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Articles

# CARVING OUT A BIOTECHNOLOGY RESEARCH TOOL EXCEPTION TO THE SAFE HARBOR PROVISION OF 35 U.S.C. § 271(E)(1)

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## *24 I. Introduction

The drug discovery process has radically evolved over the past two decades.[1] The main drive for this evolution is new drug discovery tools made possible by biotechnology.[2] For example, increasing understanding of signal transduction processes has provided the connection of disease phenotypes with precise cellular events.[3] The mapping of the human genome has provided tremendous insight into the genetic make-up of the cell and a great amount of information for finding potential drug targets.[4] Advances in technologies such as combinatorial chemistry and high throughput screening techniques have generated target leads at a much higher magnitude of scale and have allowed scientists to evaluate the functions of a huge number of potential drug targets.[5] These fundamental developments in biotechnology have created a substantial shift in the drug discovery process with increasing emphasis on early stage research and development activities.[6]

***25** The skyrocketing number of biotechnology ("biotech") companies has been fueled by the maturation of the biotech industry and the development of biotechnology over the past twenty years.[7] Although most biotech companies hope to ultimately transform into fully integrated drug developers, the majority of the companies do not have enough resources to reach that goal. For example, a company founded on a novel biological understanding may have suitable skills and abilities for drug discovery, but is not necessarily equipped for drug development. An even bigger hurdle is the cost of conducting a clinical trial, which is one of the most expensive stages of drug development.[8] As a result of these deficiencies, most biotech companies focus only on a single aspect of the drug discovery process and generate revenues primarily by licensing their research products or techniques to pharmaceutical partners.[9] As biotechnology becomes more advanced and complex, these companies have become a major and indispensable part of the research and development sector for drug discovery.[10]

Due to the risky and costly nature of the drug discovery process, gaining and protecting patent rights is vital to the continued success of a biotech company.[11] Patents serve as barriers to entry against competitors, allowing the company to maintain a dominant position in its respective field for a limited time.[12] Patents also help biotech companies obtain clients and collaborators by highlighting the uniqueness of their products or techniques.[13] Most importantly, a good patent portfolio is essential for securing investment in today's economic environment because investors need to be convinced that the companies they invest in have great potential ***26** for return and possess a unique edge over competitors.[14] Because the majority of biotech companies focus on the "drug discovery" aspect of drug development, these companies typically rely on patents that focus on research tools as well as drug products.

A safe harbor provision in the patent statute, 35 U.S.C. § 271(e)(1),[15] was originally enacted to permit generic drug developers to use patented drugs to gain regulatory approval for their generic products. Recent judicial interpretations of the provision, however, have broadened the scope of the provision to potentially exempt all uses of biotechnology research tools. This has caused tremendous concern about the value of biotechnology research tool patents and threatened the existence of small biotech companies.[16]

This article addresses some of the concerns and proposes a solution to the potential problems. The first part of the article reviews the legislative history of § 271(e)(1) and the judicial interpretation of § 271(e)(1). The second part of the article discusses the impact of the broadly interpreted § 271(e)(1), particularly in light of the recent holding in Bristol-Myers Squibb v. Rohne-Poulenc Rorer, Inc.[17] regarding biotechnology research tools. The final part of the article proposes carving out a biotechnology research tool exception to the § 271(e)(1) safe harbor as a solution to minimize the impact of § 271(e)(1) on

biotechnology research tools and biotech companies.

## *27 II. Legislative History and Judicial Interpretation of § 271(e)(1)

### A. Legislative History of § 271(e)(1)

1. The FDA approval process

The manufacturing and marketing of medical products in the United States is regulated by the Food and Drug Administration ("FDA").[18] Under the Federal Food, Drug, and Cosmetic Act ("FDCA"), a drug manufacturer must run an extensive investigation on its new drug in order to obtain FDA approval.[19] During a preclinical testing period, the drug manufacturer must generate in vitro and animal data about the drug, including chemical structure, safety, efficacy, and toxicology of the drug.[20] The preclinical testing period typically takes from thirty to fifty-seven months, and the data generated during this period are necessary for the approval of an application for an investigational new drug ("IND") status.[21] The IND approval marks the beginning of the clinical trial, which is generally divided into three phases.[22] Phase I of the clinical trial is designed to determine the safety of the drug.[23] Phase I trials typically involve a small test population of patients or normal volunteer subjects, and the trials typically take from ten to eighteen months.[24] Phase II of the clinical trial is designed to determine the effectiveness of the drug on the specific condition of interest.[25] Phase II trials are typically conducted on a larger population of adults who have the specific medical condition, and the trials may take from twenty-one to thirty-five months.[26] Phase III trials are performed after preliminary evidence suggesting effectiveness of the drug has been obtained. Phase III of the clinical trial is intended to gather additional information about the effectiveness and safety of the drug that is necessary for evaluating the overall benefit-risk relationship of the drug.[27] Phase III trials typically include hundreds or thousands of subjects, and the trials typically take from twenty-eight to fifty-five ***28** months.[28] Upon culmination of Phase III trials, the company can file a New Drug Application ("NDA").[29] The FDA scrutinizes the NDA extensively and decides whether the submitted data warrant marketing of the new drug.[30] Overall, it takes about seven to ten years to gain FDA approval of a new drug.[31]

