

IIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the *Inter Partes* Review of:

Trial Number: To Be Assigned

U.S. Patent No. 7,371,379

Filed: June 20, 2003

Issued: May 13, 2008

Inventor(s): Sharon A. Baughman, Steven Shak

Assignee: Genentech, Inc.

Title: Dosages for treatment with anti-ErbB2  
antibodies

Panel: To Be Assigned

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Mail Stop *Inter Partes* Review  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**PETITION FOR *INTER PARTES* REVIEW OF  
U.S. PATENT NO. 7,371,379  
UNDER 35 U.S.C. § 311 AND 37 C.F.R. § 42.100**

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<b>PETITIONER’S EXHIBIT LIST</b>	
<b>Exhibit No.</b>	<b>Description</b>
1001	U.S. Patent No. 7,371,379
1002	Declaration of Allan Lipton, M.D.
1003	Declaration of William Jusko, Ph.D.
1004	Assignment to Genentech, Inc. filed in U.S. Patent No. 6,627,196
1005	Eur. Patent Specification No. 1 210 115 B1 (“EP ’115 patent”)
1006	<i>Hospira UK Ltd. v. Genentech Inc.</i> , Case No. HC12C03487 [2014] EWHC (CH) 1094 (Pat), Apr. 10, 2014, Approved Judgment
1007	<i>Hospira UK Ltd. v. Genentech Inc.</i> , Case No. A3 2014 1800, [2015] WECA (Civ) 57, Feb. 6, 2015, Approved Judgment
1008	1998 FDA Approved Label for Herceptin® (“Herceptin Label”)
1009	Eur. Patent No. EP 1 210 115 B1, Application No. 00 959 423. 5, <i>Decision revoking the European Patent</i> (May 4, 2012)
1010	Drugs@FDA: <u>FDA Approved Drug Products for HERCEPTIN</u> , <a href="http://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&amp;ApplNo=103792">http://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&amp;ApplNo=103792</a> (last visited Dec. 22, 2016)
1011	Press Release, Genentech, Inc. Biotechnology Breakthrough In Breast Cancer Wins FDA Approval (Sept. 25, 1998) (on file at Genentech company website)
1012	Genentech, Inc. Annual Report (Form 10-K) (Jan. 22, 1999)
1013	Baselga, <i>et al.</i> , <i>Phase II Study of Weekly Intravenous Recombinant Humanized Anti-p185<sup>HER2</sup> Monoclonal Antibody in Patients with HER2/neu-Overexpressing Metastatic Breast Cancer</i> , 14(3) J. CLIN. ONCOL. 737–44 (1996) (“Baselga ’96”)
1014	Pegram, <i>et al.</i> , <i>Phase II Study of Receptor-Enhanced Chemosensitivity Using Recombinant Humanized Anti-p185<sup>HER2/neu</sup> Monoclonal Antibody Plus Cisplatin in Patients with HER2/neu-Overexpressing Metastatic Breast Cancer Refractory to Chemotherapy Treatment</i> , 16(8) J. CLIN. ONCOL. 2659–71 (1998) (“Pegram ’98”)



<b>PETITIONER’S EXHIBIT LIST</b>	
<b>Exhibit No.</b>	<b>Description</b>
1015	<i>Pegram, et al., Phase II Study of Intravenous Recombinant Humanized Anti-p185 HER-2 Monoclonal Antibody (rhuMab HER-2) Plus Cisplatin in Patients with HER-2/neu Overexpressing Metastatic Breast Cancer</i> , 14 PROCEEDINGS OF THE AMERICAN SOCIETY OF CLINICAL ONCOLOGY 106 (Abstract 124) (1995) (“Pegram ’95”)
1016	<i>Vogel, et al., Efficacy and Safety of Herceptin™ (Trastuzumab, Humanized Anti-HER2 Antibody) As A Single Agent in First-Line Treatment of HER2 Overexpressing Metastatic Breast Cancer (HER2+/MBC)</i> , 50(1) BREAST CANCER RESEARCH AND TREATMENT 232 (Abstract 23) (1998) (“Vogel ’98”)
1017	<i>In re Fischkoff</i> , IPR2016-00172, Paper 2, (Ex. 1006, Declaration of Sharon Baughman, Ph.D.) (Nov. 5, 2015)
1018	<i>Jones, et al., Replacing the Complementarity-determining Regions in a Human Antibody With Those From a Mouse</i> , NATURE 321(6069) 522–23 (1986) (“Jones ’86”)
1019	<i>Coates, et al., Quality of Life in Oncology Practice: Prognostic Value of EORTC QLQ-C30 Scores in Patients with Advanced Malignancy</i> , 33(7) EUROPEAN JOURNAL OF CANCER 1025–30 (1997)
1020	<i>Aaronson, et al., The European Organization for Research and Treatment of Cancer QLQ-C30: A Quality-of-Life Instrument for Use in International Clinical Trials in Oncology</i> , 85(5) J. NAT’L. CANCER INSTITUTE 365–76 (1993)
1021	<i>Ferrell, Quality of Life in Breast Cancer</i> , 4(6) CANCER PRACTICE 331–40 (1996) (“Ferrell ’96”)
1022	<i>Rowland, et al., Clinical Pharmacokinetics: Concepts and Applications</i> LIPPINCOTT WILLIAMS & WILKINS (3rd ed. 1995) (4 Volumes) (“Rowland ’95”)
1023	Reserved
1024	Certified File History for U.S. Patent No. 7,371,379
1025	<i>Biomarin Pharm., Inc. v. Genzyme Therapeutic Prods., LP</i> , IPR2013-00537, Paper 79 (P.T.A.B. Feb. 23, 2015)

<b>PETITIONER’S EXHIBIT LIST</b>	
<b>Exhibit No.</b>	<b>Description</b>
1026	Walpole, <i>et al.</i> , <i>The weight of nations: an estimation of adult human biomass</i> , 12:439 BMC PUBLIC HEALTH (2012) <a href="https://bmcpublikealth.biomedcentral.com/articles/10.1186/1471-2458-12-439">https://bmcpublikealth.biomedcentral.com/articles/10.1186/1471-2458-12-439</a> (last visited Dec. 27, 2016)
1027	U.S. Environmental Protection Agency, National Center for Environmental Assessment (NCEA) Office of Research and Development (ORD), <i>Exposure Factors Handbook</i> (1997) <a href="https://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=503445">https://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=503445</a> (last visited Dec. 27, 2016)
1028	Gibaldi, <i>et al.</i> , <i>Pharmacokinetics</i> , INFORMA HEALTHCARE USA, INC. (2nd ed. 1982)(“Gibaldi ’82”)
1029	King, <i>Applications and Engineering of Monoclonal Antibodies</i> , TAYLOR & FRANCIS LTD. (1998)
1030	Declaration of Amanda Hollis
1031	Declaration of Christopher Lowden
1032	Declaration of Simon Charles Cohen
1033	Library of Congress Copyright Record for Baselga ’96
1034	Library of Congress Copyright Record for Pegram ’98
1035	Library of Congress Copyright Record for Jones ’86
1036	Library of Congress Copyright Record for Ferrell ’96
1037	Library of Congress Copyright Record for Rowland ’95
1038	Library of Congress Copyright Record for Gibaldi ’82

Petition for *Inter Partes* Review of U.S. Patent No. 7,371,379

Pursuant to 35 U.S.C. § 311 and 37 C.F.R. § 42.100, Petitioner Hospira, Inc. respectfully requests *inter partes* review (“IPR”) of Claims 1–3, 5, 7, 9–11, 16–28, and 30–40 (the “Challenged Claims”) of U.S. Patent No. 7,371,379 (“’379 patent”), which is attached to this Petition as Exhibit 1001.<sup>1</sup>

There are no USPTO assignment records for the ’379 patent. However, the face of the ’379 patent indicates it is assigned to Genentech, Inc. (“Genentech”). *Id.* (“Assignee”). Further, the Certified File History for the ’379 patent (Ex. 1024) indicates an assignment to Genentech is on record in parent Application No. 09/648,067, now U.S. Patent No. 6,627,196 (“’196 patent”). *Id.* at 2–3. A copy of this assignment is attached to this Petition as Exhibit 1004.

**I. MANDATORY NOTICES – 37 C.F.R. § 42.8(A)(1) AND (B)**

**A. 37 C.F.R. § 42.8(b)(1): Real Party-In-Interest**

Hospira, Inc. (“Hospira” or “Petitioner”) is the real party-in-interest for Petitioner. Out of an abundance of caution, Petitioner also identifies Pfizer, Inc. as a real party-in-interest who, going forward, may have control or an interest in the outcome of this proceeding.

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<sup>1</sup> All references to exhibits, *e.g.*, “Exhibit” or “Ex.,” are to the table of exhibits attached hereto as Petitioner’s Exhibit List.

**B. 37 C.F.R. § 42.8(b)(2): Related Matters**

The UK designation of European Patent 1 210 115 B1 (“EP ’115 patent,” Ex. 1005), a European counterpart to the ’379 patent,<sup>2</sup> was recently invalidated in UK proceedings as obvious in light of one or more of the references asserted here; the court’s judgment was affirmed on appeal. *See Hospira UK Ltd. v. Genentech Inc.*, Case No. HC12C03487 [2014] EWHC (CH) 1094 (Pat) (Apr. 10, 2014), Approved Judgment (Ex. 1006); *Hospira UK Ltd. v. Genentech Inc.*, Case No. A3 2014 1800, [2015] WECA (Civ) 57(Feb. 6, 2015), Approved Judgment (Ex. 1007).

The EP ’115 patent was also invalidated and revoked across Europe by the EPO on the grounds that it failed to disclose the invention in a manner sufficiently clear and complete for it to be carried out by the skilled person. *See Eur. Patent No. EP 1 210 115 B1*, Application No. 00 959 423. 5, *Decision revoking the Eur. Patent* (May 4, 2012) (Ex. 1009) at 5, 18.

Petitioner concurrently files IPR petitions for claims of U.S. Patent Nos. 6,627,196 and 7,371,379. Petitioner is not aware of any other judicial or administrative matters that would affect, or be affected by, a decision in the proceeding.

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<sup>2</sup> The EP ’115 patent and the ’379 patent both claim priority to U.S. Provisional Application Nos. 60/213,822 and 60/151,018.

**C. 37 C.F.R. § 42.8(b)(3): Lead and Back-Up Counsel**

Petitioner designates the following counsel:

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**D. 37 C.F.R. § 42.8(b)(4): Service Information**

Please address all correspondence to lead counsel at the contact information above. Petitioner consents to service by electronic mail at Hospira\_Genentech\_IPRs@kirkland.com. A Power of Attorney is being filed concurrently herewith. 37 C.F.R. § 42.10(b).

**II. PAYMENT OF FEES – 37 C.F.R. § 42.103**

The undersigned authorizes the PTO to charge the fee set forth in 37 C.F.R. § 42.15(a) for this Petition to Deposit Account No. 506092. The undersigned further authorizes payment for any additional fees that may be due in connection with this Petition to be charged to the referenced Deposit Account.

**III. GROUNDS FOR STANDING – 37 C.F.R. § 42.104(A)**

Petitioner certifies that the '379 patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR on the grounds identified herein. 35 U.S.C. § 315.

**IV. IDENTIFICATION OF CHALLENGE – 37 C.F.R. § 42.104(B)**

The application from which the '379 patent issued was filed on June 20, 2003. Because the application was filed before March 16, 2013, this Petition is governed by pre-AIA 35 U.S.C. §§ 102 and 103.<sup>3</sup> *See* MPEP 2159.01. Pursuant to 37 C.F.R. §§ 42.104(b)(1) and (2), Petitioner requests review of the Challenged Claims on the following ground:

<b>Ground</b>	<b>Proposed Statutory Rejection of the '379 Patent</b>
1	Claims 1–3, 5, 7, 9–11, 16–28, and 30–40 are obvious based on the Herceptin Label in view of Baselga '96, Pegram '98, and the knowledge of a person of ordinary skill in the art under 35 U.S.C. § 103.

