reasonable expectation of success in characterizing the polymorph β , as opposed to the other forms of rifaximin. Although Norwich's evidence failed to show that β was produced each and every time rifaximin was prepared according to Cannata, it did strongly suggest that polymorph β is a commonly produced polymorph and the most stable form of rifaximin.

The Viscomi Declaration stated that rifaximin prepared according to Cannata yielded β along with other polymorphs. (JTX 80 at ¶ 7). Dr. Zaworotko explained that β is the most stable form. Tr. 877:17–18. (“[B]eta is the winner in terms of stability under normal conditions of temperature and humidity.”). Dr. Myerson's critiques of Dr. Zaworotko's testimony do not have the same force in the context of obviousness as they did in the context of inherent anticipation. While Viscomi 2008's increased specificity in the method of preparation suffices to suggest that Cannata may not produce rifaximin β each and every time (as would be required for inherent anticipation), the standard for obviousness is a reasonable expectation of success. *See Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (“While the definition of ‘reasonable expectation’ is somewhat vague, our case law makes clear that it does not require a certainty of success.”).

I reject Salix's argument that a POSA would not have been able to predict the precise peaks that characterize rifaximin β , and accordingly a POSA would not have had a reasonable expectation of success. The Federal Circuit has held, “[A] rule of law equating unpredictability to patentability, applied in this case, would mean that any new salt . . . would be separately patentable, simply because the formation and properties of each salt must be verified through testing. This cannot be the proper standard since the expectation of success need only be reasonable, not absolute.” *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1364 (Fed. Cir. 2007). I

think the same is true in this context. I credit the testimony of Dr. Zaworotko that the XRPD peaks and water content are “inherent” properties of a crystal form that can be tested using routine methods. (Tr. 871:20–872:5; 884:2–13; 895:8–12). Thus, a POSA would have a reasonable expectation of success at characterizing the polymorph and arriving at the claimed XRPD peaks and water contents.¹

There is no evidence of secondary considerations of nonobviousness for the Polymorph Patents. (See D.I. 174 at 15–18).

Thus, I find by clear and convincing evidence that claim 4 of the ’199 patent is obvious in light of Cannata in view of common knowledge.

Claim 36 of the ’206 patent claims a pharmaceutical composition comprising (1) rifaximin β with the claimed XRPD peaks and a water content between about 4.5% to 40% and (2) a pharmaceutically acceptable excipient or carrier.

Norwich argues that rifaximin had previously been formulated as a pharmaceutical composition comprising pharmaceutically acceptable excipients or carriers. (D.I. 176 at 37). Marchi in 1982 and the Normix Label in 2001 each taught “pharmaceutical compositions” comprising rifaximin. (*Id.*). Marchi disclosed that rifaximin can be used as an “antibacterial agent[.]” in pharmaceutical compositions with conventional pharmaceutically acceptable excipients or carriers. (JTX 48 at 4:27-33, 4:67-5:4, 5:14-40, 60-62, 6:6-31, Cls. 10–11; Tr. 865:10-866:12, 868:20-869:3). The Normix Label disclosed that rifaximin was an approved antibacterial drug in Italy in 1985 as a coated tablet comprising 200 mg of rifaximin and

¹ Plaintiffs call to my attention *Pharmacyclics LLC v. Alvogen Pine Brook LLC*, 556 F. Supp. 3d 377, 412 (D. Del. 2021), *app. filed*, No. 21-2270 (Fed. Cir. Aug. 31, 2021). (D.I. 181 at 37). I have considered that case but I do not agree with it on this point.

pharmaceutically acceptable excipients. (JTX 94 at 5, 7-8; Tr. 867:13-17, 869:10-870:4, 903:3-9).

Norwich further argues that rifaximin's antibacterial properties were known. Cannata taught that rifaximin has outstanding antibiotic properties and has poor absorption, which indicates to a POSA that it could be used for GI treatments. (Tr. 862:22-24; 863:14-18). Marchi also disclosed "remarkable" antibacterial properties. (JTX 48 at 4:27-33, 4:67-5:4, 5:14-40, 5:60-62, 6:6-31, Cls. 10-11; Tr. 865:10-866:12, 868:20-869:3).

Salix did not respond to these arguments. (*See* D.I. 181 at 37-39).

The only difference between the previous pharmaceutical compositions of rifaximin and claim 36 is that claim 36 characterizes rifaximin as polymorphic form β . Rifaximin β is obvious over Cannata in view of common knowledge, for the same reasons as previously stated in connection with asserted claim 4 of the '199 patent. Accordingly, I find that a POSA would have had the motivation to combine the prior art references of Cannata, the Normix Label, or Marchi and Cannata, in view of the commonly known testing techniques, with a reasonable expectation of success in doing so. Salix offers no evidence or arguments to the contrary. Thus, Norwich has proved by clear and convincing evidence that claim 36 of the '206 patent is invalid as obvious.

3. Written Description

The asserted claims describe rifaximin β as having XRPD peaks "at about 5.4°, 9.0°, and 20.9° 2 θ ." '199 Patent, Cl. 4, '206 Patent, Cl. 36. The specification states that rifaximin β is "characterized . . . by a powder X-ray diffractogram (reported in FIG. 2) which shows peaks at the values of the diffraction angles 2 θ of 5.4°; 6.4°; 7.0°; 7.8°; 9.0°; 10.4°; 13.1°; 14.4°; 17.1°;

17.90°; 18.30°; 20.9°.” ’199 Patent 5:64–6:3. Norwich argues that the polymorph patents improperly claim a genus, whereas the specification recites only a species. (D.I. 176 at 37–38).

Salix responds that (1) the claims, on their face, are limited to the specific polymorphic form rifaximin β , rendering Norwich’s genus characterization inaccurate, and (2) even if Norwich is right, the claims identify structural features common to the genus as required by the caselaw. (D.I. 181 at 39–42). I agree with Salix on the first point, and accordingly will not address Salix’s second argument.

The evidence shows that a subset of XRPD peaks can identify the polymorph. The “normal practice at the USPTO” is to claim a polymorphic form using “at least three powder diffraction pattern peaks.” (Tr. 965:11–17; JTX 28 at XIFAX_NOR_0002208). Dr. Zaworotko’s own patent explains, “For XRPD data herein, each composition of the present invention[, a new crystalline form of a known compound,] may be characterized by any one, any two, any three, any four, any five, any six, any seven, or any eight or more the 2θ angle peaks.” (Tr. 916:17–917:18, PTX 707 at 15:36–39). I do not think the asserted claims claim a genus. They claim only rifaximin β , a polymorphic form which can be identified using the three peaks recited in the claims.

Thus, I reject Norwich’s written description challenge.

IV. THE METHOD PATENTS

A. Inducement

1. Findings of Fact

1. At least some physicians will review Norwich’s label.
2. Physicians will instruct patients to take rifaximin according to the instructions on the label.

2. Infringement

Before turning to a limitation-by-limitation infringement analysis for the method patents, I will address an underlying dispute regarding induced infringement when the patient is the one performing the patented method. Inducement requires direct infringement. Salix argues that either (1) the patients, in taking rifaximin, will directly infringe “because patients will read and follow the instructions in Norwich’s Label (with or without the help of their physician),” or (2) physicians and patients will jointly infringe based on the label. (D.I. 174 at 4). I do not think there is joint infringement. I find that Plaintiffs have not shown that doctors condition the patient’s receipt of a rifaximin prescription on the performance of particular steps in the way contemplated by *Akamai*. See *Akamai Techs., Inc. v. Limelight Networks, Inc.*, 797 F.3d 1020, 1023 (Fed. Cir. 2015) (en banc). Rather, the patients directly infringe.

