IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

MERCK & CO., INC.,	:	
	:	
Plaintiff,	:	
	:	
v.	:	Civil Action No. 00-035-JJF
	:	Civil Action No. 00-052-JJF
TEVA PHARMACEUTICALS USA, INC. and	:	
ZENITH GOLDLINE PHARMACEUTICALS,	:	Consolidated Action
INC.,	:	
Defendants.	:	

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MEMORANDUM OPINION

November 4, 2002
Wilmington, Delaware.

Farnan, District Judge.

INTRODUCTION

This action was filed by Merck & Co., Inc. ("Merck") against Teva Pharmaceuticals USA, Inc. ("Teva"), and Zenith Goldline Pharmaceuticals, Inc. ("Zenith") (collectively, "Defendants") for infringement of U.S. Patent Number 4,621,077 ("'077 Patent"). Merck originally filed two separate actions against Teva and Zenith; however, the Court consolidated these actions on April 10, 2000. (D.I. 17). The original claims alleged infringement of United States Patent Nos.: 4,621,077, 5,804,570, 5,358,941, 5,681,590, 5,849,726, and 6,008,207. (D.I. 1, D.I. 19, D.I. 32). By stipulations signed by the Court on April 19, 2001, Merck dismissed all claims in the consolidated case except for infringement of the '077 Patent (D.I. 53, 54). Additionally, at the September 6, 2001, pretrial conference, Merck confirmed that it would not pursue its claim of willful infringement with respect to the '077 Patent. (D.I. 80).

The '077 Patent issued November 4, 1986, lists Sergio Rosini and Giorgio Staibano as inventors and is assigned to Instituto Gentili S.p.A.,("Gentili") an Italian Company. (D.I. 108 at 4). Merck is now the owner of the '077 Patent. (D.I. 108 at 4). The '077 Patent discloses and claims a method for treating urolithiasis and inhibiting bone reabsorption by administering 4-amino-1-hydroxybutane-1, 1-biphosphonic acid. Merck contends

that Defendants' filing of an Abbreviated New Drug Application (ANDA) under section 505(j) of the Federal Food, Drug and Cosmetic Act, seeking approval to market tablets containing (4-amino-1-hydroxybutylidene) bisphosphonic acid monosodium salt trihydrate before the expiration of the '077 Patent, literally infringes claim 1 of the '077 Patent. Alternatively, Merck contends that there is infringement under the doctrine of equivalents.

Defendants contend that Merck has not established that they infringe the '077 Patent. Specifically, Defendants contend that they do not infringe claim 1 of the '077 Patent because the claim requires the administration of alendronic acid and the use of Defendants' proposed product does not. Additionally, Defendants contend that their products have a substantial noninfringing use because they do not propose their products for the treatment of urolithiasis. Defendants also raise counterclaims and affirmative defenses. Specifically, Defendants allege that the '077 Patent is invalid on grounds of obviousness and anticipation and that the patent term extension is invalid.

The Court has jurisdiction over the parties and the subject matter pursuant to 28 U.S.C. § 1338(a). Additionally, venue is appropriate under 28 U.S.C. § 1391(c) and § 1400(b). Neither jurisdiction nor venue are contested by the parties.

The Court conducted a four day bench trial in this action.

This Memorandum Opinion constitutes the Court's findings of fact and conclusions of law.

BACKGROUND

I. The '077 Patent and Osteoporosis Generally

A. Osteoporosis

Osteoporosis is caused by an imbalance in the body's natural process of destroying (or resorbing) old bone, and laying down new bone in its place. (See Tr 69:16-71:5; PDX 8-9; D.I. 109 at 2). As people age, the resorption of bone remains active, but the cells for laying down new bone ("osteoblasts") begin to slow, so that not all the bone that is resorbed is replaced. Over an extended period, this imbalance can result in bones that are thin, brittle and prone to fracture. (See Tr 69:16-71:5; PDX 8-9; D.I. 109 at 2)

B. The Prosecution History of the '077 Patent

The initial application for the '077 Patent was filed on June 8, 1984. (DTX 2, Tab 1 at 38-39; D.I. 108 at 11). There were originally thirteen claims listed in the application. (DTX 2, Tab 1 at 38-39). The claims were rejected by the examiner pursuant to 35 U.S.C § 112, for using language unwarranted by the specification and for indefiniteness. (DTX 2 Tab 5 at 2-5). Additionally, the claims were rejected under 35 U.S.C. § 102(b) as anticipated. Id. As a result, the patentee ("Gentili") deleted claims 1-13 and added claim 14 which stated:

> A pharmaceutical composition useful for the treatment of urolithiasis and for inhibiting bone reabsorption, in unit dose form, which contains as the active ingredient 4-amino-1-hydroxybutan-1, 1-biphosphonic acid in the amount of 0.5-1.0 mg. per unit dose.

(DTX2 Tab 7 at 1). The examiner rejected this claim under 35 U.S.C. § 103 as obvious in light of prior relevant art. (DTX 2, Tab 9 at 2-4). Additionally, the examiner noted that "method claims using the specific compound set forth in claim 14 would be favorably considered." (DTX 2, Tab 10). Gentili, following the examiner's recommendation, then submitted only 1 method claim for the '077 Patent, which was approved by the examiner. (DTX 2, Tab 11).

C. Merck's Purchase of the '077 Patent

In the early 1980s, Merck formed a Bone Research Section in order to research osteoporosis and new drug therapies for the disease. (Tr. 68:1-69:10; D.I. 109 at 2). Dr. Gideon Rodan was brought into Merck to lead the Section. Id. Dr. Rodan invited Dr. Herbert Fleisch, a researcher of bisphosphonates, to speak about the use of bisphosphonates for the treatment of bone diseases. (Tr. 88:1-89:12; D.I. 109 at 3). During his visit, Dr. Fleisch discussed with Dr. Rodan research by Sergio Rosini, a scientist at Instituto Gentili, in Pisa Italy involving the compound 4-amino-1-hydroxybutylidene bisphosphonate (later named "alendronate") which was a potential therapy for bone resorption. (Tr. 88:1-22; D.I. 109 at 3). Merck contends that, at the time

of Dr. Fleisch's visit, experts in the field of treating bone diseases were skeptical about the use of bisphosphonates. (D.I. 109 at 3). Dr. Fleisch tested a compound called alendronate, a member of the bisphosphonate family, which Merck contends showed great and unexpected potential as treatment for osteoporosis and other bone resorption diseases. (D.I. 109 at 3). Subsequently, Dr. Rodan contacted Dr. Rosini at the Instituto Gentili and began the process of licensing and later purchasing the '077 Patent. (Tr. 90:4-5; D.I. 109 at 3).

In 1988, Merck filed a New Drug Application ("NDA") with the FDA seeking approval to market alendronate[1] sodium tablets, which were trademarked as Fosomax®. (Tr. 93:9-94:15; D.I. 109 at 120). Merck received approval to market Fosomax® in 1995. Id. Additionally, in 1995 Merck applied for and received a patent term extension of approximately three and a half years that was added to the original term of the '077 Patent. (PTX 2 at 244-45; D.I. 109 at 13). When the Patent and Trademark Office ("PTO") granted the term extension, it found that Fosomax® was covered by claim 1 of the '077 Patent. (PTX 2, at 242-43; PDX 33, 35; D.I. 109 at 13). The primary ingredient in Fosomax® is 4-amino-1-hydroxybutylidene bisphosphonic acid monsosodium salt trihydrate,

[1] The Court refers to several different things as alendronate in this opinion including: 4-amino-1-hydroxybutane-1, 1-biphosphonic acid; 4-amino-1-hydroxybutylidene bisphosphonic acid; and alendronic acid.

a sodium salt of alendronate. (PTX 86; D.I. 109 at 13). Fosomax® is approved for use in the prevention and treatment of osteoporosis and Paget's disease. Id. The '077 Patent is set to expire on August 6, 2007. (D.I. 109 at 1).

II. The Accused Product-Defendants' Generic Version of Fosomax®

Teva and Zenith filed ANDA's with the FDA for approval to market generic forms of Merck's product, Fosomax®, on September 29, 1999. (DTX 104; DTX 103; D.I. 108 at 2). Defendants also challenged certain patents that Merck had listed in the FDA's "Orange Book" as covering Fosomax® or its use. (DTX 103; PTX 6; D.I. 108 at 2). Defendants then notified Merck of their ANDA filings. Id.

On January, 19, 2000, within the forty-five day statutory period, Merck filed a complaint against Teva alleging willful infringement of several patents, including the '077 Patent due to their ANDA filings (D.I. 1). Merck also filed a similar complaint against Zenith. (D.I. 18). However, as previously discussed, the two cases were consolidated and all claims except for infringement of the '077 Patent were dismissed. (D.I. 53, D.I. 54, D.I. 80; D.I. 17). The filing of Merck's complaints triggered the thirty month stay period during which the FDA cannot approve the Defendants' applications. This period will expire on March 29, 2003. (D.I. 108 at 2).

Both Defendants have the same active ingredient in their

respective products which is a chemical compound called "alendronate monosodium salt trihydrate" or "(4-amino-1-hydroxybutylidene) bisphosphonic acid monosodium salt trihydrate" which is sometimes abbreviated as "alendronate sodium" or "alendronate sodium trihydrate."(DTX 92-95; 104, 105, 192, 204, 205 at ZA-012682, 206, 208, 209; D.I. 108 at 3). Defendants propose to market their respective products for: 1) the treatment of osteoporosis; 2) the prevention of osteoporosis; and 3) the treatment of Paget's disease of the bone. (DTX 192 at 39-40; DTX 204 at ZA-002927-29; D.I. 108 at 3).

