

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NEW U LIFE CORPORATION,
Petitioner,

v.

AXCESS GLOBAL SCIENCES, LLC,
Patent Owner.

IPR2019-01141
Patent 6,613,356 B1

Before GEORGIANNA W. BRADEN, JENNIFER MEYER CHAGNON,
and MICHAEL A. VALEK, *Administrative Patent Judges*.

VALEK, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

New U Life Corporation (“Petitioner”) filed a Petition (Paper 1 (“Pet.”)) seeking an *inter partes* review of claims 1–19 of U.S. Patent No. 6,613,356 B1 (“the ’356 patent,” Ex. 1001). We instituted trial to review the challenged claims. Paper 8 (“Dec.”). Thereafter, Axxess Global Sciences, LLC¹ (“Patent Owner”) filed a Response to the Petition (Paper 11, “PO Resp.”), Petitioner filed a Reply (Paper 15, “Reply”), and Patent Owner filed a Sur-Reply (Paper 17, “Sur-Reply”). Patent Owner also filed a contingent Motion to Amend the challenged claims in the event any of the challenged claims were determined unpatentable (Paper 12, “MTA”), Petitioner filed an Opposition to Patent Owner’s MTA (Paper 14), and we provided Preliminary Guidance on the MTA (Paper 16). Patent Owner subsequently withdrew its MTA (Paper 18). Thus, there is no pending motion to amend and only the challenged claims are at issue in this proceeding. We held an oral hearing on September 1, 2020. A transcript of that hearing is of record (Paper 26, “Tr.”).

We issue this final written decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons explained below, we conclude Petitioner has shown by a preponderance of evidence that claims 1, 2, 5, 8, 11, 14, and 17 of the ’356 patent are unpatentable, but has failed to show by a preponderance of evidence that claims 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, and 19 are unpatentable on any ground raised in the Petition.

¹ The Petition identifies VND Butyrate, LLC as the Patent Owner. In its mandatory notice, Patent Owner represents that the “entire right, title and interest in and to” the ’356 patent was assigned to Axxess Global Sciences, LLC “on or about November 20, 2018.” Paper 5, 2.

A. Related Proceedings

Patent Owner informs us that the following actions involve the '356 patent: *RK Solutions v. Equinox Nutraceuticals*, No. 2:18-cv-00797-RJS-EJF (D. Utah) and *RK Solutions, LLC v. Vitajoy USA Inc.*, No. 2:18-cv-06608-CAS-E (C.D. Cal.). Paper 5, 2.

In addition, *inter partes* review of claims 1 and 2 of the '356 patent was previously instituted based on a petition from a different petitioner in IPR2015-01798. That case was terminated pursuant to joint motion of the parties prior to the filing of a response by Patent Owner and before any final decision from the Board. See IPR2015-01798, Paper 16.

B. Background of Technology and the '356 Patent

The '356 patent relates to “a medication for weight loss by means of appetite suppression and a method for administering this medication” to humans. Ex. 1001, Abstr. This medication “comprises potassium butyrate and closely related chemical compounds, which reduce appetite in mammals when administered orally.” *Id.* at 2:18–22. According to the Specification, “[t]he anorexic effect of the butyrate ion is thought to be due to the fact that its presence is a signal to the stomach receptors that there are bacteria in the stomach contents,” which indicates the stomach is full or “stagnant.” *Id.* at 3:11–25. Thus, consuming butyrate ion before each meal makes the stomach feel as if more was eaten than was actually eaten, thereby suppressing the appetite. *Id.* at 3:35–37.

C. Illustrative Claims

Claims 1, 14, and 17 are independent claims. Claims 1–13 are method claims, and claims 14–19 are composition claims. Claim 1 is illustrative of the method claims and is reproduced below.

1. A process for causing weight loss, or avoidance of weight gain, in mammals, comprising oral administration to said mammals of butyric acid or one or more pharmaceutically effective and acceptable salts or derivatives of butyric acid selected from the group consisting of/butyric acid, sodium butyrate, calcium butyrate, potassium butyrate, magnesium butyrate, alphahydroxybutyric acid, sodium alphahydroxybutyrate, calcium alphahydroxybutyrate, potassium alphahydroxybutyrate, magnesium alphahydroxybutyrate, betahydroxybutyric acid, sodium betahydroxybutyrate, calcium betahydroxybutyrate, potassium betahydroxybutyrate, magnesium betahydroxybutyrate, isobutyric acid, sodium isobutyrate, calcium isobutyrate, potassium isobutyrate, and magnesium isobutyrate.

Ex. 1001, 8:65–9:12. As shown above, claim 1 recites the oral administration of butyric acid as well as certain salts and derivatives of butyric acid specified in a Markush group. Adopting the parties’ nomenclature, we refer to these compounds collectively as the “Markush Compounds.”

Claims 14 and 17 are composition claims directed to a “capsule” and “tablet,” respectively, comprising one or more of the Markush Compounds in “an amount effective for weight loss or avoidance of weight gain.” Claim 14 is illustrative of the composition claims and is reproduced below.

14. A composition of matter comprising a capsule capable of dissolving in the stomach of a mammal, wherein said capsule contains, in an amount effective for weight loss or avoidance of weight gain in said mammal, one or more of the compounds selected from the group consisting of/butyric acid, sodium butyrate, calcium butyrate, potassium butyrate, magnesium butyrate, alphahydroxybutyric acid, sodium alphahydroxybutyrate, calcium alphahydroxybutyrate, potassium alphahydroxybutyrate, magnesium alphahydroxybutyrate, betahydroxybutyric acid, sodium betahydroxybutyrate, calcium betahydroxybutyrate, potassium

betahydroxybutyrate, magnesium betahydroxybutyrate, isobutyric acid, sodium isobutyrate, calcium isobutyrate, potassium isobutyrate, and magnesium isobutyrate.

Ex. 1001, 10:7–22.

D. Asserted Challenges to Patentability

Petitioner asserts the following challenges to patentability:²

Claim(s) Challenged	35 U.S.C. §	Reference(s)
1, 2, 5–14, 17	102	Pawan ³
1	103	Pawan
2, 5–14, 17	103	Pawan, Neesby, ⁴ Moran ⁵
3, 4, 15, 16, 18, 19	103	Pawan, Neesby, Moran, Strachan ⁶
1, 2, 5–14, 17	102	Martin ⁷
1	103	Martin
2, 5–14, 17	103	Martin, Neesby, Moran
3, 4, 15, 16, 18, 19	103	Martin, Neesby, Moran, Strachan

² In addition, the Petition presents alternative challenges asserting that Neesby and Moran anticipate claim 1 “[i]f . . . the Board construes claim 1 so as to consider the preamble *not* limiting.” Pet. 59–60, 67. As explained below, we determine the preamble is limiting and, therefore, do not address these alternative challenges further.

³ Pawan et al., Effect of 3-Hydroxybutyrate in Obese Subjects on Very-Low-Energy Diets and During Therapeutic Starvation, *The Lancet* 15–17 (1983) (Ex. 1010) (“Pawan”).

⁴ Neesby, U.S. Patent No. 4,721,716, issued Jan. 26, 1988 (Ex. 1014) (“Neesby”).

⁵ Moran et al., U.S. Patent No. 5,962,523, issued Oct. 5, 1999 (Ex. 1015) (“Moran”).

⁶ Christine Elizabeth Strachan, *The Formulation Technology of Dispersible Tablets* (Feb. 2000) (Ph.D. thesis, Liverpool John Moores University) (Ex. 1012) (“Strachan”).

⁷ Martin et al., U.S. Patent No. 6,380,244 B2, filed July 22, 1999, issued Apr. 30, 2002 (Ex. 1017) (“Martin”).

Claim(s) Challenged	35 U.S.C. §	Reference(s)
14, 17	102	Neesby
15, 16, 18, 19	103	Neesby, Strachan
14, 17	102	Moran
15, 16, 18, 19	103	Moran, Strachan

II. ANALYSIS

A. *Principles of Law*

To prevail on its challenge to Patent Owner’s claims, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e) (2012); 37 C.F.R. § 42.1(d) (2018). The petitioner “has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review).

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008); *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). While the elements must be arranged or combined in the same way as in the claim, “the reference need not satisfy an *ipsissimis verbis* test,” i.e., identity of terminology is not required. *In re Gleave*, 560 F.3d 1331,

1334 (Fed. Cir. 2009); *In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990). Thus, the dispositive question “is whether one skilled in the art would reasonably understand or infer from a prior art reference that every claim element is disclosed in that reference.” *Eli Lilly v. Los Angeles Biomedical Research Inst. at Harbor–UCLA Med. Ctr.*, 849 F.3d 1073, 1074–75 (Fed. Cir. 2017). Still further, “it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom.” *In re Preda*, 401 F.2d 825, 826 (CCPA 1968).

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) any secondary considerations, if in evidence. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

The Petition does not specifically address the level of skill of a person of ordinary skill in the art. Patent Owner asserts:

The correct level of ordinary skill in the field of the effects of chemicals on the human body is a person having a bachelor’s degree in biochemistry or a similar discipline, or equivalent work experience. This level of ordinary skill reflects the

educational level of workers in the field and the sophistication of the technology.

PO Resp. 7. Petitioner does not dispute Patent Owner's description in its Reply.

Patent Owner's description is consistent with the level of skill reflected in the prior art of record and in the disclosure of the '356 patent. Accordingly, we agree with Patent Owner's description of the level of ordinary skill in the art and adopt it for our analysis herein.

C. Claim Construction

In an *inter partes* review based on a petition filed on or after November 13, 2018 (as in this proceeding), a claim term "shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b)." See Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (codified at 37 C.F.R. pt. 42 (2019)) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018). Under this standard, claim terms are given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Philips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc). If the specification "reveal[s] a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess[,] . . . the inventor's lexicography governs." *Id.* at 1316.

1. Markush Compounds

As discussed above, each of the claims is limited to a list of pharmaceutically effective and acceptable salts or derivatives of butyric acid recited in the form of a Markush group. In our Institution Decision, we agreed with the Board's prior determination that the claims are drafted in Markush form. Dec. 7 (citing Ex. 1008 (IPR2015-01798, Paper 11), 6). In particular, we applied the Board's determination from IPR2015-01798 "that the claims are limited to the specific salts and derivatives identified in the Markush group." Ex. 1008, 6. The parties in the present proceeding do not dispute that the claims are so limited (*see* Pet. 15; PO Resp. 7–8). We maintain this construction for this Final Written Decision.