Prior to the enactment of the Hatch-Waxman Act,[32] manufacturers of generic forms of a patented drug had to undergo the same lengthy regulatory approval process.[33] As a consequence, there was no immediate competition from generic drugs after the patent for the brand name drug expired, and the patent holder continued to enjoy de facto market exclusivity after the expiration of its patent.[34] On the other hand, because the patent holders had to go through a lengthy FDA approval process in order to bring their new drug products to the market, a large portion of their patent terms were sacrificed to the FDA approval process, which significantly shortened the length of the effective patent terms.[35]

2. Roche Products, Inc. v. Bolar Pharmaceutical Co., Inc.[36]

A conflict between generic and pioneer drug developers resulting from the lengthy FDA approval process is evidenced in Roche. Roche arose out of a dispute between Roche Products, Inc. ("Roche"), a large research-oriented pharmaceutical company, and Bolar Pharmaceutical Co. ("Bolar"), a manufacturer of generic drugs. In early 1983, Bolar became interested in marketing a generic drug equivalent of Roche's patented sleeping drug, Dalmane.[37] Bolar realized that "a generic drug's commercial success is related to how quickly it is brought to the market after a patent expires" and that the "approval for an equivalent of an established drug can take more than two years."[38] Bolar did not wait for Roche's patent to expire before ***29** taking steps to obtain FDA approval of its generic drug.[39] Instead, Bolar began to perform bioequivalency and biostability tests on Roche's patented drug during the last six months of the patent term.[40] In response, Roche sued Bolar in district court to enjoin Bolar from using its patented drug.[41] The district court found that Bolar's use of the patented drug was de minimis and experimental and thus not an infringement of Roche's patent.[42]

On appeal, the Federal Circuit addressed Bolar's arguments that (1) its use of the patented drug was protected by the common law experimental use exception and (2) public policy favored generic drugs and thus mandated the creation of a new exemption to activities related to drug testing required by the FDA.[43]

In response to Bolar's alternative public policy argument, the Federal Circuit noted that two significant distortions in patent law existed as a result of the FDA regulation.[44] First, the court noted that the delay in FDA approval significantly shortened the length of the effective term of a patent.[45] Second, the court noted Bolar's argument that pioneer drug manufacturers

enjoyed a longer period of monopoly by preventing generic drug developers from using the patented drugs for testing purposes until after the patents expired.[46] Despite its recognition of these issues the court stated that:

> [i]t is the role of Congress to maximize public welfare through legislation. Congress is well aware of the economic and societal problems which the parties debate here, and has before it legislation with respect to these issues. No matter how persuasive the policy arguments are for or against these proposed bills, this court is not the proper forum in which to debate them.[47] ***30** Consequently, the Federal Circuit reversed the district court's decision, and held that Bolar's use of Roche's patented drug for testing purposes constituted patent infringement.[48]

3. The Hatch-Waxman Act

Following the Roche decision, both pioneer and generic drug developers appealed to Congress for a remedy for the two distortions resulting from the FDA approval process recognized by Roche.[49] Pioneer drug developers lobbied for extended patent terms in order to compensate for the time they spent on the FDA approval process.[50] Generic drug developers, on the other hand, argued that they should gain access to the FDA approval process before the pioneer drug patents expired so that generic products could be brought to the market immediately after expiration of the patents.[51] In response to these lobbying efforts, Congress enacted the Drug Price Competition and Patent Term Restoration Act of 1984, popularly known as the Hatch-Waxman Act,[52] in an attempt to create a compromise between the conflicting interests of pioneer drug developers and generic drug developers.[53]