<sup>3</sup> References to 35 U.S.C. §§ 102 and 103 throughout this Petition are to the pre-AIA versions of those provisions.

The cited prior art is as follows:

- **Herceptin Label.** The 1998 FDA approved label for rhuMAB HER2<sup>4</sup> (the “Herceptin Label”) is attached as Exhibit 1008. The Herceptin Label is a printed publication that was accessible to the relevant public as of the claimed priority date. It is dated “September 1998,” (*id.* at 2), and the FDA approved rhuMAB HER2 on September 25, 1998 (Exs. 1010<sup>5</sup>; 1011<sup>6</sup> at 1). Further, as evidenced by Genentech’s SEC filings, rhuMAB HER2 was manufactured and marketed by Genentech by at least 1998. *See* Ex. 1012<sup>7</sup> at 4–5, 13, 36. In addition, the Herceptin Label can be found on the FDA Website at the following highlighted link titled “Label (PDF)”:

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<sup>4</sup> Also known as Herceptin® or trastuzumab. This Petition will refer to these interchangeable terms as “rhuMAB HER2”. *See also* Exs. 1002 ¶ 7, FN 3; 1003 ¶ 3, FN 1.

<sup>5</sup> Drugs@FDA: FDA Approved Drug Products for HERCEPTIN, <http://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=103792> (last visited Dec. 22, 2016) (“FDA Website”).

<sup>6</sup> Press Release, Genentech, Inc. Biotechnology Breakthrough In Breast Cancer Wins FDA Approval (Sept. 25, 1998) (on file at Genentech company website).

<sup>7</sup> Genentech, Inc. Annual Report (Form 10-K) (Jan. 22, 1999).

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Action Date	Submission	Submission Classification or Approval Type	Letters, Reviews, Labels, Patient Package Insert	Note
03/17/2016	SUPPL-5330	Labeling-Package Insert	<a href="#">Label (PDF)</a>	
04/23/2015	SUPPL-5327	Labeling-Package Insert	<a href="#">Label (PDF)</a>	
03/07/2014	SUPPL-5311	Efficacy	<a href="#">Label (PDF)</a>	
11/20/2013	SUPPL-5305	Labeling	<a href="#">Label (PDF)</a>	
10/29/2010	SUPPL-5256	Labeling	<a href="#">Label (PDF)</a>	
10/20/2010	SUPPL-5250	Efficacy	<a href="#">Label (PDF)</a>	
01/18/2008	SUPPL-5175	Efficacy	<a href="#">Label (PDF)</a>	
11/16/2006	SUPPL-5150	Efficacy	<a href="#">Label (PDF)</a>	
08/28/2002	SUPPL-5008	Efficacy	<a href="#">Label (PDF)</a>	
12/11/2001	SUPPL-5004	Efficacy	<a href="#">Label (PDF)</a>	
02/09/2000	SUPPL-1005	Supplement		
09/25/1998	ORIG-1	Approval	<a href="#">Label (PDF)</a>	

Showing 1 to 12 of 12 entries

Ex. 1010. As shown above, no changes to the label were approved for years after rhuMAb HER2’s approval on September 25, 1998. The next approved label is not listed until 2001. According to 21 U.S.C. § 352(b) (effective 1998), drugs like rhuMAb HER2 if intended for sale in the U.S. must include with their package the FDA-approved label. This means that the Herceptin Label must have been included with any package of rhuMAb HER2 sold or available for sale in the U.S. in 1998 and 1999. Further, during UK litigation involving the EP ’115 patent that claimed priority to the same date of August 27, 1999, Genentech “accept[ed] the [Herceptin Label] is prior art.” Ex. 1006 ¶ 13. For all of these reasons, the Herceptin Label is prior art to the ’379 patent claims under 35 U.S.C. § 102(a) as of August 27, 1999 (the earliest possible priority date). *See also Apotex Corp. v. Alcon Research, Ltd.*, IPR2013-00428, Paper 2 (Jul. 5,



2013) ¶¶ 14, 119 (“FDA Approved Drug Label ‘TRAVATAN® ...’ (2001) ... As evidenced by an Alcon SEC filing dated May 15, 2002, Travatan was launched in the U.S. in April 2001... As a product must be sold with its label, the Travatan Label was publically available more than one year before the EPD of the ’299 patent.”); *Phigenix, Inc. v. Immunogen, Inc.*, IPR2014-00676, Paper 11 at 21–22 (P.T.A.B. Oct. 29, 2014) (instituting IPR based, in part, on the Herceptin Label); Ex. 1006 ¶ 68 (invalidating EP ’115 patent based, in part, on the Herceptin Label), Declaration of Allan Lipton, M.D. (Ex. 1002) ¶¶ 10, 36 (describing administering rhuMAb HER2 to patients including around the earliest possible priority date and reviewing the Herceptin Label).

- **Baselga ’96.** Baselga, *et al.*, *Phase II Study of Weekly Intravenous Recombinant Humanized Anti-p185<sup>HER2</sup> Monoclonal Antibody in Patients with HER2/neu-Overexpressing Metastatic Breast Cancer*, 14(3) J. CLIN. ONCOL. 737–44 (1996) (“Baselga ’96”) is attached as Exhibit 1013. Baselga ’96 is a printed publication that was accessible to the relevant public as of the earliest possible priority date of the ’379 patent. Baselga ’96 was published in the *Journal of Clinical Oncology* on March 1, 1996. *See id.* at 9. Thus, Baselga ’96 is prior art to the ’379 patent claims under 35 U.S.C. § 102(b) as of August 27, 1999.
- **Pegram ’98.** Pegram, *et al.*, *Phase II Study of Receptor-Enhanced Chemosensitivity Using Recombinant Humanized Anti-p185<sup>HER2/neu</sup> Monoclonal*

*Antibody Plus Cisplatin in Patients with HER2/neu-Overexpressing Metastatic Breast Cancer Refractory to Chemotherapy Treatment*, 16(8) J. CLIN. ONCOL. 2659–71 (1998) (“Pegram ’98”) is attached as Exhibit 1014. Pegram ’98 is a printed publication that was accessible to the relevant public as of the earliest possible priority date of the ’379 patent. Pegram ’98 was published in the *Journal of Clinical Oncology* in August 1998 and was available to the relevant public by at least August 12, 1998 as evidenced by the Health Sciences Libraries stamp bearing the same date. *See id.* at Cover Page, Table of Contents. Thus, Pegram ’98 is prior art to the ’379 patent claims under 35 U.S.C. § 102(b) as of August 27, 1999.

Below is a detailed explanation of the statutory ground for the unpatentability of each of the Challenged Claims that identifies examples of where each element can be found in the cited prior art, and the relevance of that prior art.

Additional evidence is provided in the accompanying Declaration of Allan Lipton, M.D. (Ex. 1002), Declaration of William Jusko, Ph.D. (Ex. 1003), and other supporting exhibits.<sup>8</sup> 37 C.F.R. § 1.68. Dr. Lipton and Dr. Jusko were both

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<sup>8</sup> Additional evidence authenticating various exhibits is provided in the Declaration of Amanda Hollis (Ex. 1030), Declaration of Christopher Lowden (Ex. 1031), and Declaration of Simon Cohen (Ex. 1032).

persons of ordinary skill in the art at the time of the alleged invention. *See* Exs. 1002 ¶ 14; 1003 ¶ 15.

**Dr. Allan Lipton** is a Professor of Medicine and Oncology at the Milton S. Hershey Medical Center of The Pennsylvania State University, with over 50 years of experience in the medical field and extensive experience in clinical oncology. *See* Ex. 1002 ¶¶ 4, 6. Dr. Lipton has clinical experience prescribing rhuMAb HER2 in combination with chemotherapy, and participated in the administration of clinical trials that led to FDA approval of rhuMAb HER2. *See id.* ¶¶ 7, 10.

**Dr. William Jusko** is a Distinguished Professor at the State University of New York at Buffalo in the Department of Pharmaceutical Science, with over 50 years of experience in the field including teaching and consulting for government bodies as well as pharmaceutical companies. *See* Ex. 1003 ¶¶ 4, 7, 9.

## V. BACKGROUND

### A. The '379 Patent

The '379 patent is directed to the “treatment of disorders characterized by the overexpression of ErbB2”<sup>9</sup> by administering “an antibody that binds ErbB2.” Ex. 1001 at 1:15–37 (“Field of the Invention”). One such disorder is cancer. More

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<sup>9</sup> “[H]uman ErbB2 gene (erbB2, also known as her2, or c-erbB-2)...is overexpressed in about 25% to 30% of human breast cancer.” Ex. 1001 at 1:44–50; *see also* Exs. 1008 at 1; 1013 at 9.

specifically, the '379 patent is directed to “front loading the dose of antibody during treatment.” *Id.* at 1:20–25.

The '379 patent claims priority back to August 27, 1999. By then, rhuMAb HER2, a breast cancer-treating anti-ErbB2 antibody, was already known. *See id.* at 3:59–4:3. rhuMAb HER2 had been developed, FDA-approved for use in humans, and commercially sold in the U.S. for nearly a year. *See Exs.* 1006 ¶ 68; 1008 at 2; 1010; 1011 at 1; 1012 at 4–5, 13, 36.

The prior, FDA-approved, “recommended” dosing for rhuMAb HER2 was front-loaded:<sup>10</sup> an initial loading dose of 4 mg/kg administered followed by a weekly maintenance dose of 2 mg/kg. *See Ex.* 1008 at 1. The purported invention of the '379 patent was “**greater** front loading”—*i.e.*, providing a **greater** “initial dose or doses of anti-ErbB2 antibodies followed by subsequent doses of equal or smaller amounts of antibody.” *See Ex.* 1001 at 4:25–31.<sup>11</sup> According to the patent, “[t]he front loading drug treatment method of the invention has the advantage of increased efficacy by reaching a target serum drug concentration early in treatment.” *Id.* at 5:9–12; *see also Ex.* 1003 ¶¶ 41–42.

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<sup>10</sup> In this Petition, “front-loaded” means use of a loading dose.

<sup>11</sup> All emphasis is added unless otherwise noted.

But although the alleged invention requires administering an initial dose of “at least approximately 5 mg/kg,” the ’379 patent includes no data or explanation as to how the amount of the initial dose was determined, or why it was surprising that a greater front-loaded dose would work. Similarly, although the claims require subsequent doses “separated in time from each other by at least two weeks,” the ’379 patent contains no data or explanation as to how this length of time was determined. The patent contains no experimental data from a dosing regimen in humans other than the prior art “weekly” regimen. *See* Ex. 1001 at 8:38–44, Fig. 3.

Likewise, none of the patent’s six examples include experiments conducted using dosing regimens other than an initial 4 mg/kg dose followed by 2 mg/kg weekly doses. *See id.* at 35:37–48:43 (Examples 1–6). Example 5 *proposes* various dosing regimens, including an 8 mg/kg initial dose, followed by a 6 mg/kg every three weeks, and *predicts* that the regimen will maintain a desired “trough serum concentration.” *Id.* at 44:5–46:58. But as decided, and admitted by Genentech, in the UK proceedings, “Example 5 is entirely ‘prophetic.’” *See* Ex. 1006 ¶ 54. Example 6 similarly describes a *proposed* clinical trial in which 12 metastatic breast cancer patients would be administered an initial 8 mg/kg dose of rhuMAb HER2 followed by 6 mg/kg every three weeks, in combination with paclitaxel every three weeks. *See* Ex. 1001 at 46:60–48:32. The ’379 patent concludes by

stating that “[i]t is *believed* that the above treatment regimen will be effective in treating metastatic breast cancer.” *Id.* at 48:28–29.