According to Norwich, “Because patients will not take rifaximin correctly without physician instruction, the Norwich Label does not induce patients and cannot be the basis for finding specific intent.” (D.I. 183 at 3–4 (citation omitted)). Essentially, because there is another party involved in the inducement (physicians), the “chain of events leading to infringement is . . . too attenuated to prove specific intent.” (D.I. 183 at 6–7). I disagree. The Court of Appeals has long held, “the sale of a product specifically labeled for use in a patented method constitutes inducement to infringe that patent[.]” *Eli Lilly & Co. v. Actavis Elizabeth LLC*, 435 F. App’x 917, 926 (Fed. Cir. 2011). In the context of a prescription medication, physicians have a particularly important role in conveying essential information to patients. The evidence in this case bears this out. (See Tr. 66:22-69:20; Tr. 119:5-120:16 (describing the process of prescribing rifaximin to patients)). Other areas of law, such as the learned intermediary doctrine, recognize the physician’s essential role in communicating information about a medication to the patient. See *Reyes v. Wyeth*

Lab'ys, 498 F. 2d 1264, 1276 (5th Cir. 1974). A pharmaceutical company, such as Norwich, is well aware of how doctors prescribe medications to patients. Thus, if there will be direct infringement, then Norwich will have the specific intent to induce patients' direct infringement.

B. The HE Patents

HE is a liver disease that affects the brain. (Tr. 41:15-21; 48:10-16). For patients with HE, the liver does not properly filter toxins from the blood. These toxins can cause changes to the patient's mental state. (*Id.*) Physicians grade HE severity using the Conn score, which ranges from 0 to 4. (Tr. 45:14-47:4). Conn scores of 0 or 1 reflect a normal or near-normal mental state. A Conn score of 2 or higher reflects more serious symptoms, from obvious personality changes to stupor or even coma. (Tr. 46:6-11, 14-15). Conn scores of 0 and 1 cannot be detected in a routine physical exam. (Tr. 45:20-21; 46:4-5). Physicians also assess HE severity using an asterixis score. (Tr. 346:5-8). Asterixis occurs when a patient cycles between lower and higher levels of consciousness and can be measured by tremors in a patient's outstretched hand. (Tr. 46:16-47:4).

HE can be either episodic or persistent. (Tr. 44:13-25). Persistent HE is characterized by a Conn score that remains at 2 or above. (Tr. 44:24-25). Patients with episodic HE have periods of remission punctuated by episodes of breakthrough overt HE. (Tr. 44:13-25; 45:14-46:15). An episode of "breakthrough overt HE" is an increase in the patient's Conn score to grade 2 or higher (e.g., going from 0 or 1 to 2 or more), or an increase in the patient's Conn and asterixis scores of one grade each with a baseline Conn Score of 0. (D.I. 149, Ex. 1 ¶ 81). Patients with a history of overt HE who are not currently having an overt HE episode are in "remission of HE." (*Id.* ¶ 81; Tr. 48:2-6). Thus, patients with a Conn score of 0 or 1 and no asterixis are in remission. (Tr. 48:2-6). After a first overt HE episode, only about half of patients will live one year. (Tr. 50:6-19).

Plaintiff asserts four method claims in connection with the HE patents.

Asserted Claim 6 of the '195 patent is a dependent claim with three elements: (1) reducing the risk of HE recurrence, (2) by orally administering about 550 mg of rifaximin twice daily (BID) to the adult subject, (3) for a period of 12 months or longer.

Asserted Claim 8 of the '573 patent is a dependent claim with three elements: (1) maintaining remission of HE, wherein remission is defined as a Conn score of 0 or 1, (2) by administering 550 mg of rifaximin to the subject BID, (3) for a period of 12 months or longer.

Asserted Claim 11 of the '397 patent is a dependent claim with four elements: (1) reducing a subject's risk of experiencing a breakthrough overt HE episode, (2) by orally administering to the subject 550 mg of rifaximin BID, (3) for a period of about 12 months or longer, (4) to a subject with a Conn score of 0 or 1.

Asserted Claim 12 of the '397 patent is a dependent claim with five elements: (1) reducing a subject's risk of experiencing a breakthrough overt HE episode, (2) by orally administering to the subject between about 1000 mg to about 1200 mg of rifaximin daily, (3) for a period of about 12 months or longer, (4) to a subject with a Conn score of 0 or 1, (5) "further comprising administering lactulose."

1. Findings of Fact

1. Norwich has knowledge of the HE patents.
2. Norwich's label will encourage administration of rifaximin for 12 months or longer.
3. Norwich's label will encourage administration of rifaximin for the "reduction in risk of overt hepatic encephalopathy (HE) recurrence in adults."
4. Norwich's label will encourage administration in patients having a Conn score of 0 or 1.

5. Norwich's label will encourage at least some physicians to co-administer rifaximin and lactulose.
6. Patients will take rifaximin according to the instructions on the label and will directly infringe the asserted HE claims.
7. Norwich's label will induce infringement of the asserted HE claims.
8. The priority date of the asserted claims is October 2, 2008.
9. A POSA would have had a Ph.D. in pharmacology, biology, biomedical sciences, microbiology and/or an M.D. with board certification in gastroenterology. He or she would have had training in or experience with liver and GI disorder research. If needed, a POSA would have collaborated with others having ordinary skill in areas relevant to the claimed subject matter, including infectious diseases and microbiology.
10. The Salix Presentation was not publicly accessible as of the priority date and is not prior art.
11. Leevy 2007 does not disclose a method of administering rifaximin to maintain remission.
12. As of the priority date, a 12-month duration for the administration of rifaximin was not within the common knowledge of a POSA.
13. The claimed method met a long-felt need of reducing the risk of HE recurrence and maintaining remission.
14. There was skepticism in the industry regarding the long-term use of antibiotics to maintain remission in HE patients.
15. The HE patents are not invalid as obvious.
16. The specification describes using rifaximin with or without lactulose.
17. A POSA would recognize that the inventors had possession of the claimed method.