2. Preamble language (claim 1)

The preamble of independent claim 1 recites a process "for causing weight loss, or avoidance of weight gain, in mammals." Ex. 1001, 8:65–66. Petitioner argues that the preamble is limiting because the patent applicant relied on it to distinguish prior art during prosecution. *See* Pet. 17. Moreover, Petitioner contends the applicant's arguments during prosecution "foreclos[e] any claim scope beyond express use for appetite suppression." *Id.* at 13. In its Preliminary Response to the Petition, Patent Owner urged that the claims are not limited to appetite suppression because they more broadly "recite 'weight loss, or avoidance of weight gain'" and there is no clear and unmistakable disclaimer limiting them to weight management via appetite suppression. Paper 7, 10–11.

We offered a preliminary construction in our Institution Decision, determining that the preamble is limiting and that it "encompasses appetite suppression as a means for 'causing weight loss or avoidance of weight

gain,’ as claimed,” but “does not exclude other mechanisms for achieving such.” Dec. 10. Patent Owner does not dispute that construction. PO Resp. 7–8. Nor does Petitioner specifically address it in its Reply. We now reiterate our prior rationale and adopt the same construction for this decision.

The preamble of claim 1 is limiting because the patent applicant relied on it to distinguish the prior art during prosecution. *See Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (“[C]lear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art transforms the preamble into a claim limitation because such reliance indicates use of the preamble to define, in part, the claimed invention.”). During prosecution, the claims of the ’356 patent were rejected over Lammerant,⁸ which the examiner found taught “a pharmaceutical composition containing a pharmaceutically acceptable salt of butyric acid . . . to prevent metabolic disorders.” Ex. 1002 (’356 patent file history), 52. The applicant responded, urging that “Lammerant relates to problems of the heart, not obesity, and is therefore not relevant to the Application,” and submitted a declaration from Dr. Ghulam Ahmad Shakeel Ansari (“Ansari Decl.”) exhorting the same. *Id.* at 56; *see also id.* at 59–64 (Ansari Decl.). The applicant later amended claim 1 to add the preamble language and to incorporate the Markush group of claim 2 such that the amended claim was limited to administration of the Markush Compounds for the express purpose of “causing weight loss, or avoidance of weight gain.” *Id.* at 153. Thus, the applicant clearly relied on the preamble—first

⁸ Lammerant et al., U.S. Patent No. 4,771,074, issued Sept. 13, 1988.

by arguing that its invention was directed to problems of obesity to distinguish the prior art, and second by amending claim 1 to add the preamble language in response to the examiner's rejections. *See In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1347–48 (Fed. Cir. 2002) (determining that preamble was limiting where patentee relied on such “to persuade the Patent Office that the claimed invention is not anticipated by the prior art”).

While claim 1 is limited by the preamble to “causing weight loss or avoidance of weight gain,” it does not require that the weight loss or avoidance of weight gain occur by a particular mechanism. According to the Specification, “[t]he presence of exogenously administered butyric acid or butyrate ions apparently . . . causes stomach receptors to react as though there were stagnant food in the stomach, and causes the receptors to signal to the brain through the vagus nerve, thus suppressing the appetite.” Ex. 1001, 3:27–32; *see also id.* at Abstr. (“The invention involves a medication for weight loss by means of appetite suppression”). The language of the claim preamble, however, is more general and does not recite appetite suppression or any other mechanism by which the claimed weight loss or avoidance of weight gain must be achieved. Petitioner urges, without identifying any particular statement or support, that the applicant's arguments in response to the Lammerant rejection “foreclose[d] any claim scope beyond express use for appetite suppression.” Pet. 13 (citing Ex. 1002, 50–54 (applicant's response), 55–91 (Ansari Decl.)). But we see no “clear and unmistakable disclaimer” in those arguments that would foreclose the administration of the Markush Compounds to cause weight loss or avoid weight gain by means other than appetite suppression. *See Omega Eng'g, Inc. v. Raytek*

Corp., 334 F.3d 1314, 1326 (Fed. Cir. 2003). Thus, while the Specification makes clear that appetite suppression is one way by which the Markush Compounds can cause weight loss or avoid weight gain (and, therefore, claim 1 encompasses appetite suppression as a means for “causing weight loss or avoidance of weight gain,” as claimed), the preamble language does not exclude other mechanisms for achieving such.

3. “an amount effective for weight loss or avoidance of weight gain” (claims 14 and 17)

Patent Owner argues “the Board should construe ‘an amount effective for weight loss or avoidance of weight gain’” as recited in claims 14 and 17 to mean “an amount ranging from 90 milligrams to 7.5 grams.” Sur-reply 3. According to Patent Owner, this construction “is consistent with the claims, specification, and how Petitioner itself construed this term in the Petition.” *Id.* Petitioner disagrees. Reply 18, 27–28. According to Petitioner, claims 14 and 17 “do not recite dosage ranges” and there “is no sound reason for importing any specific dosage information into Claims 14 and 17.” *Id.*

We agree with Petitioner that claims 14 and 17 are not limited to a particular dosage range. Claims 14 and 17 recite “[a] composition of matter” comprising either a “capsule” (claim 14) or a “tablet” (claim 17) that “contains, in an amount effective for weight loss or avoidance of weight gain” one or more of the Markush Compounds. Ex. 1001, 10:7–11, 10:37–40. There is no particular dosage range recited in the claim language itself.

The Specification of the ’356 patent does not define “an amount effective for weight loss or avoidance of weight gain” so as to restrict that term to a particular range. Rather, the Specification generally describes

exemplary dosages in terms of the amount in a single dose or capsule. *See, e.g.*, Ex. 1001, 3:45–57 (“[t]he upper range of the preferred dose is about 1.15 grams of potassium butyrate or 5 of the size #0 filled capsules (described in this Application) taken three times a day”); 4:16–28 (describing tests on human volunteers who were administered “a dosage of 3–5 capsules” multiple times per day with each capsule “typically contain[ing] 231 to 287 mg of potassium butyrate” along with excipients in a “920 to 1 100 mg Size 0 Lilly gelatin capsule”). The Specification also describes these exemplary dosages in terms of total daily dosage, i.e., the aggregate amount administered in multiple capsules or tablets over the course of a day. *See, e.g., id.* at 4:9–10 (stating that “even 10 doses a day or 36 capsules would probably be well tolerated”).

The statement in the Specification that “[t]he maximum safe dose is probably 2.5 grams (2,500 mg) before meals” (Ex. 1001, 3:59–60) is not a sufficient basis to import Patent Owner’s proposed dosage range into claims 14 and 17. Patent Owner appears to derive the upper end of its proposed range, i.e., 7.5 grams, by assuming that three doses of 2.5 grams each could be administered over the course of a day. *See* Tr. 54:14–23 (acknowledging that the range in Patent Owner’s proposed construction comes from the specification’s description of the total daily dosage). But the Specification also states that even as many as “10 doses a day,” i.e., $2.5 \times 10 = 25$ grams, could be “well tolerated.” *Id.* at 4:9–10. In addition, the Specification refers to alternative embodiments in which “[o]ther ranges of dosage of potassium butyrate and frequency of administration to mammals might be used.” *Id.* at 6:50–57. We, therefore, decline Patent

Owner's invitation to import a dosage range that is not recited in claim language and that would exclude these other embodiments.

We also note Patent Owner's proposed construction is inconsistent with the surrounding claim language, which recites a capsule or tablet "*wherein said capsule [or tablet in claim 17] contains, in an amount effective for weight loss or avoidance of weight gain*" one or more Markush Compounds. *See* Ex. 1001, 10:7–11 (emphasis added). The emphasized text evidences that the term "amount effective" refers to the amount contained in a capsule or tablet—not the aggregate amount administered in multiple capsules or tablets over the course of a day. Thus, there is a disconnect between Patent Owner's proposed construction, which Patent Owner acknowledges is derived from the Specification's description of the total daily dosage (*see* Tr. 54:14–23), and the text of claims 14 and 17.

Nevertheless, Patent Owner argues we should adopt its construction because Petitioner proposed the same construction in the Petition. *See* Sur-reply 2–3 (asserting "Petitioner is judicially estopped from now disavowing its prior claim construction position.") We disagree.

Petitioner did not propose a construction for this term in the Petition. Rather, in its argument that the compositions of claims 14 and 17 are anticipated, Petitioner urged that the amounts taught in the prior art compositions were inherently "effective for weight loss or avoidance of weight gain" because the prior art taught the administration of capsules and tablets to provide daily dosages that overlap with those in the '356 patent. *See, e.g.*, Pet. 53 ("Since the dose amounts taught by Neesby . . . correspond generally to the amounts taught in the '356 Patent (that is, between 96 mg and 7.5 grams per day), it is inherent that taking butyrates as, and in the

amounts, taught by Neesby [] **would be effective in suppressing appetite as taught by the ‘356 Patent.**”). Thus, the Petition cites the description of some of the exemplary dosages in the Specification as evidence the limitation is inherently met in the prior art. Petitioner did not, however, seek to limit claims 14 and 17 to only those exemplary dosages. Moreover, even if Petitioner had proposed the same claim construction Patent Owner now advances, the intrinsic record of the ’356 patent does not support and, therefore, we do not accept that claim construction as explained above.

In sum, we reject Patent Owner’s proposed construction. Claims 14 and 17 are not limited to a particular daily dosage range. The term “an amount effective for weight loss or avoidance of weight gain” includes, but is not limited to, the amounts in the exemplary, standard-sized capsules described in the Specification. *See* Ex. 1001, 4:16–28. Further claim construction of this term is unnecessary to resolve the issues presented in this proceeding. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (explaining that it is only necessary to “construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

4. Remaining claim terms

The parties do not propose constructions for any other claim terms and we determine that it is unnecessary to expressly construe any other claim terms to resolve the issues presented. *See Nidec*, 868 F.3d at 1017.

D. References Relied Upon

1. Pawan (Ex. 1010)

Pawan describes a study in which “[s]odium DL-3-hydroxybutyrate was administered to obese subjects . . . who were either receiving a 2 · 5 MJ (600 kcal) diet . . . one day with a total fast (water and vitamins only) on the next day . . . or were undergoing therapeutic starvation.” Ex. 1010, 1. The subjects on the energy restricted diet received 18 g/day of sodium DL-3-hydroxybutyrate either in a “slow intravenous infusion” or orally in a flavored aqueous solution in four doses “taken at 8, 12, 16 and 20 hours daily.” *Id.* The therapeutic starvation subjects received 18 g/day orally. *Id.*

Pawan reports all of the subjects lost weight, but there was no significant difference in the rate of weight loss for those subjects given 3-hydroxybutyrate as compared to control subjects on the same energy restricted or therapeutic starvation diets. *Id.* at 2. For the cohort of subjects on the energy restricted diet, Pawan reports that “[b]oth intravenous and oral 3-hydroxybutyrate was well tolerated and significantly reduced net body protein loss.” *Id.* Moreover, “none [of the subjects in Pawan’s study] complained of hunger while receiving 3-hydroxybutyrate” and, even for those subjects undergoing therapeutic starvation, “[g]enerally the patients reported feeling less hungry when receiving hydroxybutyrate.” *Id.* at 1–2.