### **B. The Herceptin Label**

Prior to the earliest possible priority date of August 27, 1999, the availability, safety, and efficacy of rhuMAB HER2 were well publicized. As mentioned above, rhuMAB HER2 was already *FDA-approved* and commercially sold in the U.S. by 1998. *See* The ‘379 Patent (p. 9). By the end of 1998, Genentech had already made \$30.5 million in rhuMAB HER2 sales and licensing revenue. *See* Ex. 1012 at 36.

Genentech did not submit the Herceptin Label to the USPTO during prosecution of the ‘379 patent. This label provides important pharmacokinetic data useful for determining dosing. For example, the Herceptin Label reports that “[s]hort duration intravenous infusions of 10 to 500 mg once weekly demonstrated dose-dependent pharmacokinetics.” Ex. 1008 at 1. Further, the “[m]ean half-life increased ... with increasing dose level.” *Id.* At the 10 mg dose, the half-life was 1.7 days, while the half-life was *12 days* at the 500 mg dose. *See id.*

In addition, the Herceptin Label indicates that when rhuMAB HER2 was co-administered with paclitaxel, serum trough concentrations were elevated. *See id.* This means that, when administered in combination with paclitaxel, rhuMAB HER2 took longer to dip below the blood concentrations deemed effective and,

thus, its half-life was actually longer than when it was administered by itself. The Herceptin Label further teaches that rhuMAb HER2 *was FDA approved for administration in combination with paclitaxel*, and that paclitaxel was administered every three weeks. *See id.* The Herceptin Label also contemplates administration of rhuMAb HER2 in combination with other chemotherapeutic drugs (e.g., doxorubicin and epirubicin) that were administered every three weeks. Indeed, all of the chemotherapeutic agents mentioned in the Herceptin Label for administration with rhuMAb HER2 were administered tri-weekly.

As discussed below, the Herceptin Label would not only encourage a person of ordinary skill in the art at the time of the alleged invention (a “POSITA”) to try extending the dosing interval for rhuMAb HER2 with a reasonable expectation of success, but the disclosed half-life information could be used to determine—using well-known pharmacokinetics equations—the appropriate loading and maintenance doses for such an extended interval.

### **C. Baselga '96**

Baselga '96 reports the results of a phase II clinical trial in which patients with ErbB2-overexpressing metastatic breast cancer were treated with rhuMAb HER2. *See* Ex. 1013 at 9–10. The pharmacokinetic goal of the trial “was to achieve rhuMAb HER2 trough serum concentrations greater than 10 µg/mL, a level associated with optimal inhibition of cell growth in the preclinical model.” *Id.* at 10.

Further, the “[s]erum levels of rhuMAb HER2 as a function of time were analyzed for each patient using a one-compartment model.” *Id.*

The clinical trial was successful. *See id.* at 11; *see also* Ex. 1001 at 3:59–65. Moreover, “[t]oxicity [from rhuMAb HER2] was minimal,” and no immune response against the antibody was detected. *See* Ex. 1013 at 9. rhuMAb HER2 was administered 768 times and “only 11 events occurred that were considered to be related to the use of the antibody.” *Id.* at 11.

Baselga '96 also teaches that in preclinical studies (both *in vitro* and in xenografts), rhuMAb HER2 “*markedly potentiated the antitumor effects* of several chemotherapist agents, including cisplatin, doxorubicin, and paclitaxel, *without increasing their toxicity.*” *Id.* at 15 (citations omitted).

#### **D. Pegram '98**

Pegram '98 reports the results of a phase II clinical trial using a combination of rhuMAb HER2 plus cisplatin. *See* Ex. 1014 at 8. Pegram '98 reports that a rhuMAb HER2 “target trough serum concentration of 10 to 20 µg/mL” was used. *Id.* Pegram '98 also reports a toxicity profile of the combination that paralleled the toxicity of cisplatin alone. *See id.* at 17. This led to the conclusion that rhuMAb HER2 did not increase toxicity. *See id.*



### **E. Pegram '95 and Vogel '98**

Additional clinical data published years before the earliest possible priority date showed that rhuMAB HER2 “has no substantial toxicity at any dose level.” Pegram '95 (Ex. 1015)<sup>12</sup> at 5. In addition, clinical data published in 1998 showed rhuMAB HER2 was successfully administered to stage IV breast cancer patients at a front-loaded dose of 8 mg/kg followed by 4 mg/kg weekly. Vogel '98 (Ex. 1016).<sup>13</sup> Vogel '98 reports that a control group received the FDA-approved 4 mg/kg initial dose followed by 2 mg/kg weekly. The results showed “[p]atients in the two dose groups were generally comparable,” but the “Response Rate (RR%)” for the higher dose (28%) was higher than for the lower dose (21%). *Id.* “[rhuMAB HER2] was generally very well tolerated in both dose groups,” and researchers

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<sup>12</sup> Pegram, *et al.*, *Phase II Study of Intravenous Recombinant Humanized Anti-p185 HER-2 Monoclonal Antibody (rhuMAB HER-2) Plus Cisplatin in Patients with HER-2/neu Overexpressing Metastatic Breast Cancer*, 14 PROCEEDINGS OF THE AMERICAN SOCIETY OF CLINICAL ONCOLOGY 106 (Abstract 124) (1995).

<sup>13</sup> Vogel, *et al.*, *Efficacy and Safety of Herceptin™ (Trastuzumab, Humanized Anti-HER2 Antibody) As A Single Agent in First-Line Treatment of HER2 Overexpressing Metastatic Breast Cancer (HER2+/MBC)*, 50(1) BREAST CANCER RESEARCH AND TREATMENT 232 (Abstract 23) (1998).

concluded that “[rhuMab HER2] is active, well-tolerated, and has a favorable safety profile.” *Id.*

#### **F. Background Principles in Oncology and Pharmacokinetics**

rhuMab HER2 is an injectable drug. Patient safety, convenience and satisfaction were routine considerations and important factors for POSITAs in choosing injectable treatments for metastatic cancer at the time of the alleged invention. *See* Ex. 1002 ¶ 38; *see also* Declaration of Sharon Baughman, Ph.D., *In re Fischkoff*, IPR2016-00172, Paper 2 (Nov. 5, 2015) (Ex. 1017) ¶¶ 51, 63–64.

A single visit to the oncologist to receive an infusion of the antibody and any additional chemotherapeutic agents takes several hours and depending on how far away the oncologist is, can take up to an entire day. *See* Ex. 1002 ¶ 43. POSITAs recognized the difficulties this could present to patients. *See id.* ¶ 44; Exs. 1019<sup>14</sup> (studying quality of life for cancer patients); 1020<sup>15</sup> (same); 1021<sup>16</sup> (same).

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<sup>14</sup> Coates, *et al.*, *Quality of Life in Oncology Practice: Prognostic Value of EORTC QLQ-C30 Scores in Patients with Advanced Malignancy*, 33(7) EUROPEAN JOURNAL OF CANCER 1025–30 (1997).

<sup>15</sup> Aaronson, *et al.*, *The European Organization for Research and Treatment of Cancer QLQ-C30: A Quality-of-Life Instrument for Use in International Clinical Trials in Oncology*, 85(5) J. NAT’L. CANCER INSTITUTE 365–76 (1993).

A drug effect arises from a pharmacodynamic interaction between the drug and its target within the body. The effect generally depends on the concentration of the drug at the site of action. *See* Ex. 1003 ¶ 36. A commonly used pharmacokinetic parameter is half-life. *See id.* ¶ 38. Half-life is the time required for the serum concentration to drop by one half of any previously selected concentration. *See id.* As named '379 patent inventor, Sharon A. Baughman, declared to the Board:

[H]alf-lives are routinely used to develop the appropriate dosing frequency. For example, the half-life can be used informally to map out a treatment regimen and to predict what dosing intervals would likely be efficacious. It can also be used more formally, where appropriate data is available, to model the pharmacokinetics and pharmacodynamics of multiple-dose treatments.

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*[T]he half-life reported ... was 11.6 to 13.7 days ... [which] would have supported dosing [] less frequently than weekly* because a substantial amount of antibody would still be circulating in the blood one week after the initial injection.

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<sup>16</sup> Ferrell, *Quality of Life in Breast Cancer*, 4(6) *CANCER PRACTICE* 331–40 (1996).

Ex. 1017 ¶¶ 66–67.<sup>17</sup>

When a drug is administered repeatedly, the concentration in the body eventually approaches a steady-state. *See* Ex. 1003 ¶ 40. For drugs given by repeat dosing, an initial higher dose (loading dose) was a commonly used method to reach steady-state more rapidly. *See id.* ¶¶ 41–42; *see also* Ex. 1022–1:109–11.<sup>18</sup> Further, the serum concentration of the drug rises to a peak sometime after dosing and falls to a trough just before the next dose is given. *See* Exs. 1003 ¶ 40; 1022–1:111.

It is routine in drug development to assess the minimum trough serum concentration needed for the drug to be efficacious. *See, e.g.*, Exs. 1013 at 10; 1014 at 9 (using 10 µg/mL and 10–20 µg/mL, respectively, as the minimum trough serum concentration for rhuMAb HER2 phase II clinical trials). For maximum efficacy, the typical aim of a dosing regimen is to keep trough serum concentration above the target minimum serum concentration. *See* Ex. 1003 ¶ 52.

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<sup>17</sup> Dr. Baughman’s Declaration was filed in an IPR for a patent with an alleged priority date of June 8, 2001. Her cited statements would have been true at the time of the alleged priority date for the ’379 patent. *See* Ex. 1003 ¶ 39.

<sup>18</sup> Rowland, *et al.*, *Clinical Pharmacokinetics: Concepts and Applications* LIPPINCOTT WILLIAMS & WILKINS (3rd ed. 1995) (Ex. 1022). All citations to Ex. 1022 are in the format: Ex. 1022–volume:page.

As discussed below, for a drug analyzed using a one-compartment model like rhuMAb HER2, there are simple, textbook equations that pharmacokineticists use to calculate an appropriate loading dose for a desired dosing interval. These equations can be generally used to calculate a loading dose such that the maximum serum concentration ( $C_{\max}$ ) during the loading dose will only go as high as that at steady-state if one just administered the maintenance dose; such a dose would typically not raise toxicity concerns. *See, e.g.*, Ex. 1003 ¶ 62 (Figure 2).

### **G. Summary of the Prosecution History of the '379 Patent**

The '379 patent issued from Application No. 10/600,152, which was filed on June 20, 2003. Exs. 1001 (“Related U.S. Application Data”); 1024 at 2. The '379 patent is a divisional of Application No. 09/648,067 (now the '196 patent) and claims priority to Provisional Application Nos. 60/213,822 and 60/151,018, which were filed on June 23, 2000 and August 27, 1999, respectively. *See* Exs. 1001 (“Related U.S. Application Data”); 1024 at 2.

Genentech did not submit the Herceptin Label to the USPTO. *See id.* at 72–82 (Information Disclosure Statement (“IDS”) dated June 20, 2003), 101–104 (IDS dated May 20, 2005), and 374–377 (IDS dated February 9, 2007). As a result, the Herceptin Label had not been considered by the Examiner when the '379 patent issued. *See id.*; Ex. 1001 (“References Cited”).

During prosecution of the '379 patent, the Examiner rejected the claims as obvious over prior art references that taught weekly administration of rhuMab HER2 to treat breast cancer, administration of paclitaxel to treat breast cancer, and preclinical evidence of synergy between rhuMab HER2 and paclitaxel. *See* Ex. 1024 at 232–37.

The Examiner allowed the claims when a limitation requiring at least two weeks between subsequent doses of the antibody was added to the independent claims. But Genentech did not disclose that a 500 mg dose had been safely administered or that the 500 mg dose had a 12-day half-life.

