NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

UNITED THERAPEUTICS CORPORATION,
Appellant

v.

LIQUIDIA TECHNOLOGIES, INC.,
Appellee

2023-1805

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2021-00406.

Decided: December 20, 2023

DOUGLAS H. CARSTEN, McDermott Will & Emery, LLP, Irvine, CA, argued for appellant. Also represented by ARTHUR PAUL DYKHUIS; ADAM WILLIAM BURROWBRIDGE, Washington, DC; WILLIAM COVINGTON JACKSON, Goodwin Procter LLP, Washington, DC; SHAUN R. SNADER, United Therapeutics Corporation, Washington, DC.

SANYA SUKDUANG, Cooley LLP, Washington, DC, argued for appellee. Also represented by BRITTANY CAZAKOFF, JONATHAN DAVIES.

Before LOURIE, PROST, and REYNA, *Circuit Judges*.

LOURIE, *Circuit Judge*.

United Therapeutics Corporation ("UTC") appeals from the final written decision of the U.S. Patent and Trademark Office Patent Trial and Appeal Board ("the Board") in an *inter partes* review ("IPR") concluding that claims 1–8 of U.S. Patent 10,716,793 ("the '793 patent") are unpatentable. *Liquidia Techs., Inc. v. United Therapeutics Corp.*, No. IPR2021-00406, 2022 WL 2820717 (P.T.A.B. July 19, 2022) ("*Decision*"). For the following reasons, we *affirm*.

BACKGROUND

UTC owns the '793 patent, which is directed to methods of treating pulmonary hypertension comprising inhalation of treprostinil. Claim 1 is the only independent claim. It reads as follows:

> 1. A method of treating pulmonary hypertension comprising administering by inhalation to a human suffering from pulmonary hypertension a therapeutically effective single event dose of a formulation comprising treprostinil or a pharmaceutically acceptable salt thereof with an inhalation device, wherein the therapeutically effective single event dose comprises from 15 micrograms to 90 micrograms of treprostinil or a pharmaceutically acceptable salt thereof delivered in 1 to 3 breaths.

'793 patent at col. 18, ll. 23–31. As relevant here, dependent claims 4, 6, and 7 include additional limitations directed to dry powders. Those claims read as follows:

> 4. The method of claim 1, wherein the inhalation device is a dry powder inhaler.

> 6. The method of claim 4, wherein the formulation is a powder.
>
> 7. The method of claim 6, wherein the powder comprises particles less than 5 micrometers in diameter.

Id. at col. 18, ll. 36–37, 40–43.

Liquidia Technologies, Inc. ("Liquidia") petitioned for IPR of all claims of the '793 patent, asserting that they would have been obvious over, *inter alia*, U.S. Patent 6,521,212 ("the '212 patent"), in view of Voswinckel JESC ("JESC")[1] and Voswinckel JAHA ("JAHA")[2] (collectively, "the Voswinckel abstracts"). The '212 patent, an unrelated patent owned by UTC, is directed to methods of delivering benzindene prostaglandins, such as treprostinil sodium, to patients via inhalation to treat pulmonary hypertension. *See* '212 patent at Abstract, J.A. 1207. JESC is an abstract that describes a study in which patients inhaled solutions of treprostinil in concentrations of 16, 32, 48, and 64 µg/mL via a nebulizer. *See* J.A. 1240. JAHA is an abstract that describes a study in which patients inhaled solutions of treprostinil sodium via a nebulizer in 3 single breaths. *See id.* at 1243.

Before the Board, UTC challenged the prior art status of the Voswinckel abstracts, arguing that Liquidia had failed to adequately show that those references qualified as "printed publications" under pre-AIA 35 U.S.C. § 102(b).

---

[1] R. Voswinckel et al., *Inhaled treprostinil is a potent pulmonary vasodilator in severe pulmonary hypertension*, 25 EUROPEAN HEART J. 22 (2004), J.A. 1234–1240.