2. Infringement

i. Administering for 12 Months or Longer (All Claims)

It is more likely than not that Norwich's Label will encourage administration of the ANDA product for 12 months or longer in at least some patients, and that Norwich knows and specifically intends for this period of administration. Norwich's product is indicated for reducing overt HE recurrence. (JTX 73 § 1.2). HE is chronic. It must be managed until the patient gets a liver transplant or dies. I credit the testimony of Drs. Mahl and Brown that they have had HE patients maintain remission of HE for 12 months while on rifaximin 550 mg BID. (Tr. 120:21–24; Tr. 55:3–11). The label has no recommendation as to duration of administration. The label further describes a study in which some patients used the product for 12 months or longer. Taken together, this evidence demonstrates by a preponderance of the evidence that Norwich's label would encourage administering rifaximin for at least 12 months.

ii. Maintaining Remission ('573 Patent, Claim 8)

I find that Salix has proved by a preponderance of the evidence that Norwich's label instructs as to "maintaining remission of HE" as required by the asserted claims. Norwich's label is indicated for the "reduction in risk of overt hepatic encephalopathy (HE) recurrence in adults." (JTX 73 § 1.2). The experts described "reducing the risk of overt HE recurrence" and "maintaining remission of HE" as "basically synonymous" or a "continuum of the same thing." (Tr. 249:23–250:18, 252:9–18; Tr. 51:21–52:19). Remission is binary—either a patient is in remission or the patient is not. An overt HE recurrence ends remission. Thus, to maintain remission, a patient must avoid overt HE recurrence.

iii. Conn Score of 0 or 1 ('397 Patent, Claims 11 and 12)

Norwich's label will more likely than not induce use of rifaximin in patients with a Conn score of 0 or 1. The label encourages use to prevent an overt HE recurrence, which as I have found, means maintaining remission. The evidence shows that patients in remission of HE have a Conn score of 0 or 1. Thus, the label will encourage the use of rifaximin in patients who have a Conn score of 0 or 1. This conclusion is bolstered by the Clinical Studies section, which describes a clinical study in which the patients were "defined as being in remission (Conn score of 0 or 1) from hepatic encephalopathy." (JTX 73 § 14.2).

Norwich argues that (1) doctors do not calculate a Conn score for their patients before prescribing rifaximin, and (2) the Indications section does not reference the Clinical Studies section and thus it "merely describe[s] a parameter of the study, rather than actually encouraging, recommending, or promoting" the infringing use. (D.I. 183 at 10). I find these arguments unpersuasive.

The expert testimony shows that at least some physicians use Conn scores in clinical practice. (Tr. 154:2–22; 264:6–7). Defendant's expert, Dr. Mahl, testified that he does not calculate Conn scores but does record the "elements that might go into a Conn score." (Tr. 114:16–20). The patents do not require the calculation of a Conn score. Rather, they require use in patients with a Conn score of 0 or 1, which can be present regardless of whether it has been calculated. On this testimony, it seems likely that Norwich's ANDA product will be used in at least some patients who have a calculated Conn score of 0 or 1 as well as patients whose Conn scores would be a 0 or 1, if calculated, based on the symptoms observed by their physicians.

Regarding the Clinical Studies section, the law does not require the indication section of a label to specifically direct the reader to look at other sections in order for those other sections to

be considered. The Court of Appeals has held, “The jury was entitled to credit expert testimony regarding the label's instructions on who should take what drug, when, why, and how, and to reject the argument that certain portions of the label were disjointed from others.” *GlaxoSmithKline LLC v. Teva Pharms. USA Inc.*, 7 F.4th 1320, 1329 (Fed. Cir. 2021), *petition for cert. filed*, No. 22-37 (July 11, 2022). I credit the testimony of Dr. Brown that physicians commonly read the Clinical Studies section. (Tr. 67:24–68:8). The “Hepatic Encephalopathy” subsection starts with the sentence: “The efficacy of rifaximin tablets 550 mg taken orally two times a day was evaluated in a randomized, placebo-controlled, double-blind, multi-center 6-month trial of adult subjects from the U.S., Canada, and Russia who were defined as being in remission (Conn score of 0 or 1) from hepatic encephalopathy (HE).” (JTX 73 § 14.2). Accordingly, I find that the label will induce use in patients with a Conn score of 0 or 1.

iv. Administration with Lactulose ('397 Patent, Claim 12)

Norwich’s label will encourage co-administration with lactulose. In the Indications and the Clinical Studies section, the label notes that 91% of patients took rifaximin and lactulose concomitantly, and that lactulose did not alter the treatment effect of rifaximin. (JTX 73 §§ 1.2, 14.2). This strongly suggests that taking lactulose concomitantly is safe and effective, and it will likely encourage some physicians to administer rifaximin in conjunction with lactulose as required by the claims. I reject Norwich’s comparison to *Shire LLC v. Amneal Pharmaceuticals*, which held that label indicating that a drug could be taken “with or without” food was “indifferent” as to which option was select and thus not an instruction to infringe. 2014 WL 2861430, at *5 (D.N.J. June 23, 2014), *aff’d in part, rev’d on other grounds*, 802 F.3d 1301 (Fed. Cir. 2015). The high percentage of patients who took lactulose concomitantly, and the fact that this information was included in the Indications section, encourages physicians to prescribe the two concomitantly.

I credit the testimony of Dr. Brown, who stated that the label, by citing the 91 percent figure, “makes clear that you can – you can and probably should use Lactulose in the majority of your subjects.” (Tr. 76: 5–7). I further credit Dr. Brown’s testimony, “Whenever possible, I use the combination of Lactulose and rifaximin because that’s where the bulk of the data is.” (Tr. at 76:12–13). I find that a physician reading the Norwich label and considering a study in which 91% of the patients were administered lactulose concomitantly will be inclined to do so likewise “because that’s where the bulk of the data” showing the efficacy of rifaximin is.

v. Substantial Noninfringing Use (All Claims)

Norwich argues that its ANDA product has substantial noninfringing uses, which is relevant to intent to induce. (D.I. 183 at 11–12). Most HE patients live less than 12 months after their first overt HE episode. Thus, a substantial number of patients taking Norwich’s ANDA as directed will not take rifaximin for 12 months or more, and these uses will not meet the 12-month-or-more claim limitation. Norwich points to *Warner-Lambert Co. v. Apotex Corp.*, 316 F.3d 1348, 1363–66 (Fed. Cir. 2003) in support of this argument.

The Federal Circuit has distinguished *Warner-Lambert*, where the infringing use would be off-label use of the defendant’s ANDA product and encompass only a small number of sales, and cases where “the proposed label itself recommends infringing acts.” *Vanda Pharms. Inc. v. West-Ward Pharms. Int’l Ltd.*, 887 F.3d 1117, 1132–33 (Fed. Cir. 2018). Here, since I find that the label itself recommends infringement, the potential for substantial non-infringing uses does not negate Norwich’s intent to induce infringement.

3. Invalidity

The parties agree that the definition of a POSA is not outcome determinative. (D.I. 176 at 2; D.I. 181 at 1). I adopt Plaintiffs’ definition of a POSA.

Norwich argues that as of 2008, it was widely known that rifaximin was safe and effective for treating HE. (D.I. 176 at 3). Rifaximin was indicated abroad for HE in 2000. (JTX 94 at 5, 9). In 2004, the FDA approved Salix's Xifaxan for traveler's diarrhea. From that time, there is evidence of widespread off-label use of Xifaxan by physicians to treat patients with HE. Market research conducted by Salix shows that, by January 2007, 77% of physicians who treated HE patients had prescribed Xifaxan for HE. (DTX 349-16).