#### **H. UK Proceedings**

During proceedings challenging the EP '115 patent, the United Kingdom High Court of Justice, Patents Court found Genentech's claimed invention invalid as obvious. *See* Ex. 1006 ¶ 118.<sup>19</sup> The court determined that Genentech and Hospira had a common understanding that a person of ordinary skill in the art

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<sup>19</sup> In the U.K., the standard for lack of inventive step is “obvious[ness] to a person skilled in the art.” Patents Act, 37§ 3 (U.K.) (“An invention shall be taken to involve an inventive step if it is not obvious to a person skilled in the art.”) A similar analysis to the *Graham* factors considered by U.S. Courts is performed. *See Pozzoli Spa v. BDMO SA & Anor.*, 2007 WL 1685192, [2007] EWCA Civ. 588 ¶ 23 (Jun. 22, 2007).

“looking at the [Herceptin Label] would find and consider” Baselga ’96 and Pegram ’98 because they “are part of the common general knowledge in the sense that they are things which the skilled person would find and consider.” *Id.* ¶ 87.

The court held a three week dosing schedule for rhuMAb HER2 would have naturally occurred to a skilled clinician, and would have been obvious and desirable, particularly given the existing three week dosing schedule for paclitaxel. *See id.* ¶¶ 71, 79.

Looking at Baselga ’96 and Pegram ’98, “the skilled person would see that the target trough serum concentrations ... for [rhuMAb HER2] were 10 µg/ml (Baselga) or 10–20 µg/ml (Pegram).” *Id.* ¶ 88. This “key piece” of information could be used “to assess whether a proposed dosing regimen would be effective.” *Id.* From Baselga ’96, the court reasoned one of ordinary skill in the art would understand that a “one-compartment model” had been used to estimate serum levels over time. *See Ex. 1013 at 10.*

According to the court, a POSITA would have estimated patient serum level over three weeks after a single dose of 500 mg rhuMAb HER2 based on the 12 day half-life taught by the Herceptin Label and would have compared the estimated serum level for that regimen with the minimum target trough concentration of 10–20 µg/mL:

There is no doubt about the mathematics. Based on this calculation the trough serum concentration would be 48 µg/ml on day 21. In other words after three weeks, at the time the next dose would be due on a three weekly schedule, a 500 mg dose of [rhuMAb HER2] would produce more than double the target trough serum concentration.

Ex. 1006 ¶ 93. As such, the court found the claimed tri-weekly rhuMAb HER2 regimen invalid as obvious in view of the Herceptin Label, Baselga '96, and Pegram '98. *See id.* ¶ 118. The Court of Appeal affirmed. *See* Ex. 1007 ¶ 56.

A comparison of the claim at issue (and found exemplary) in the UK proceedings (claim 1) and claim 1 of the '379 patent is shown below:

**TABLE 1**

'379 patent	EP '115 patent
<p>1. [a] A method for the treatment of a human patient diagnosed with cancer characterized by overexpression of ErbB2 receptor, comprising [b] administering an effective amount of an anti-ErbB2 antibody to the human patient, the method comprising:</p> <p>[c] administering to the patient an initial dose of at least approximately 5 mg/kg of the anti-ErbB2 antibody; and</p> <p>[d] administering to the patient a plurality of subsequent doses of the antibody in an amount that is approximately the same or less than the initial dose,</p>	<p>1. [b] Use of the anti-ErbB2 antibody 4D5-8 in the manufacture of a medicament for use in a [a] method for treating a human patient diagnosed with a breast cancer characterized by overexpression of ErbB2,</p> <p>said method comprising the steps of [c] administering to the patient an initial dose of 8 mg/kg of the anti-ErbB2 antibody;</p> <p>[d] and administering to the patient a plurality of subsequent doses of the antibody in an amount that is 6 mg/kg,</p> <p>[e] wherein the doses are separated in time from each other by three weeks.</p>



**TABLE 1**

'379 patent	EP '115 patent
[e] wherein the subsequent doses are separated in time from each other by at least two weeks; and further comprising administering an effective amount of a chemotherapeutic agent to the patient.	

As can be seen in Table 1, claim 1 of the EP '115 patent is narrower than claim 1 of the '379 patent in all relevant respects except for “further comprising administering an effective amount of a chemotherapeutic agent to the patient.” However, as discussed above, combination treatment of rhuMAb HER2 and the chemotherapeutic paclitaxel was already a known, FDA-approved treatment for HER2 breast cancer. *See* The Herceptin Label (p. 12).

**VI. LEVEL OF ORDINARY SKILL**

A person of ordinary skill in the art at the time of the alleged invention (“POSITA”) would be a team including:

- (1) a clinical or medical oncologist specializing in breast cancer with several years of experience in breast cancer research or clinical trials, and
- (2) a person with a Ph.D. in pharmaceutical sciences or a closely related field with an emphasis in pharmacokinetics with three years of relevant experience in protein based drug kinetics.

See Exs. 1002 ¶ 14; 1003 ¶ 15; *see also* Ex. 1006 ¶ 32 (finding a person of ordinary skill would be a team of an oncologist and an expert in pharmacokinetics). The Challenged Claims should be found unpatentable as obvious even if the level of ordinary skill were lower.

## VII. 37 C.F.R. § 42.104(B)(3): CLAIM CONSTRUCTION

A claim in an IPR is given the broadest reasonable interpretation (“BRI”) in light of the specification to a person having ordinary skill in the art. 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278 (Fed. Cir. 2015), *cert. granted sub nom. Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 890 (2016).

### A. “ErbB2 receptor” (claim 1)

Hospira submits that the BRI of “ErbB2 receptor” in the ’379 patent claims is, interchangeably, “HER2,” “ErbB2,” or “p185<sup>HER2</sup>.” This construction is supported by the patent specification, which states that “the human ErbB2 gene (erbB2, also known as her2, or c-erbB-2), which encodes a 185-kd transmembrane glycoprotein receptor (p185<sup>HER2</sup>) related to the epidermal growth factor receptor (EGFR), is overexpressed in about 25% to 30% of human breast cancer,” and uses the terms interchangeably. *See, e.g.*, Ex. 1001 at 1:44–50; *see also* Exs. 1002 ¶ 23; 1003 ¶ 23.

### **VIII. STATEMENT OF THE LAW**

A patent claim is invalid under 35 U.S.C. § 103(a) if the differences between the patented 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 pertinent art. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). In addition, “[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense.” *See id.*

“Generally, differences in concentration ... will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration ... is critical.” MPEP 2144.05. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Applied Materials, Inc.*, 692 F.3d 1289, 1295–96 (Fed. Cir. 2012) (internal citation omitted). Further, “[i]t is a settled principle of law that a mere carrying forward of an original patented conception involving only change of form, proportions, or degree, or the substitution of equivalents doing the same thing as the original invention, by substantially the same means, is not such an invention as will sustain a patent, even

though the changes of the kin[d] [*sic*] may produce better results than prior inventions.” *In re Williams*, 36 F.2d 436, 438 (CCPA 1929).

### **IX. THE CHALLENGED CLAIMS ARE UNPATENTABLE**

Claims 1–3, 5, 7, 9–11, 16–28, and 30–40 are invalid under 35 U.S.C. § 103(a) as being obvious over the Herceptin Label in view of Baselga ’96, Pegram ’98, and the knowledge of a POSITA.

The Herceptin Label teaches rhuMAb HER2 should be used “in combination with paclitaxel” for treatment of patients with metastatic breast cancer. *See* Ex. 1008 at 1. This was an FDA-approved, safe and effective use. The FDA recommended dose of rhuMAb HER2 was administered by intravenous injection “weekly,” whereas paclitaxel was given by intravenous injection “every 21 days.” *Id.* As discussed above, the Herceptin Label also contemplates rhuMAb HER2 in combination with other tri-weekly chemotherapeutic agents such as doxorubicin and epirubicin.

It would have been obvious to a POSITA to have tried decreasing the frequency of rhuMAb HER2 injections to every three weeks (tri-weekly) to match the schedule of chemotherapy. A POSITA would have been motivated to do so to reduce injection frequency and trips to the hospital—thereby being more efficient and convenient, particularly for terminally ill patients—and to improve patient compliance and quality of life. *See, e.g.*, Ex. 1002 ¶ 63. In fact, named inventor,

Dr. Baughman, has argued as much to the Board. Ex. 1017 ¶ 64 (“It would have been desirable to reduce the frequency of injection to increase patient compliance. First, injections hurt. By reducing the frequency of dosing and as a result dosing-related pain, patient compliance and satisfaction may improve.”). Further, a tri-weekly regimen would have been an obvious choice because it aligns with paclitaxel and other chemotherapy’s dosing schedule and administering the combined therapies on the same schedule would achieve further benefits. *See* Ex. 1002 ¶¶ 42, 66.

The claimed tri-weekly dosing schedule for rhuMAb HER2 was merely a matter of routine calculation and optimization. *See* Exs. 1002 ¶ 67; 1003 ¶ 67. The Herceptin Label, particularly in view of Baselga ’96 or Pegram ’98 or both, had all the information and motivation necessary for a POSITA to try the claimed dosing regimens. The Herceptin Label itself shows rhuMAb HER2 dosing should be front-loaded, *see* Ex. 1008 at 1, as do several other prior art references, *see* Exs. 1013 at 9–10; 1014 at 8; 1015 at 5; 1016 at 27. And unlike the prior art cited during prosecution, the Herceptin Label teaches that the average half-life for rhuMAb HER2 was as long as 12.1 days, and that the half-life is even longer if rhuMAb HER2 is administered in combination with paclitaxel. *See* Ex. 1008 at 1. Baselga ’96 and Pegram ’98 provide the target minimum trough concentration of 10–20 µg/mL. All three references confirm rhuMAb HER2 is safe and that doses

up to at least 500 mg exhibited no serious side effects. *See* Exs. 1008 at 1; 1013 at 9; 1014 at 8.

A POSITA would have been motivated to combine the teachings of the Herceptin Label, Baslega '96, and Pegram '98 because all three references are directed to the same problem of treating HER2-overexpressing cancers with rhuMAb HER2, and indeed, Baselga '96 and Pegram '98 describe clinical trials that led to the approval of rhuMAb HER2 and the Herceptin Label by the FDA.

The case for obviousness here is even stronger than that presented in *Biomarin Pharm., Inc. v. Genzyme Therapeutic Prods., LP*, IPR2013-00537, Paper 79 (P.T.A.B. Feb. 23, 2015) (Ex. 1025), *aff'd Genzyme Therapeutic Prods. LP v. Biomarin Pharm. Inc.*, 825 F.3d 1360 (Fed. Cir. 2016). There, the Board declared claims directed to a particular dose of a biologic (at least 10 mg/kg body weight of enzyme) and dosing schedule ("biweekly") unpatentable. *See id.* at 23. In *Biomarin*, "human clinical trials were not initiated" before the relevant priority date. *Id.* at 17. Nevertheless, the Board found that a POSITA "would have been motivated to pursue the clinical development of the therapy disclosed" in the prior art, and "what remained to be achieved to arrive at the claimed subject matter was the selection of a specific dose and dosing schedule for a treatment regimen." *Id.* at 18–19. The Board found that "the selection of the dose and dosing schedule would have been a routine optimization of the therapy outlined in [the prior art] which

would have been achievable through the use of standard clinical trial procedures.” *Id.* at 19. Indeed, “[t]he motivation to optimize the therapy disclosed in [the prior art] ‘flows from the normal desire of scientists or artisans to improve upon what is already generally known.’” *Id.* at 20 (internal citations omitted).

So too here. Only in this case, clinical trials of rhuMAb HER2 *had* been successfully performed at various doses including up to a weekly dose of 500 mg. And it was a matter of routine pharmacokinetic calculations to confirm a front-loaded dosing regimen for safely and effectively administering rhuMAb HER2 on a tri-weekly basis. *See* Ex. 1003 ¶ 67.

The Board should declare the Challenged Claims unpatentable.