2. Martin (Ex. 1017)

Martin relates to nutritional or therapeutic compositions for increasing ketone body levels in the blood of mammals by providing a source of ketone bodies in the form of linear or cyclic oligomers or derivatives of 3-hydroxyacids. Ex. 1017, Abstr. According to Martin, increasing blood

ketone levels is desirable for appetite suppression during weight loss. *Id.* at 1:12–17. Martin cites Pawan and explains it “has been reported that 3-hydroxybutyrate beneficially suppresses the appetite.” *Id.* at 1:63–67.

Martin teaches that 3-hydroxybutyrate is a preferred 3-hydroxyacid for its compositions. *Id.* at Abstr., 3:47–48. Martin teaches formulations of such compounds can be administered “alone, in dry or powdered form, in solution in a carrier . . . or mixed with other materials which will elevate blood ketones.” *Id.* at 7:21–24; *see also id.* at 9:15–17 (Example 2) (describing administration of a 3-hydroxyacid compound in gelatin to dogs).

3. Neesby (Ex. 1014)

Neesby discloses a method for treating food allergies by desensitizing the gastrointestinal tract with oral ingestion of an effective amount of butyric acid or a salt thereof. Ex. 1014, Abstr., 1:47–52. Neesby teaches that butyrate may be “administered orally in either tablet or capsule form.” *Id.* at 2:51–52. According to Neesby, “[t]he normal dosage [for desensitizing the gastrointestinal tract] is in an amount of one to two grams of butyrate for each dose to be administered,” but the dosage may vary. *Id.* at 2:52–55. In Example 1, Neesby describes the preparation of “a size 00 gelatin capsule accommodating 500 to 600 mg. sodium butyrate.” *Id.* at 2:65–3:7. Neesby discloses that a dose should be taken “at each meal for a total daily intake of about 3 to about 10 grams butyrate.” *Id.* at 2:56–57.

4. Moran (Ex. 1015)

Moran discloses “methods of protecting against injury to hair follicles in a mammal by administering an effective amount of butyric acid or a biologically active butyric acid derivative.” Ex. 1015, Abstr. Moran teaches

that a daily dose of the active ingredient “can be expected to be about 0.05 to 50 grams per kilogram of body weight.” *Id.* at 8:23–26. Moran discloses that the “active ingredient can be administered orally in solid or semi-solid dosages forms, such as hard or soft-gelatin capsules” or “tablets,” containing “10–500 milligrams of the active ingredient.” *Id.* at 8:38–40, 9:45–60. Moran also teaches that “tablets can be . . . enteric-coated for selective disintegration in the gastrointestinal tract.” *Id.* at 8:52–55.

5. Strachan (Ex. 1012)

Strachan discloses various “[a]pproaches to formulating a solid dosage form which rapidly disintegrates.” Ex. 1012, 8–12. One of the approaches described in Strachan is formulation in “[e]ffervescent tablets” that “depend on the reaction of bicarbonate or carbonate with an acid or other excipient with the capacity to evolve a gas after contact with water” causing the tablet to “rapidly disintegrate[] to produce a solution or suspension.” *Id.* at 8. According to Strachan, production of such tablets “is expensive and demanding and requires manufacturing at low relative humidity” and is “unsuitable” for drugs that are “incompatible with bicarbonate and acids.” *Id.*

E. Alleged Anticipation by Pawan and/or Obviousness over Pawan Alone or in Combination with Other References

Petitioner asserts claims 1–19 are unpatentable as anticipated by Pawan and/or obvious over Pawan, alone or in combination with other references. *See* Pet. 19–36. Patent Owner disputes Petitioner’s contentions. *See* PO Resp. 12–15, 24–27. As explained below, we determine Petitioner has shown by a preponderance of the evidence that claims 1, 2, 5, 8, 11, 14 and 17 are unpatentable based on one or more of its grounds relying on

Pawan. We determine, however, Petitioner has not met that burden for claims 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, and 19.

1. Claim 1

Petitioner argues claim 1 is anticipated by Pawan and/or obvious over Pawan. Pet. 20–22. Specifically, Petitioner argues that Pawan teaches the oral administration of one of the Markush Compounds, sodium 3-hydroxybutyrate,⁹ “as part of a **therapy** specifically aimed at **weight loss**” and that “the amounts given by Pawan were pharmaceutically effective (at least because they reduced hunger in severely fasting patients) and pharmaceutically acceptable (at least because the administration of hydroxybutyrate was known to be *and shown to be* safe).” *Id.* at 20.

Patent Owner contends Pawan “does not disclose a Markush Compound used for ‘Causing Weight Loss or Avoidance of Weight Gain,’ as recited in claims 1–13” because “there was no finding in Pawan of any causal relationship between weight loss and ingestion of hydroxybutyrate.” PO Resp. 13. In particular, Patent Owner urges that: (1) “the express disclosures of Pawan teach that there is no cause-and-effect relationship between hydroxybutyrate administration and weight loss”; (2) “Pawan reports that subjects on hydroxybutyrate actually lost 0.3 kg less weight;” and (3) “Pawan’s finding that hydroxybutyrate administration ‘seems to increase the ratio of fat/lean tissue loss in obese patient’ does not establish a

⁹ 3-hydroxybutyrate is another name for betahydroxybutyrate. Pet. 15 (citing Ex. 1009); *see also* PO Resp. 4 (agreeing that betahydroxybutyrate is “also known as 3-hydroxybutyrate”). Thus, sodium 3-hydroxybutyrate corresponds to “sodium betahydroxybutyrate” in the recited Markush group. Ex. 1001, 9:7–8.

causal relationship between hydroxybutyrate administration and weight loss generally.” *Id.* at 13–14 (internal citation omitted).

After considering the full record developed in this proceeding, we are not persuaded by Patent Owner’s arguments and agree with Petitioner that Pawan anticipates claim 1. Pawan discloses a method in which a Markush compound, 3-hydroxybutyrate, was administered, both orally and by other routes, to “obese subjects” on either a 21-day energy restricted diet or undergoing therapeutic starvation for 14 days. Ex. 1010, 1 (“Summary” section). Pawan reports the subjects who received the prescribed dosage of 3-hydroxybutyrate lost weight. *Id.* at 2 (disclosing “weight losses” for both the energy-restricted diet and therapeutic starvation cohorts). In addition, Pawan discloses “none [of the patients] complained of hunger while receiving 3-hydroxybutyrate.” *Id.* at 1 (“Summary” section). Thus, Pawan evidences that the amount of 3-hydrobutryate administered in its study was effective to suppress appetite. Accordingly, Pawan discloses a method comprising all of the limitations of claim 1, including the preamble requirement.

The fact that the *amount* of weight loss was not increased for those patients as compared to the control group in the study does not distinguish claim 1. See Ex. 1010, 2 (results showing no “significant difference” in “weight losses” between subjects receiving 3-hydroxybutyrate and those in the control group on the same diet).¹⁰ First, contrary to Patent Owner’s

¹⁰ Pawan reports that for the subjects undergoing therapeutic starvation “[w]eight losses during the 14-day period of starvation were not significantly different in the control (6.4 ± 1.1 kg) and hydroxybutyrate (6.1 ± 1.6 kg) groups.” Ex. 1010, 2. According to Patent Owner, this means

argument, claim 1 does not require a direct “cause-and-effect” relationship, nor does it exclude taking additional steps (such as limiting calorie intake) along with the administration of a Markush Compound to achieve weight loss or avoid weight gain. Thus, Pawan is sufficient to anticipate claim 1 because it discloses a method wherein a Markush Compound was administered to patients on two types of calorie restricted diets to cause weight loss. Second, Pawan discloses that the amount of hydroxybutyrate administered in its study, i.e., 18 g/day, was effective to suppress appetite. Ex. 1010, 1–2. Thus, Pawan additionally evidences that treatment with 3-hydroxybutyrate functions according to the same mechanism for causing weight loss described in the ’356 patent. Third, the patients in Pawan were hospitalized and fed a closely-monitored, “very low energy low-protein diet” or therapeutically starved. *Id.* at 3. According to Pawan, “none complained of hunger while receiving 3-hydroxybutyrate.” *Id.* at 1. Accordingly, the fact the control group lost weight at the same rate does not evidence that the 3-hydroxybutyrate administered there was ineffective, nor does it otherwise suggest that the same amount of this Markush Compound would not, in fact, cause weight loss or avoid weight gain, particularly if administered outside of a hospital setting where calorie intake was less tightly regulated.

Patent Owner argues “Pawan fails to show with a preponderance of evidence that Hydroxybutyrate was effective to suppress appetite.” PO Resp. 14–15. According to Patent Owner,

that “subjects on hydroxybutyrate actually lost 0.3 kg less weight.” PO Resp. 13–14. We disagree. Pawan makes clear that the difference between the two weight loss numbers was not significant and, indeed, 0.3 kg is well within the reported error rates.

Pawan reports that the 20 obese patients undergoing therapeutic starvation “generally” reported feeling less hungry. Ex. 1010 at 1-2. On the flip side, for the 20 obese patients who were on the energy-restricted diet, Pawan reports that “[n]one of the subjects complained of hunger.” Pawan at 2. Thus, at best Pawan’s finding that the 50 percent of patients who were on a starvation diet of water and vitamins “generally” reported feeling less hungry when receiving hydroxybutyrate is equally balanced by the other 50 percent of patients on the energy-restricted diet for whom hydroxybutyrate had no appetite suppression effect. However, a “preponderance” of evidence requires more than a 50 percent chance that a given proposition is true. It cannot be said that it is more likely than not that a proposition is true, if it is false at least 50 percent of the time.

Id. at 15.

This argument is unpersuasive for several reasons. First, we do not agree with Patent Owner’s interpretation of Pawan. As Petitioner points out, Pawan’s statement “[n]one of the subjects complained of hunger” (Ex. 1010, 2) is the last sentence in a paragraph whose “sole focus” is describing results for the subset of the energy-restricted diet patients who received 3-hydroxybutyrate. *See* Reply 26. We agree with Petitioner that one of ordinary skill in the art would understand this sentence to refer only to the patients who received 3-hydroxybutyrate—not all of the subjects in the energy-restricted diet cohort.

Second, even if we were to accept Patent Owner’s interpretation, Pawan still does not support Patent Owner’s argument that “hydroxybutyrate had no appetite suppression effect” for the patients on Pawan’s energy-restricted diet. PO Resp. 15. At most, it would simply mean patients in the control group of the energy-restricted diet cohort also did not complain of hunger. Nothing Patent Owner points to rebuts Pawan’s clear teaching that

“none” of the patients “complained of hunger while receiving 3-hydroxybutyrate.” Ex. 1010, 1 (“Summary” section). Thus, Pawan, in fact, teaches the dosage of 3-hydroxybutyrate administered in its study was effective to suppress appetite in 100% of the subjects to whom it was administered.