[2] Robert Voswinckel et al., *Inhaled Treprostinil Sodium (TRE) For the Treatment of Pulmonary Hypertension*, in Abstracts from the 2004 Scientific Sessions of the American Heart Association, 110 CIRCULATION III-295 (Oct. 26, 2004), J.A. 1241–43.

Decision at *3. Specifically, UTC argued that, because in its petition Liquidia relied on those abstracts having been stored in libraries, it was required to establish that the abstracts would have both been available at the library and sufficiently indexed or categorized by priority date. *Id.* at *4. The Board observed, however, that Liquidia had not relied solely on the availability of those references in libraries to establish their prior art status. *Id.* Rather, Liquidia had also asserted that each abstract had been presented at a public conference and that they were both cited in other documents dating from before the priority date of the '793 patent. *Id.* On the second of these two theories, the Board concluded that Liquidia had shown by a preponderance of the evidence that each of the Voswinckel abstracts was prior art because it had been cited in a "research aid," *i.e.*, a publicly accessible article that provided a "sufficiently definite roadmap leading to" the abstract. *Id.* at *5 (quoting *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1350 (Fed. Cir. 2016)).

Having found the Voswinckel abstracts to be prior art, the Board concluded that a person of ordinary skill in the art would have been motivated to combine those abstracts with the '212 patent to arrive at the claimed invention. *See id.* at *5–9. This, the Board found, was true despite UTC's evidence of objective indicia of nonobviousness, such as unexpected results, copying, and long-felt and unmet need. *Id.* at *9–13. Accordingly, the Board found all claims of the '793 patent unpatentable as obvious. *See id.* at *15.

UTC requested rehearing of the Board's decision, and included a request for rehearing by the U.S. Patent and Trademark Office's Precedential Opinion Panel ("the Panel") on the issue of whether or not the Voswinckel abstracts were prior art. *See Liquidia Tech., Inc. v. United Therapeutics Corp.*, IPR2021-00406, Paper 81 (Oct. 26, 2022) at 2, J.A. 885. The Panel denied UTC's request but determined that the Board had failed to consider whether the "research aids" in which the abstracts were cited were

themselves available prior to the critical date of the '793 patent, *i.e.*, May 15, 2005. *Id.* It also determined that the Board had not adequately addressed whether the Voswinckel abstracts "were publicly accessible by way of their presentation and/or inclusion in distributed materials, such as at a conference or library." *Id.* Accordingly, the Panel directed the Board to, in its consideration on rehearing, "clearly identify whether the [Voswinckel abstracts] qualify as prior art." *Id.* at 3, J.A. 886.

In its decision on rehearing, the Board maintained that the Voswinckel abstracts were prior art. *See Liquidia Tech., Inc. v. United Therapeutics Corp.*, IPR2021-00406, Paper 82 (Feb. 2, 2023) ("*Rehearing Decision*"), J.A. 50–67. Conceding that it had overlooked the fact that the research aids did not pre-date May 15, 2005, *see id.* at 5–7, J.A. 54–56, the Board nevertheless found that Liquidia had adequately shown that the abstracts had been publicly distributed at conferences prior to that date, *id.* at 7–12, J.A. 56–61. Specifically, the Board concluded that JESC was distributed at the European Society of Cardiology Congress that was held from August 28, 2004, to September 1, 2004, in Munich, Germany, and that JAHA was distributed at the American Heart Association's Scientific Sessions that occurred from November 7, 2004, to November 10, 2004, in New Orleans, Louisiana. *Id.*; *see* J.A. 1241. Both parties' experts agreed that a person of ordinary skill in the art would have been one of over 20,000 attendees at each of those conferences and that an "abstract book" from which each of the abstracts was excerpted would have been provided to all attendees. *Rehearing Decision* at 10, 12, J.A. 59, 61. Accordingly, the Board maintained that the abstracts were prior art and denied UTC's rehearing request.

UTC timely appealed. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A) and 35 U.S.C. § 141(c).