**A. Claim-By-Claim Explanation of Grounds of Unpatentability**

**1. Claims 1–3, 5, 7, 9–11, 16–28, and 30–40 are Obvious Over the Herceptin Label in View of Baselga ’96, Pegram ’98, and the Knowledge of a Person of Ordinary Skill in the Art**

**(a) Claim 1**

Claim 1 is obvious over the Herceptin Label in view of Baselga ’96, Pegram ’98, and the knowledge of a POSITA.

i. **Claim 1, preamble: “A method for the treatment of a human patient diagnosed with cancer characterized by overexpression of ErbB2 receptor, comprising administering an effective amount of an anti-ErbB2 antibody to the human patient, the method comprising:”**

The Herceptin Label teaches treatment of a human patient diagnosed with cancer characterized by overexpression of ErbB2 by administering an anti-ErbB2 antibody. For example, the Herceptin Label teaches that rhuMAb HER2, which is an anti-ErbB2 antibody, is “administ[ered]” in “dosage[s]” “for the treatment of [human] patients with metastatic breast cancer whose tumors overexpress the HER2 protein.” Ex. 1008 at 1–2; *see also id.* at 1 (“Indications and Usage”).

The Herceptin Label also teaches administering an “effective amount” of rhuMAb HER2. Depending on the level of HER2 overexpression in patients, the Herceptin Label says the overall response rate was 21–44% and the median time to disease progression was 4.4–7.1 months. *See id.* at Table 2. A POSITA would have understood this response rate and median time to disease progression as an effective result.<sup>20</sup> *See* Ex. 1002 ¶ 53. As discussed below, a POSITA also would have understood that the claimed amounts would be effective.

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<sup>20</sup> Genentech also obtained FDA approval of the Herceptin Label and included the Herceptin Label with its sales of rhuMAb HER2 (sold under trade name Herceptin®). A POSITA would have been well aware that the FDA’s drug



ii. **Claim 1, element [a]: “administering to the patient an initial dose of at least approximately 5 mg/kg of the anti-ErbB2 antibody; and”**

The Herceptin Label teaches that rhuMAb HER2 doses of up to 500 mg had been successfully administered to patients. *See* Ex. 1008 at 1 (“Short duration intravenous infusions of 10 to 500 mg once weekly demonstrated dose-dependent pharmacokinetics.”). Doses may be expressed as absolute or weight-based values. *See* Ex. 1002 ¶ 54. 500 mg is an absolute dose. To get a weight-based dose from an absolute dose, one divides the absolute dose by the weight of the particular patient. For example, if a patient weighs 70 kg (154 lbs), a weight-based dose for the 500 mg absolute dose taught by the Herceptin Label is:  $500 \text{ mg} / 70 \text{ kg} = 7.14 \text{ mg/kg}$  (i.e.,  $> 5 \text{ mg/kg}$ ). *See id.* ¶ 55.

Patient weight is unique to each individual patient, and 70 kg is used as a representative example. Indeed, there are necessarily patients for whom the 500 mg absolute dose taught by the Herceptin Label is greater than approximately 5 mg/kg including 70 kg patients. *See id.* ¶ 56. Additionally, 55–85 kg is a reasonable range that a POSITA would assume for patient weight. *See id.* ¶ 57; Exs. 1026 at 3; 1027 at 334 (Table 7-2); *see also* Ex. 1003 ¶ 45. The Herceptin Label’s disclosure of a 500 mg absolute dose converts to a weight-based dose of at least approximately 5

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review process, which includes a review of labeling, is for the purpose of ensuring safe and effective use of the drug. *See* Ex. 1002 ¶ 35.

mg/kg across this entire weight range (5.88 mg/kg for 85 kg patient to 9.09 mg/kg for 55 kg patient). *See id.* ¶ 65 (Table A). Furthermore, as discussed below, a POSITA would know to use a front-loaded initial dose that is greater than 500 mg, and thus greater than 5.88–9.09 mg/kg for patients weighing 55–85 kg. *See* claim 1, element [c] (p. 34).

In light of a POSITA’s knowledge about patient weights and the appropriate weight assumptions to apply when calculating doses, the claimed dose of at least approximately 5 mg/kg would be at minimum obvious to a POSITA reviewing the Herceptin Label.<sup>21</sup> The obviousness of this element is further confirmed by the fact that the ‘379 patent contains no data showing that any of the claimed dosing regimens, much less the full scope of claimed dosing regimens, were tested by the inventors, had any unexpected properties, or were critical. *See In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990) (“The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. These cases have consistently held that in such a situation, the applicant must show that the particular range is critical, generally by

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<sup>21</sup> This Petition is addressing obviousness to a POSITA at the time of the alleged invention; Petitioner therefore does not repeat this phrase throughout the Petition.

showing that the claimed range achieves unexpected results relative to the prior art range.”).

iii. **Claim 1, element [b]: “administering to the patient a plurality of subsequent doses of the antibody in an amount that is approximately the same or less than the initial dose”**

The Herceptin Label further discloses “administering to the patient a plurality of subsequent doses of the antibody in an amount that is approximately the same or less than the initial dose.” The Herceptin Label teaches that rhuMAb HER2 doses should be front-loaded. *See* Ex. 1008 at 1 (recommending “a loading dose of 4 mg/kg followed by” a lower “weekly maintenance dose of 2 mg/kg”; describing clinical “studies using a loading dose”). Baselga ’96 and Pegram ’98 confirm rhuMAb HER2 regimens should be front-loaded. *See* Exs. 1013 at 9 (“Patients received a loading dose of 250 mg of intravenous rhuMAb HER2, then 10 weekly doses of 100 mg each.”); 1014 at 8 (“Patients received a loading dose of rhuMAb HER2 (250 mg IV) on day 0, followed by weekly doses of 100 mg IV for 9 weeks.”).

Further, a POSITA would have known from his or her ordinary education and experience that intravenous injectable antibodies like rhuMAb HER2 should be administered such that the repeated doses are approximately the same or less than the initial dose. *See* Ex. 1003 ¶ 41.

For these reasons, it would have been obvious to have administered a plurality of subsequent rhuMAB HER2 doses in an amount approximately the same or less than the initial dose.

iv. **Claim 1, element [c]: “wherein the subsequent doses are separated in time from each other by at least two weeks”**

The Herceptin Label teaches weekly administration of rhuMAB HER2. *See* Ex. 1008 at 1. A POSITA would have arrived at the claimed dosing schedule by routine optimization of the therapy outlined by the Herceptin Label. *See* Ex. 1025 at 19–20. Indeed, a POSITA would have been motivated to decrease the frequency of rhuMAB HER2 injections for several reasons, as detailed below.

*Firstly*, a skilled artisan would decrease the frequency of injections to improve efficiency, to provide a more convenient dosing regimen—particularly for terminally ill patients—, and to improve patient compliance and quality of life. *See Hoffman-La Roche Inc. v. Apotex Inc.*, 748 F.3d 1326, 1329 (Fed. Cir. 2014) (“A relatively infrequent dosing schedule has long been viewed as a potential solution to the problem of patient compliance.”), *cert. denied*, 135 S. Ct. 878 (2014). As discussed in Dr. Lipton’s Declaration, a trip to the clinic for a single intravenous infusion can take a full day. *See* Ex. 1002 ¶ 43. Further, travel time to and from the clinic can make the patient’s day even longer. In addition, clinic visits can be

emotionally taxing (for example, by being placed in an infusion room) and disruptive to a patient's life (for example, by missing work). *See id.* ¶¶ 42–43.

Dr. Baughman, one of the named inventors of the '379 patent, has also argued for the obviousness of decreasing the frequency of injections for many of these same reasons discussed here in a Declaration submitted in another *inter partes* review. *See* Ex. 1017 ¶ 64 (“It would have been desirable to reduce the frequency of injection to increase patient compliance. First, injections hurt. By reducing the frequency of dosing and as a result dosing-related pain, patient compliance and satisfaction may improve.”); *see also* Ex. 1002 ¶ 64.

*Secondly*, a skilled artisan would decrease the frequency of injections in view of the teachings of the Herceptin Label, which describes administration of rhuMab HER2 in combination with chemotherapeutic agents, and that these chemotherapeutic agents are administered once every three weeks:

For those who had received prior anthracycline therapy in the adjuvant setting, *chemotherapy consisted of paclitaxel ... every 21 days* for at least six cycles); for all other patients, *chemotherapy consisted of anthracycline plus cyclophosphamide (AC: doxorubicin ... or epirubicin ... plus ... cyclophosphamide every 21 days* for six cycles).

\* \* \*

INDICATIONS AND USAGE. ... ***HERCEPTIN in combination with paclitaxel*** is indicated for treatment of patients with metastatic breast cancer whose tumors overexpress the HER2 protein and who have not received chemotherapy for their metastatic disease.

*See* Ex. 1008 at 1.

When decreasing the frequency of rhuMAb HER2 injections, a tri-weekly regimen would have been an obvious choice because it would have aligned with the tri-weekly dosing schedules of the chemotherapy, and administering the combined therapies on the same schedule would achieve even further benefits. For example, a patient would only have to make one trip to the clinic to receive both therapies (with the added benefit of improving patient compliance). As discussed above, all of the chemotherapeutic agents mentioned in the Herceptin Label for administration with rhuMAb HER2 were administered tri-weekly.

It is also beneficial for the clinic to administer the combined therapies on the same schedule because they only have to prep the patient once. *See* Ex. 1002 ¶¶ 42, 66. In addition, there is added cost to the patient's care for each visit to the clinic. *See id.* ¶¶ 43, 66.

***Finally***, a skilled artisan would decrease the frequency of injections and use a tri-weekly dosing regimen in view of rhuMAb HER2's known pharmacokinetic properties. *See* Ex. 1003 ¶ 67. These properties are taught by the Herceptin Label

and include rhuMAb HER2's average half-life (12.1 days for a weekly dose of 500 mg) and "volume of distribution" (44 mL/kg). Ex. 1008 at 1. The skilled artisan would have also been aware of the target trough serum concentration for rhuMAb HER2 (10–20 µg/mL) in view of Baselga '96 and Pegram '98 (*see* Ex. 1003 ¶ 51), and the type of pharmacokinetic model (one-compartment model) to use in view of Baselga '96 and the Herceptin Label (*see id.* ¶ 35).

More specifically, Baselga '96 discloses that serum levels were analyzed using a one compartment model. *See* Ex. 1013 at 10. Further, because the Herceptin Label reports only a single half-life, a POSITA would have understood that the pharmacokinetic data contained therein had been modelled by a one compartment model. *See* Exs. 1008 at 1; 1003 ¶ 34; *see also* Ex. 1006 ¶ 101 ("the only model which could be used based on the [Herceptin Label] was a one compartment model. Indeed it is clear from the information in the [Herceptin Label] that a one compartment model was used.").