According to Patent Owner, it is “notable” that “Pawan’s authors omitted from their conclusion any statement that hydroxybutyrate has an appetite suppressant effect.” PO Resp. 16. We disagree. Pawan repeatedly states the subjects in its study who received 3-hydroxybutyrate did not complain of hunger and reported feeling less hungry. Ex. 1010, 1–2. Moreover, Martin cites Pawan and explains “[i]t also has been reported that 3-hydroxybutyrate beneficially suppresses the appetite.” Ex. 1017, 1:63–66. Thus, Martin evidences that a skilled artisan would understand Pawan to teach that the 3-hydroxybutyrate administered there was effective to suppress appetite. For these reasons, we conclude that Petitioner has established that Pawan anticipates claim 1 by a preponderance of the evidence of record.

We also find Petitioner has shown sufficiently that claim 1 would have been obvious over Pawan. Our finding that Pawan anticipates claim 1 also supports the contention that claim 1 would have been obvious over Pawan. *See In re Fracalossi*, 681 F.2d 792, 794 (CCPA 1982) (“[L]ack of novelty is the ultimate of obviousness.”). In addition, Pawan’s teaching that “none” of the subjects in its study “complained of hunger while receiving 3-hydroxybutryate” despite being on extremely restrictive diets would have motivated one of ordinary skill in the art to administer 3-hydroxybutyrate for the purpose of causing weight loss or avoiding weight gain. Ex. 1010, 1.

One of skill would have had a reasonable expectation that administration of 3-hydroxybutyrate would be successful in such a method because Pawan teaches the subjects who orally received 3-hydroxybutyrate in its study: (1) lost the same amount of weight as those in the control group (*id.* at 1–2), which would have reasonably suggested that 3-hydroxybutyrate did not inhibit lose weight when dieting, and (2) reported feeling less hungry (*id.*), which would have reasonably suggested that taking 3-hydroxybutyrate could make it easier for someone to stick to a dieting regimen even outside of a controlled, clinical environment.

Patent Owner contends there are objective indicia of nonobviousness, i.e., evidence of the commercial success, to consider with respect to Petitioner’s obviousness challenges.¹¹ PO Resp. 25–27. Specifically, Patent Owner relies on sales of Petitioner’s “KetoGen4” product, urging that “Petitioner’s own admissions demonstrate the commercial success of the claimed invention of the ‘356 Patent.” *Id.* at 26; *see* Tr. 63:17–64:5. Patent Owner submits evidence that KetoGen4 is sold as a powder “drink mix” designed to “put you in the optimal state of ketosis” and that it comprises a blend of “Beta-Hydroxybutyrate” salts. Ex. 2105. Patent Owner further relies upon a pleading from a different proceeding (Ex. 2103) in which Petitioner alleged that Patent Owner could “claim” it “contributorily infringed” claims 1–13 of the ’356 patent by selling KetoGen4 and that, as

¹¹ Evidence of commercial success is relevant to obviousness, but not to Petitioner’s anticipation grounds. *See Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1364 (Fed. Cir. 2008) (“[O]bviousness requires analysis of secondary considerations of nonobviousness, while secondary considerations are not an element of a claim of anticipation.”).

of July 2019, Petitioner had “already sold several million dollars’ worth of exogenous [betahydroxybutyrate] nutraceuticals since launching the KetoGen4™ product on May 8, 2019.” PO Resp. 27 (quoting Ex. 2103, 11, 20–21).

Petitioner argues that Patent Owner’s commercial success evidence is not “commensurate with the scope of the claims” and that there is not a sufficient “nexus” between KetoGen4 and the claims of the ’356 patent. Reply 30. For these reasons, Petitioner contends “Patent Owner’s reliance on Petitioner’s putative commercial success as secondary indicia of nonobviousness is misplaced.” *Id.* at 29.

We agree with Petitioner on both points. First, Patent Owner has not established a sufficient nexus between the use of KetoGen4 and the claims of the ’356 patent. *See Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, (Fed. Cir. 2009) (explaining that objective indicia evidence “must have a ‘nexus’ to the claims” in order “to be accorded substantial weight in the obviousness analysis” and Patent Owner “bears the burden of showing that a nexus exists”) (citations omitted). Petitioner’s allegation that Patent Owner could “claim” it contributorily infringes is not an admission that KetoGen4 practices any of the claims of the ’356 patent. *See* Ex. 2103, 11. Indeed, in the same pleading Patent Owner relies upon to establish a nexus for its commercial success evidence, Petitioner affirmatively denies that the use of KetoGen4 would infringe any claim of the ’356 patent. *Id.*

Second, even if we were to assume that the use of KetoGen4 practices claim 1 and that KetoGen4 is, in fact, commercially successful, such evidence would only demonstrate commercial success for a subset of the Markush Compounds, i.e., betahydroxybutyrate salts. Patent Owner has not

identified any evidence that the other recited Markush Compounds are commercially successful, nor has Patent Owner identified sufficient evidence to support a conclusion that the other Markush Compounds will behave in the same manner as betahydroxybutyrate. *See In re Huai-Hung Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011) (explaining that evidence of objective indicia for one embodiment may be sufficient if the proponent “provides an adequate basis to support the conclusion that other embodiments falling within the claim will behave in the same manner”). As such, Patent Owner’s commercial success evidence is not “reasonably commensurate” with the full scope of the claimed Markush Compounds. *Id.*

For these reasons, we determine that Patent Owner’s commercial success evidence has limited, if any, probative value. Weighing that evidence against the strong showing of obviousness, we conclude that the preponderance of the evidence demonstrates that claim 1 would have been obvious over Pawan.

2. Claim 2

Petitioner argues claim 2 is anticipated by Pawan or alternatively would have been obvious over Pawan in view of Neesby and/or Moran. Pet. 33 (referring back to prior discussion of claims 14 and 17 (at Pet. 23–32)). Claim 2 depends from claim 1 and recites the Markush Compound “in a dissolvable tablet or capsule.” In the study disclosed in Pawan, 3-hydroxybutyrate was administered either intravenously or in an oral solution. Ex. 1010, 2. Thus, Pawan does not expressly disclose a dissolvable tablet or capsule.

Nevertheless, Petitioner contends Pawan inherently discloses this limitation. *See* Pet. 24. We disagree. Inherency requires that the limitation

“‘is necessarily present . . . in the single anticipating reference.’” *In re Montgomery*, 677 F.3d 1375, 1379–80 (Fed. Cir. 2012) (quoting *Verizon Servs. Corp. v. Cox Fibernet Va., Inc.*, 602 F.3d 1325, 1337 (Fed. Cir. 2010)). Here, however, not only is it not necessarily the case that the 3-hydroxybutyrate was administered in a capsule or tablet, Pawan affirmatively states that the 3-hydroxybutyrate was administered by means other than a capsule or tablet. Thus, Pawan neither expressly nor inherently discloses a dissolvable capsule or tablet as recited in claim 2. For this reason, Petitioner has not shown by a preponderance of the evidence that claim 2 is anticipated by Pawan.

We agree, however, with Petitioner’s argument that claim 2 would have been obvious over Pawan in view of Neesby and/or Moran. *See* Pet. 26–27. Both Neesby and Moran teach the oral administration of one or more of the Markush Compounds in a capsule and tablet form. Ex. 1014, 1:46–48, 2:50–52; Ex. 1015, 8:38–55. In addition, Petitioner cites evidence demonstrating that “[i]t has been well-known for many years that tablets and capsules are readily available means of getting a desired medication available in powder form into humans via oral administration.” *See, e.g.*, Pet. 24–26 (citing Ex. 1011, Ex. 1013). Petitioner contends, and we agree, that one of ordinary skill in the art would have understood that 3-hydroxybutyrate administered orally in solution, as disclosed in Pawan, “would be readily available, in dissolved form, in the stomach” (*id.* at 24) and, therefore, it “would have been obvious to a POSITA” to achieve the same effect “without requiring the mixing of a liquid (for example, if it was desired to distribute the Markush Compound in a readily-transportable

form), to package the Markush Compound of Pawan in either an uncoated capsule or [] tablet” (*id.* at 26).

Patent Owner argues that one of ordinary skill in the art would not have been motivated to combine the capsule and tablet forms taught in Neesby and Moran with Pawan (or Martin) because Neesby and Moran are “directed to different objectives.” PO Resp. 24–25. We disagree. While it is true that both Neesby and Moran teach the administration of a Markush Compound for a different purpose than Pawan, this distinction does not negate their teaching that the Markush Compounds can be administered in a dissolvable capsule or tablet, nor does it undermine the Petitioner’s argument for combining the references. As Petitioner explains, “the main teaching of Neesby and/or Moran that is combined with Pawan is the form factor of the betahydroxybutyrate that can be used”—i.e., that the same effect achieved by Pawan’s oral solution route of administration can also be achieved through administration in a dissolvable capsule or tablet. *See* Reply 29.

Moreover, in addition to Neesby and Moran, Petitioner cites other references demonstrating that capsules and tablets lacking enteric coatings have long been used as vehicles to deliver a drug for dissolution in the stomach. *See, e.g.*, Ex. 1011, 2 (discussing “enteric coatings”); Ex. 1013, 4:11–18 (“Regardless of what is capsulated, if the capsule is taken into the stomach . . . the gelatin will dissolve . . . and the contents of the capsule will be released.”). For these reasons, we agree with Petitioner that one of ordinary skill in the art would have been motivated to modify Pawan’s oral solution by putting it in a more convenient “form factor,” i.e., a dissolvable

capsule or tablet, with reasonable expectation of achieving a similar result when ingested.

To the extent Patent Owner contends its commercial success evidence is relevant to claim 2 (*see* PO Resp. 25–27), we are unpersuaded. Patent Owner has failed to establish a nexus between KetoGen4, which is sold as a powder for use in a “drink mix” and not a tablet or capsule, as required by claim 2. Ex. 2015; *see also* Tr. 63:17–64:13, 76:2–7 (counsel for both parties confirming that KetoGen4 is sold as a powder and not as a tablet or capsule). In addition, that evidence as applied to claim 2 suffers from the same deficiencies discussed above in the context of claim 1. Accordingly, after weighing Patent Owner’s commercial success evidence along with the other evidence of record, we conclude Petitioner has established by a preponderance of the evidence that claim 2 would have been obvious over Pawan in combination with Neesby and/or Moran.

3. Claims 14 and 17

Petitioner argues claims 14 and 17 are anticipated by Pawan or alternatively would have been obvious over Pawan in view of Neesby and/or Moran. Pet. 23–32. Claims 14 and 17 are composition claims requiring: (1) a capsule (claim 14) or tablet (claim 17) “capable of dissolving in the stomach of a mammal” and (2) one or more of the Markush Compounds in “an amount effective for weight loss or avoidance of weight gain.” As explained above with respect to claims 1 and 2, Pawan discloses an amount of 3-hydroxybutyrate that is effective for weight loss or avoidance of weight gain, but it does not disclose it in a capsule or tablet. For this reason, Petitioner has not shown by a preponderance of the evidence that claims 14 and 17 are anticipated by Pawan.