The prior art described the use of rifaximin in HE patients. For instance, a 1993 article ("Festi") described one open study and two randomized, controlled, comparative studies. The three studies "confirm[ed] the usefulness of rifaximin in the management of cirrhotic patients with mild HE." (JTX 42 at 607; Tr. 165:11-166:5). A 2000 article ("Williams 2000") described a study confirming that 1200 and 2400 mg doses of rifaximin showed significant improvement "in reducing objective parameters of HE in cirrhotic patients," and "treatment with rifaximin 1200 mg/day may be considered as an adjuvant or an alternative" to lactulose, with no adverse effects. (JTX 66 at 203-4, 207). Lactulose was the "mainstay" for HE therapy at the time. (See Tr. 203:17-204:5). In 2004, doctors at a Salix-hosted conference on hepatology reported being "very happy with [rifaximin's] results" and that rifaximin had "excellent" tolerability with "no significant side effects." (Tr. 172:10-18; 174:8-22; DTX 584-1, 3). A 2007 retrospective chart review ("Leevy 2007") showed better treatment outcomes for patients on rifaximin than on lactulose. (DTX 390-3; Tr. 204:6-16).

Norwich also points to retrospective chart reviews published after the priority date that show use of rifaximin for HE before the priority date. (See D.I. 176 at 9-10 (citing JTX 111, JTX 109)). I do not think these uses are in the prior art because there is no evidence that a POSA would have known about them. They do provide evidence of a POSA's state of mind, since the physicians

prescribing Xifaxan off-label meet both parties' definition of a POSA. (See D.I. 182 ¶ 121; D.I. 177 ¶ 1). See *In Re: Copaxone Consol. Cases*, 906 F.3d 1013, 1025 (Fed. Cir. 2018) (holding, "The district court . . . properly relied on [a reference] not as statutory prior art, but for the fact that [POSAs] were interested in pursuing less frequent dosing regimens.").

i. Prior Art Combinations

Norwich presents two obviousness combinations for the asserted HE claims: the Bausch HE Study in light of the Salix Presentation, and Leevy 2007 in light of common knowledge. I will consider each in turn.

The Bausch HE Study is the protocol for the clinical trial that ultimately led to the approval of rifaximin for HE. It disclosed the method, dosage, lactulose, and Conn score limitations of the asserted claims. The Salix Presentation was a presentation given by Dr. Leevy at a Salix shareholder's meeting in which Dr. Leevy described using rifaximin to treat HE. (DTX 52-4). Dr. Leevy described the duration limitation. Between the two, all claim limitations are disclosed.

Salix argues that the Salix Presentation was not in the prior art because it was not accessible. (D.I. 181 at 4). Salix tried to exclude the evidence before trial. (D.I. 150). I denied Salix's motion without prejudice to evaluating its prior art status based on a complete understanding of the record. (D.I. 161 at 28:9–18). Norwich's response to the motion in limine relied on evidence that Norwich did not present at trial. (See D.I. 150 at 9 of 18 (describing a Salix press release announcing the conference)). Accordingly, I will reconsider the question in light of the evidence presented at trial.

At trial, Defendant offered the transcript of the Salix Presentation and expert testimony regarding the presentation. (DTX 660; Tr. 175:20–176:22). Defendant's expert, Dr. Berg, testified that the Salix presentation was publicly available online at the SEC and that a POSA would be

motivated to find it because Salix was the only company selling rifaximin in the United States at the time. (Tr. 175:22–24; 176:15–22). Salix responds that this testimony is unsupported by explanation or evidence. (D.I. 181 at 4–5). While I credit Dr. Berg’s assertions regarding a POSA’s motivation to look for and methods of finding such a document, I do not credit his testimony regarding the availability of the Salix Presentation online before the priority date. I do not think a medical doctor’s expertise is a basis for opining on what the SEC had available online more than a decade ago. Dr. Berg’s opinion is not supported by independent evidence. “At this critical point in the determination of obviousness, there must be factual support for an expert’s conclusory opinion.” *Upjohn Co. v. Mova Pharm. Corp.*, 225 F.3d 1306, 1311 (Fed. Cir. 2000). Without evidence of online accessibility, and without evidence that the meeting was attended by interested POSAs (or even directed to POSAs, rather than investors), I find that Defendant has not shown by clear and convincing evidence that the Salix Presentation is prior art.

Norwich’s second prior art combination is Leevy 2007 and common knowledge. Norwich argues, “Leevy 2007 disclosed the method, dosage, and Conn score limitations.” (D.I. 176 at 8). Norwich argues that common knowledge supplies the missing limitations of duration (of 12 months or more) and lactulose. (*Id.* at 9).

Upon review of the evidence, I find that Leevy 2007 does not describe the method limitation. Independently, common knowledge cannot supply the duration limitation. I will address each in turn.

The claims are directed to maintaining remission or reducing the risk of breakthrough overt HE. Leevy 2007 concluded that HE hospitalizations were less frequent and shorter for patients on rifaximin than for patients on lactulose. Norwich argues that these hospitalizations are a metric for breakthrough overt HE and therefore Leevy 2007 discloses the method limitation. (D.I. 176 at

8). But Norwich's argument is not supported by the record. Norwich's expert, Dr. Berg, testified as to Leevy 2007's disclosure of rifaximin's ability "to treat HE" or as "therapy for HE." (*E.g.*, Tr. 181:9–18; 206:2–10). He did not characterize it as disclosing prevention or the like. I see no testimony linking Leevy's reduction in hospitalizations with the claimed method of preventing breakthrough overt HE.

Furthermore, Leevy 2007 did not track Conn scores throughout the study. As Salix argues, "a POSA would not have been able to determine whether subjects who had a Conn score of 1 at the beginning of the rifaximin phase maintained that Conn score throughout the 6 months." (D.I. 181 at 5). I credit Dr. Brown's testimony, "You cannot interpret the natural course of these patients' HE through the six-month period based on the data provided." (Tr. 393:4–6). Leevy 2007 does not teach the maintaining remission limitation.

Thus, Leevy 2007 cannot supply the limitations required for the asserted claims, whether it is maintaining remission of HE or reducing the risk for breakthrough overt HE. On that basis alone, Defendant fails to prove obviousness.

There is a second, independent basis to reject the prior art combination of Leevy 2007 and common knowledge. I do not think that a POSA would have a reasoned basis to resort to the "common sense" that rifaximin could be used for 12 months or longer. Common sense can supply a limitation missing from the prior art if a "searching" review of the prior art provides a "reasoned basis for resort to common sense." *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1363 (Fed. Cir. 2016).

Many of the sources Norwich relies upon to show long-term administration are not prior art. (*See* D.I. 176 at 9–10 (citing retrospectives published after the priority date and the Salix Presentation)). They were not, at that point, in the common knowledge of the field.

Administration of rifaximin for 12 months or more suggests prevention (i.e., maintaining remission or reducing the risk of overt HE recurrence), not mere treatment. Norwich argues, “[T]he record is replete with prior art disclosing the use of rifaximin in patients in remission from HE (i.e., having a Conn score of 0 or 1).” (D.I. 185 at 5–6). It is true that some of the studies included patients with Conn scores of 0 or 1. (JTX 66 at 205; JTX 42 at 607.) Many of these patients would have been in remission, but the sources discuss HE “treatment,” not prevention or maintenance of remission. The Bausch HE study was the first prior art source to clearly articulate a desire to prevent hepatic encephalopathy. (DTX 52-4). As of the priority date, the Bausch Study did not have any results. Accordingly, I do not think that a 12-month treatment period was within the common knowledge as of the priority date.