Using data from the Herceptin Label, it would have been a matter of routine calculation for a POSITA to determine that a tri-weekly rhuMAb HER2 dose regimen would have resulted in a serum concentration well above the target minimum trough concentration of 10–20 µg/ml. *See, e.g.*, Ex. 1003 ¶¶ 57 (Figure 1), 62 (Figure 2). Specifically, a POSITA would have known that the initial antibody serum concentration can be estimated by the following equation, wherein

the “*Dose*” is weight-based and  $V_D$  is the volume of distribution, and solving for  $C_0$ :

$$V_D = \frac{Dose}{C_0}$$

*Id.* ¶ 47 (Equation (2)); Ex. 1022–1:33. Then, using a one compartment model, the drug concentration over time could have been approximated by:

$$Conc = C_0 \cdot e^{-k_{el} \cdot time}$$

Ex. 1003 ¶ 46 (Equation (1)). In Equation (1),  $k_{el}$  is defined as follows, wherein  $t_{1/2}$  is the half-life:

$$k_{el} = \frac{\ln(2)}{t_{1/2}}$$

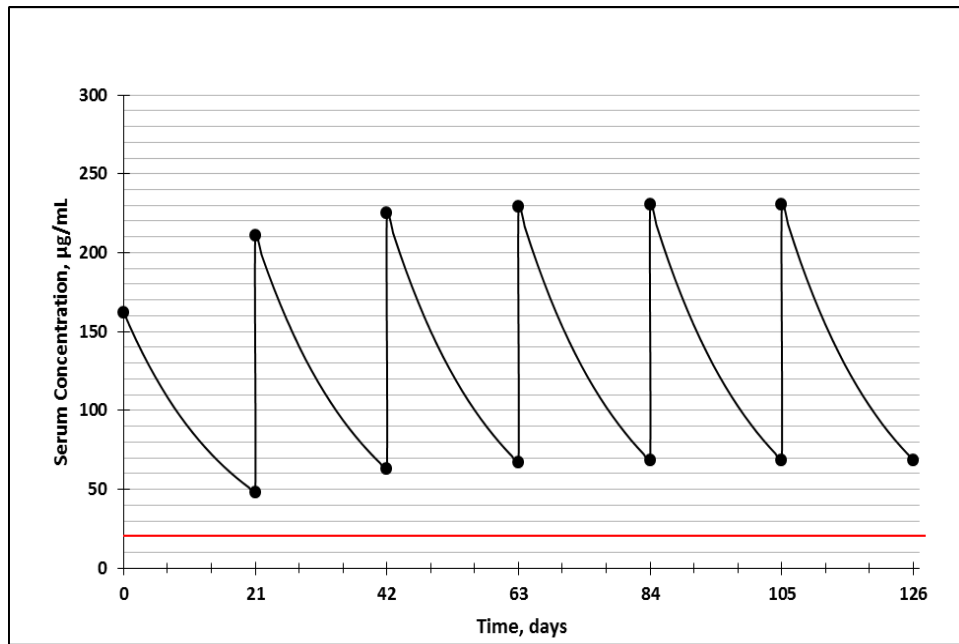
*Id.* ¶ 49 (Equation (3)); Ex. 1022–1:34.

Performing these routine calculations demonstrates that, after administering a 500 mg dose of antibody, the initial drug minimum concentration of a 70 kg patient after three weeks is 48.3 µg/mL, or at least double the target minimum trough concentration of 10–20 µg/ml. Ex. 1003 ¶¶ 50–51. After repeated 500 mg doses are administered, the steady-state trough concentration will eventually reach approximately 68.7 µg/mL. *Id.* ¶ 56.

The expected concentration of antibody over time during this treatment regimen is illustrated in Figure 1.



**Figure 1**



*Id.* ¶ 57. As can be seen in Figure 1, a POSITA would have expected the rhuMab HER2 serum concentration to stay well above the target minimum trough concentration of 10–20 µg/ml (20 µg/ml shown in red).

Based on these calculations, a pharmacokineticist would have had a reasonable expectation of success in trying tri-weekly 500 mg rhuMab HER2 since 500 mg weekly doses had been safely administered and, based on routine calculations, a 500 mg tri-weekly regimen would have resulted in a serum concentration well above the target minimum trough concentration. *See id.* ¶ 58.

Further, to reach steady-state on the first administration of rhMab HER2, a POSITA could have used other textbook equations to estimate an appropriate

loading dose for a 500 mg repeating dose. *See* Exs. 1003 ¶ 61; 1022–1:101.

Specifically, a loading dose can be estimated by either of:

$$D_L = C_{\max} \text{ (at steady-state)} \times V_D$$

$$D_L = D_M \times R$$

Ex. 1003 ¶ 59 (Equations (7) and (8), respectively). In these equations, the  $D_M$ ,  $R$ ,  $\tau$ , and  $K_{el}$  are defined as follows:

$D_M$  is the maintenance dose

$$R = \frac{1}{1 - e^{-k_{el}\tau}}$$

$\tau$  is the dose interval

$$k_{el} = \frac{\ln 2}{t_{1/2}}$$

In this case, the dose interval is three weeks, or 21 days, and the maintenance dose is 500 mg. Solving these equations results in a loading dose of approximately 712 mg. *See id.* ¶ 61. This converts to the weight-based doses in Table A below:

**Table A**

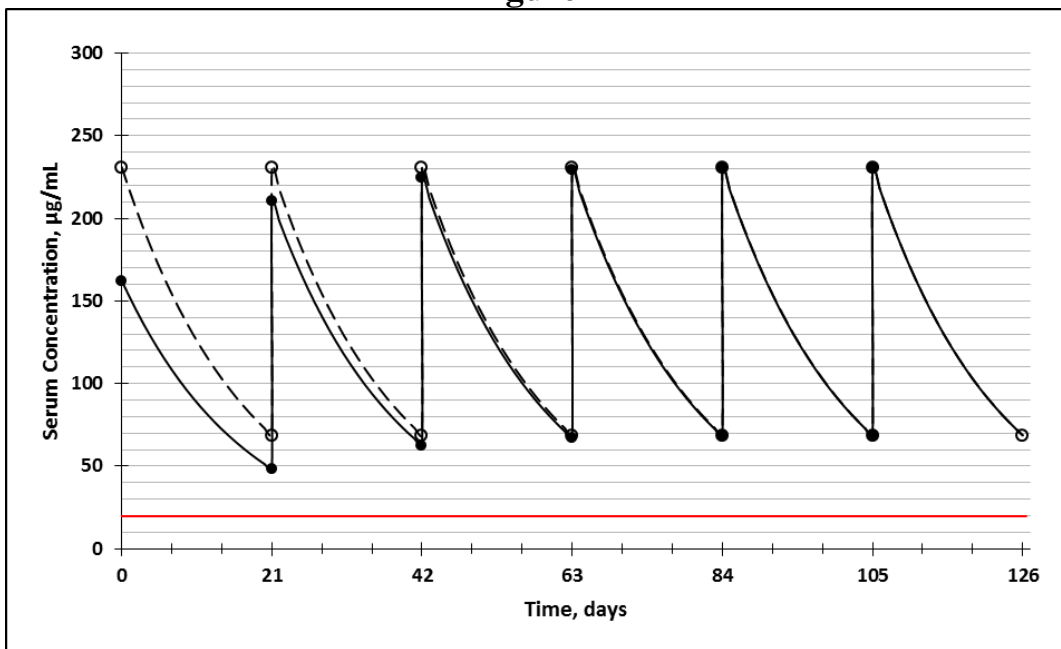
Patient Weight	712 mg Loading Dose	500 mg Maintenance Dose
55 kg	12.9 mg/kg	9.09 mg/kg
70 kg	10.2 mg/kg	7.14 mg/kg

85 kg	8.38 mg/kg	5.88 mg/kg
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*Id.* ¶ 65 (Table A).

The concentration of rhuMAb HER2 over time during a treatment regimen of 712 mg followed by 500 mg every three weeks is illustrated in Figure 2 (dashed line):

**Figure 2**



*Id.* ¶ 62. As shown in Figure 2, a 712 mg loading dose of rhuMAb HER2 followed by 500 mg/kg tri-weekly results in steady-state kinetics after the first dose administration. Just as in Figure 1, the rhuMAb HER2 serum concentration would have been expected to stay well above the target minimum trough concentration of 10–20 µg/ml (20 µg/ml shown in red line).

A POSITA also would have known rhuMAb HER2 was generally well tolerated, toxicity from the antibody was minimal, and that lower doses were effective. *See, e.g.*, Exs. 1008 at 1; 1013 at 9; 1014 at 17; *see also* Exs. 1003 ¶55; 1016 at 27 (Abstract 23) (describing safe administration of 8 mg/kg loading doses). Therefore, a POSITA at minimum would have had a reasonable expectation that a 712 mg loading dose followed by tri-weekly 500 mg doses would have worked.

In performing his calculations, Dr. Jusko made three assumptions. First, Dr. Jusko assumed that rhuMAb HER2 exhibits mono-exponential kinetics. *See* Ex. 1003 ¶ 69. Second, Dr. Jusko assumed  $C_0$  can be estimated by multiplying the dose by the volume of distribution and average mass of a patient. *See id.* ¶ 70; Gibaldi, *et al.*, *Pharmacokinetics*, INFORMA HEALTHCARE USA, INC. (2nd. 1982) (Exhibit 1028) at 91 (describing the up-curve in plasma concentrations produced by the infusion process diminishes the influence of the early distribution process causing a bi-exponential curve to look more mono-exponential). Last, Dr. Jusko assumed the kinetics of rhuMAb HER2 remain constant with multiple-dosing. *See* Ex. 1003 ¶ 71; King, *Applications and Engineering of Monoclonal Antibodies*, TAYLOR & FRANCIS LTD, (1998) (Exhibit 1029) at 77 (describing the pharmacokinetics of IgG).

v. **Claim 1, element [d]: “further comprising administering an effective amount of a chemotherapeutic agent to the patient.”**

The Herceptin Label teaches administering an effective amount of a chemotherapeutic agent. As discussed above for claim 1, element [c] (p. 34), the Herceptin Label discloses administration of rhuMAb HER2 in combination with paclitaxel, as well as in combination with anthracycline (either doxorubicin or epirubicin). *See* Ex. 1008 at 1.

Table 2 below shows the response rates and median time to disease progression for the chemotherapeutic agents alone as well as in combination with rhuMAb HER2:

**Table 2**  
Treatment Effect versus Level of HER2 Expression

	Single-Arm Trial	Treatment Subgroups in Randomized Trial			
	HERCEPTIN	HERCEPTIN + Paclitaxel	Paclitaxel	HERCEPTIN + AC	AC
<u>Overall Response Rate</u>					
2+ overexpression	4% (2/50)	21% (5/24)	16% (3/19)	40% (14/35)	43% (18/42)
3+ overexpression	17% (29/172)	44% (30/68)	14% (11/77)	53% (57/108)	36% (35/96)
<u>Median time to progression (months) (95% CI)</u>					
2+ overexpression	N/A <sup>a</sup>	4.4 (2.2, 6.6)	3.2 (2.0, 5.6)	7.8 (6.4, 10.1)	7.1 (4.8, 9.8)
3+ overexpression	N/A <sup>a</sup>	7.1 (6.2, 12.0)	2.2 (1.8, 4.3)	7.3 (7.1, 9.2)	4.9 (4.5, 6.9)

<sup>a</sup> N/A = Not Assessed

*Id.* Table 2; *see also id.* at 1 (“For those who had received prior anthracycline therapy in the adjuvant setting, chemotherapy consisted of paclitaxel (175 mg/m<sup>2</sup> over 3 hours every 21 days for at least six cycles); for all other patients, chemotherapy consisted of anthracycline plus cyclophosphamide (AC: doxorubicin 60 mg/m<sup>2</sup> or epirubicin 75 mg/m<sup>2</sup> plus 600 mg/m<sup>2</sup> cyclophosphamide every 21 days for six cycles.”). A POSITA would have understood these positive response rates and months of time to disease progression indicate effective amounts of chemotherapy were given to the patients. *See* Ex. 1002 ¶ 71.

In light of the prior art teachings that combinations of rhuMAb HER2 with paclitaxel and rhuMAb HER2 with anthracycline were effective—indeed synergistic—and carried an acceptable safety profile, *see* Ex. 1008 at 1, a POSITA would have been motivated to try the same amounts disclosed in the Herceptin Label with the greater 712 mg front loaded dose of rhuMAb HER2 discussed in claim 1, element [c] (p. 34) and would have had a reasonable expectation of success in doing so. *See* Exs. 1002 ¶¶ 72–74; 1003 ¶ 67.

Additionally, a POSITA would have known that paclitaxel, doxorubicin and epirubicin were FDA-approved before the alleged invention date of the ‘379 patent. It would have been known or obvious to a POSITA to use these chemotherapeutic agents in amounts already approved by the FDA and demonstrated to the FDA to be effective. *See also* Ex. 1002 ¶¶ 72–74.

**(b) Claim 2**

i. **“The method of claim 1, wherein the initial dose is at least approximately 6 mg/kg.”**

For at least the reasons discussed above for claim 1, elements [a] (p. 31) and [c] (p. 34), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. For example, all the loading doses in Table A are at least approximately 6 mg/kg. *See* Ex. 1003 ¶ 65 (Table A).