DISCUSSION

We review the Board's legal determinations *de novo*, *In re Elsner*, 381 F.3d 1125, 1127 (Fed. Cir. 2004), and its factual findings for substantial evidence, *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). A finding is supported by substantial evidence if a reasonable mind might accept the evidence as adequate to support the finding. *Consol. Edison Co. v. NLRB*, 305 U.S. 197, 229 (1938). Moreover, we review the Board's determination whether, under the Board's own regulations, a party exceeded the scope of a proper reply for abuse of discretion. *Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1380 (Fed. Cir. 2023).

UTC raises three challenges on appeal. First, it argues that the Board erred in determining that the Voswinckel abstracts are prior art. Second, it argues that, even if those abstracts are prior art, the Board erred in finding that the claimed dose would have been obvious over the '212 patent in combination with the Voswinckel abstracts. And finally, it argues that the Board legally erred in its treatment of dependent claims 4, 6, and 7, and that its obviousness determination as to those claims was not supported by substantial evidence. We address each argument in turn.

I

UTC contends that the Board's prior art analysis as to the Voswinckel abstracts suffered from two errors. First, it argues that the Board's analysis improperly exceeded the prior art theories set forth in Liquidia's petition. Second, it argues that the Board's determination that the abstracts were publicly accessible as of the critical date was not supported by substantial evidence.

A

By statute, the scope of an IPR is limited to the grounds set forth in the initial petition. 35 U.S.C. § 312(a)(3); *see SAS Inst. Inc., v. Iancu*, 138 S. Ct. 1348, 1357 ("[T]he statute tells us that the petitioner's contentions, not the

Director's discretion, define the scope of the litigation all the way from institution through to conclusion."). It is therefore improper for the Board to deviate from the grounds in the petition and raise its own theories of unpatentability. *Sirona Dental Sys. GmbH v. Institut Straumann AG*, 892 F.3d 1349, 1356 (Fed. Cir. 2018). UTC argues that the Board violated this principle when it concluded that the Voswinckel abstracts were prior art based on an "abstract book" theory. In UTC's view, this theory was not advanced by Liquidia until its Reply before the Board, and that it was therefore untimely. *See* Appellant's Br. at 33. We disagree.

As the Board recognized, Liquidia's IPR petition asserted that each of the Voswinckel abstracts was publicly presented or published at least one year before the priority date of the '793 patent, making each of them printed publications within the meaning of § 102(b). *See Decision* at *4; *see also* Petition at 22, 24, J.A. 133, 135. UTC first challenged the sufficiency of those grounds in its post-institution Patent Owner Response. *See* Patent Owner Response at 11–18, J.A. 372–79. Thereafter, in its Reply, Liquidia asserted, with additional evidence, that both Voswinckel abstracts were publicly presented and sufficiently disseminated at conferences prior to the critical date such that they qualified as printed publications. *See* J.A. 471, 474–75.

The Board found that Liquidia's arguments and evidence raised in its Reply were not untimely as they were made in direct response to UTC's attack on the prior art status of the abstracts first raised in its post-institution Patent Owner Response. *Decision* at *4, J.A. 10. This conclusion was not an abuse of the Board's discretion. *See Anacor Pharms., Inc. v. Iancu*, 889 F.3d 1372, 1380–82 (Fed. Cir. 2018) (explaining that the petitioner "may introduce new evidence after the petition stage if the evidence is a legitimate reply to evidence introduced by the patent owner"); *see also Axonics*, 75 F.4th at 1380 (explaining that a

petitioner's entitlement to respond to new arguments made in a patent owner response is consistent with *SAS*). As the Board observed, Liquidia's arguments were not inconsistent with, and therefore not new over, the grounds raised in its IPR petition—that the Voswinckel abstracts were publicly accessible prior to the critical date. *Ericsson Inc. v. Intell. Ventures I LLC*, 901 F.3d 1374, 1380 (Fed. Cir. 2018) ("[T]he Board has discretion to determine whether a petition for *inter partes* review identified the specific evidence relied on in a reply and when a reply contention crosses the line from the responsive to the new."). Accordingly, we conclude that the Board did not abuse its discretion in considering the arguments and evidence raised in Liquidia's Reply.