DISCUSSION

I. INFRINGEMENT

Merck claims that Defendants' ANDA filings for their generic version of Fosomax® infringe Merck's '077 Patent. Defendants contend that they have not infringed the '077 Patent either literally or under the doctrine of equivalents.

A. Establishing an Infringement Claim

A patent is infringed when a person "without authority makes, uses or sells any patented invention, within the United States during the term of the patent . . . ." 35 U.S.C. § 271(a). Additionally, whoever actively induces infringement of a patent or sells a material for use in practicing a patented process is liable as an infringer. 35 U.S.C. § 271(b),(c). In determining whether a patent has been infringed, the patent owner

bears the burden of proof, and must meet its burden by a preponderance of the evidence standard. SmithKline Diagnostics, Inc. v. Helena Lab. Corp., 859 F.2d 878, 889 (Fed. Cir. 1988) (citations omitted).

A patent owner may establish infringement under either of two theories: literal infringement or the doctrine of equivalents. Under the theory of literal infringement, infringement occurs where each element of at least one claim of the patent is found in the alleged infringer's product. Panduit Corp. v. Dennison Mfg. Corp.,836 F.2d 1329, 1330 n.1 (Fed. Cir. 1987). A claim in a patent can only be infringed if it reads on each and every element of the alleged infringer's product. American Hoist & Derrick Co. v. Manitowoc Co., Inc., 603 F.2d 629, 630 (7th Cir. 1979); see also Amstar Corp. v. Enviro Tech Corp., 730 F.2d 1476, 1484 (Fed. Cir. 1984), cert. denied, 469 U.S. 924 (1984) (infringement avoided only if element present in alleged infringing process absent in patented invention); Hormone Research Found., Inc. v. Genentech, 904 F.2d 1558, 1562 (Fed. Cir. 1990), cert. dismissed, 499 U.S. 955 (1991) (infringement only if each claim or equivalent found in accused invention).

Under the theory of the doctrine of equivalents, however, infringement may be established even where elements in the claimed invention are missing from the alleged infringer's product, if the "accused device performs substantially the same

function in substantially the same way to achieve substantially the same result as the claimed device." Graver Tank & Mfg. Co. v. Linde Air. Prods. Co., 339 U.S. 605, 608 (1950); Warner-Jenkinson Company, Inc. v. Hilton David Chemical Co., 117 S. Ct. 1040 (1997) (declining to overrule Graver Tank); Malta v. Schulmerich Carillons, Inc., 952 F.2d 1320, 1325 (Fed. Cir. 1991).

To find infringement under either theory, the Court must undertake a two-step process. First, it must interpret the claims at issue by evaluating the language of the claims ("claim construction"). Miles Lab., Inc. v. Shandon, Inc., 997 F.2d 870, 876 (Fed. Cir. 1993), cert. denied, 510 U.S. 1100 (1994). Claim construction is a question of law. Markman v. Westview Instruments, Inc., 52 F.3d 967, 977-978 (Fed. Cir. 1995), aff'd, 517 U.S. 370, 388-390 (1996).

When construing the claims of a patent, a court considers the literal language of the claim, the patent specification and the prosecution history. Markman, 52 F.3d at 978. A court may consider extrinsic evidence, including expert and inventor testimony, dictionaries, and learned treatises, in order to assist it in construing the true meaning of the language used in the patent. Id. at 980 (citations omitted). When extrinsic evidence is used in claim interpretation, sources available prior to the litigation are preferred over the testimony or evidence

created with the specter of litigation. Sunrise Medical HHG , Inc. v. AirSep Corp., 95 F. Supp. 2d 348, 438 (W.D. Pa. 2000) (citing Vitronics Corp. v. Conceptronic, 90 F.3d 1576, 1583-84(Fed. Cir. 1996)). A court should interpret the language in a claim by applying the ordinary and accustomed meaning of the words in the claim. Envirotech Corp. v. Al George, Inc., 730 F.2d 753, 759 (Fed. Cir. 1984). However, if the patent inventor clearly supplies a different meaning, the claim should be interpreted accordingly. Markman, 52 F.3d at 980 (noting that patentee is free to be his own lexicographer, but emphasizing that any special definitions given to words must be clearly set forth in patent). If possible, claims should be construed to uphold validity. In re Yamamoto, 740 F.2d 1569, 1571 & n.* (Fed. Cir. 1984) (citations omitted). Additionally, a patent specification may define claim terms by "implication" where the meaning may be "found in or ascertained by a reading of the patent documents." Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582, 1584 n.6 (Fed. Cir. 1996).

The second step in determining infringement requires a court to compare the accused product with the properly construed claims of the patent at issue to determine whether the accused product infringes the patent under either the theory of literal infringement or under the theory of the doctrine of equivalents ("infringement analysis"). Miles Lab., 997 F.2d at 876; SRI

Int'l v. Matsushita Elec. Corp. of America, 775 F.2d 1107, 1121 (Fed. Cir. 1985).

B. Claim Construction of the '077 Patent

In arguing that Defendants' generic versions of Fosomax® do not infringe on the '077 Patent, Defendants raise two claim construction issues:(1) whether in claim 1 of the '077 Patent "4-amino-1-hydroxybutane-1,1-biphosphonic acid" includes both its free acid and sodium salt forms and (2) whether claim 1 of the '077 Patent requires both the treatment of urolithiasis and inhibiting bone reabsorption simultaneously. Other than these two issues, the parties do not dispute the meaning of the claims.

Claim 1 of the '077 Patent reads as follows:

> A method of treatment of urolithiasis and inhibiting bone reabsorption which consists of administering to a patient in need thereof an effective amount of 4-amino-1-hydroxybutane-1, 1-biphosphonic acid.

(DTX 2, Tab 11 at 1). For the reasons that follow, the Court construes the terms as follows:

1. "4-amino-1-hydroxybutane-1,1-biphosphonic acid"

Both parties agree that neither the patent claim nor the specification expressly defines the term "4-amino-1-hydroxybutane-1,1-biphosphonic acid". Defendants argue that "4-amino-1-hydroxybutane-1,1-biphosphonic acid" in claim 1 should be construed to encompass only the free acid form. (D.I. 107 at 11-

17.). According to Defendants, claim 1 of the '077 Patent expressly recites the administration of "4-amino-1-hydroxybutane-1, 1-biphosphonic acid" (which is now known as alendronic acid), and this chemical name in claim 1 is unambiguous and refers to a single compound. (D.I. 107 at 12). Defendants maintain that the specification distinguishes between salts and acids, therefore strengthening their position that claim 1 refers only to a single acid compound. (D.I. 107 at 13).

In support of their proposed construction, Defendants direct the Court to Table 6 of the '077 Patent specification, which lists typical pharmaceutical formulations of amino-butan diphosphonic acid. For example, Defendants point out that Table 6 distinguishes between formulations containing "4-amino-1-hydroxybutan-1,1-biphosphonic acid" and those containing "4-amino-1-hydroxybutan-1, 1-biphosphonic acid, sodium salt." (D.I. 107 at 13; '077 Patent col. 13 lines 5-18). Additionally, Defendants direct the Court to the examples in the patent specification. For example, Defendants point out that examples 1 through 4 describe the manufacture of acids, whereas, the manufacture of salts is described separately in examples 5 through 8. (D.I. 107 at 13; '077 Patent col. 3 lines 31-68, col. 4 lines 1-68, col. 5 lines 1-68, col. 6 lines 1-68). Additionally, according to Defendants, Merck's expert, Dr. Recker supports their proposed construction. Specifically, Defendants

point to Dr. Recker's testimony where he conceded that the '077 Patent specification distinguishes between acids and salts. (Recker Tr. 481:1-21).

In addition to the tables and language of the specification Defendants also direct the Court to the prosecution history of the '077 Patent. According to Defendants, the patentee disclaimed the coverage of salts through claim amendments made during the prosecution history. (D.I. 107 at 14). Finally, in support of their contention that acid and sodium are not used interchangeably, Defendants point to affidavits of Merck scientists, Dr. Brenner and Dr. Rodan, which describe differences between the effects of alendronic acid and alendronate sodium. (D.I. 113 at 14; DTX 14, ¶ 11; DTX 65,¶ 22).

In response to Defendants' proffered interpretation of claim 1, Merck contends that claim 1 of the '077 Patent includes both the acid and sodium salt forms of "4-amino-1-hydroxybutane-1,1-biphosphonic acid". Merck asserts that those of ordinary skill in the art, at the time of the '077 Patent filing, understood that the acid and sodium salt forms have identical therapeutic properties in regard to bone disease, and that they are chemically indistinguishable after being dissolved in bodily fluids. (D.I. 106 at 9). Additionally, in support of its position, Merck directs the Court to Table 6 of the specification. Table 6 lists typical pharmaceutical formulations

containing amino-butan-diphosphonic acid. The first entry under the heading "Opercolated Capsules" lists 4-amino-1-hydroxybutan-1, 1-biphosphonic acid, sodium salt as the first referenced acid. ('077 Patent col. 13 lines 3-9). Thus, Merck contends, the specification clearly and implicitly defines "4-amino-1-hydroxybutane-1,1-biphosphonic acid" as encompassing its sodium salt forms. (D.I. 106 at 10).

In addition, Merck again points to Table 6 of the specification, where two other formulations are disclosed which are effervescent granules and formulations suitable for injection. ('077 Patent col. 13 lines 15-32). Merck contends that although these formulations are listed as containing 4-amino-1-hydroxybutan-1, 1-biphosphonic acid, both formulations are a sodium salt solution. (D.I. 106 at 10-11). Merck asserts that, although actually administering a sodium salt solution, the specification defines these formulations as containing alendronic acid, which demonstrates the contextual usage of the term acid as adopted by the '077 Patent specification. (D.I. 106 at 11). Additionally, Merck directs the Court to Tables 7 and 8 of the specification. ('077 Patent col. 14, lines 40-67, col. 15, lines 1-48, col. 16, lines 1-47). Tables 7 and 8 depict results obtained by administering different bisphosphonates to rats. Id. However, the text does not specify whether the free acid or sodium salt forms were administered. Id. Merck argues that

this demonstrates that those of skill in the art recognize that the administration of free acid versus sodium salt is immaterial to the compounds efficacy in inhibiting bone reabsorption. (D.I. 106 at 12).