On September 24, 1984, the Hatch-Waxman Act was signed into law.[54] The Act has two titles. Title I of the Act modifies the FDCA[55] and provides an Abbreviated New Drug Approval ("ANDA") procedure whereby generic drug firms can introduce copies of pioneer drugs to the marketplace without repeating expensive and lengthy clinical trials.[56] Title II of the Act modifies the Patent Code by providing both a safe harbor provision to the general prohibition against patent infringement and a patent term extension provision.[57]

The patent term extension provision in Title II of the Hatch-Waxman Act is encoded in 35 U.S.C. § 156. This provision arose out of Congress's recognition that the FDA premarket approval requirements reduced the effective patent term of ***31** pioneer drug developers' inventions.[58] It permits an extension of the original term of a patent if certain mandatory conditions are met.[59] According to the statute, the product types eligible for patent term extension include "(A) [a] drug product . . . [and] (B) [a]ny medical device, food additive, or color additive subject to regulation under the Federal Food, Drug, and Cosmetic Act."[60]

The safe harbor provision of Title II of the Hatch-Waxman Act is encoded in 35 U.S.C. § 271(e)(1). Through the enactment of the safe harbor provision, Congress overruled Roche's holding that a generic drug developer's use of a patented drug for the FDA approval process constituted patent infringement.[61] Section 271(e)(1) states,

> It shall not be an act of infringement to make, use, offer to sell, or sell within the United States or import into the United States a patented invention . . . solely for uses reasonably related to the development and submission of information under a Federal law which regulates the manufacture, use, or sale of drugs . . . .[62] Congress hoped this change would result in less expensive generic equivalents of brand name drugs becoming available to consumers eighteen months to two years earlier than under the system established by Roche.[63]

Congress also hoped the Hatch-Waxman Act would minimize the amount of time between the expiration of a patent on a brand name drug and the availability of approved generic equivalents, while continuing to protect the needs of pioneer drug developers and their incentives to innovate.[64] By creating an abbreviated application process and permitting use of patented drugs for regulatory approval of generic drugs, the Hatch-Waxman Act ensures that generic drugs can be marketed immediately after any relevant patents expire.[65] In addition to partial restoration of time lost on the patent term while the product is awaiting pre-marketing approval, the Act creates an incentive for pioneer drug developers to spend more money and effort ***32** in research and development of new product.[66] The Hatch-Waxman Act is, therefore, a carefully drafted statute that balances the interests of both pioneer and generic drug developers.

**B. Judicial Interpretation of § 271(e)(1)**

The legislative history of § 271(e)(1) suggests that the purpose of the safe harbor provision is to permit generic drug developers to use patented drugs to gain regulatory approval of their generic products. However, courts interpreting § 271(e)(1) have consistently broadened its intended scope.[67] Judicial interpretations of § 271(e)(1) have focused primarily on two key aspects of the statute: 1) the scope of patented inventions and products within the meaning of the statute and 2) the kind of activities that are "solely for uses reasonably related" to development and submission of information for FDA approval.[68]

1. The scope of patented inventions and products within the meaning of § 271(e)(1)

i) Eli Lilly & Co. v. Medtronic, Inc.[69]

The Eli Lilly Court addressed the scope of patented inventions and products within the meaning of § 271(e)(1). Eli Lilly & Co. ("Eli Lilly") owned a patent on a medical device called an implantable heart defibrillator.[70] Medtronic, Inc. ("Medtronic") argued that §271(e)(1) allowed the use of Eli Lilly's patented invention for development and submission of information for FDA approval of their new implantable heart defibrillator.[71] The district court rejected Medtronic's argument that its activities were exempt under § 271(e)(1) and held that § 271(e)(1) extended only to drug products, not medical devices.[72] The Federal Circuit reversed the district ***33** court's decision and held that both drugs and medical devices may fall within the safe harbor of § 271(e)(1).[73]

The Supreme Court granted certiorari, and, in a 6-2 decision, affirmed the Federal Circuit's decision.[74] Justice Scalia, writing for the majority, stated "the phrase 'patented invention' in § 271(e)(1) is defined to include all inventions, not drug-related inventions alone."[75] The Court reasoned that if Congress intended to refer only to patented drugs in the statute, then there were "infinitely more clear and simple ways of expressing that intent" and "it is hard to believe the convoluted manner [Eli Lilly] suggests was employed would have been selected."[76]

The Court further rejected Eli Lilly's contention that the statutory phrase "a Federal law which regulates the manufacture, use, or sale of drugs" mandates that the statute cover only drug products.[77] The Court held that the phrase "more naturally summons up the image of an entire statutory scheme of regulation."[78] Accordingly, the Court held that, as far as the text was concerned, it was more natural to read the statute to broadly permit Medtronic's medical devices.[79]