Furthermore, Salix has presented evidence that a POSA would have known that long-term administration of rifaximin, an antibiotic, was risky. Not only could long-term use of antibiotics lead to a superinfection, which could kill the patient, but, “A POSA would have been concerned that if an HE patient developed clinical resistance to rifaximin, [the POSA] would not be able to administer rifaximin the next time the patient experienced an HE episode.” (D.I. 181 at 11; Tr. 388:3–9). The parties’ experts disagreed about the level of risk associated with long-term administration of rifaximin and how a POSA would consider that risk. I credit Dr. DuPont’s testimony that without further studies, a POSA would have been reluctant to administer rifaximin long-term. (Tr. 467:7–12). Thus, I think that the prior art does not provide enough of a reasoned basis for supplying the duration limitation.

Finally, Salix has presented evidence of secondary considerations of nonobviousness that weigh in favor of finding the HE patents nonobvious. The claimed HE methods met a long-felt need for maintaining remission and reducing the risk of breakthrough overt HE episodes. Salix

argues, “As of October 2008, no drug had been approved for HE in over 30 years, and no drug had ever been approved to *prevent* HE recurrence.” (D.I. 174 at 17). Norwich’s expert responded that there was no need because physicians were already using a combination of rifaximin and lactulose to treat HE. (Tr. 222:7–20). As Salix points out, however, “Short-term, off-label use of rifaximin to *treat* HE did not meet a long-felt need for long-term *prevention* of HE recurrence.” (D.I. 186 at 10).

There was also some skepticism in the industry. Salix points to comments from the FDA advisory committee expressing the concern “that indefinite use of rifaximin could change the gut flora and cause antibiotic resistance.” (D.I. 174 at 17). Norwich argues that the FDA statements lack a nexus to the asserted claims. I disagree. “Where the offered secondary consideration actually results from something other than what is both claimed and novel in the claim, there is no nexus to the merits of the claimed invention.” *Novartis AG v. Torrent Pharm. Ltd.*, 853 F.3d 1316, 1330 (Fed. Cir. 2017) (citation omitted). But here, the potential antibiotic resistance would have resulted from the claimed method of treatment. Accordingly, I give some weight to the FDA comments as evidence of skepticism.

Ultimately, I find that Norwich has not shown by clear and convincing evidence that the asserted HE claims are invalid as obvious.

ii. Written Description

Norwich argues, “Claim 8 of the ’573 patent, claim 6 of the ’195 patent, and claim 11 of the ’397 patent are invalid for lack of written description because the specifications of the patents fail to show that the administration of rifaximin alone (*i.e.*, in the absence of concomitant administration of lactulose) achieves the claimed effects.” (D.I. 181 at 16). Norwich’s argument seems to be that the specifications lack data supporting the efficacy of rifaximin alone. (*See id.*).

This is not the standard for written description. The specifications all describe using rifaximin with or without lactulose. (JTX 19 at 16:62-17:3 (“This method includes: administering rifaximin to a subject daily that is being treated with lactulose, and tapering lactulose consumption.... In one embodiment, the baseline use of lactulose is no use.”); JTX 11 at 16:62-17:3; JTX 22 at 10:49-57). I therefore find that Norwich has not shown a lack of adequate written description by clear and convincing evidence.

C. THE IBS-D PATENTS

Irritable bowel syndrome (“IBS”) is characterized by symptoms including abdominal pain, bloating, frequency, urgency, gas, and changed bowel habits, such as diarrhea, constipation, or alternating diarrhea and constipation. (*E.g.*, Tr. 618:23–620:2). Subtypes of IBS include IBS with diarrhea (IBS-D), IBS with constipation (IBS-C), or IBS with alternating diarrhea and constipation (IBS-A). (Tr. 622:9–623:1). The IBS-D subtype comprises about one-third of IBS patients. (Tr. 622:21–623:1). IBS may be caused, for example, by abnormal motility, abnormal muscular coordination, changes in the microbiome in the colon or small intestine, intolerance to certain foods, or psychological factors. (Tr. 618:23–620:2).

Plaintiffs assert two claims in connection with the IBS-D patents.

Asserted Claim 3 of the ’667 patent is a dependent claim that has three elements: (1) administering 550 mg of rifaximin three times a day (TID) for 14 days; (2) to treat one or more symptoms of IBS-D; (3) in a subject 65 years of age or older.

Asserted Claim 2 of the ’569 patent is a dependent claim with two elements: (1) administering 550 mg of rifaximin TID for 14 days; and (2) after stopping rifaximin, achieving a durability of response that comprises about 12 weeks of adequate relief of symptoms.

1. Findings of Fact

1. Norwich is aware of the IBS-D patents.
2. Norwich's label will encourage administering rifaximin to adults aged 65 years or older with IBS-D.
3. Norwich's label will encourage administration of "one 550 mg tablet taken orally three times a day for 14 days" for the treatment of IBS-D, which inevitably will result in at least some patients having a durability of response comprising about 12 weeks of adequate relief after stopping rifaximin.
4. Patients will take rifaximin according to the label and will directly infringe the asserted IBS-D claims.
5. Norwich's label will induce infringement of the asserted IBS-D claims.
6. The priority date for the IBS-D claims is February 26, 2008.
7. A person of skill in the art would have had a medical degree with training in gastroenterology or have been a practicing physician, such as an internist, with experience in treating IBS.
8. The prior art includes the '608 patent (JTX 132), the Pimentel Book (PTX 752), Yang (DTX 892), the RFIB 2001 Press Release (DTX 657), Pimentel 2006 (JTX 53), the RFIB 2001 Protocol (DTX 340), Cuoco (JTX 38), Barrett (JTX 71), Viscomi 2005 (JTX 64), Lin 2006 (JTX 69), Lauritano (DTX 384), and Scarpellini (JTX 60).
9. The RFIB 2001 Protocol and Pimentel 2006 disclose all limitations of the IBS-D claims.
10. A POSA would have been motivated to combine the RFIB 2001 Protocol and Pimentel 2006 with a reasonable expectation of success.

11. As of the priority date, the prior art disclosed positive results in using rifaximin to treat IBS-D for a range of doses. The asserted IBS-D claims describe a dosing regimen within the known range.
12. A POSA would have had motivation to treat IBS-D patients 65 years of age or older with rifaximin. A POSA would have had a reasonable expectation of success in treating this patient group with rifaximin.
13. The prior art did not teach away from using rifaximin to treat IBS-D according to the claimed methods.
14. There was some skepticism in the literature.
15. The asserted IBS-D claims are invalid as obvious.
16. The specification describes "durability of response" as including adequate relief from symptoms for 12 weeks.
17. A POSA would recognize that the inventor possessed the claimed durability of response.
18. A POSA would have reasonable certainty regarding the meaning of "adequate relief" and "durability of response."