In response to Defendants' argument that the specification differentiates between the free acid and sodium salt forms, Merck also contends that the '077 Patent specification contains two distinct sections with different purposes. (D.I. 106 at 12). The first section, Merck argues, is a chemistry section setting out methods for making certain pharmaceutically active bisphosphonates and is merely background and not related to claim 1 of the '077 patent. (D.I. 106 at 12). However, the second section,(which starts at column 6 line 45 of the '077 Patent) Merck contends, could be classified as the biological section, which deals with pharmacological effects of bisphosphonates and supports the claim in issue. (D.I. 106 at 12).

Merck also directs the Court to Novo Nordisk v. Genentech, Inc., 77 F.3d 1364 (Fed. Cir. 1996). In Novo Nordisk, the Federal Circuit, bypassing an ordinary meaning analysis, determined that a term was implicitly disclosed in the specification as encompassing both forms of human growth hormone. See Novo Nordisk, 77 F.3d at 1368; (D.I. 106 at 15). Merck contends that Novo Nordisk is highly analogous to the case at bar and urges the Court to adopt its reasoning in reference to its

interpretation of claim 1. (D.I. 106 at 15).

Merck also asserts that the PTO, in a Notice of Final Determination in 1995, specifically found that the '077 Patent claims 4-amino-1-hydroxybutane-1, 1-biphosphonic acid monosodium salt trihydrate (alendronate sodium), the active ingredient in Fosomax® and the Defendants' accused products, and argues that this determination should be given deference. (D.I. 106 at 17). Finally, Merck maintains that the amendments made during the prosecution of the patent are irrelevant in this case because the first claims that were submitted were composition claims, whereas, the approved claim was a method of use claim and therefore the amendments did not result in a narrowing of coverage. (D.I. 114 at 23).

The starting point for a claim construction analysis is the language of the claim. Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996). While the court may consider the patent specification and prosecution history as relevant intrinsic evidence in its analysis, the court need not accord this evidence the same weight as the claims themselves. CCPI v. American Premier, Inc., 966 F. Supp. 276, 278 (D. Del. 1997). Rather, "[t]he claim language itself is of paramount importance," and therefore the specification and prosecution history need only be consulted to give the necessary context to the claim language. Id. Additionally, a court may consider extrinsic evidence,

including expert and inventor testimony, dictionaries and learned treatises in order to assist it in construing the true meaning of the language used in the Patent. Markman, 52 F.3d at 979-80. Thus, the specification and other evidence may assist in determining the meaning of a claim, but it may not be used to impose limitations on a claim not found in the words of the claim itself. Electro Medical Sys., S.A. v. Cooper Life Sciences, Inc., 34 F.3d 1048, 1054 (Fed. Cir. 1994).

After reviewing the claim language, specification, and prosecution history of the '077 Patent, in addition to considering the expert testimony, the Court agrees with Merck's interpretation of this language. The phrase "4-amino-1-hydroxybutane-1, 1-biphosphonic acid" is not explicitly defined in the patent. However, in the Court's view, the specification defines the term by implication. Specifically, the Court concludes that in claim 1 of the '077 Patent "4-amino-1-hydroxybutane-1, 1-biphosphonic acid" includes both its free acid and sodium salt forms.

The starting point of this claim construction analysis is that claim 1 of the '077 Patent is a method of use claim as opposed to a composition claim, as it was initially filed. (PTX 25 at 143). Following from this, the Court finds that Merck's separation of the specification into chemistry and biological sections is correct. If claim 1 were still a composition claim

the chemistry section would be highly instructive. However, claim 1 of the '077 Patent is a method of use claim i.e. it discloses a method for treating urolithiasis and inhibiting bone reabsorption. Therefore, pharmacological effects described in the biological section are more pertinent to the claim.

The Court also finds that in terms of their effectiveness for treating bone reabsorption, there is no difference between the free acid and sodium salt forms as used in the '077 patent specification. First, the Court is persuaded by Dr. Recker, Merck's expert, who testified that in the biological part of the '077 Patent specification, sodium salt is used interchangeably with the acid form. (Recker Tr. 448:8-25). Further, as Dr. Recker testified, there are no distinctions between the free acid and sodium salt forms in reference to the measurement of toxicity and biological effects. (Recker Tr. 450:5-10). Additionally, Defendants assert that Dr. Recker admitted that there were distinctions made between the free acid and sodium salt forms in the '077 Patent. (Recker Tr. 481:1-21). However, this excerpt of Dr. Recker's testimony was taken out of context. After the portion of Dr. Recker's testimony that Defendants cite, Dr Recker testified as follows:

> Q. That's right. He doesn't use the word acid, he uses the word salt. When he means salt, he said salt, doesn't he?
> A. I don't know what he means but I know what's written down here is salt.
> Q. But when he talked about the acid, 4-amino-1-hydroxybutane acid you refer he's not talking about a salt

there, don't you
A. Yes but again it's—this is in the context of biology and he uses salt later. And so I–even though he said salt here, in my view and in the view of an ordinary clinical scientist, he would be referring to a sodium salt as well, particularly when you look at the context of this whole section of the –Patent.

(Recker Tr. 481:21-482:10).

Further, the tables and examples listed in the '077 Patent specification also support Merck's proposed claim construction. Specifically, the sentence before Table 6 of the '077 Patent specification (at column 13) states that "[s]ome typical pharmaceutical formulations containing amino-butan-diphosphonic acid are shown here below." ('077 Patent col. 13, lines 3-4). In Table 6, under the section titled Opercolated Capsules, 4-amino-hydroxybutane-1, 1-biphosphonic acid, sodium is listed. Additionally, Dr. Hanzlik, Defendants' expert, in reference to the Effervescent Granules Section of Table 6, conceded that there might be an opportunity for sodium salt. (Hanzlik Tr. 293:3-5).

The Court finds Dr. Hanzlik's testimony concerning the distinctions made between the free acid form and sodium salt form in the specification unpersuasive. Dr. Hanzlik testified that Tables 7 and 8, which depict results obtained by administering different bisphosphonates to rats, would be useless to a scientist because they do not list which form was used i.e. acid or sodium salt. (Hanzlik Tr. 297:16-298:1-17). The Court finds that this ambiguity in Tables 7 and 8 supports Merck's contention

that there is no difference between the free acid and sodium salt forms in terms of bone disease treatment. Additionally, the '077 Patent is a method of use patent which claims a method for the treatment of urolithiasis and bone reabsorption. Dr. Hanzlik is admittedly not a clinician. (Hanzlik Tr. 281:1-3). Further, he has no education or research experience specific to bisphosphonates. (Hanzlik Tr. 275:16-24, Tr. 276:12-24, Tr. 277:12-22, Tr. 280:18-20).

In addition, the Court finds this issue to be analogous to the issue before the Federal Circuit in Novo Nordisk v. Genentech, Inc., 77 F.3d 1364 (Fed. Cir. 1996). In Novo Nordisk, the parties disputed the term "human growth hormone." Id. at 1368. The patentee asserted that the term encompassed both the human growth hormone ("hGH") and "met hGH" which contained an extra molecule. Id. at 1366, 1368. The Federal Circuit held that the term was implicitly defined in the specification and encompassed both forms. Id. at 1368. Similarly, in the case at bar the specification, especially in Tables 7 and 8, implicitly defines "4-amino-1-hydroxybutane-1, 1-biphosphonic acid" to encompass both the sodium salt and free acid forms.

The Court also finds the PTO's determination that claim 1 of the '077 Patent claims alendronate sodium, the active ingredient in Fosomax®, instructive. Although claim interpretation is a question of law and the Court should be the final arbiter, the

Court finds that the PTO's determination should be given weight in this case. See e.g. Purdue L.P. v. Faulding Inc., 230 F.3d 1320 (Fed. Cir. 2000) (citing Quad Envtl. Technologies Corp. v. Union Sanitary Dist., 946 F.2d 870, 875-76 (Fed. Cir. 1991) for the proposition that although the PTO should be accorded some deference, the Court is the final arbiter on questions of law).

Lastly, Defendants contend that the patentee disclaimed the use of salts during the prosecution of the '077 Patent. (D.I. 107 at 14-15). The Court disagrees with Defendants' contention and finds that there was no disclaimer of salts during the prosecution of the '077 Patent. Under the doctrine of prosecution history estoppel, the burden is on the patentee to prove that he did not surrender an equivalent during the prosecution of the patent. However, the analysis is different when the court is construing the claim language. See Gentile v. Franklin Sports, Inc., 211 F. Supp. 2d 334, 337 (D. Mass. 2002). The Federal Circuit has recognized the distinction in the analysis of prosecution history in claim construction and under the doctrine of equivalents and has stated:

> Claim interpretation in view of the prosecution is a preliminary step in determining literal infringement, while prosecution history estoppel applies as a limitation on the range of equivalents if, after the claims have been properly interpreted, no literal infringement has been found. The limit on the range of equivalents that may be accorded a claim due to prosecution history estoppel is simply irrelevant to the interpretation of those claims.

Southwall Technologies, Inc. v. Cardinal IG Co., 54 F.3d 1570, 1578 (Fed. Cir. 1995). The distinction between the two stages of analysis is the burden of proof. In order to prove that a patentee has disclaimed a meaning to a term during the prosecution history, for purposes of claim construction, the challenger "must prove that the patentee made clear representations during the prosecution history which limit the scope of his claim." Gentile, 211 F. Supp. 2d at 337.