For the same reasons discussed above for claim 2, however, we agree with Petitioner’s argument that a composition comprising 3-hydroxybutyrate in a capsule and tablet capable of dissolving in the stomach would have been obvious over Pawan in view of Neesby and/or Moran. In particular, Moran teaches that tablets “can,” but need not be, “enteric-coated for selective disintegration in the gastrointestinal tract.” Ex. 1015, 8:52–55. Neesby similarly refers to the option of applying an enteric coating to avoid dissolution in the stomach. *See* Ex. 1014, 2:29–32. The implication from these teachings is that absent an enteric coating, the capsules and tablet forms these references disclose will dissolve in the stomach. *See also* Ex. 1011, 2 (teaching if “an orally administered drug harms the stomach lining or decomposes in the acidic environment of the stomach” an enteric coating can be applied to a capsule or tablet “to prevent it from dissolving until it reaches the small intestine”).

We also find that the “an amount effective for weight loss or avoidance of weight gain” limitation in claims 14 and 17 would have been obvious over the articulated combination of references. As explained above, we reject Patent Owner’s attempt to construe this term to require a particular daily dosage range. Both Neesby and Moran teach standard-sized capsules and tablets containing a Markush Compound. *See* Ex. 1014, 2:65–3:7 (teaching “a size 00 gelatin capsule accommodating 500 to 600 mg. sodium butyrate”); Ex. 1015, 8:38–40, 9:35–62 (teaching capsules and tablets containing “10–500 milligrams of the active ingredient”). Pawan describes the administration of an 18 g daily dose of 3-hydroxybutyrate in 4 individual doses of an oral solution comprising 4.5 grams each “taken at 8, 12, 16 and 20 hours daily.” Ex. 1010, 1. Thus, assuming 500 mg of active ingredient

in each capsule/tablet as taught in Neesby and Moran, a skilled artisan would have understood that each of Pawan's 4.5 gram oral solution doses could be administered in 9 capsules/tablets (e.g., 4.5 g divided by 0.5 g/capsule = 9 capsules) or in a total of 36 capsules/tablets per day. These amounts are similar to the exemplary dosages described in the Specification and, therefore, constitute "an amount effective for weight loss or avoidance of weight gain," as that term is recited in claims 14 and 17. *See, e.g.*, Ex. 1001, 3:59–61 (describing a maximum safe dose as "12 capsules" before each meal); 4:9–10 (noting that "10 doses a day or 36 capsules would probably be well tolerated").

Patent Owner's argument that one of ordinary skill in the art would not have been motivated to combine Pawan with Neesby or Moran (*see* PO Resp. 24–25) is unpersuasive for the same reasons discussed above for claim 2. Moreover, to the extent Patent Owner contends that its commercial success evidence is relevant to claims 14 and 17, we determine that evidence suffers from the same deficiencies noted above for claims 1 and 2 and is, therefore, unpersuasive. Accordingly, after weighing all of the evidence of record, we conclude that Petitioner has established by a preponderance of the evidence that claims 14 and 17 would have been obvious over Pawan in combination with Neesby and/or Moran.

4. Claims 3, 4, 15, 16, 18, and 19

Petitioner argues claims 3, 4, 15, 16, 18, and 19 would have been obvious over Pawan in view of Neesby and/or Moran and Strachan. Pet. 33–35. Claims 3, 15, and 18 recite that the contents of the tablet or capsule of the claim from which they depend:

further comprise sodium bicarbonate, calcium carbonate, or potassium bicarbonate for producing carbon dioxide gas on contact with the stomach liquids of said mammal wherein the amount of sodium bicarbonate, calcium carbonate, or potassium bicarbonate is sufficient to cause the breakup of the capsule or tablet thus releasing the salts or derivatives, but insufficient to cause distension of the stomach of the mammal.

Ex. 1001, 9:15–24. Petitioner contends this limitation would have been obvious “in view of the widely-known art illustrated by [Strachan] to use sodium bicarbonate or an equivalent to speed dispersion of a medicine within a tablet or capsule.” Pet. 25; *see also id.* at 34 (urging that “it would be obvious to combine any of Pawan, Neesby ’715, or Moran ’523 with Strachan to incorporate sodium bicarbonate into capsules or tablets”).

We do not agree with Petitioner’s position. Strachan describes “[e]ffervescent tablets” that “depend on the reaction of bicarbonate or carbonate with an acid or other excipient with the capacity to evolve a gas after contact with water” as one of several approaches to “formulating a solid dosage form which rapidly disintegrates.” Ex. 1012, 24. Even if one assumes this description is sufficient to teach the limitation recited in claims 3, 15, and 18, Petitioner has not offered sufficient evidence to demonstrate why one of skill in the art at the time of *and without knowledge of the patented invention* would have been motivated to combine this teaching with Pawan. *See KSR*, 550 U.S. at 418 (“[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.”).

Instead, Petitioner affirmatively relies on knowledge of the patented invention to provide the motivation to formulate an effervescent capsule or tablet, urging that

since Claim 14 (and similarly Claim 17) teaches that the Markush Group composition in a capsule or tablet form must be “capable of dissolving in the stomach of a mammal,” the need for speedy dispersion once the capsule or tablet reaches the stomach would clearly suggest to a POSITA the use of non-enteric coated capsules or tablets, with or without sodium bicarbonate or related compounds for gas generation.

Pet. 25. Petitioner reiterates this argument in its Reply, making clear it relies on the specification of the ’356 patent—not the prior art—as its evidence for the alleged motivation to combine the cited references:

[T]he *specification* of the ’356 Patent does clearly suggest the need for speedily dispersing the orally administered butyrate compound, and the ’356 Patent is in the record already as Exhibit 1001. An extensive discussion of at least two means of speeding dispersion of the potassium butyrate is provided. Ex. 1001, *col. 5, lines 34–67*. It was a clearly stated goal of the inventor that potassium butyrate be dispersed quickly in the stomach after oral administration, in order to [quoting Ex. 1001, 5:42–46]. This need would provide a motivation to combine Pawan with Strachan.

Reply 20 (emphasis in original).

Petitioner’s reliance on the claims and specification of the patent it seeks to invalidate as evidence of the motivation to combine teachings in disparate prior art references is improper hindsight. *See W.L. Gore & Assocs. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983) (“To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.”); *Ecolchem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1371–72 (Fed. Cir. 2000) (rejecting an obviousness analysis premised on using the challenged

patent as a “blueprint for piecing together the prior art”) (internal quotations omitted). Accordingly, we agree with Patent Owner that Petitioner has failed to offer evidence of a proper basis for combining Strachan with the other references. *See* Sur-Reply 4–5 (urging us to “reject Petitioner’s attempt to use the challenged patent itself to provide the hindsight motivation to combine the prior art”).

In addition, Strachan expressly identifies a number of drawbacks to formulating an “effervescent tablet,” which Petitioner overlooks. *See* Ex. 1012, 8 (teaching, for example, that production of such tablets is “expensive and demanding” and that “[m]any drugs are incompatible with bicarbonate and acids, which render them unsuitable”). Thus, even if the Petition did identify evidence demonstrating that a skilled artisan would have been motivated to formulate the Markush Compound in a tablet or capsule that rapidly disintegrates, Petitioner has not shown it would have been obvious to pursue the approach required by claims 3, 15, and 18, as opposed to other approaches to formulating a rapidly disintegrating tablet or capsule that may have been known in the art. For these reasons, we determine Petitioner has failed to show by a preponderance of the evidence that claims 3, 15, and 18 would have been obvious over Pawan in view of Neesby and/or Moran and Strachan.

Claims 4, 16, and 19 depend from claims 3, 15, and 18, respectively, and further recite that the claimed capsule or tablet “contains a plurality of holes” to allow stomach liquids to more rapidly enter it and facilitate its breakup. *See* Ex. 1001, 9:25–10:65. Petitioner argues “it would have been obvious to consider adding holes to the capsules or tablets” because Pawan

taught “rapid dispersion of the Markush Compounds into the stomach” in an oral solution. Pet. 35.

We do not agree with Petitioner’s argument for two reasons. First, Petitioner has not offered any evidence to support its argument that one of ordinary skill in the art would have considered adding holes to capsules or tablets to facilitate their breakup. Second, even if Petitioner had provided evidence to support its argument that the “plurality of holes” limitation would have been obvious, Petitioner has failed to establish that the claims from which these claims depend (i.e., claims 3, 15, and 18) would have been obvious in view of the cited prior art. For these reasons, we determine Petitioner has likewise failed to show by a preponderance of the evidence that claims 4, 16, and 19 would have been obvious over Pawan in view of Neesby and/or Moran and Strachan.

5. Claims 5, 8, and 11

Petitioner argues claims 5, 8, and 11 are anticipated by Pawan or alternatively would have been obvious over Pawan in view of Neesby and/or Moran. Pet. 35–37. Claim 5 depends from claim 1 and additionally recites that the Markush Compound is administered in an amount that “is at least 60 milligrams per square meter of body surface area per day.” Ex. 1001, 9:36–37. According to the Specification, “[t]he body surface area of an average adult is 1.6 square meters.” *Id.* at 6:44–45. Thus, for an average adult, claim 5 requires a daily dosage of “at least” 96 milligrams (i.e., 1.6×60 mg/day). The 18 g/day dose taught in Pawan, therefore, meets the “at least 60 milligrams per square meter of body surface area per day” limitation of claim 5.

Patent Owner does not advance any argument for claim 5 that is separate from those that we have already considered and rejected in our analysis of claim 1. Thus, because Petitioner has met its burden with respect to claim 1, and because Pawan discloses the additional limitation of claim 5, we determine Petitioner has shown by a preponderance of the evidence that claim 5 is both anticipated by and obvious over Pawan.

Claim 11 depends from claim 5 and further recites that the total daily amount is divided into “a plurality of doses up to and including 10 per day.” Ex. 1001, 9:65–67. In Pawan’s study, the 3-hydroxybutyrate was administered in four equal doses. Ex. 1010, 1. Thus, Pawan discloses a dosing regimen that meets the “plurality of doses” limitation recited in claim 11.

Patent Owner does not advance any argument for claim 11 that is separate from those that we have already considered and rejected in our analysis of claim 1. Thus, because Petitioner has met its burden with respect to claims 1 and 5, and because Pawan discloses the additional limitation of claim 11, we determine Petitioner has shown by a preponderance of the evidence that claim 11 is both anticipated by and obvious over Pawan.