2. Infringement

i. Age 65 and Over ('667 Patent, Claim 3)

Claim 3 of the '667 patent requires administration of rifaximin to patients who are 65 years and older. I find that Norwich's label will induce administration to this patient population. Norwich's ANDA product is indicated for "adults." (JTX 73 § 1.3). "Adults" include people who are 65 years and older. The label's "Use in Special Populations" section describes "Geriatric Use." (JTX 73 § 8.5). The label states, "No overall differences in safety or effectiveness were observed between these subjects [aged 65 and over] and younger subjects for either indication." (*Id.*)

Accordingly, Norwich knows and specifically intends that its ANDA product will be used to treat IBS-D in patients who are 65 and older.

ii. 12 Week Durability of Response ('569 Patent, Claim 2)

Claim 2 of the '569 patent requires a “durability of response [that] comprises about 12 weeks of adequate relief.” I find that Norwich’s label will induce such a response in at least some patients. Salix argues, “By following [the dosing] instructions [on the label], some patients will inevitably have a durability of response comprising about 12 weeks of adequate relief.” (D.I. 174 at 14). Salix’s expert testified to this, and Norwich’s expert admitted as much. (Tr. 537:12–540:4, 581:16–22 (agreeing that at least some patients “will experience adequate relief of their IBS-D symptoms for 12 weeks after taking rifaximin 550 milligrams three times a day for 14 days”)). “[A]n accused product that sometimes, but not always, embodies a claimed method nonetheless infringes.” *Bell Commc'ns Rsch., Inc. v. Vitalink Commc'ns Corp.*, 55 F.3d 615, 622–23 (Fed. Cir. 1995).

Norwich’s label supports a finding of inducement. The product is indicated “for the treatment of irritable bowel syndrome with diarrhea.” (JTX 73 § 1.3). The Clinical Studies section states, “The efficacy of rifaximin tablets for the treatment of IBS-D was established in 3 randomized, multi-center, double-blind, placebo-controlled trials in adult patients.” (JTX 73 § 14.3). The third study, TARGET 3, tracked long-term response to treatment. In it, “382 [patients] experienced a period of symptom inactivity or decrease that did not require repeat treatment by the time they discontinued, including patients who completed the 22 weeks after initial treatment with rifaximin.” (*Id.*). Norwich argues that TARGET 3 only measured two symptoms of IBS-D, rather than the claimed “adequate relief” of IBS-D symptoms, and that it reported “time to recurrence” rather than the claimed “durability of response.” (D.I. 183 at 14).

Even when a proposed label does not exactly track the claim language, a package insert containing directives that will “inevitably lead some consumers to practice the claimed method” provides sufficient evidence for a finding of specific intent. *See AstraZeneca LP v. Apotex, Inc.*, 633 F.3d 1042, 1060 (Fed. Cir. 2010). Accordingly, I find that Norwich’s label will induce some patients to experience a 12-week durability of response as required by the patents and that Norwich will have the specific intent to induce infringement.

3. Obviousness

Salix asserts that the definition of a POSA is not outcome determinative. (D.I. 181 at 16). Norwich has proposed that a POSA would have had a medical degree with training in gastroenterology or have been a practicing physician, such as an internist, with experience in treating IBS. (D.I. 181 at 17). I adopt Norwich’s definition of a POSA.

Norwich argues that, as of the priority date, rifaximin was known to be safe and effective in treating IBS-D. Prior to February 2008, there was widespread off-label use of Xifaxan to treat IBS in the United States. As of January 2008, 74% of gastroenterologists polled by Salix had prescribed Xifaxan for IBS. (DTX 349-130). Prescription data showed that 27.7% of Xifaxan 200 mg tablet uses in November 2007 had been for IBS. (DTX 349-89; Tr. 832:2-833:23).

The prior art also discussed using rifaximin to treat IBS. In 1999, Dr. Pimentel applied for patents on the use of rifaximin to treat IBS. (JTX 132; JTX 133; Tr. 617:1-21). The ’608 patent claims a method of “treating a subject suffering from [IBS], comprising administering rifaximin to the subject . . .” (JTX 132 at cl. 1; Tr. 620:3-621:9).² At a 2005 conference hosted by Salix, Dr. Pimentel disclosed that his practice group had used rifaximin to treat about 900 patients. (Tr.

² The ’608 patent issued in 2010 but the parties agree that it was publicly accessible before the priority date. (D.I. 149, Ex. 1 ¶ 136).

627:7-628:5; DTX 582-4, 5). In 2006, Dr. Pimentel published a book titled *A New IBS Solution, Bacteria – the Missing Link in Treating Irritable Bowel Syndrome*, which recommended the use of rifaximin as a safe and effective way to treat IBS-D. (PTX 752; Tr. 623:25-624:21).

In 2006, three studies were published on the use of rifaximin to treat IBS. A randomized, double-blind, placebo-controlled study found rifaximin to be more effective than placebo in improving IBS. (“Pimentel 2006,” JTX 53). A retrospective chart review of IBS patients who had tested positive for small intestine bacterial overgrowth (“SIBO”) reported a significant reduction in the number of patients having IBS symptoms 4-5 months after treatment, and that 12 of 23 patients had “complete resolution of IBS symptoms.” (“Cuoco,” JTX 38 at 94). Another retrospective chart review of 8 patients disclosed, “rifaximin use resulted in complete resolution of clinical symptoms in 4 patients, with no IBS relapse (follow-up, 1 to 6 months),” and “partial symptom improvement was observed in 4 patients, 3 of whom were treated for an additional 2 months with rifaximin 400 mg three times daily cycle therapy (2 weeks on / 1 week off []) which resulted in a 50% to 70% improvement from baseline.” (“Barrett,” JTX 71; Tr. 639:9-640:5).

Norwich proposes three prior art combinations involving three pieces of prior art. Because I agree that Pimentel 2006 in light of the RFIB 2001 Protocol renders the asserted claims of the IBS-D patents obvious, I will not address the other two combinations.

Pimentel 2006 administered rifaximin, 400 mg TID for 10 days, to treat IBS patients aged 18-65. Pimentel 2006 taught, “rifaximin resulted in statistically greater global improvement in IBS than placebo,” and “[i]mprovements were sustained through 10 weeks of follow-up” after 10 days of treatment. (JTX 53 at 562).

The “RFIB 2001 Protocol” (DTX 340) was a Phase II trial designed to administer rifaximin to patients aged 18 and over, 550-2,220 mg per day for 14 days for the treatment of IBS-D. The

protocol included the outcome measures of providing adequate relief of symptoms and evaluating a durability of response over a 12-week post-treatment period. Salix announced the successful completion of this study on September 5, 2007 (the “RFIB 2001 Press Release”) and disclosed, “Top-line results of this study demonstrate that . . . a 14-day course of rifaximin at 550 mg twice-a-day, provides a statistically significant improvement in both adequate relief of IBS symptoms and adequate relief of bloating, compared to placebo.” (DTX 657-4; Tr. 656:12-657:10).

The RFIB 2001 Protocol and Pimentel 2006 disclose all limitations of the asserted IBS-D claims.