In this case, the Defendants can point to no specific evidence in the prosecution history that the patentee "made clear representations during the prosecution history which limit the scope of his claim." Id. The Court finds that the fact that the patentee amended a composition claim to a method claim does not amount to a clear representation that the patentee limited the scope of his claim to the free acid form of 4-amino-1-hydroxybutane-1,1-biphosphonic acid. Therefore for the aforementioned reasons, the Court construes the term 4-amino-1-hydroxybutane-1,1-biphosphonic acid, to include both free acid and sodium salt forms.

2. treatment of urolithiasis and inhibiting bone reabsorption

Defendants argue that Claim 1 of the '077 Patent should be construed as requiring the treatment of both urolithiasis and the inhibition of bone reabsorption. (D.I. 107 at 4-9). According to the Defendants, claim 1 expressly requires the treatment of both

conditions in one patient. (D.I. 107 at 4). In support of their proposed construction, Defendants direct the Court to Northern Telecom Ltd. v. Samsung Electronics Co., 215 F.3d 1281 (Fed. Cir. 2000). Defendants contend that Northern Telecom is on point because the Federal Circuit construed the word "and" to mean "both", and Defendants urge the Court to adopt the same reasoning in this case. (D.I. 107 at 6).

Additionally, Defendants argue that the prosecution history supports the conjunctive use of the word "and" in claim 1. Specifically, Defendants point out that the Italian application leading to the '077 Patent contained a claim to a method of treatment for urolithiasis and another claim for the inhibition of bone reabsorption. (D.I. 107 at 6; DTX 20). Later, when it filed its U.S. application, Gentili combined the treatment of urolithiasis and inhibition of bone reabsorption into a single claim. (D.I. 107 at 6; DTX 20). The examiner then rejected the composition claim and indicated that a method of use claim would be favorably considered. (D.I. 107 at 6; DTX 2 Tab 10). Gentili then submitted a single method of use claim for the treatment of urolithiasis and inhibiting bone reabsorption. (D.I. 107 at 6). Defendants contend that this demonstrates that Gentili intended the '077 Patent to be a single method that involved using alendronic acid to treat two conditions. (D.I. 107 at 6). In further support of this contention, Defendants point to the

testimony of Ms. Fernanda Fiordalisi, the attorney who prosecuted the '077 Patent, who testified that claim 1 is directed to treating both conditions with one compound at the same time. (D.I. 107 at 7; DTX 214 at 99-100).

Defendants further assert that their proposed construction is reasonable in the context of invention. (D.I. 107 at 7). Defendants point to the testimony of their urolithiasis expert, Dr. Coe, who testified that 600,000 people in the United States have both conditions and could benefit from a drug that would deal with both at the same time (D.I. 107 at 7; Coe Tr. 430-431). Dr. Coe further testified that at the time the patent application was filed, it would have been reasonable for scientists to believe that alendronic acid would work both to treat urolithiasis and inhibit bone reabsorption. (D.I. 107 at 7; Coe Tr. 431).

Defendants also disagree with Merck's dictionary definition of "and." First, Defendants criticize Merck's reliance on a single dictionary for their definition. (D.I. 113 at 2). Second, Defendants assert that, even in the single dictionary that Merck cites to, the principle meanings of "and" are listed as: along with or together with, added to or linked to, as well as and at the same time. (D.I. 113 at 3; Websters Third International Dictionary 80 (1986)). Additionally, Defendants argue that the "or" interpretation of the word "and" is only used

when two alternatives are plainly inconsistent. (D.I. 113 at 3). Defendants assert that the treatment of urolithiasis and inhibiting bone reabsorption are not inconsistent alternatives and therefore the "or" interpretation is inapplicable in this case. (D.I. 113 at 3).

Defendants further contend that even though the abstract to the specification uses the word "or" instead of "and", the abstract, according to 37 C.F.R. § 1.72, cannot be relied upon when interpreting claims. (D.I. 113 at 3). Additionally, Defendants argue that, even though the specification did not disclose an example of the simultaneous treatment of urolithiasis and inhibition of bone reabsorption, it discusses the use of the compounds for both purposes and combining those uses into a single method is consistent with the patent. (D.I. 113 at 4). Thus, Defendants assert, both the intrinsic and extrinsic evidence support their proposed claim construction. (D.I. 107 at 8).

In response to Defendants' proposed claim construction, Merck contends that the phrase "a method of treatment of urolithiasis and inhibiting bone reabsorption" means that the method can be used to treat either condition, but does not require the treatment of both conditions at the same time and in the same patient. (D.I. 106 at 18). In support of their contention, Merck relies on Webster's Third International

Dictionary which defines "and" to express "reference to either or both of two alternatives . . . especially in legal language when also plainly intended to mean or." (D.I. 106 at 18; Webster's Third New International Dictionary 80 (1986)).

Merck also argues that the specification supports their proposed construction. For example, Merck argues, the specification never mentions the two conditions being treated simultaneously. (D.I. 113 at 18). Further, Merck asserts that the abstract to the '077 Patent states that biphosphonic acids are valuable in "the treatment of urololithiasis or in the treatment as inhibitors of bone reabsorption." ('077 Patent, Abstract). Moreover, Merck contends that Tables 7 and 8 in the specification would be meaningless under Defendants' proposed construction because they only disclose results relating to the inhibition of bone reabsorption and not the treatment of urolithiasis. (D.I. 114 at 5). In regard to the prosecution history, Merck asserts that the amendment of the claims, combining the claims dealing with urolithiasis and the inhibition of bone reabsorption, reinforces the fact that claim 1 describes the treatment of the two conditions in the alternative. (D.I. 114 at 6).

Merck also directs the Court to U.S. Patent Nos. 4,054,598 ("'598 Patent") and 4,267,108 ("'108 Patent") to support its contention. (D.I. 106 at 19). Merck asserts that Defendants

construe "and" differently in reference to these patents. Specifically, Merck argues that Defendants construe the terms "pharmaceutical and cosmetic preparations" in these patents to mean pharmaceutical or cosmetic preparations. Thus, Merck contends that Defendants adopt different lexicons for the term "and" when it suits their purpose. (D.I. 106 at 19).

Additionally, Merck directs the Court to Thomson Consumer Electronics, Inc. v. Innovatron, 43 F. Supp. 2d 26 (D.C.C. 1999). The Court, in Thomson, held that a strict interpretation of the word "and" would be inconsistent with the patent's specification. Id. at 34. Merck argues that the Thomson case is analogous to the claim in issue, where a strict interpretation of "and" would be inconsistent with the '077 Patent specification. (D.I. 106 at 21). Merck also distinguishes the Northern Telecom case from the instant case because the court was not construing the term "and", but was in fact construing the term "aluminum." (D.I. 106 at 21). As a result, Merck argues, Northern Telecom does not support Defendants' proposed construction. (D.I. 106 at 21).

Merck argues that a conjunctive reading of the term "and" would lead to an absurd result. In support of this argument Merck contends that the diseases are unrelated and only a minuscule percent of people have both disorders. Merck asserts that only 3% of people who have osteoporosis suffer from both disorders. Additionally, Merck argues that this type of

limitation in the patent, without any indication in the patent itself, is unreasonable. (D.I. 106 at 23).

Lastly, Merck contends that Defendants improperly utilized extrinsic evidence when intrinsic evidence was available and unambiguous. See Bell & Howell Document Management Prod. Co. v. Altek Sys., 132 F.3d 701, 706 (Fed. Cir. 1997) (citing Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1583 (Fed. Cir. 1996)); (D.I. 114 at 3). Specifically, Merck argues that reliance on the testimony of Ms. Fiordalisi, the patent lawyer who prosecuted the '077 Patent, is improper. (D.I. 114 at 3). Further, Merck argues that even if Ms. Fiordalisi's testimony were properly considered, it is entitled to no weight because Ms. Fiordalisi, who is 80 years old and who prosecuted the patent over 15 years ago, was questioned about a claim that she barely reviewed during her deposition. (D.I. 114 at 3). As a result of the aforementioned arguments, Merck urges the court to construe claim 1 to cover the treatment of urolithiasis or bone reabsorption.

After reviewing the claim language, specification, prosecution history and extrinsic evidence, the Court agrees with Merck's interpretation of this language. Specifically, the Court concludes that claim 1 of the '077 Patent does not require the simultaneous treatment of urolithiasis and bone reabsorption in the same patient. Additionally, the Court finds that the

intrinsic evidence is ambiguous and therefore will also examine extrinsic evidence. See Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1584 (Fed. Cir. 1996)(noting that if the intrinsic evidence is ambiguous the Court may examine extrinsic evidence in construing claims).[2] The Court will examine the intrinsic evidence and will also consider the statistics on the occurrence of urolithiasis and bone resorption in the same patient, the dictionary definition of "and", and Ms. Fiordalisi's testimony.

The Court finds that Merck's construction is supported by the specification. Specifically, the Court finds that the abstract is a useful source in determining the meaning of a claim.[3] See Tate Access Floors, Inc. v. Maxcess Technologies, Inc., 222 F.3d, 958, 966 n.2 (Fed Cir. 2000)(stating that the abstract of a patent is potentially useful for determining the meaning of a disputed claim); Hill-Rom Co. v. Kinetic Concepts, Inc., 209 F.3d 1337, 1341 n.* (Fed Cir. 2000) (same). The

[2] It is important to note that there is an inconsistency in Merck's argument. Merck argues that Defendants improperly utilized extrinsic evidence in the context of Ms. Fiordalisi's testimony, however, Merck utilized statistics on the occurrences of urolithiasis and bone resorption in the same patient, and a dictionary definition of "and" which are extrinsic evidence.