Claim 8 also depends from claim 5 and further recites that the total daily amount is divided into “3 substantially equal doses, each administered orally . . . before each of three meals per day.” Ex. 1001, 9:53–56. Pawan’s four-dose regimen is not the same the three-dose regimen recited in claim 8. Thus, Pawan does not anticipate claim 8.

We agree, however, that it would have been obvious to modify Pawan’s four-dose regimen to the three-dose regimen recited in claim 8. *See* Pet. 36. Pawan’s four doses were spaced throughout the day such that they

were administered roughly around meal times, i.e., “at 8, 12, 16 and 20 hours daily.” Ex. 1010, 1.¹² We agree with Petitioner that administering the same daily amount, but in three equal doses instead of four as taught in Pawan, would have been a matter of “common sense.” Pet. 36–37; *see KSR*, 550 U.S. at 421 (“[a] person of ordinary skill is . . . a person of ordinary creativity, not an automaton.”). This is particularly so in light of Neesby’s teaching that, at least within the context of using such compounds to treat food allergies, the Markush Compounds should be “ingested before each meal.” Ex. 1014, 4:61–62, 6:9–10.

Patent Owner does not respond specifically to Petitioner’s argument that the three-dose regimen recited in claim 8 would have been a matter of “common sense” in view of the cited references. Nor does Patent Owner otherwise advance any argument for claim 8 that is separate from those that we have already considered and rejected in our analysis of claim 1. Thus, because Petitioner has met its burden with respect to claims 1 and 5, and because we find that the additional limitation of claim 8 would have been obvious, we determine Petitioner has shown by a preponderance of the evidence that claim 8 would have been obvious over Pawan and Neesby.

6. Claims 6, 7, 9, 10, 12, and 13

Petitioner argues claims 6 and 7 would have been obvious over Pawan in view of Neesby.¹³ Pet. 36. Claims 6 and 7 depend from claim 1 and

¹² Pawan teaches that these subjects were on a diet that required them to fast every other day so at least some of these doses would not have been administered before a meal.

¹³ Although Petitioner includes its arguments for claims 6 and 7 in a section titled “Claims 5–13 are Anticipated by Pawan, or Rendered Obvious by

recite daily dosage ranges, but in contrast to claim 5, claims 6 and 7 recite an upper limit to the daily amount of the Markush Compound to be administered. *See* Ex. 1001, 9:38–52. Petitioner acknowledges that the 18 g/day dose disclosed in Pawan exceeds the upper limit of the ranges in claims 6 and 7. *See* Pet. 36 (urging that it “would have been obvious to try lower doses than those used in Pawan”). Thus, there is no overlap between the daily dosage disclosed in Pawan and the range recited in claims 6 and 7. *Cf. E.I. DuPont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996, 1006 (Fed. Cir. 2018) (explaining that where the prior art discloses a range that overlaps with the claimed range there is a “presumption of obviousness”). Nevertheless, Petitioner contends it would have been obvious to use lower doses because Pawan involved “patients undergoing therapeutic starvation and thus needed a much larger amount of butyrate to accomplish the goal . . . when compared to what would be needed for a ‘normal’ person seeking to suppress the person’s appetite by taking betahydroxybutyrate before meals.” Pet. 36.

We do not agree with Petitioner’s arguments for the following reasons. First, Pawan involved two groups of patients—one set receiving a 600 kcal diet “containing 34 g protein, 60 g carbohydrate, and 25g fat[] one day and a total fast the next day,” and a second cohort undergoing therapeutic starvation. Ex. 1010, 1. Both groups received the same 18 g/day

Pawan in view of Neesby ‘716 and/or Moran ‘523,” the only argument presented in that section is that claims 6 and 7 would have been obvious over Pawan in view of Neesby. *See* Pet. 35–37; *see also* Tr. 20:6–25 (Petitioner acknowledging that its evidence for claims 6 and 7 is limited to Pawan and Neesby).

dose. *Id.* That fact undermines Petitioner’s logic because it suggests the dose was not selected based on the extent to which the subject was restricting their calorie intake.

Second, even if it were obvious to pursue a lower dose, Petitioner has failed to provide sufficient evidence demonstrating that the particular ranges recited in claims 6 and 7 would have been obvious to a person of ordinary skill in the art. Assuming an average body surface of 1.6 square meters and multiplying that value by the “per square meter” limits recited in these claims, the upper limit of the range is about 1.4 g/day in claim 6 and about 7.5 g/day in claim 7. Ex. 1001, 6:44–45. Petitioner has not offered evidence sufficient to demonstrate that it would have been obvious to reduce Pawan’s dose by more than half to approach the range of claim 7, much less to reduce that dose by more than 90% to approach the range in claim 6.

The only evidence Petitioner points to is the dosage taught in Neesby. *See* Pet. 36. But Neesby teaches that dosage for a different purpose (i.e., desensitizing the gastrointestinal tract to food allergy) than the method of causing weight loss or avoiding weight gain recited in claims 6 and 7. Petitioner does not provide an adequate explanation, nor supporting evidence, to show how one of skill in the art would have understood Neesby’s dosage to pertain to weight loss or avoidance of weight gain. *See* Tr. 23:19–24 (Petitioner acknowledging that there is no evidence in the record that “connects food allergy sensitivity to weight loss or avoidance of weight gain”). For these reasons, we determine Petitioner has failed to show

by a preponderance of the evidence that claims 6 and 7 would have been obvious over the cited prior art.¹⁴

Each of claims 9, 10, 12, and 13 depend from either claim 6 or 7. *See* Ex. 1001, 9:57–64, 10:1–6. Because Petitioner has not carried its burden for claims 6 and 7, Petitioner has likewise failed to establish by a preponderance of the evidence that claims 9, 10, 12, and 13 would have been obvious over the cited prior art.

F. Alleged Anticipation by Martin and/or Obviousness over Martin Alone or in Combination with Other References

Petitioner asserts that claims 1–19 are unpatentable as anticipated by Martin and/or obvious over Martin, alone or in combination with other references. *See* Pet. 37–52. Patent Owner disputes Petitioner’s contentions. PO Resp. 17. As explained below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 14, and 17 are

¹⁴ Beginning in its Reply, Petitioner asserts that the dosage ranges in claims 6 and 7 are not enabled for all of the Markush Compounds and that we should assess whether these claims meet the enablement and definiteness requirements of 35 U.S.C. § 112. *See* Reply 21; Tr. 27:8–28:3, 35:12–37:4 (arguing the Board should “consider any statutory basis” for unpatentability of the challenged claims, including grounds that have not and could not have been raised in the IPR petition). We do not reach Petitioner’s § 112 arguments because 35 U.S.C. § 311(b) limits the grounds that can be raised to challenge an existing claim in IPR to “a ground that could be raised under section 102 or 103.” *See, e.g., Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2141–42 (2016) (offering the “cancel[lation] of a patent claim for indefiniteness under § 112 in an inter partes review” as an example of an action that would be “outside [the Agency’s] statutory limits”) (internal quotation omitted); *Samsung Elecs. Am., Inc. v. Prisia Eng’g Corp.*, 948 F.3d 1342, 1350–51 (Fed. Cir. 2020) (explaining that “[t]he petition . . . defines the scope of an IPR proceeding, and nothing in the IPR statute permits the Board to expand that scope in its final written decision.”).

unpatentable based on one or more of its grounds relying on Martin. We determine, however, that Petitioner has not met that burden for claims 3–13, 15, 16, 18, and 19.

1. Claim 1

Petitioner argues claim 1 is anticipated by Martin and/or obvious over Martin. Pet. 37–40. Specifically, Petitioner argues Martin teaches “oral administration” of “betahydroxybutyrate,” i.e., 3-hydroxybutyrate, which is one of the Markush Compounds, to increase “levels of ketone bodies” in humans for the purpose of “appetite suppression during weight loss.” Pet. 38 (citing Ex. 1017, 1:13–37, 3:36–48).

Petitioner’s argument is supported by the disclosure in Martin. Specifically, we find that Martin discloses the oral administration of 3-hydroxybutyrate to increase blood ketone levels. Ex. 1017, Abstr. Martin teaches that increasing blood ketone levels is useful for, inter alia, “appetite suppression during weight loss.” *Id.* at 1:17. In addition, Martin explains that “[s]pecial diets” are “used when a person urgently needs to lose weight for health reasons.” *Id.* at 1:52–54. In such instances a “doctor may prescribe a diet greatly restricting the person’s caloric intake” that can lead to “the breakdown of proteins (i.e., ‘catabolism’),” which is undesirable. *Id.* at 1:54–62. Citing Pawan, Martin teaches that the administration of 3-hydroxybutyrate has been shown to be advantageous for patients on such special diets: “Supplementation of the diet with hydroxybutyric acid has been shown to reduce protein catabolism in subjects on low energy diets (Pawan & Semple, *Lancet* 8:15 (1983)). It has also been reported that 3-hydroxybutyrate beneficially suppresses the appetite.” *Id.* at 1:63–67. Thus, like Pawan, Martin describes a method for causing weight loss

comprising both limiting caloric intake and orally administering 3-hydroxybutyrate, i.e., one of the Markush Compounds, which Martin teaches is beneficial because it acts to suppress appetite in dieting individuals, i.e., a means to cause weight loss or avoid weight gain that is encompassed by the preamble of claim 1. Accordingly, we find the disclosure in Martin is sufficient to both anticipate and render obvious the method recited in claim 1.

Patent Owner acknowledges that “Martin describes modulating blood ketone levels to ‘suppress the appetite of the mammal’” through the administration of 3-hydroxybutyrate, but urges that it “describes no dosages, and merely references Pawan with respect to its teaching on appetite suppression.” PO Resp. 16. Accordingly, Patent Owner contends “Martin adds nothing of substance to the teachings of Pawn [sic] and is therefore distinguishable for the same reasons discussed above with respect to Pawan.” *Id.* at 17. In other words, Patent Owner relies on the same arguments to distinguish Martin that it does for Pawan.

We do not agree with Patent Owner’s arguments for the same reasons discussed above in our analysis of the grounds based on Pawan above. Indeed, Martin’s description of Pawan evidences that one of skill in the art would understand that 3-hydroxybutyrate had been shown to be effective to suppress appetite in patients on medically-prescribed diets to achieve rapid weight loss. In this regard, Martin further undermines Patent Owner’s argument that “Pawan . . . falls short of showing with a preponderance of evidence that hydroxybutyrate has an appetite-suppressant effect.” *See* PO Resp. 16.

Accordingly, we conclude Petitioner has shown by a preponderance of the evidence that claim 1 is anticipated by Martin. To the extent Patent Owner relies on its commercial success evidence (*see* PO Resp. 25–27) to respond to Petitioner’s obviousness ground, that evidence suffers from the same deficiencies noted above in our analysis of the grounds based on Pawan. Thus, weighing Patent Owner’s commercial success evidence against the comparatively strong showing of obviousness, we also conclude that the preponderance of the evidence demonstrates claim 1 would have been obvious over Martin.