I find that a POSA would have been motivated to combine Pimentel 2006 with the RFIB 2001 Protocol and would have had a reasonable expectation of success. Pimentel 2006 reported sustained improvement in IBS symptoms for patients aged 18-65 for at least 10 weeks on a 400 mg TID, 10-day regimen. The RFIB 2001 Protocol included no upper age limit, a 14-day dosing regimen of 550 to 2200 mg per day, and the treatment of patients with IBS-D in particular. As of the priority date, a POSA would have known about the successful RFIB 2001 Protocol results. Widespread off-label use reflects a motivation to use rifaximin for the treatment of IBS-D with a reasonable expectation of success. As described above, several pieces of prior art reported success in treating IBS with rifaximin. The caselaw does not require “conclusive proof of efficacy.” *Hoffmann-La Roche Inc. v. Apotex Inc.*, 748 F.3d 1326, 1331 (Fed. Cir. 2014). Rifaximin had been shown to be effective in treating IBS in Pimentel 2006 and IBS-D in the RFIB 2001 Protocol, which were randomized, placebo-controlled clinical trials. Together, I think this is strong evidence that a POSA would have a motivation to use rifaximin for the treatment of IBS-D.³

³ The parties do not discuss whether there is any difference between the motivation to use rifaximin to treat IBS and to treat IBS-D. I think a POSA would have been motivated to treat IBS-D and would have had a reasonable expectation of success in doing so, even though much of

I also find that a POSA would have had the motivation to select an optimal dosing regimen from within the known range. The prior art describes positive results from a range of doses. Pimentel 2006 used 400 mg of rifaximin TID for 10 days and reported “global improvement in IBS.” (JTX 53 at 558). Cuoco disclosed a total dose of 1200 mg for 14 days and reported significant reduction in the number of patients having IBS symptoms. (JTX 38 at 91). Barrett disclosed 400 mg TID for 1-5 months. (JTX 71). In 2007, Quigley explained, “Antibiotic dose and duration of therapy have not been established. All studies to date have used different doses and antibiotic regimens; the optimal approach needs to be established in a prospective, placebo-controlled, dose-ranging study.” (PTX 692 at 1142). The RFIB 2001 Protocol taught a range from 1100 mg to 2200 mg per day for 10-14 days. (Tr. 655:20-656:11). The RFIB 2001 Press Release reported that a “14-day course of rifaximin at 550 mg twice-a-day” dosage saw effective results. (DTX 657-4). The claimed dose is 550 mg of rifaximin TID for 14 days.

“Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or working ranges by routine experimentation.” *In re Applied Materials, Inc.*, 692 F.3d 1289, 1295 (Fed. Cir. 2012) (cleaned up). Here, a POSA would have been motivated to combine the prior art to achieve a dosage regimen within the known range. Salix’s market research showed that 56% of physicians who prescribed Xifaxan for IBS used TID dosing and 62% had prescribed the drug to be taken for 10-14 days. (DTX 349-131). This market research is not prior art because it was not publicly available as of the priority date, but it reflects a POSA’s state of mind. Pimentel 2006 taught, “Recent data suggest that the optimal dosage of rifaximin may, in fact, be higher than that used in our study.” (JTX 53 at 562). A POSA would have been

the prior art describes the treatment of “IBS.” About one third of IBS patients have IBS-D, and there is no evidence in the record that a POSA would expect an IBS-D patient to respond differently to treatment than a patient with another form of IBS. (Tr. 622:21-623:1).

motivated to use TID dosing to maintain an effective concentration of rifaximin in the small intestine to control bacteria levels. (Tr. 672:4-23). Finally, a POSA would have been motivated to improve the use of rifaximin to treat IBS by using a larger tablet to reduce patients' pill burden and improve compliance. (Tr. 674:1-16).⁴

I further find that a POSA would have had the motivation to treat patients 65 years of age or older with a reasonable expectation of success. The prior art described rifaximin use to treat symptoms of IBS-D patients 65 years or older. (JTX 71 at 1-2; DTX 340-7; DTX 657-4). A POSA would have expected the effect observed in Pimentel 2006 to apply to older patients too. (Tr. 679:12-16).

Salix attacks Norwich's obviousness case on several fronts.

Salix argues that a POSA would recognize these prior art sources as flawed. Cuoco, for instance, is based on the unproven premise that SIBO contributed to IBS-D. Furthermore, its methodology was poor. (D.I. 181 at 19). Barrett was a retrospective chart review of only 8 patients and concluded that more research was needed. (*Id.*). Pimentel 2006 did not find an improvement in the symptoms of abdominal pain and diarrhea. (JTX 53 at 561). An editorial by Dr. Drossman noted that Pimentel 2006's limitations made its "findings inconclusive and raise[d] questions about the clinical significance of the results." (PTX 457 at 627; Tr. 767:11-18, 770:10-19). Finally, Salix argues that the RFIB 2001 Protocol did not disclose results, and "it was unrebutted that a

⁴ Salix argues that Dr. Harary undermined his own testimony on the pill burden. Dr. Harary testified, "I don't think going from two pills to one pill would make a big difference, but if you have a larger number of pills, then going to one pill would be – would be convenient and the patients would be more comfortable taking them." (Tr. 674:12-16). As of the priority date, only 200 mg pills were available. I take Dr. Harary's testimony to be saying that three 200 mg pills would be needed to achieve a similar dose (600 mg, as opposed to the claimed 550 mg), and that three pills are more inconvenient than one pill. Accordingly, I do not see how Dr. Harary undermined his own testimony regarding pill burden.

POSA would not have reasonably expected RFIB2001 would be successful simply because the trial had begun.” (D.I. 181 at 19–20).

I am unpersuaded by these arguments. It is fair to critique sources, and a POSA would take a source’s shortcomings into consideration when evaluating the evidence. Obviousness does not require perfect evidence, however, and the available evidence persuaded a significant number of doctors who would have been qualified as POSAs to use rifaximin to treat IBS. Regarding Pimentel 2006’s failure to find an improvement in abdominal pain and diarrhea, the patents are not directed to specific symptoms but to “adequate relief.” There are many symptoms of IBS-D. The patents themselves do not claim relief from every symptom.

Finally, I find that Salix’s press release disclosing success in the RFIB 2001 Protocol study is prior art, and thus a POSA would have known about the RFIB 2001 top-line results as of the priority date. Salix argues that the press release was derived from the inventor’s work and thus cannot be prior art. (D.I. 181 at 20 (citing *Invitrogen Corp. v. Biocrest Mfg., L.P.*, 424 F.3d 1374, 1380-81 (Fed. Cir. 2005))). Norwich argues that Salix has waived this contention by failing to raise it in the Pretrial Order. (D.I. 185 at 8). Upon review of the Pretrial Order and its Exhibits (D.I. 147-149), I see Plaintiffs’ acknowledgement that Norwich is asserting the press release as prior art (D.I. 149, Ex. 4, at 5 n.2), and I see a list of items the prior art status of which Plaintiffs contest, which does not include the press release (*id.* at 6 ¶28), and I do not see any discussion of derivation, so the argument is likely waived. But I do not need to decide waiver, however, because there is no evidence upon which to make a factual finding that the press release was derived from the inventor’s work. “Since appellees have produced no evidence—unsurprising given their belated recourse to this argument—and provided no supported explanation demonstrating that the Brandt references were in fact printed publications authored by Dr. VanDenburgh for the purposes

of § 102(a), we see no reason to remand to make further findings on this issue.” *Allergan, Inc. v. Apotex Inc.*, 754 F.3d 952, 969 (Fed. Cir. 2014). The *Allergan* Court thus concluded that the printed publications at issue were prior art. *Id.* at 969–70). The press release is therefore prior art. Its disclosure of positive results would give a POSA a reasonable expectation of success in using rifaximin to treat IBS-D.