[3] The Court finds that Defendants' assertion that the abstract is disallowed in claim construction is incorrect. Specifically, the Federal Circuit has stated "[s]ection 1.27(b), however, is a rule of the Patent and Trademark Office . . . it does not address the process by which courts construe claims in infringement actions." Hill-Rom Company, Inc. v. Kinetic Concepts, Inc., 209 F.3d 1337, 1341 n* (Fed. Cir. 2000).

abstract of the '077 Patent recites Merck's proposed claim construction stating that biphosphonic acids are valuable in "the treatment of urololithiasis or in the treatment as inhibitors of bone reabsorption." ('077 Patent, Abstract). Further, Tables 7 and 8 of the specification disclose results relating to the inhibition of bone reabsorption and not urolithiasis; if Defendants' proposed construction were accepted these tables would be meaningless. Thus, in the Court's view, the abstract and specification demonstrate that urolithiasis and inhibition of bone reabsorption do not have to be treated simultaneously in the same patient for purposes of claim 1 of the '077 Patent.

The Court also finds that the prosecution history of the '077 Patent supports Merck's construction. The treatment of urolithiasis and inhibiting bone reabsorption were initially in separate claims. However, Gentili amended the claim and combined the treatment of both diseases into one claim. This amendment reinforces the conclusion that the two diseases are treated in the alternative for purposes of claim 1. Moreover, Defendants' construction of "and" in the '598 and '108 patents, in reference to "pharmaceutical and cosmetic preparations", demonstrate the plausibility of Merck's construction.

Additionally, in reference to the extrinsic evidence, only 3% of people with osteoporosis suffer from both urolithiasis and excessive bone resorption. (D.I. 106 at 23). This would

significantly limit the patent and is unreasonable. Also the Court finds the "or" construction of "and" listed in Webster's Third International Dictionary persuasive. Further, the Court gives Ms. Fiordalisi's testimony little weight due to the fact that she was questioned fifteen years after the prosecution of the patent and given little time to actually review the patent.

In addition, the Court finds that Northern Telecom is inapposite because the Federal Circuit was construing the term "aluminum" rather than "and" as in the claim in issue. The Court, however, finds this issue to be analogous to the issue in Thomson Consumer Electronics, Inc. v. Innovatron, 43 F. Supp. 2d 26 (D.C.C. 1999). In Thomson, the District of Columbia District Court had to construe the term "and". The Court held that the term "and" was construed as "or" because if the conjunctive meaning of "and" were adopted it would lead to an absurd result and the specification suggested the "or" construction of the term. See Thomson, 43 F. Supp. 2d at 34-35. The claim in issue is highly analogous to Thomson because if the term "and" was used conjunctively it would render the results depicted in Tables 7 and 8 meaningless. Moreover, the abstract of the '077 Patent recites the "or" construction.

For these reasons, the Court concludes that the term "and" should be construed to mean "or". Specifically, the Court concludes that claim 1 of the '077 Patent allows for the

treatment of urolithiasis or inhibiting bone reabsorption.

C. Literal Infringement Analysis

Under 35 U.S.C. § 271(e)(2), it is an act of infringement to file an ANDA under Section 505(j) of the Federal Food, Drug and Cosmetic Act for a drug claimed in a patent or the use of which is claimed in a patent, with the purpose of marketing the drug before the expiration of the patent. See 35 U.S.C. § 271(e)(2). Although this act of infringement is stated to be "artificial", 35 U.S.C. § 271(e)(2) gives patentees a jurisdictional basis to bring a lawsuit even though the ANDA applicant is not making using or selling the patented product, which are the traditional acts of infringement. See Glaxo, Inc. v. Novopharm Ltd., 110 F.3d 1562, 1569 (Fed. Cir. 1997). Section 271(e)(2)(A) makes it possible for a patent owner to have a court determine whether, if a drug were actually marketed, it would infringe the owner's patent. Id. Additionally, a relevant inquiry is whether the patentee has proven by a preponderance of the evidence that the alleged infringer will likely market or sell the infringing product. See Glaxo, 110 F.3d at 1569. However, the burden is not met by the mere filing of the ANDA. Id. If the Court determines that the relevant patent is valid, that infringement would occur, and that the ANDA applicant's paragraph IV certification is incorrect, the patent owner is entitled to an order that FDA approval of the ANDA not be effective until the

expiration of the patent. See id. (citing 21 U.S.C. § 355(j)(4)(B)(iii)(II); 35 U.S.C. § 271(e)(4)(A)).

Despite the different jurisdictional basis, a district court's inquiry in a lawsuit brought pursuant to § 271(e)(2) is the same as in all other infringement suits, i.e. "whether the patent in question is 'invalid or will not be infringed by the manufacture, use or sale of the drug for which the [ANDA] was submitted.'" Glaxo, 110 F.3d at 1569 (quoting 21 U.S.C. § 355 (j)(2)(A)(vii)(IV)).

First, the Court finds that Merck has proven by a preponderance of the evidence that Defendants are likely to market the generic version of Fosomax®. The Court bases its finding on the admission by the Defendants in their post trial brief. Defendants, in their Opening Post Trial Brief, stated "defendants propose to market their products for (1) the treatment of osteoporosis; (2) the prevention of osteoporosis; and (3) treatment of Paget's disease of the bone." (D.I. 107 at 3).

In order to determine whether the Defendants' ANDA filing for the generic version of Fosomax® literally infringes claim 1 of the '077 Patent as Merck contends, the Court must compare the language of the claim in issue with the accused product. After comparing the generic form of Fosomax® to the language of claim 1 of the '077 Patent, the Court concludes that Merck has

established by a preponderance of the evidence that all elements of claim 1 of the '077 patent are present in the generic version of Fosomax®-the accused product.

A method of treatment of urolithiasis and inhibiting bone reabsorption.

The Court finds that the Defendants' generic version of Fosomax® is a method of treatment of urolithiasis and inhibiting bone reabsorption. The Court bases its finding on the claim construction and the undisputed facts. First, as noted previously by the Court "A method of treatment of urolithiasis and inhibiting bone reabsorption" in claim 1 of the '077 Patent is construed as a method of treatment of urolithiasis or inhibiting bone reabsorption. Second, it is undisputed that Defendants' generic version of Fosomax® is a method of treatment for osteoporosis and Paget's disease and both of these diseases are treated by inhibiting bone reabsorption (D.I. 109 at 13; D.I. 107 at 3). Accordingly, the Court finds that this element is present in Defendants' generic version of Fosomax®.

which consists of administering to a patient in need thereof an effective amount of 4-amino-1-hydroxybutane-1, 1-biphosphonic acid

The Court finds that Defendants' generic version of Fosomax® involves administering to a patient in need thereof an effective amount of 4-amino-1-hydroxybutane-1, 1-biphosphonic acid. The

Court bases its finding on the claim construction and the undisputed facts. First, as noted previously, by the Court, "4-amino-1-hydroxybutane-1,1-biphosphonic acid" in claim 1 of the '077 Patent includes both its free acid and sodium salt forms. Second, it is undisputed that Defendants' proposed generic product of Fosomax® contains a chemical compound called "alendronate monosodium salt trihydrate," sometimes called "alendronate sodium" which is a sodium salt form of "4-amino-1-hydroxybutane-1,1-biphosphonic acid." (D.I. 107 at 2; D.I. 106 at 25). Therefore, the Court finds that this element is present in Defendants' generic version of Fosomax®.

In sum, the Court finds that each element of claim 1 of the '077 Patent is present in Defendants' generic version of Fosomax®. Therefore, the Court concludes that Defendants' accused product literally infringes claim 1 of the '077 Patent.[4]

II. Invalidity

Once issued a patent is presumed to be valid. See 35 U.S.C. § 282. The party challenging the patent bears the burden of proving by clear and convincing evidence that the patent is invalid. See Helifix Ltd. v. Blok-Lok Ltd., 208 F.3d 1339, 1346 (Fed. Cir. 2000). Clear and convincing evidence is evidence that

[4] The Court will not examine infringement under the doctrine of equivalents because there is literal infringement. See Warner-Jenkinson Co. v. Hilton Davis Chem Co., 520 U.S. 17, 21 (1997) (noting that when a product does not literally infringe, it may infringe under the doctrine of equivalents).

places in the fact finder "an abiding conviction that the truth of [the] factual contentions are 'highly probable.'" Colorado v. New Mexico, 467 U.S. 310, 316 (1984).

Defendants contend that the '077 Patent is invalid and therefore cannot be infringed. Defendants argue invalidity on two grounds: anticipation by the Blum Patent under 35 U.S.C. § 102(e), and obviousness under 35 U.S.C. § 103. For the reasons set forth below, the Court concludes that the '077 Patent is valid.

A. Whether the '077 Patent is Invalid as Anticipated

In pertinent part, 35 U.S.C.§ 102(e)(2) provides:

> A person shall be entitled to a patent unless . . .
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

35 U.S.C § 102(e)(2).

Anticipation is determined through a comparison of the claim language with a single prior art reference. See Wesley Jessen Corp. v. Bausch & Lomb, Inc., 209 F. Supp. 2d 348, 391 (D. Del 2002). Anticipation under 35 U.S.C. § 102(e) requires that every element of the claim be found either expressly or inherently "in a single prior art reference." In re Robertson, 169 F.3d 743, 745 (Fed. Cir. 1999). Thus, if the prior art reference does not

expressly state an element of the claim, "that reference may still anticipate if that element is 'inherent' in its disclosure. Id. Inherency is established if the evidence makes "clear that the missing descriptive matter is necessarily present in the thing described in the reference and, and that it would be so recognized by persons of ordinary skill." Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268 (Fed. Cir. 1991). However, inherency cannot be established by probabilities. In re Robertson, 169 F.3d at 745.