B

UTC next argues that, even if timely, the Board erred in finding that the Voswinckel abstracts were publicly accessible because its "abstract book" theory was entirely "hypothetical" and supported only by "conclusory expert testimony." Appellant's Br. at 37. In its view, the Board's theory would have been adequately supported only if Liquidia had provided "evidence of *actual* existence or dissemination" of the books. *Id.* (emphasis added). But that is not the proper standard.

Public accessibility is the "touchstone in determining whether a reference constitutes a 'printed publication.'" *Blue Calypso*, 815 F.3d at 1348 (quoting *In re Hall*, 781 F.3d 897, 898–99 (Fed. Cir. 1986)). "Our cases have consistently held that the standard for public accessibility is whether a person of ordinary skill in the art *could*, after exercising reasonable diligence, access a reference." *Samsung Elecs. Co. v. Infobridge Pte. Ltd.*, 929 F.3d 1363, 1374 (Fed. Cir. 2019). Once accessibility is proved, "there is no requirement to show that particular members of the public *actually received* the information." *Jazz Pharms., Inc. v. Amneal Pharms., LLC*, 895 F.3d 1347, 1356 (Fed. Cir.

2018) (quoting *Constant v. Adv. Micro-Devices, Inc.*, 848 F.2d 1560, 1569 (Fed. Cir. 1988)) (emphasis added). Contrary to UTC's position then, Liquidia had no obligation to produce, for example, a declarant testifying to having received the abstract books in which the Voswinckel abstracts appeared, let alone the abstract books themselves.

We find that the Board's conclusion that the Voswinckel abstracts were sufficiently disseminated such that each constituted a printed publication was supported by substantial evidence. Specifically, the Board determined that the two 2004 conferences at which the abstracts were presented were attended by over 20,000 attendees. *Rehearing Decision* at 7–12, J.A. 58–61. And both Liquidia's and UTC's experts testified that every attendee of either conference would have received a copy of the abstract book in which each of the Voswinckel abstracts appeared. *See id.* Further still, the Board found that neither abstract book would have been disseminated with any expectation of privacy, given that the conference attendees included scientists, physicians, and nurses, *as well as* journalists. *See id.* at 59. Substantial evidence therefore supports the Board's conclusion that the Voswinckel abstracts qualify as prior art.

II

UTC's next challenges pertain to the Board's obviousness analysis as to independent claim 1.

A

Claim 1 requires the inhalation of a therapeutically effective single event dose of 15 micrograms to 90 micrograms of treprostinil or a therapeutically acceptable salt thereof. '793 patent at col. 18, ll. 28–30. The Board concluded that, although no reference explicitly taught this dose, the person of ordinary skill in the art would have understood the solutions in JESC to have delivered an

amount of treprostinil within the claimed range. *Decision* at *6–7. That finding was supported by substantial evidence.

JESC discloses the administration of treprostinil solution via a nebulizer to patients in concentrations of 16, 32, 48, and 64 µg/mL. J.A. 1240. As the Board recognized, JESC does not disclose the volume of solution administered, which is necessary to calculate the amount (in µg) of treprostinil administered. *Decision* at *6. Accordingly, the Board looked to the declarations of Liquidia's two experts, each of which testified that, at the time of the invention, nebulizers delivered at least 1 mL and up to 5 mL of solution. *Id.* (citing J.A. 1054, 1166). Based on those delivery volumes, the Board concluded that the amounts of treprostinil delivered in JESC would have been from 16–80, 32–160, 48–240, or 64–320 µg, each of which has at least one endpoint that falls within the claimed range of 15–90 µg. *Id.*

UTC argues that the Board's conclusion was error because the experts' testimony related only to *fill* volume, not volume actually delivered. Appellant's Br. at 43. Because no nebulizer can be 100% efficient, UTC argues it was error to rely on the experts' testimony without accounting for other factors, such as patients' breathing volume and patterns, and individual nebulizer characteristics (*e.g.*, residual volume, nebulization rate, etc.). *Id.* But the Board considered, and rejected, those same arguments. Specifically, it concluded that, "[t]o the extent that something less than the entire fill volume was delivered to the patient, . . . the preponderance of the evidence still supports actual delivered solution volume being at least one milliliter." *Decision* at *7. And, to be sure, UTC's own expert testified that, in 2006, he had not administered treprostinil via a nebulizer that utilized less than one milliliter of drug solution. *Id.* (citing J.A. 3185).