Salix also points to skepticism in the literature regarding the connection between SIBO and IBS and whether to use antibiotics to treat IBS-D. Drossman criticized the Pimentel 2006 methodology, as discussed above. A 2007 Education Practice note by Eamonn M.M. Quigley stated, “sound rationale for antibiotic therapy ha[d] not been established because the issue of SIBO in IBS ha[d] not been resolved.” (PTX 692 at 1142; Tr. 777:20–21). Indeed, Salix argues, using antibiotics would have drawbacks: antibiotics could “exacerbate symptoms” or “lead to antibiotic resistance and opportunistic infections” like *c. difficile*. (PTX 664 at 1780; PTX 692 at 1142). A February 4, 2008 article by Vanner considered the evidence and concluded that there was insufficient evidence to recommend the use of antibiotics to treat IBS. (Tr. 779:3–8). Accordingly, Salix argues that the off-label use is best understood as physicians acting out of “desperation, not because they expected it to work.” (D.I. 181 at 17).

Upon review of the evidence, it appears that IBS is a complex disease and the pathogenesis was unknown as of the priority date. The relationship between IBS and SIBO was actively being explored, provoking a debate within the field. Quigley, Vanner, and Drossman do not teach away from using rifaximin to treat IBS, and Salix does not argue that they do. Based on the evidence, I do not think a POSA would elevate these sources above the other prior art available. The RFIB 2001 Press Release—which was not cited by Quigley, Vanner, or Drossman—states, “The belief that bacteria in the small bowel may play a role in the symptoms of IBS gains additional evidence

with this large, multicenter trial.” (DTX 657-4). I do not think a POSA would have discounted prior art sources that were based upon the theory that SIBO contributed to IBS because studies such as the RFIB 2001 Protocol were testing that hypothesis at the time. More importantly, a POSA would look to the top-line results from the RFIB 2001 Protocol as evidence that rifaximin could be effective in treating IBS-D, regardless of whether the results were based upon a link between IBS-D and SIBO.

Regarding the concerns of bacterial resistance, expert testimony shows that short-term administration did not raise resistance concerns. (Tr. 493:15-494:20). Furthermore, in 2007, a retrospective study of 84 IBS patients who were retreated with rifaximin noted that 69% of patients had a “clinical response” to rifaximin and that retreatment did not result in clinically relevant antibiotic resistance. (DTX 892-2, 5; Tr. 630:5-19, 631:9-18).

Accordingly, I do not think these concerns would dissuade a POSA from exploring the use of rifaximin in treating IBS-D. The 74% of gastroenterologists who had reported using rifaximin for IBS-D patients is real world evidence supporting the conclusion that there was a motivation to explore this treatment, despite the potential risks.

Regarding secondary considerations, Salix argues that there was skepticism that the claimed dosing regimen could safely and effectively treat IBS-D. (D.I. 174 at 17). Salix points to statements in Quigley, Drossman, and Vanner such as, “A sound rationale for antibiotic therapy has not been established,” and, “There is insufficient evidence to recommend antibiotics for the treatment of [IBS] at present.” (PTX 692 at 1142; PTX 693 at 1319). Furthermore, experts on the FDA advisory committee stated that using rifaximin 550 TID for 14 days was “a completely different paradigm and a different treatment structure,” and that Salix had proposed to “treat[] a disease which we know nothing or very little about with a drug that we know little or nothing

about.” (PTX 535 at 302, 307). The FDA advisory committee also expressed concern about antibiotic resistance. (*Id.* at 137).

Norwich responds that Salix’s evidence of skepticism “fails” because rifaximin had already been used to safely and effectively treat IBS-D before 2008. (D.I. 183 at 18). I do not think this negates Salix’s evidence of skepticism.

Regarding skepticism in the literature, Norwich argues that one of the articles was published before Yang and the RFIB 2001 Press Release, and the other two articles did not cite those references. (*Id.* at 20). I agree that evidence of skepticism is not as powerful when the skepticism is expressed by a source unfamiliar with the “prior art references that laid the groundwork for the inventors’ experiments.” *PharmaStem Therapeutics, Inc. v. ViaCell, Inc.*, 491 F.3d 1342, 1365 (Fed. Cir. 2007). I still give some weight to these articles, especially Vanner, which was published less than a month before the priority date.

Regarding the FDA advisory committee, Norwich argues, “The cited passages from the 2011 FDA advisory committee meeting regarding the IBS-D indication did not criticize the safety or effectiveness of rifaximin to treat IBS-D in at least some patients.” (*Id.* at 19). Norwich’s expert did not address the FDA statements. I decline to adopt attorney argument in place of expert testimony.

Ultimately, I give some weight to Salix’s evidence of skepticism from the literature and the FDA’s statements. I do not think these experts “expressed disbelief,” *United States v. Adams*, 383 U.S. 39, 52 (1966), but there is a “range of third-party opinion that can constitute skepticism.” *Neptune Generics, LLC v. Eli Lilly & Co.*, 921 F.3d 1372, 1378 (Fed. Cir. 2019). Ultimately, Salix has shown a small amount of skepticism but not enough to change the outcome of the obviousness analysis.

I find that the asserted IBS-D claims are invalid as obvious.

4. Written Description

Norwich argues that asserted claim 2 of the '569 patent lacks written description because it fails to show possession of the claimed “durability of response compris[ing] about 12 weeks of adequate relief of symptoms.” (D.I. 176 at 30). The specification explains:

As used herein, ‘durability of response’ includes for example, adequate relief of symptoms after removal of treatment, continuous adequate relief of symptoms after removal of treatment, or response that is greater than or superior to placebo response. . . . The duration of response, may be, for example, 2 days, 7 days, two weeks, 3 weeks, 4 weeks, 12 weeks, between about 1 week and about 24 weeks or longer.

'569 Patent at 11:44–53. The specification also discloses a proposed study design in Figure 3 “to show durability of response.” *Id.* at 6:10–12. Figure 3 shows a “4 Week Treatment Period” follow by a 12 week “Post-Treatment Phase.” *Id.* at Fig. 3, 25:55–59. I think this is enough to show possession of the claimed 12-week durability of response.

Norwich argues that the disclosure is “effectively unlimited in time.” (D.I. 176 at 31). “[T]he level of detail required to satisfy the written description requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology.” *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). Here, the evidence shows that IBS-D is a complex disease and that not all patients achieve a 12-week durability of response. A POSA would recognize that the inventor adequately described a range of possibilities for the durability of response and was in possession of the claimed 12-week period.

5. Indefiniteness

Norwich argues that asserted claim 2 of the '569 patent is invalid as indefinite. (D.I. 176 at 28). As noted, Claim 2 includes the limitation, “durability of response compris[ing] about 12 weeks of adequate relief of symptoms.” Norwich argues that “adequate relief of symptoms” is

subjective opinion. (*Id.*). Salix responds that “adequate relief” and “durability of response” have accepted meanings to a POSA. (D.I. 181 at 31). IBS-D is a collection of symptoms and there is no biomarker to determine a successful overall treatment of IBS-D. (Tr. 507:24-508:7). I credit Dr. Schoenfeld’s testimony that patient-reported “adequate relief” is used to determine IBS-D treatment success in the field. (Tr. 519:15-22; 821:9-822:1). Thus, I reject Norwich’s argument that claim 2 of the ’569 patent is invalid as indefinite.

V. CONCLUSION

For the foregoing reasons, Norwich’s ANDA will induce infringement of the HE, IBS-D, and Polymorph patent claims. The HE claims are nonobvious and Norwich has failed to show a lack of adequate written description. The asserted Polymorph and IBS-D claims are invalid as obvious.

I will enter a final judgment in accord with the conclusions of this opinion.