1. The Parties' Contentions

Defendants, relying on American Hoist & Derrick Co. v. Sowa & Sons, Inc., 725 F.2d 1350, 1360 (Fed. Cir. 1984), argue that because the PTO did not consider U.S. Patent Number 4,407,761 ("the Blum '761 Patent") during the examination of the '077 patent, their burden is more easily met in regard to invalidity. (D.I. 108 at 54). Defendants contend that the '077 Patent was anticipated by the Blum '761 Patent. Specifically, Defendants contend that the Blum '761 Patent is prior art, that it discloses 4-amino-1-hydroxybutane-1, 1-bisphosphonic acid and states that it is "suitable for the production of cosmetic and pharmaceutical preparations." (D.I. 107 at 54). The Defendants admit that the Blum '761 patent does not expressly disclose that 4-amino-1-hydroxybutane-1, 1-bisphosphonic acid would inhibit bone reabsorption, as claimed in the '077 Patent, but rather they

claim there was inherent disclosure because one skilled in the art as of April 1982 would have understood that the pharmaceutical uses of the compound described in the Blum '761 Patent included treating bone resorption. (D.I. 108 at 54- 72).

Defendants argue that Merck's expert, Dr. Recker, admitted that he understood the pharmaceutical preparations referred to in the Blum '761 Patent were active on the bone. (D.I. 108 at 60-61). Defendants also contend that prior art scientific articles and prior art patents would have disclosed the use of bisphosphates for the treatment of bone disorders. (D.I. 108 62-72). Additionally, Defendants claim that there was no ambiguity to the inherent disclosure of pharmaceutical preparations in the Blum '761 Patent because there were two previous patents by the same inventors, listed on the cover of the Blum '761 Patent, which used the phrase pharmaceutical preparations to refer to preparations that were active on bone metabolism. (D.I. 108 at 68). Lastly, Defendants argue that for purposes of determining anticipation, the unexpected results or commercial success of a product are irrelevant. See Thomson S.A. v. Quixote Corp., 979 F. Supp. 286 (D. Del. 1997), aff'd, 166 F.3d 1172 (Fed. Cir. 1999). For these reasons, Defendants contend that they have met their burden of proof in regard to anticipation. (D.I. 108 at 70).

In response to Defendant's contentions, Merck argues that

Defendants have failed to meet their burden of clear and convincing evidence. (D.I. 106 at 33). First, Merck argues that the Blum '761 Patent does not disclose every element of the claim in issue because the Blum '761 Patent says nothing about alendronate being effective as a method of treatment for bone diseases. (D.I. 106 at 33). In fact, Merck contends that the '761 Patent suggests that the disclosed compounds are suitable for other purposes such as preventing corrosion and scale in cooling waters, or as water softeners. (D.I. 106 at 33).

Additionally, Merck argues that the Blum '761 Patent does not inherently disclose the use of alendronate for the treatment of bone metabolism disorders, because although the '761 Patent discloses alendronate, it is generally directed to a process for the synthesis or production of biphosphonic acids for other uses related to calcium carbonate, not the biological activity of bisphosphonates in treating bone (calcium phosphate) reabsorption. (D.I. 106 at 33; Posner Tr. 405:16-24).

Merck also contends that the phrase "pharmaceutical preparations" does not indicate the usefulness of the compounds. In support of this contention Merck relies on, In re Diedrich, 318 F.2d 946, 949 (CCPA 1963), where the court found that such a statement, along with disclosure of certain properties, was not enough to be a disclosure to one skilled in the art that such compounds should be used as x-ray contrasts. Diedrich, 318 F.2d

at 949. With regard to the previous Blum patents, Merck argues that these additional references cannot be used to fill in the gaps of the '761 Blum Patent. Merck claims that the '598 and '108 patents describe bisphosphonates other than alendronate that absorb crystals and stabilize them and neither discloses alendronate for the treatment of bone metabolism disorders. (D.I. 108 at 35). In fact, Merck contends that most scientists who were researching bone resorption therapies in the 1980s had given up on bisphosphonates as a treatment. Therefore, Merck contends that Defendants have not shown by clear and convincing evidence that the '077 Patent is anticipated.

3. Findings of Fact and Conclusions of Law

After a review of the record in this case, the Court concludes that the '077 Patent is not anticipated under 35 U.S.C. § 102(e)(2). Specifically, the Court concludes that, although bisphosphonates were generally known to be active on bone, one of ordinary skill in the art at the time of the '077 Patent filing would not have understood alendronate to be useful in the inhibition of bone reabsorption as a result of the '761 Blum Patent.

Defendants have failed to prove by clear and convincing evidence that every element of the '077 patent is inherently disclosed by the Blum '761 Patent. First, contrary to Defendants' contentions, they have to prove invalidity by clear

and convincing evidence. See American Hoist & Derrick Co. v. Sowa & Sons, Inc.,725 F.2d 1350, 1360 (Fed. Cir. 1984)(citations omitted) (stating that when a challenger produces prior art not before the PTO "the standard of proof does not change; it must be by clear and convincing evidence or its equivalent.")

Defendants' asserted prior art reference is the Blum '761 Patent. The Blum '761 patent discloses a process for preparing bisphosphonates, including alendronate. (DTX 47 at p.1). The '761 Patent suggests that the bisphosphonates may be useful to prevent water corrosion or as water softeners. (DTX 47 at Col. 3, lines 30-37; Tr. 405:16-18; Tr. 456:20-24). It also is directed generally to a process of synthesis or production of biphosphonic acids for uses related to calcium carbonate, not the biological activity of bisphosphonates in inhibiting bone reabsorption which is calcium phosphate. (D.I. 106 at 34; Posner Tr. 405:16-24; DTX 47). The patent also states that the bisphosphonates "are also suitable for the production of cosmetic and pharmaceutical preparations." (DTX 47 at Col. 3, lines 38-40). Defendants contend that this language inherently discloses that alendronate is useful in inhibiting bone reabsorption. The Court is unpersuaded by this argument. Defendants' own expert admitted that, standing alone, the '761 Patent does not disclose the method of treatment listed in the '077 Patent. (Posner Tr. 407:21-408:9). Moreover, the '761 Patent does not even mention

inhibition of bone reabsorption. (Tr. 412:3-9; DTX 47).

The Blum '761 Patent merely states that bisphosphonates are "suitable for the production of cosmetic and pharmaceutical preparations." (DTX 47 at Col. 3, lines 30-37). Dr. Recker, Merck's expert, testified that other than general knowledge that bisphosphonates were bone active, the '761 patent did not tell him anything. (Recker Tr. 457:11-15; 494:20-496:18). Additionally, Dr. Recker testified that he saw minimal positive bone effects and some negative bone effects using bisphosphonates for bone research prior to 1982; therefore, he abandoned this research. (Recker Tr. 457:16-458:4). Further, Dr. Fleisch testified that bisphosphonate research was not looked upon favorably in the mid-1980s by one of ordinary skill in the art. (Fleisch Tr. 138:1-10) (noting that a fellow scientist told him that he should be sued for malpractice for attempting to get clinicians to use bisphosphonates). The Court is persuaded by this testimony and finds that one of skill in the art, at the time of the '077 Patent filing, would not have recognized that alendronate would be used as a suitable agent to inhibit bone reabsorption.

The Court also finds that Defendants have improperly utilized additional references. Defendants contend that they are using two prior patents by the same inventor as extrinsic evidence to demonstrate the understanding of those skilled in the

art. Defendants have offered the Blum '761 Patent, along with the '598 Patent and the '108 Patent. The Defendants cannot build an anticipation argument using multiple references; they must prove by clearing and convincing evidence that a single reference discloses all elements of the '077 Patent. See Scripps Clinic & Research Foundation v. Genetech, Inc., 927 F.2d 1565, 1576-77 (Fed. Cir. 1991) (noting that you can not build an anticipation argument based on a combination of references). Moreover, Defendants cannot prove anticipation by "filling in the gaps" of their asserted prior art reference. Id. (stating that "the role of extrinsic evidence is to educate the decision-maker to what the reference meant to persons of ordinary skill . . . not to fill gaps in the reference."). In this case, the Defendants are improperly buttressing their anticipation argument by utilizing multiple prior art references while trying to disguise them as sources for knowledge of skill in the art.

Defendants assert that the phrase "pharmaceutical and cosmetic preparations" in the Blum '761 Patent inherently discloses that alendronate is useful in inhibiting bone reabsorption as claimed in the '077 patent. The Court is not persuaded by this argument and finds that this case is analogous to In re Deidrich, 318 F.2d 946, 949 (CCPA 1963). In the Deidreich case the court found that the general term "pharmaceutical preparations" in addition to other disclosures

were not sufficient to disclose that compounds could be used as X-ray contrast agents. Id. Similarly, in this case, the term "pharmaceutical and cosmetic preparations", along with the knowledge of one of ordinary skill, does not disclose alendronate as an agent for inhibiting bone reabsorption. Accordingly, the Court finds that the evidence presented by the Defendants is insufficient to show that each element of claim 1 of the '077 patent was present in the Blum '761 Patent either expressly or inherently. Therefore, the Court concludes that Defendants have not established that the '077 Patent was anticipated by the Blum '761 Patent.