2. Claims 2, 14, and 17

As noted above, claims 2, 14, and 17 recite a “capsule,” “tablet” or both. Petitioner argues these claims are both anticipated by Martin and obvious over Martin in view of Neesby and/or Moran. Pet. 41–48.

We do not agree that Martin anticipates these claims. As Petitioner acknowledges, Martin does not expressly disclose administration of a Markush Compound in either a “capsule” or a “tablet.” *See id.* at 41 (“Martin ‘244 does not explicitly mention utilization of capsules”). Rather, Martin teaches that its 3-hydroxybutyrate compositions can be administered “in dry or powdered form.” Ex. 1017, 7:21–22. Moreover, Martin includes an example in which a compound was administered “in gelatin,” which is similar to, but not the same as, administration in a gelatin capsule. *Id.* at 9:15–20 (Example 2). For this reason, the preponderance of the evidence does not show that Martin anticipates claims 2, 14, or 17.

We agree, however, that it would have been obvious to deliver 3-hydroxybutyrate in a dissolvable capsule or tablet in view of the teachings in the cited references. Martin discloses administration in a powdered form

that can be orally administered in “food or drink.” Ex. 1017, 7:9–13, 7:21–22, 9:15–20 (Example 2). As explained above in our discussion of the grounds based on Pawan, Petitioner cites evidence demonstrating that dissolvable capsules and tablets were known both generally in the art (see Ex. 1011, 1–2; Ex. 1013, 4:11–18) and specifically for the administration of certain Markush Compounds (Ex. 1014, 2:50–52; Ex. 1015, 8:38–55, 9:35–62). In light of these teachings, we agree with Petitioner that it would have been obvious to package the orally-administered powder of Martin in a dissolvable capsule and tablet for the same reasons noted above in our analysis of claims 2, 14, and 17 for the grounds based on Pawan.

Patent Owner does not present any separate argument for Petitioner’s arguments that Martin renders claims 2, 14, and 17 unpatentable beyond those we have already considered, and rejected, in analyzing the grounds based on Pawan. See PO Resp. 16–17, 24–25. We do not agree with Patent Owner for the same reasons explained above.¹⁵ Accordingly, we conclude Petitioner has shown by a preponderance of the evidence that claims 2, 4, and 17 would have been obvious over Martin in view of Neesby and/or Moran.

3. Claims 3, 4, 15, 16, 18, and 19

Petitioner offers the same arguments regarding these claims for the grounds based on Martin as it does for the grounds based on Pawan, again

¹⁵ We agree with Petitioner that an ordinarily-skilled artisan would have been motivated to combine Neesby and Moran’s teachings regarding administration in capsules and tablets, i.e., the “form factor,” with Martin (see Reply 29). Our reasons for that finding are the same as those discussed above for combining Neesby and Moran’s “form factor” with Pawan.

relying on Strachan and unsupported assertions that the limitations recited in these claims would have been obvious to a skilled artisan. *See* Pet. 48–50 (arguing that these claims would have been obvious over Martin in view of Neesby and/or Moran and Strachan). These arguments are unpersuasive for the same reasons we explained in our analysis of the grounds based on Pawan. Accordingly, Petitioner has failed to meet its burden for these claims.

4. Claims 5–13

As explained above, claims 5–13 either recite or depend from a claim that recites a particular daily dosage range. Petitioner argues these claims are both anticipated by Martin and obvious over Martin in view of Neesby.¹⁶ Pet. 50–52.

Unlike Pawan, Martin does not recite a particular daily dosage of 3-hydroxybutyrate. Nevertheless, Petitioner argues that Martin describes oral administration of a Markush Compound “in very large doses (Ex. 1017, at column 11, lines 9-14; 25% of all caloric intake in test mice[])” and asserts that such a dosage “is equivalent [to] at least several ounces in a human, if 25% of caloric intake for a human was of hydroxybutyrates.” *Id.* at 51. Petitioner contends this dosage exceeds the threshold recited in claim 5 and, therefore, Martin anticipates claim 5. *Id.*

¹⁶ Although Petitioner includes its arguments for these claims in a section titled “Claims 5–13 are Anticipated by Martin, or Rendered Obvious by Martin in view of Neesby ‘716 and/or Moran ‘523,” the only argument presented in that section is that claims 5–7 would have been obvious over Pawan in view of Neesby. *See* Pet. 50–52; *see also* Tr. 20:6– 25 (Petitioner acknowledging that its evidence for claims 6 and 7 is limited to Pawan and Neesby).

We do not agree. First, Martin discloses that the test animals¹⁷ in its experiment were fed two different 3-hydroxybutyrate “oligomers, short and medium” with different molecular masses. Ex. 1017, 11:9–15. Petitioner has not shown how, if at all, one of ordinary skill in the art would relate the dosage of such 3-hydroxybutyrate oligomers to that of the recited Markush Compounds. Second, Petitioner’s argument that the dosage administered to the rats in this test is equivalent to several ounces in a human (Pet. 51) is unsupported attorney argument. Indeed, Petitioner has not offered expert testimony, nor identified any other evidence, to support such a finding. Thus, Petitioner has failed to provide sufficient evidence to show how, if at all, the dosages taught in Martin relate to the ranges recited in claims 5–7.

Additionally, Petitioner has not shown that the upper end of the ranges recited in claims 6 and 7 would have been obvious based on the teachings in Martin and Neesby. Similar to its arguments regarding the grounds based on Pawan, Petitioner argues that it would have been “obvious to try lower doses” because “individuals have widely-varying weight-loss goals.” Pet. 51. Even so, Petitioner offers insufficient explanation why it would have been obvious to try a dose within the particular ranges recited in claims 6 and 7. Indeed, a dose of “several ounces” (*id.*) would likely exceed the upper end of the range in both claims 6 and 7 by at least an order of magnitude.¹⁸

¹⁷ Martin discloses that these animals were “Sprague-Dawley rats” not test mice. Ex. 1017, 11:6.

¹⁸ A dose of just two ounces would be more than 56 grams per day. In contrast, based on an average body surface area of 1.6 square meters (*see* Ex. 1001, 6:44–45), the upper end of the range in claims 6 and 7 is only about 1.4 and 7.5 grams per day, respectively.

The only evidence Petitioner points to in support of its argument that it would have been obvious to try a dosage within the recited range are the dosages taught in Neesby. *See* Pet. 51. But, as explained above, Neesby teaches that dosage for a different purpose than the method in claims 5–7, and Petitioner does not provide sufficient evidence-backed argument to show how one of skill in the art would have understood Neesby’s dosage to pertain to causing weight loss or avoiding weight gain.

For these reasons, Petitioner has failed to show by a preponderance of the evidence that claims 5–7 are anticipated by Martin or would have been obvious over Martin and Neesby. Because claims 8–13 each depend from one of claims 5, 6, and 7, Petitioner has likewise failed to establish by a preponderance of the evidence that claims 8–13 are anticipated by or would have been obvious over the cited prior art.

G. Alleged Anticipation by and Obviousness of Claims 14–19 in view of Neesby

Petitioner asserts that Neesby anticipates claims 14 and 17 and that Neesby in combination with Strachan renders obvious claims 15, 16, 18, and 19. *See* Pet. 52–60. Patent Owner disputes those contentions. *See* PO Resp. 12, 17–22. As explained below, we determine Petitioner has shown by a preponderance of the evidence that claims 14 and 17 are unpatentable as anticipated by Neesby. Petitioner has not shown, however, by a preponderance of the evidence that claims 15, 16, 18, and 19 would have been obvious over Neesby in view of Strachan.

1. Claims 14 and 17

Petitioner argues that Neesby anticipates claims 14 and 17 because Neesby discloses the administration of a Markush Compound (butyric acid)

in a capsule and tablet. See Pet. 52–59. Petitioner contends these claims “do[] not require an intention to cause weight loss,” but rather “require[] only . . . an amount that would be effective for weight loss.” *Id.* at 53, 56. Thus, according to Petitioner, because Neesby teaches a daily dosage range that “correspond[s] generally to the amounts taught in the ’356 Patent (that is, between 96 mg and 7.5 grams per day), it is inherent that taking butyrates as, and in the amounts, taught by Neesby ‘716 **would be effective in suppressing appetite as taught by the ‘356 Patent.**” *Id.* at 53.

After reviewing the full record developed in this proceeding, we agree with Petitioner’s arguments. Neesby discloses a composition comprising butyric acid “in either tablet or capsule form” and teaches “[a] dose should preferably be taken at each meal for a total daily intake of about 3 to about 10 grams.” Ex. 1014, 2:50–57, 4:66–68. In addition, Neesby Example 1 discloses an exemplary “size 00 gelatin accommodating 500 to 600 mg. sodium butyrate.” *Id.* at 3:5–7. Moreover, the record evidences that such capsules are capable of dissolving in the stomach.¹⁹ See Ex. 1017, 1:16–18, 1:36–38 (explaining that the walls of gelatin capsules are soluble and

¹⁹ Petitioner points to Neesby’s teaching that an “enteric coating can be applied to the powder particles *within* the tablet” as evidence that the capsule itself is not enterically coated and therefore would dissolve in the stomach. Pet. 58 (citing Ex. 1017, 2:29–32; Ex. 1011). We agree with Petitioner’s logic. That is, because Neesby teaches that its compositions may “further comprise an enteric coating material on the butyrate granules,” it discloses capsules and tablets that do not have an enteric coating. See *Upsher-Smith Labs., Inc. v. Pamlab, LLC*, 412 F.3d 1319, 1322 (Fed. Cir. 2005) (explaining that a reference disclosing the optional inclusion of a particular component teaches compositions that both do and do not contain that component).

dissolve in the stomach); Ex. 1011, 2 (explaining that enteric coatings can be added to capsules and tablets that would otherwise dissolve in the stomach). Thus, Neesby discloses compositions comprising a standard-sized, dissolvable capsule and tablet containing a Markush Compound (i.e., butyric acid and sodium butyrate) in an amount of about 500–600 mg.

Neesby’s capsule and tablet compositions contain “an amount effective for weight loss or avoidance of weight gain,” as recited in claims 14 and 17. As explained above, this term refers to the amount in an individual capsule or tablet and encompasses amounts in standard-sized capsules and tablets such as the “size 00” capsules described in Neesby. Moreover, Neesby’s disclosure of exemplary capsules requiring multiple capsules to reach the “daily intake of . . . about 3 to 10 grams” (Ex. 1014, 2:50–57, 4:66–68) corresponds to the description of exemplary dosages in the ’356 patent Specification. See Ex. 1001, 3:45–48 (“[t]he upper range of the preferred dose is about 1.15 grams of potassium butyrate or 5 of the size #0 filled capsules (described in this Application) taken three times a day”); 4:9–10 (“even 10 doses a day or 36 capsules would probably be well tolerated”); 4:22–28 (describing the use of capsules “typically contain[ing] 231 to 287 mg of potassium butyrate” along with excipients “in a 920 to 1 100 mg Size 0 Lilly gelatin capsule”).