Accordingly, the Board's finding that the combination of the '212 patent, JESC, and JAHA would have rendered obvious claim 1 was supported by substantial evidence.

B

UTC further challenges the Board's consideration of its evidence of objective indicia of nonobviousness, arguing that the Board "clearly erred" by concluding that UTC had failed to even allege that the invention demonstrated unexpected results over the '212 patent, JESC, and JAHA. Appellant's Br. at 49–50 (citing *Decision* at *10). This argument, only a single paragraph in UTC's opening brief, borders on waiver. *See SmithKline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 1320 (Fed. Cir. 2006). But even if given due consideration, we conclude that the Board's determination was supported by substantial evidence.

Before the Board, UTC only provided evidence that the claimed compositions exhibited unexpected results over inhaled iloprost, intravenous epoprostenol, and intravenous treprostinil. *See Decision* at *10. But, as the Board recognized, the claims require inhaled treprostinil, which is taught by each of the '212 patent, JESC, and JAHA, making those references the closest prior art. And the only argument made by UTC that the claimed invention was unexpected over those references was a conclusory statement that "the ability to administer treprostinil at high doses in only 1–3 breaths and with fewer side effects was unexpected." J.A. 585. With no other evidence to consider, we see no error in the Board's conclusion that UTC failed to satisfy its burden in establishing unexpected results.

III

Finally, we turn to UTC's challenge to the Board's treatment of dependent claims 4, 6, and 7, which are directed to the inhalation of dry powder formulations of treprostinil. UTC argues that the Board failed to consider each claim as a separate invention and that none of the '212

patent, JESC, or JAHA discloses any dry powder dosages. Specifically, it argues that the Board failed to explain why a person of ordinary skill in the art would "reasonably expect to succeed in preparing a therapeutically effective *dry powder* formulation" using concentrations prepared only for solutions. Appellant's Br. at 55.

But, as Liquidia explains, UTC never raised this particular argument before the Board. Instead, it argued that claims 4, 6, and 7 were not obvious "because the prior art lacks disclosure of a single event dose of 15–90 µg delivered in 1–3 breaths, *regardless of the form of administration* (liquid *or powder*)." Patent Owner Response at 41, J.A. 401 (emphases added). We therefore find UTC's argument forfeited. *Fresenius USA, Inc. v. Baxter Int'l, Inc.*, 582 F.3d 1288, 1296 (Fed. Cir. 2009) (explaining that this court may decline to consider an argument "[i]f a party fail[ed] to raise [that] argument before the trial court, or present[ed] only a skeletal or undeveloped argument to the trial court.").

In any event, the Board's conclusion that dependent claims 4, 6, and 7 were obvious was supported by substantial evidence. Namely, as the Board observed, the '212 patent, which is also owned by UTC, discloses the use of an "inhaler," and that "solid formulations, usually in the form of a powder, may be inhaled in accordance with the present invention." '212 patent at col. 5, ll. 30, 37–39, J.A. 1228. It also teaches that such formulations have particle sizes of preferably "less than 5 micrometers in diameter." *Id.* at col. 5, ll. 39–41, J.A. 1228. The Board relied not only on these disclosures, but also on the unrebutted testimony of Liquidia's expert that a person of ordinary skill in the art would have had a reasonable expectation of success in arriving at the claimed dry powder formulation based on the combined teachings of the '212 patent, JESC, and JAHA. *Decision* at *14.

CONCLUSION

We have considered UTC's remaining arguments and find them unpersuasive. For the reasons provided above, we *affirm* the Board's unpatentability determination.

AFFIRMED