B. Whether the '077 Patent is Invalid as Obvious

Defendants contend that the '077 Patent is invalid, under 35 U.S.C. § 103, as obvious. In pertinent part, 35 U.S.C. § 103 provides that a patent may not be obtained "if the differences between the subject matter sought to be patented and prior art are such that the subject matter as a whole would have been obvious to a person having ordinary skill in the art . . ." 35 U.S.C. § 103. The obviousness determination is a question of law which is based on several underlying factual inquiries. See Richardson-Vicks Inc. v. UpJohn Co., 122 F.3d 1476, 1479 (Fed. Cir. 1997). The underlying factual inquiries require consideration of the four "Graham" factors which are: (1) the scope and content of the prior art; (2) the differences between

the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) any secondary considerations of nonobviousness such as commercial success, long felt but unsolved need, failure of others, and acquiescence of others in the industry that the patent is valid. See Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 17-18 (Fed. Cir. 1996). Additionally, as with anticipation, the burden of demonstrating obviousness is with the challenger and invalidity must be proven by clear and convincing evidence. C.R. Bard, Inc. v. M3 Systems, 157 F.3d 1340, 1351 (Fed. Cir. 1998).

Defendants contend that the '077 Patent is invalid because it would have been obvious to one skilled in the art to substitute the known compound in the Blum '761 Patent for another known bisphosphonate, pamidronate (containing three carbons), which was known to inhibit bone reabsorption. (D.I. 107 at 73). Additionally, Defendants argue that the teachings of the Blum '761 Patent disclosure combined with the '598 and '108 patents, render the '077 Patent invalid as obvious. (D.I. 113 at 45). Defendants further contend that this substitution would have been obvious to those skilled in the art because: (1) there was a motivation in the art to look for compounds related to pamidronate to inhibit bone reabsorption; and (2) the art suggested that one would have reasonably expected that 4-amino-1-hydroxybutane-1, 1-biphosphonic acid would inhibit bone

reabsorption as well as the three carbon pamidronate. (D.I. 107 at 74). Additionally, Defendants contend that all that is required for an obviousness determination is that there is a "reasonable expectation of success" that the compound would perform the function in the method claimed. See Merck v. Biocraft Labs, Inc., 874 F.2d 804, 809 (Fed. Cir. 1989); (D.I. 107 at 75).

In response, Merck contends that the secondary considerations factor is the most probative of the Graham factors in determining nonobviousness in this case. See Minnesota Mining & Manufacturing Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559, 1573 (Fed. Cir. 1992); (D.I. 106 at 36). Specifically, Merck argues that claim 1 of the '077 Patent is not obvious because alendronate's success in inhibiting bone reabsorption was completely unexpected as defense expert Dr. Posner admitted. (D.I. 106 at 36-37; Posner Tr. 399:13-400:23; Tr. 401:4-9; Tr. 403:15-17). Additionally, Merck contends that pamidronate, had several side effect problems. (D.I. 106 at 37). Finally, Merck contends that lengthening the chain to the 4-carbon compound would not have been obvious, except by using hindsight, which is disallowed in an obviousness analysis. (D.I. 106 at 38).

After reviewing the relevant prior art in light of the evidence and the factors related to the obviousness inquiry, the

Court concludes that the Defendants have failed to establish by clear and convincing evidence that the '077 Patent was obvious in light of the prior art references. The Court in its obvious analysis must be cognizant of "hindsight syndrome." In re Warner Kotzab, 217 F.3d 1365, 1369-1370 (Fed. Cir. 2000). The Federal Circuit has stated, "the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references." In re Gartside, 203 F.3d 1305, 1329 (Fed. Cir. 2000). Therefore, in order to establish obviousness from a combination of elements disclosed in prior art, "there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicant." Kotzab, 217 F.3d at 1370 (citations omitted). This motivation, suggestion or teaching may come from explicit statements in the prior art, the implicit nature of the prior art as a whole, the knowledge of one of ordinary skill in the art at the time of the invention or the nature of the problem to be solved. Id. (citations omitted). Thus, essential to the obviousness determination is "casting the mind back to the time of the invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field." Id. at 1369 (citations omitted).

1. Level of One Skilled in the Art

For the purposes of the obviousness inquiry the Court finds that at the time of the filing of the '077 Patent, a person of ordinary skill in the art was an individual who would have both a professional or graduate degree in either the medical sciences, chemistry, medicinal chemistry, pharmacology, or a related field, and a "knowledge of the pharmacology and/or mechanisms of action of bisphosphonates." Exhibit A, Expert Report of Frederic L. Coe, M.D. at 3. Additionally, a person of ordinary skill in the art would be aware of work being done with bone metabolism, and would have been exposed to lectures and publications dealing with the pharmaceutical chemistry of agents that act on bone or influence metabolism. See Exhibit B, Expert Report of Dr. Aron S. Posner at 3. The Court bases this finding on a combination of Dr. Coe's and Dr. Posner's interpretation of one skilled in the art. Additionally, Merck does not dispute Dr. Posner's interpretation of one skilled in the art and has not expressly disputed Dr. Coe's interpretation. See D.I. 106 at 41 (citing to Dr. Posner's definition of one skilled in the art).[5]

[5] It should also be noted that Dr. Hanzlik, Defendants' expert, admitted that Dr. Posner's definition of one skilled in the art goes, "a little beyond what I would consider myself to be." (Tr. Hanzlik 284:6-18).

2. Scope and Content of Prior Art

Although the Blum '761 Patent and the '598 and '108 patents have relevance to the '077 Patent, the Court is not persuaded that the Defendants have established a motivation, teaching or suggestion for combining these references. The Blum '761 Patent discloses a process for preparing bisphosphonates, including alendronate. (DTX 47 at 1). The '761 Patent suggests that the bisphosphonates may be useful to prevent water corrosion or as water softeners. (DTX 47 at Col. 3, lines 30-37; Tr. 405:13-18; Tr. 456:20-24). It is also directed generally to a process of synthesis or production of biphosphonic acids for uses related to calcium carbonate, not the biological activity of bisphosphonates in inhibiting bone reabsorption which is calcium phosphate. (D.I. 106 at 34; Posner Tr. 405:16-24; DTX 47). The patent also states that the bisphosphonates "are also suitable for the production of cosmetic and pharmaceutical preparations." (DTX 47 at Col. 3, lines 30-37).

Defendants contend that the Blum '761 Patent, in conjunction with the '598 and '108 patents, should be combined as references for the purpose of the obviousness analysis. First, although the Blum '761 Patent does disclose alendronate, this disclosure is not directed at inhibiting bone reabsorption. Second, the '598 and '108 patents, although used for treating osteoporosis, do not disclose alendronate as in the '077 Patent. (DTX 163, Col. 4

lines 33-50; DTX 47, 80, 91). In fact, the '598 and '108 patents describe bisphosphonates other than alendronate that absorb crystals and stabilize them. Therefore, the different nature of these patents suggest that they should not be combined as references for an obviousness analysis.

Moreover, Dr. Posner, Defendants' expert, admitted that it was not possible to test the efficacy of one bisphosphonate to another and that each bisphosphonate had its own unique characteristics. (Tr. Posner 399:13-400:23; Tr. 401:4-9; Tr. 403:15-17). Therefore, the '598 and '108 patents, which disclose a different bisphosphonate from the Blum '761 and the '077 Patent, will not be helpful in an obviousness analysis. Further, Defendants fail to point to any express statement in the prior art that suggests combining these references or how the nature of the prior art as a whole points to combining these references.

There are also several known prior art bisphosphonates that the parties do not dispute. First, Clodronate (dichloromethylene-biphosphonic acid) was given to patients to treat Paget's disease and inhibit bone reabsorption (Posner Tr. 357; DTX 154 at 837, 843; DTX 144 at 94; DTX 154 at 837). Second, Etidronate (1-hydroxyethylidene-1, 1-biphosphonic acid) was given to patients for osteoporosis, Paget's disease and inhibition of bone reabsorption. (Posner Tr. 359 ; DTX 121 at 341, 343; DTX 124 at 310; DTX 140 at E298; DTX 147 at 145; DTX

125 at 1110; DTX 132 at 63, 67; DTX 119 at 575; DTX 135 at 594; DTX 126 at 70; DTX 130 at 1419; DTX 132 at 63; DTX 138 at 459; DTX 147 at 145). Finally, pamidronate (3-amino-1-hydroxypropane-1, 1 -biphosphonic acid) was given to patients to inhibit bone reabsorption and to treat Paget's disease.[6] (Posner Tr. 361; Recker Tr. 489 DTX 138 at 467-68; DTX 143 at 799, 801; DTX 144 at 94; DTX 153 at ZA-104415).

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[6] Defendants, in their anticipation section of their Proposed Findings of Fact and Conclusions of Law, (D.I. 108 at 52-55) list prior scientific articles as prior art (Posner Tr. 376; DTX 325 (summary demonstrative exhibit); DTX 110-114; DTX 117-119; DTX 121; DTX 123-138;DTX 140-145; DTX 147-154) for the proposition that bisphosphonates pointed towards diseases of bone loss. Defendants, in their obviousness discussion generally referred back to their prior art discussion; however, they made no specific obviousness contentions in regard to these articles other than that some articles revealed bisphosphonates would inhibit bone reabsorption and longer chains would be more efficacious as general propositions. (D.I. 108 at 67-68). Additionally, the Court finds that these scientific articles do not teach or suggest that it is obvious to one skilled in the art to substitute the known compound in the Blum '761 Patent for pamidronate. See SmithKline Diagnostics, Inc, v. Helena Labs Corp., 859 F.2d 878, 887 (Fed. Cir. 1997) (noting that the burden of asserting prior art is not met where party picks and chooses among elements of asserted prior art but must show how it teaches the combination claimed). Therefore the Court will not consider them as prior art in reference to its obviousness discussion. Additionally, the Defendants, in their general prior art section, referred to several prior art patents which they contend disclosed the use of bisphosphonates for the treatment of disorders of bone metabolism. (D.I. 108 at 55-56; Posner Tr. 378; DTX 325 (summary demonstrative exhibit); DTX 156-167). However, these patents were not specifically discussed in reference to obviousness. Therefore the Court will not consider them as prior art in its obviousness discussion. The Court will address the Blum '761 patent and the '598 and '108 patents.