**(c) Claim 3**

i. **“The method of claim 2, wherein the initial dose is at least approximately 8 mg/kg.”**

For at least the reasons discussed above for claim 1, elements [a] (p. 31) and [c] (p. 34), and claim 2 (p. 45), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. For example, all the loading doses in Table A are at least approximately 8 mg/kg. *See* Ex. 1003 ¶ 65 (Table A).

**(d) Claim 5**

i. **“The method of claim 1, wherein the subsequent doses are separated in time from each other by at least three weeks.”**

For at least the reasons discussed above for claim 1, element [c] (p. 34), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill.

(e) **Claim 7**

i. **“The method of claim 1, wherein the initial dose is administered by intravenous injection, wherein at least two subsequent doses are administered, and wherein each subsequent dose is administered by a method selected from the group consisting of intravenous injection and subcutaneous injection.”**

For at least the reasons discussed above for claim 1, element [b] (p. 33), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. In particular, the Herceptin Label teaches “[rhuMAb HER2] is a sterile, white to pale yellow, preservative-free lyophilized powder *for intravenous (IV) administration.*” Ex. 1008 at 1. Likewise, Baselga '96 and Pegram '98 teach intravenous administration of rhuMAb HER2. *See* Exs. 1013 at 9; 1014 at 8.

Further, the Herceptin Label discloses an initial and at least two subsequent doses. For example, the Herceptin Label teaches weekly administration of rhuMAb HER2 for 32 weeks. *See* Ex. 1008 at 1. Since the Herceptin Label teaches rhuMAb HER2 is *for* intravenous injection, it would have been obvious to a POSITA to have administered the initial and at least two subsequent doses via intravenous injection. *See* Ex. 1002 ¶ 79.



(f) **Claim 9**

i. **“The method of claim 1, wherein the initial dose is selected from the group consisting of approximately 6 mg/kg, 8 mg/kg, or 12 mg/kg, wherein the plurality of subsequent doses are at least approximately 2 mg/kg.”**

For at least the reasons discussed above for claim 1, elements [a] (p. 31), [b] (p. 33) and [c] (p. 34), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. In particular, and as discussed above for claim 1, element [c] (p. 34), a POSITA could have calculated a 712 mg loading dose for a 500 mg tri-weekly repeating dose. There are necessarily patients for whom a 712 mg loading dose is approximately 8 mg/kg. *See* Ex. 1002 ¶ 80. For example, the weight-based loading dose for an 89 kg patient would be  $712 \text{ mg} / 89 \text{ kg} = 7.99 \text{ mg/kg}$ . *See id.* Similarly, there are necessarily patients for whom a 712 mg loading dose is approximately 12 mg/kg. *See id.* For example, the weight-based loading dose for a 59 kg patient is 12.06 mg/kg. *See id.*

Additionally, 55–85 kg is a reasonable range that a POSITA would assume for patient weight. *See* Exs. 1002 ¶ 81; 1003 ¶ 45; 1026 at 3; 1027 at 334 (Table 7-2). A 712 mg loading dose converts to a weight-based dose of 8.38 mg/kg for an 85 kg patient. *See* Ex. 1003 ¶ 65 (Table A).

In light of a POSITA's knowledge about patient weight and the appropriate assumptions to apply when calculating doses, the claimed dose would be at minimum obvious to a POSITA reviewing the Herceptin Label.

The obviousness of this element is further confirmed by the fact that the '379 patent contains no data showing that any of the claimed dosing regimens were tested by the inventors, were critical, or had any unexpected properties. *See Woodruff*, 919 F.2d at 1578.

**(g) Claim 10**

i. **“The method of claim 9, wherein the plurality of subsequent doses are separated in time from each other by at least three weeks.”**

For at least the reasons discussed above for claim 1, element [c] (p. 31) and claim 9 (p. 47), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill.

**(h) Claim 11**

i. **“The method of claim 10, wherein the initial dose is approximately 8 mg/kg, and wherein at least one subsequent dose is approximately 6 mg/kg.”**

For at least the reasons discussed above for claim 1, elements [a] (p. 31), [b] (p. 33) and [c] (p. 34), and claim 10 (p. 48), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. In particular, and as discussed

above for claim 1, element [c] (p. 34), 712 mg would have been an appropriate approximate loading dose for tri-weekly 500 mg rhuMAB HER2. *See also* Ex. 1003 ¶ 61. There are necessarily patients for whom a 712 mg loading dose is approximately 8 mg/kg and 500 mg subsequent doses are 6 mg/kg. For example, the loading dose for an 89 kg patient is  $712 \text{ mg} / 89 \text{ kg} = 7.99 \text{ mg/kg}$ , and the maintenance dose is  $500 \text{ mg} / 89 \text{ kg} = 5.62 \text{ mg/kg}$ .

Additionally, 55–85 kg is a reasonable range that a POSITA would assume for patient weight. *See* claim 1, element [a] (p. 31); Exs. 1002 ¶ 57; 1003 ¶ 45; 1026 at 3; 1027 at 334 (Table 7-2). A 712 mg loading dose followed by 500 mg maintenance doses converts to an initial weight-based loading dose of 8.38 mg/kg followed by 5.88 mg/kg maintenance doses for an 85 kg patient. *See* Ex. 1003 ¶ 65 (Table A). These numbers round exactly to the claimed 8 mg/kg x 6 mg/kg dosing regimen. *See also id.* ¶ 66 (discussing rounding for convenience).

In light of a POSITA's knowledge about patient weights and the appropriate assumptions to apply when calculating doses, the claimed dose would be at minimum obvious to a POSITA reviewing the Herceptin Label. The obviousness of this element is further confirmed by the fact that the '379 patent contains no data showing that any of the claimed dosing regimens were tested by the inventors, were critical, or had any unexpected properties. *See Woodruff*, 919 F.2d at 1578.

**(i) Claim 16**

i. **“The method of claim 1, wherein said cancer is selected from the group consisting of breast cancer [and other cancers].”**

The method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. As discussed above, the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill render obvious claim 1. *See* claim 1 (p. 29). Further, the Herceptin Label discloses rhuMAb HER2 is indicated for the treatment of metastatic breast cancer. *See, e.g.*, Ex. 1008 at 1. (“Both trials studied patients with *metastatic breast cancer* whose tumors overexpress the HER2 protein.”); *id.* (“[rhuMAb HER2] in combination with paclitaxel is indicated for treatment of patients with *metastatic breast cancer* whose tumors overexpress the HER2 protein”). Baselga '96 and Pegram '98 also teach rhuMAb HER2 treats metastatic breast cancer. *See* Exs. 1013 at 9; 1014 at 8.

**(j) Claim 17**

i. **“The method of claim 16, wherein said cancer is breast cancer.”**

For at least the reasons discussed above for claim 16 (p. 50), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill.

**(k) Claim 18**

**i. “The method of claim 17, wherein said cancer is metastatic breast carcinoma.”**

The method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. As discussed above, the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill render obvious claim 17. *See* claim 17 (p. 50). Further, at least some of the patients in the clinical trials described in the Herceptin Label, Baselga '96, and Pegram '98 had carcinomas. *See, e.g.*, Ex. 1013 at 9 (“We treated 46 patients with metastatic breast carcinomas that overexpressed HER2.”). Carcinoma is a common type of breast cancer. *See* Ex. 1002 ¶¶ 89–90.

**(l) Claim 19**

**i. “The method of claim 1, wherein said antibody binds to the extracellular domain of the ErbB2 receptor.”**

The method of this claim is disclosed by, inherent in, and at minimum obvious over the Herceptin Label, Baselga '96, and Pegram '98, in light of the POSITA's ordinary skill. As discussed above, the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill render obvious claim 1. *See* claim 1 (p. 29). Further, the Herceptin Label teaches “[rhuMAb HER2] is a recombinant DNA-derived humanized monoclonal antibody that selectively binds with high affinity in a cell-based assay ( $K_d = 5$  nM) to the *extracellular domain of the*

*human epidermal growth factor receptor-2* protein, HER2,” and “[t]he antibody is an IgG<sub>1</sub> kappa that contains human framework regions with the complementarity-determining regions of a murine antibody (4D5) that binds to HER2.” Ex. 1008 at 1. Since rhuMAb HER2 contains the complementarity determining regions of the 4D5 antibody, it will bind to the same epitope as the 4D5 antibody.

Baselga '96 further teaches that “[t]he murine monoclonal antibody (MAb) 4D5, *directed against the extracellular domain* of p185<sup>HER2</sup> (ECD<sup>HER2</sup>), is a potent inhibitor of growth, in vitro and in xenograft models, of human breast cancer cells that overexpress HER2.” Ex. 1013 at 9. Pegram '98 further discloses that the humanized rhuMAb HER2 “has improved binding affinity to the extracellular domain of HER2/*neu*.” Ex. 1014 at 9; *see also* Exs. 1002 ¶ 31; 1018<sup>22</sup> at 5–6 (describing the replacement of complementary determining regions in a human antibody with those from a mouse).

**(m) Claim 20**

**i. “The method of claim 19, wherein said antibody binds to epitope 4D5 within the ErbB2 extracellular domain sequence.”**

For at least the reasons discussed above for claim 19 (p. 51), the method of this claim is disclosed by, inherent in, and at minimum obvious over the Herceptin

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<sup>22</sup> Jones, *et al.*, *Replacing the Complementarity-determining Regions in a Human Antibody With Those From a Mouse*, NATURE 321 (6069), 522–23 (1986).

Label, Baselga '96, and Pegram '98, in light of the POSITA's ordinary skill. In particular, the Herceptin Label, Baselga '96, and Pegram '98 teach that rhuMAb HER2 binds to epitope 4D5. *See, e.g.*, Exs. 1008 at 1 “[rhuMAb HER2] is an IgG<sub>1</sub> kappa that contains human framework regions with the complementarity-determining regions of a murine antibody (**4D5**) that binds to HER2”; 1013 at 9 (“[t]he murine monoclonal antibody (MAb) **4D5** ... was humanized”); 1014 at 8 (rhuMAb HER2 is a humanized “murine monoclonal anti-HER2 antibody, **4D5**.”).

**(n) Claim 21**

i. **“The method of claim 20, wherein said antibody is a humanized 4D5 anti-ErbB2 antibody.”**

For at least the reasons discussed above for claims 19 (p. 51) and 20 (p. 52), the method of this claim is disclosed by, inherent in, and at minimum obvious over the Herceptin Label, Baselga '96, and Pegram '98, in light of the POSITA's ordinary skill.

**(o) Claim 22**

i. **“The method of claim 1, wherein the chemotherapeutic agent is a taxoid.”**

For at least the reasons discussed above for claim 1, element [d] (p. 43), the method of this claim is at minimum obvious over the Herceptin Label, Baselga '96, and Pegram '98, in light of the POSITA's ordinary skill. In particular, the Herceptin Label discloses the chemotherapeutic agent can be paclitaxel, which is a taxoid. Ex. 1008 at 1 (“For those who had received prior anthracycline therapy in

the adjuvant setting, *chemotherapy consisted of paclitaxel (175 mg/m<sup>2</sup> over 3 hours every 21 days* for at least six cycles)"). Paclitaxel is a taxoid. *See* Ex. 1002 ¶ 95.

**(p) Claim 23**

i. **“The method of claim 22, wherein said taxoid is paclitaxel or docetaxel.”**

For at least the reasons discussed above for claim 22 (p. 53), the method of this claim is at minimum obvious over the Herceptin Label, Baselga '96, and Pegram '98, in light of the POSITA's ordinary skill.