The Specification is, of course, relevant to the interpretation of the term “an amount effective for weight loss or avoidance of weight gain” in claims 14 and 17. See *Phillips*, 415 F.3d at 1315 (“[T]he specification is always highly relevant to the claim construction analysis.” (internal quotations omitted)). Here, the Specification describes an exemplary dose of about 3.5 g/day (i.e., 1.15 g x 3) comprising multiple capsules or tablets

taken with each meal is an effective amount as that term is used in claims 14 and 17. The fact that Neesby does not expressly recognize that the compositions it discloses contain butyric acid in an amount effective for weight loss or avoiding weight gain does not avoid anticipation. *Catalina Mktg.*, 289 F.3d at 809 (“[T]he patentability of . . . composition claims depends on the claimed structure, not on the use or purpose of that structure.”); *see also Atlas Powder Co. v. Ireco, Inc.*, 190 F.3d 1342, 1349 (Fed. Cir. 1999) (“Insufficient prior understanding of the inherent properties of a known composition does not defeat a finding of anticipation.”); *Titanium Metals Corp. of Am. v. Banner*, 778 F.2d 775, 781 (Fed. Cir. 1985) (“[I]t is immaterial, on the issue of their novelty, what inherent properties the [compositions] have or whether these applicants discovered certain inherent properties.”).

Patent Owner contends “[b]oth Neesby and the ‘356 Patent claims 14 and 17 involve dosage ranges” and “when the claims and prior art both recite ranges, anticipation is not shown based merely from some amount of overlap between the ranges.” PO Resp. 17–18 (citing *Ineos USA LLC v. Berry Plastics Corp.*, 783 F.3d 865, 869 (Fed. Cir. 2015)). We, however, do not agree with the premise of Patent Owner’s argument. Claims 14 and 17 do *not* recite a dosage range, nor do we accept Patent Owner’s invitation to import such a requirement into those claims through claim construction. Thus, Patent Owner’s reliance on *Ineos* is misplaced.²⁰ What claims 14 and

²⁰ Patent Owner further asserts that the daily dosage range taught in the ‘356 patent is critical to the claimed invention. PO Resp. 19–22. This argument does not avoid the anticipation grounds advanced against claims 14 and 17 because those claims do not recite a dosage range. Even if they did, we are

17 do require is a capsule or tablet respectively that contains a Markush Compound in “an amount effective for weight loss or avoidance of weight gain.” As explained above, Neesby discloses such compositions. Thus, we conclude that the preponderance of the evidence of record demonstrates that claims 14 and 17 are anticipated by Neesby.

2. Claims 15, 16, 18, and 19

Petitioner offers the same arguments regarding claims 15, 16, 18, and 19 for its obviousness ground based on Neesby in view of Strachan as it does for these claims in the other grounds. Pet. 59; Reply 20 (arguing that it would have been obvious to combine Neesby and Strachan based on the teachings in the Specification of the '356 patent). Those arguments are unpersuasive as explained in our analysis of these claims for the grounds based on Pawan. Accordingly, Petitioner not shown by a preponderance of the evidence that claims 15, 16, 18, and 19 would have been obvious over Neesby in view of Strachan.

H. Alleged Anticipation by and/or Obviousness of Claims 14–19 in view of Moran

Petitioner asserts that Moran anticipates claims 14 and 17 and that Moran in combination with Strachan renders obvious claims 15, 16, 18, and 19. See Pet. 60–67. Patent Owner disputes those contentions. See PO Resp. 12, 17–22. As explained below, we determine that Petitioner has

not persuaded that the results described in the Specification are sufficient to establish criticality for the full range of the exemplary daily dosages described there. As Patent Owner points out the dosage amounts for these volunteers ranged from 420 mg – 3,465 mg/day (see PO Resp. 21), whereas the Specification describes exemplary daily dosages within a much broader range. See Ex. 1001, 3:44–4:11.

shown by a preponderance of the evidence that claims 14 and 17 are unpatentable as anticipated by Moran. However, Petitioner not shown by a preponderance of the evidence that claims 15, 16, 18, and 19 would have been obvious over Moran in view of Strachan.

1. Claims 14 and 17

Petitioner's argument that Moran anticipates claims 14 and 17 is largely the same as its argument regarding Neesby above. *See* Pet. 60–67. Specifically, Petitioner relies on Moran's disclosure of a dosage range that corresponds to the preferred dose described in the Specification as evidence that Moran discloses capsules and tablets comprising a Markush Compound (i.e., butyric acid) in an amount that is inherently effective for weight loss or avoidance of weight gain. *See id.* at 61.

After the reviewing the full record developed in this proceeding, we agree with Petitioner's arguments. Moran discloses standard-sized capsules and tablets containing “10–500 milligrams” of “butyric acid” and “butyrate salts” as an active ingredient. Ex. 1015, 5:29–31, 9:35–62. The amount of Markush Compound in Moran's capsules and tablets overlaps with and encompasses the exemplary dosages described in the Specification of the '356 patent, which for the reasons explained above in our analysis of the anticipation ground based on Neesby evidences that Moran's compositions contain “an amount effective for weight loss or avoidance of weight gain” as recited in claims 14 and 17. The fact that Moran teaches the administration of these compositions for a different purpose than causing weight loss or avoiding weight gain does not distinguish the compositions recited in claims 14 and 17 from Moran's capsule and tablet compositions. *See Catalina*

Mktg., 289 F.3d at 809; *Atlas Powder*, 190 F.3d at 1349; *Titanium Metals*, 778 F.2d at 781.

In addition, like *Neesby*, Moran discloses “gelatin” capsules (Ex. 1015, 9:35–50) and teaches that its tablets “can be . . . enteric-coated” (*id.* at 8:52–54). Thus, as explained above, the record evidences that the capsule and tablet compositions disclosed in Moran are capable of dissolving in the stomach. For these reasons, we determine that Moran discloses compositions that meet all of the limitations of claims 14 and 17.

As it did with *Neesby*, Patent Owner contends that claims 14 and 17 are “distinguishable because [Moran] teaches a dosage range different from that described in the claimed invention, and does not teach that there is ‘no reasonable difference in how the invention operates over the ranges.’” PO Resp. 22 (quoting *Ineos*, 783 F.3d at 869). As explained above, this argument is not persuasive because claims 14 and 17 do not recite any dosage range, much less the particular daily dosage range that Patent Owner contends is the distinguishing aspect of these claims. For these reasons, we conclude Petitioner has shown by a preponderance of the evidence that claims 14 and 17 are anticipated by Moran.

2. Claims 15, 16, 18, and 19

Petitioner offers the same arguments regarding claims 15, 16, 18, and 19 for its obviousness ground based on Moran in view of Strachan as it does for these claims in the other grounds. Pet. 67; Reply 20 (arguing that it would have been obvious to combine *Neesby* and Strachan based on the teachings in the Specification of the ’356 patent). We do not agree with those arguments for the same reasons explained in our analysis of these claims for the grounds based on Pawan above. Accordingly, Petitioner not

shown by a preponderance of the evidence that claims 15, 16, 18, and 19 would have been obvious over Moran in view of Strachan.

I. Appointments Clause Challenge

Patent Owner argues that, per the Federal Circuit’s decision in *Arthrex*, “the statutory scheme for appointing Administrative Patent Judges (‘APJs’) violated the Appointments Clause of the U.S. Constitution,” and the Federal Circuit’s remedy in *Arthrex* “fails to cure the constitutional defect.” PO Resp. 28 (citing *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320, 1335 (Fed. Cir. 2019), *cert. granted*, No. 19-1434, -1452, -1458, 592 U.S. ____ (Oct. 13, 2020)); *see also* Reply 12 (Petitioner reserving “its right to oppose any future challenge to the constitutionality of this review under the Appointments Clause”). Our reviewing court has addressed this issue. *Arthrex*, 941 F.3d at 1337 (“This as-applied severance . . . cures the constitutional violation.”); *see also Arthrex, Inc. v. Smith & Nephew, Inc.*, 953 F.3d 760, 764 (Fed. Cir. 2020) (Moore, J., concurring in denial of rehearing) (“Because the APJs were constitutionally appointed as of the implementation of the severance, *inter partes* review decisions going forward were no longer rendered by unconstitutional panels.”). Accordingly, we do not consider this issue any further.

III. CONCLUSION

Petitioner has shown by a preponderance of the evidence that claims 1, 2, 5, 8, 11, 14, and 17 are unpatentable for one or more of the asserted grounds. Petitioner has not met that burden for claims 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, and 19.

In summary:

Claims	35 U.S.C. §	References/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1, 2, 5– 14, 17	102	Pawan	1, 5, 11	2, 6–10, 12– 14, 17
1	103	Pawan	1	
2, 5–14, 17	103	Pawan, Neesby, Moran	2, 5, 8, 11, 14, 17	6, 7, 9, 10, 12, 13
3, 4, 15, 16, 18, 19	103	Pawan, Neesby, Moran, Strachan		3, 4, 15, 16, 18, 19
1, 2, 5– 14, 17	102	Martin	1	2, 5–14, 17
1	103	Martin	1	
2, 5–14, 17	103	Martin, Neesby, Moran	2, 14, 17	5–13
3, 4, 15, 16, 18, 19	103	Martin, Neesby, Moran, Strachan		3, 4, 15, 16, 18, 19
14, 17	102	Neesby	14, 17	
15, 16, 18, 19	103	Neesby, Strachan		15, 16, 18, 19
14, 17	102	Moran	14, 17	
15, 16, 18, 19	103	Moran, Strachan		15, 16, 18, 19
Overall Outcome			1, 2, 5, 8, 11, 14, 17	3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19

ORDER

Accordingly, it is

ORDERED that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 5, 8, 11, 14, and 17 of U.S. Patent 6,613,356 B1 are unpatentable;

FURTHER ORDERED that Petitioner has not shown by a preponderance of the evidence that claims 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, and 19 of U.S. Patent 6,613,356 B1 are unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to this proceeding seeking judicial review of our Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2019-01141
Patent 6,613,356 B1

PETITIONER:

Brian Galvin
GALVIN PATENT LAW LLC
brian@glavinpatentlaw.com

Vanessa Pierce
LAW OFFICE OF VANESSA PIERCE
vanessa@bowmanpierce.com

PATENT OWNER:

Ryan E. Hatch
LAW OFFICE OF RYAN E. HATCH
ryan@ryanehatch.com

Tara Klamrowski
SEGE LAW PRACTICE
tara@alansege.com