3. Differences Between the Prior Art and the Claim at Issue.

In addition there are significant differences between the method claimed in the '077 Patent and the relevant prior art. First, the relevant prior art references, for purposes of this discussion, are pamidronate and clodronate. Alendronate is a 4-carbon aminobisphosphonate having three CH_2 ("methyl") groups for a total of four carbons ending in an NH_2 molecule. See PDX 18. Pamidronate, the next adjacent compound to alendronate, contains one less carbon group in the alkane chain. (D.I. 107 at 79).

Additionally, alendronate is up to one hundred times more efficacious than relevant prior art. See PTX 17, 18 and 19.[7] For example, clodronate and pamidronate have relative potencies of ten and one hundred respectively. Id. Whereas, alendronate has a potency of one thousand. Id. Moreover, bisphosphonates that were used to inhibit bone reabsorption in prior compounds, such as pamidronate and clodronate, had debilitating side effects such as causing malignancies along with other uncomfortable side effects (Recker Tr. 460:1-14).

4. Secondary Indicia of Nonobviousness

In regard to the secondary indicia of nonobviousness, the Court finds that the results of alendronate were surprising and

[7] The Court also finds, Yamanouchi Pharamaceutical Co. v. Danbury Pharmcoal, Inc., 21 F. Supp. 2d 366, 374-75 (S.D.N.Y. 1998), aff'd, 231 F.3d 1339 (Fed. Cir. 2000) instructive because the district court held that evidence of advanced potency supported a finding of nonobviousness.

unexpected. First, Defendants contend that it would be obvious to one of skill in the art to lengthen the carbon chain of pamidronate. However, as Dr. Posner admitted, pamidronate was discovered five years before alendronate, and no one before Dr. Rosini attempted to lengthen the chain. (Posner Tr. 414:25-415:15). Also, as previously noted, pamidronate had debilitating side effects. Additionally, Dr. Posner conceded that the potency changes that would result from tinkering with the molecule were unpredictable. (Posner Tr. 417:7-12; see also Tr. 403:15-17). Moreover, Dr. Posner, who agreed with Dr. Fleisch, also admitted that it is not possible to extrapolate the efficacy of one biphosphonate to another and the efficacy of each bisphosphonate must be tested by trial and error before anything can be assumed about them. (Posner Tr. 399:13-400:23; Tr. 401:4-9; Tr. 403:15-17; Tr. 143:22-144:9; Tr. 146:14-147:4). Further, Dr. Recker, who the Court finds credible, testified that in 1982 no one could have predicted the effect that any structural changes to bisphosphonate molecules would have upon their efficacy. (Recker Tr. 461:25-462:7).

Additionally, the Court finds that Defendants' argument boils down to the fact that they contend it was "obvious to try" to lengthen the carbon chain of pamidronate. However, as the Federal Circuit has noted, the "obvious to try" various

combinations does not mean that the invention was obvious. In re Geiger, 815 F.2d 686, 688 (Fed. Cir. 1987).

Therefore, the Court finds that the efficacy of alendronate was surprising and unexpected. Also, Merck has shown a sufficient nexus between the claimed secondary considerations and the patented method. Accordingly, the Court will give these secondary considerations the importance they deserve in reaching its conclusion of nonobviousness. See Minnesota Mining & Manufacturing Co. v. Johnson & Johnson Orthopedics, Inc. 976 F.2d 1559, 1573 (Fed. Cir. 1992) (noting the importance of secondary considerations in the obviousness analysis).

5. Summary

In sum, the Court is not persuaded that the Defendants have established by clear and convincing evidence a motivation suggestion or teaching to combine the Blum '761 Patent and the '598 and '108 patent references. In addition, the Court finds that the significant differences between the prior art and the claimed method coupled with the significant secondary considerations undermine a claim of obviousness. Accordingly, the Court concludes that the Defendants have not established by clear and convincing evidence that the '077 Patent was obvious in light of prior art.

III. **Validity of the Patent Term Extension**

A. The Application for the Extension

In 1995 Merck's application for the '077 Patent was approved. (D.I. 106 at 23). Subsequently, Merck, to restore some of the patent term lost while waiting for FDA approval, filed for an extension of the patent term under 35 U.S.C. § 156. In pertinent part section 156 provides:

> (a) a term of a patent which claims a product, a method of using a product, or a method of manufacturing a product shall be extended . . . if
>
> (4) The product has been subject to a regulatory review period before its commercial marketing or use; ...
>
> (f) For purposes of this section:
>
> (1) The term "product" means
>
> (A) a drug product ...
>
> (2) the term "drug product" means the active ingredient of-
>
> (A) a new drug, antibiotic drug . . . (as those terms are used by the Federal Food, Drug and Cosmetics Act and the Public Health Service Act) ... including any salt or ester of the active ingredient....

35 U.S.C.§ 156.

The application requested that the PTO extend the term of the '077 Patent for 1,369 days. On January 11, 1996, the PTO sent an "Order to Show Cause" which ordered Merck "to give a reasoned explanation as to why the patent is considered to claim an active ingredient of the approved product." (DTX 2, Tab 19 at 2). Before responding to the Show Cause Order, Merck's attorneys met with the examiner. The examiner's interview summary indicates that two questions were asked during the interview:

"(1) is a salt trihydrate a salt as used in the statute and as a commonly accepted meaning? 2) Is the active ingredient in the tablet?" (DTX 2 Tab 20). On February 15, 1996 Merck filed its "Response to Order to Show Cause." In its response, Merck confirmed that salt trihydrate is a salt as used in the statute and also confirmed that the active ingredient of Fosomax®, alendronate monosodium salt trihydrate is present in the tablet. (DTX 2, Tab 21). On March 25, 1996 the PTO advised the FDA that the '077 Patent "does claim the active ingredient of the proposed product." (DTX 2 Tab 23). On March 27, 1997 the PTO issued a "Notice of Final Determination" which stated that the '077 Patent was eligible for a patent term extension of 1,371 days. (DTX 2 Tab 27).

B. The Parties' Contentions

Defendants contend that the patent term extension is invalid. Specifically, Defendants contend that claim 1 of the '077 Patent does not claim the sodium salt form of alendronate. As a result, Defendants, relying on Hoeschst-Roussel Pharmaceuticals, Inc v. Lehman, 109 F.3d 756, 759-61 (Fed. Cir. 1997), contend that Merck is not entitled to an extension irrespective of whether there is infringement under the doctrine of equivalents. (D.I. 107 at 38).

In response, Merck contends that since Fosomax®'s active ingredient is a salt of alendronate and is covered by claim 1 of

the '077 Patent, the patent term extension is valid. (D.I. 106 at 25).

C. Findings of Fact and Conclusions of Law

The Court concludes that the patent extension of the '077 Patent is valid. The Court bases its conclusion on its claim construction, the requirements of 35 U.S.C. § 156 and the PTO's Notice of Final Determination. In this case, the Court's claim construction determined that the term "4-amino-1-hydroxybutane-1,1-biphosphonic acid" in claim 1 of the '077 Patent includes both its free acid and sodium salt forms. The active ingredient in Fosomax®, the claimed product, is 4-amino-1-hydroxybutylidene bisphosphonic acid monosodium salt trihydrate, a salt of alendronate. (D.I. 106 at 25). Also, § 156 requires that the claimed product be subject to regulatory review, before it is marketed; that fact is undisputed in this case. Additionally, § 156 requires that there be a "product" within the meaning of that section, which in this case, is a drug product, whose active ingredient is claimed in the relevant patent. 35 U.S.C. § 156.

Further, in this case, the PTO's grant of a patent extension required them to construe the claims in the '077 patent to determine if the active ingredient was present in Fosomax®, the claimed product. Claim construction is a question of law. Markman, 52 F.3d at 979. Although the court is the final arbiter on questions of law the PTO is entitled to some

deference. See e.g. Purdue L.P. v. Faulding Inc., 230 F.3d 1320 (Fed. Cir. 2000) (citing Quad Envtl. Technologies Corp. v. Union Sanitary Dist., 946 F.2d 870, 875-76 (Fed Cir. 1991) for the proposition that even though the PTO is owed deference, the Court is the final arbiter for questions of law)). Accordingly, the Court concludes that since the active ingredient in Fosomax® is covered by claim 1 of the '077 Patent, the patent extension is valid, and the PTO's grant of the patent extension was proper.[8]

Conclusion

For the reasons discussed, the Court concludes that Defendants' ANDA filing for the generic version of Fosomax® literally infringes claim 1 of the '077 Patent. The Court further concludes that the '077 Patent is valid and the patent term extension is valid. Therefore, because the Court concludes that there is literal infringement, that paragraph IV of Defendants' ANDA certifications are incorrect and that the '077 Patent is valid, the Court will issue an order that FDA approval of Defendants' ANDA will not be effective until the expiration of the '077 Patent.[9]

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[8] The Court finds that Hoeschst-Roussel Pharmaceuticals, Inc v. Lehman, 109 F.3d 756 (Fed. Cir. 1997) is inapposite. In the Hoeschst case the Court was not confronted with literal infringement as in the present case. Therefore, the facts of Hoeschst are different from the case at hand, and are thus not controlling.

[9] Merck's argument that if Defendants' ANDA is approved, Defendants will infringe contributorily and by inducement is moot

Plaintiff shall submit a Proposed Order within ten (10) days of its receipt of this Memorandum Opinion. Defendants may stipulate to Plaintiff's Proposed Order, or file any objections within ten (10) days of their receipt of the Proposed Order.

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because the Court will issue an order that due to the literal infringement the ANDA shall not be approved by the FDA until the expiration of the '077 Patent.