**(q) Claim 24**

i. **“The method of claim 1, wherein the effective amount of the anti-ErbB2 antibody and the effective amount of the chemotherapeutic agent as a combination is lower than the sum of the effective amounts of said anti-ErbB2 antibody and said chemotherapeutic agent, when administered individually, as single agents.”**

The method of this claim is at minimum obvious over the Herceptin Label, Baselga '96, and Pegram '98, in light of the POSITA's ordinary skill. As discussed above, the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill render obvious claim 1. *See* claim 1 (p. 29). Further, the Herceptin Label teaches that rhuMAb HER2 is synergistic with chemotherapeutic agents including paclitaxel and anthracycline. *See* Exs. 1008 at 1, Table 2. A POSITA reading the Herceptin Label would have had a reasonable expectation that the combination of



rhuMAB HER2 and paclitaxel or anthracycline treatments would be synergistic in humans and thus that an effective amount of the combination would be lower than the sum of effective amounts of each treatment individually. *See* Ex. 1002 ¶ 97.

A synergistic increase in tumor killing power means that if one drug at a given dose is combined with a second drug given at a second dose, the magnitude of the combined effect is greater than the magnitude of the sum of the individual effects (“synergistic effect”). Absent synergy, a higher dose of one or both of the drugs to achieve the same effect as the synergistic effect is required. Thus, the “effective amount” of the synergistic combination—*i.e.*, the sum of the doses of the drugs that produces a given synergistic effect—is less than the “effective amount”—*i.e.*, the sum of the doses of drugs to produce that same effect—if there was no synergy. Therefore, because the Herceptin Label teaches that rhuMAB HER2 is synergistic with paclitaxel as well as with anthracyclines, a POSITA would have had a reasonable expectation that the effective amount of the combination would be lower than the sum of the effective amounts of rhuMAB HER2 or paclitaxel administered individually.

Finally, this claim also establishes that independent claim 1 does not require any synergy in response.

**(r) Claim 25**

**i. “The method of claim 1, wherein the chemotherapeutic agent is an anthracycline.”**

For at least the reasons discussed above for claim 1, element [d] (p. 43), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. In particular, and as discussed above for claim 1, element [d] (p. 43), the Herceptin Label discloses that the chemotherapeutic agent can be anthracycline (doxorubicin or epirubicin). *See* Ex. 1008 at 1 (“[F]or all other patients, *chemotherapy consisted of anthracycline plus cyclophosphamide (AC: doxorubicin ... or epirubicin ... plus ... cyclophosphamide every 21 days* for six cycles).”).

**(s) Claim 26**

**i. “The method of claim 25, wherein the anthracycline is doxorubicin or epirubicin.”**

For at least the reasons discussed above for claim 25 (p. 56), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill.

**(t) Claim 27**

**i. “The method of claim 25, wherein the method further comprises administration of a cardioprotectant.”**

For at least the reasons discussed above for claim 25 (p. 56), the method of this claim would have been at minimum obvious to a POSITA in light of the

Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. In particular, the Herceptin Label further discloses administration of cyclophosphamide, which is a cardioprotectant, when anthracycline is administered. *See* Ex. 1008 at 1 (“[F]or all other patients, chemotherapy consisted of anthracycline plus *cyclophosphamide* (AC: doxorubicin...or epirubicin...plus... *cyclophosphamide* every 21 days for six cycles).”). *See* Ex. 1002 ¶ 100.

**(u) Claim 28**

**i. “The method of claim 1, wherein efficacy is measured by determining the time to disease progression or the response rate.”**

The method of this claim is at minimum obvious over the Herceptin Label, Baselga '96, and Pegram '98, in light of the POSITA's ordinary skill. As discussed above, the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill render obvious claim 1. *See* claim 1 (p. 29). Further, the Herceptin Label discloses that efficacy is measured by time to disease progression as well as overall response rate. *See* Ex. 1008 at 1 (“Compared with patients randomized to chemotherapy alone, the patients randomized to [rhuMAb HER2] and chemotherapy experienced a significantly longer time to disease progression, a higher overall response rate (ORR), a longer median duration of response, and a higher one-year survival rate.”).

Baselga '96 also discloses that efficacy is measured by the time to disease progression:

- “[O]ne patient had a complete remission and four had partial remissions”;
- “14 patients had stable disease at day 77. These patients entered a maintenance phase of weekly antibody administration until progression of disease”;
- “The median time to progression for the patients with either minor or stable disease was 5.1 months”;
- “One additional patient had a greater than 50% shrinking of her cancer that lasted more than 1 month”; and
- “[T]wo patients had regression of cancers in the liver and one patient achieved a pathologically-proven complete response of chest wall disease, which has persisted for 24 months.”

*See, e.g.*, Ex. 1013 at 12–13.

Or efficacy is measured by response rate. *See id.* at 12–14 (“Table 4. Response Rate Obtained With rhuMAb HER2 in 43 Assessable Patients”; Table 5; Fig. 2; “overall response rate of 11.6%”).

Pegram '98 further discloses that efficacy is measured by the time to disease progression, *see* Ex. 1014 at 14 (Table 5), or response rate, *see id.* at 8 (“Conclusion: The use of rhuMAb HER2 in combination with CDDP ... results in

objective clinical response rates higher than those reported previously for CDDP alone, or rhuMAb HER2 alone.”) (emphasis in original). *See also* Ex. 1002 ¶ 101.

(v) **Claim 30**

A comparison of claim 30 with claim 1 is shown below:

Claim 30	Claim 1
[preamble] A method for the treatment of cancer in a human patient comprising	[preamble] A method for the treatment of a human patient diagnosed with cancer characterized by overexpression of ErbB2 receptor, comprising administering an effective amount of an anti-ErbB2 antibody to the human patient, the method comprising:
[a] administering to the patient a first dose of an anti-ErbB2 antibody	[a] administering to the patient an initial dose of at least approximately 5 mg/kg of the anti-ErbB2 antibody; and
[b] followed by two or more subsequent doses of the antibody,	[b] administering to the patient a plurality of subsequent doses of the antibody in an amount that is approximately the same or less than the initial dose,
[c] wherein the subsequent doses are separated from each other in time by at least about two weeks, and	[c] wherein the subsequent doses are separated in time from each other by at least two weeks; and
[d] further comprising administering an effective amount of a chemotherapeutic agent to the patient.	[d] further comprising administering an effective amount of a chemotherapeutic agent to the patient.

Applying the BRI, the scope of claim 30 is broader than that of claim 1. *See* Ex. 1002 ¶ 105. Accordingly, for all of the reasons claim 1 is unpatentable, so is claim 30. Hospira therefore incorporates by reference its analysis for claim 1. *See* claim 1 (p. 29).

**(w) Claim 31**

i. **“The method of claim 30, wherein the first dose and a first subsequent dose are separated from each other in time by at least about three weeks.”**

For at least the reasons discussed above for claim 1, element [c] (p. 31) and claim 30 (p. 59), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill.

**(x) Claim 32**

i. **“The method of claim 30, wherein the first dose and subsequent doses are each from about 2 mg/kg to about 16 mg/kg.”**

For at least the reasons discussed above for claim 1, elements [a] (p. 31), [b] (p. 33) and [c] (p. 34), and claim 30 (p. 59), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. For example, all of the doses in Table A are each from about 2 mg/kg to about 16 mg/kg. *See* Ex. 1003 ¶ 65 (Table A).

**(y) Claim 33**

i. **“The method of claim 32, wherein the first dose and subsequent doses are each from about 4 mg/kg to about 12 mg/kg.”**

For at least the reasons discussed above for claim 1, elements [a] (p. 31), [b] (p. 33) and [c] (p. 34), and claim 30 (p. 59), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. For example, all the doses in Table A are each from about 4 mg/kg to about 12 mg/kg. *See* Ex. 1003 ¶ 65 (Table A).

**(z) Claim 34**

i. **“The method of claim 33, wherein the first dose and subsequent doses are each from about 6 mg/kg to about 12 mg/kg.”**

For at least the reasons discussed above for claim 1, elements [a] (p. 31), [b] (p. 33) and [c] (p. 34), and claim 30 (p. 59), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. For example, all the doses in Table A are each from about 6 mg/kg to about 12 mg/kg. *See* Ex. 1003 ¶ 65 (Table A).

**(aa) Claim 35**

**i. “The method of claim 30, wherein from about two to about ten subsequent doses of the antibody are administered to the patient.”**

For at least the reasons discussed above for claim 1, element [c] (p. 34) and claim 30 (p. 59), the method of this claim is at minimum obvious over the Herceptin Label, Baselga '96, and Pegram '98 in light of a POSITA's ordinary skill. In particular, and as discussed above, it would have been obvious to modify the rhuMAb HER2 dosing schedule taught by the Herceptin Label to a tri-weekly regimen. *See* claim 1, element [c] (p. 34). The Herceptin Label discloses that paclitaxel was administered for at least six cycles. *See* Ex. 1008 at 1. Since weekly rhuMAb HER2 was administered throughout the time that paclitaxel was administered during the clinical trial described in the Herceptin Label, a POSITA would understand that rhuMAb HER2 should also be administered throughout the time that paclitaxel is administered under a three week dose regimen. *See* Ex. 1002 ¶ 110. For this reason, it would have been obvious to a POSITA to administer rhuMAb HER2 for at least six cycles along with paclitaxel (i.e., loading dose followed by five maintenance doses).



**(bb) Claim 36**

i. **“The method of claim 30, wherein the two or more subsequent doses are separated from each other in time by at least about three weeks.”**

For at least the reasons discussed above for claim 1, element [c] (p. 34) and claim 30 (p. 59), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill.

**(cc) Claim 37**

i. **“The method of claim 30, wherein the two or more subsequent doses are each from about 2 mg/kg to about 16 mg/kg.”**

For at least the reasons discussed above for claim 1, element [b] (p. 33) and claim 30 (p. 59), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. For example, all of maintenance doses in Table A are each from about 2 mg/kg to about 12 mg/kg. *See* Ex. 1003 ¶ 65 (Table A).

**(dd) Claim 38**

i. **“The method of claim 30, wherein the two or more subsequent doses are each from about 4 mg/kg to about 12 mg/kg.”**

For at least the reasons discussed above for claim 1, element [b] (p. 33) and claim 30 (p. 59), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a

POSITA's ordinary skill. For example, all of maintenance doses in Table A are each from about 4 mg/kg to about 12 mg/kg. *See* Ex. 1003 ¶ 65 (Table A).

**(ee) Claim 39**

i. **“The method of claim 30, wherein the two or more subsequent doses are each from about 6 mg/kg to about 12 mg/kg.”**

For at least the reasons discussed above for claim 1, element [b] (p. 33) and claim 30 (p. 59), the method of this claim would have been at minimum obvious to a POSITA in light of the Herceptin Label, Baselga '96, Pegram '98 and a POSITA's ordinary skill. For example, all of the maintenance doses in Table A are each from about 6 mg/kg to about 12 mg/kg. *See* Ex. 1003 ¶ 65 (Table A).

**(ff) Claim 40**

i. **“The method of claim 30, wherein the chemotherapeutic agent is a taxoid.”**

For at least the reasons discussed above for claim 22 (p. 53) and claim 30 (p. 59), The method of this claim is at minimum obvious over the Herceptin Label, Baselga '96, and Pegram '98, in light of the POSITA's ordinary skill.

**X. SECONDARY CONSIDERATIONS DO NOT SUPPORT THE NONOBVIOUSNESS OF THE '379 PATENT CLAIMS**

There is no evidence of secondary considerations of non-obviousness of the claims of '379 patent. *See* Ex. 1002 ¶ 116. Should Genentech make allegations regarding secondary considerations, Petitioner will respond.

**XI. CONCLUSION**

Hospira respectfully requests IPR of the Challenged Claims.

\* \* \*

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Respectfully submitted,

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Petition for *Inter Partes* Review of U.S. Patent No. 7,371,379

**CERTIFICATE OF COMPLIANCE**

This Petition complies with the type-volume limitations as mandated in 37 C.F.R § 42.24, totaling 13,441 words. Counsel has relied upon the word count feature provided by Microsoft Word.

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Petition for *Inter Partes* Review of U.S. Patent No. 7,371,379

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 7,371,379, along with all exhibits and other supporting documents, were served on January 30, 2017, via FedEx Overnight delivery directed to the assignee for the patent at the following address:

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