Although the Supreme Court relied heavily on the statutory language in its analysis, it acknowledged that the statute was "not plainly comprehensible on anyone's ***34** view."[80] Accordingly, the Court went on to examine the structure of the Hatch-Waxman Act as a whole. The Court recognized that the Act was designed to respond to two unintended distortions produced by the FDA approval process: erosion of the pioneer drug developer's patent term and delay of market entry by generic drug developers.[81] The Court reasoned that because medical devices were subject to the same distortions as drugs, they should also enjoy the same benefits of the Hatch-Waxman Act.[82] The Court further noted that the patent term extension provision in §156 allows patent term extensions for both drugs and medical devices.[83] The Court reasoned that because § 271(e)(1) and § 156 were part of a single legislative package, the Hatch-Waxman Act, the scope of § 271(e)(1) should be coextensive with that of § 156.[84] Based on these analyses, the Court held that medical devices were covered by § 271(e)(1).

ii) Federal Circuit cases interpreting Eli Lilly

The FDCA classifies medical devices into three categories based on the risk posed by their uses.[85] Class III medical devices, including the implantable heart defibrillators involved in Eli Lilly, are subjected to the most rigorous premarketing approval process and fall within the scope of § 156.[86] Class I and Class II medical devices, on the other hand, are subjected to an expedited approval process and do not fall within the scope of § 156.[87] While the Court in Eli Lilly held that Class III medical devices were covered by § 271(e)(1), it left the question of whether Class I and Class II medical devices are also covered by § 271(e)(1) unanswered.

In the Abtox line of cases the Federal Circuit answered that question. In the district court Abotx, Inc. ("Abtox") accused Exitron Corp. ("Exitron") of infringing ***35** its patent directed to a plasma sterilization device, which, Abtox argued, was "likely to be deemed a Class I or Class II device by the FDA."[88] Abtox, owner of the disputed patent, argued that § 271(e)(1) should not apply to Class I or Class II devices because they were not covered by § 156.[89] Abtox further reasoned that because Class I and Class II devices were subject to an expedited approval process, there is no delay of market entry by would-be competitors, and consequently, no need to invoke § 271(e)(1) to remedy such a delay.[90] The district court rejected Abtox's arguments, finding that § 271(e)(1) applies to all three classes of medical devices.[91]

On appeal, the Federal Circuit noted that this case presented "a novel question of law," and required an evaluation of the Supreme Court's interpretation of the statute in Eli Lilly.[92] The court then drew a distinction between the "broad holding" of Eli Lilly, that all products subject to approval under the FDCA fall within the scope of the § 271(e)(1) safe harbor, and the Supreme Court's "narrower justification," that § 271(e)(1) should be interpreted symmetrically with § 156.[93] The court acknowledged that, under Eli Lilly's narrower justification based on statutory symmetry, only Class III devices fell within the scope of the statute.[94] The court nevertheless concluded that it was bound by Eli Lilly's broad holding, "which remains in force despite a potential conflict with its own narrower reasoning" and emphasized that the statute "makes no distinctions based upon the different FDA classes of medical devices or drugs."[95] The court further pointed out the Supreme Court's recognition of instances "in which a patentee will obtain the advantage of the § 156 extension but not suffer the disadvantage of the § 271(e)(1) noninfringement provision, and others in which he will suffer the disadvantage without the benefit."[96] ***36** Accordingly, the court held that Class I and Class II medical devices are covered by § 271(e)(1).[97]

iii) The Broad Scope of "Patented Inventions"

Both the Eli Lilly and Abtox series of cases involved patented medical devices. Because the patented invention was identical to the product subject to government approval under the FDCA in these cases, the courts did not address the question of whether a patented invention that is neither a drug nor a medical device is covered by § 271(e)(1). Prior to Bristol-Myers Squibb, only one district court has encountered this question.[98] In Infigen, Inc. v. Advanced Cell Technology, Inc.,[99] the disputed patents were directed to a process for activating bovine oocytes and to a culture media for growing bovine oocytes, respectively.[100] This combined patented process and culture media can be used to create transgenic cattle.[101] Neither the culture media nor the resultant transgenic cattle would be subject to the FDA approval process; however, the ultimate goal of making such transgenic cattle was to produce genetically altered milk, which would require FDA approval prior to marketing.[102] The district court refused to apply § 271(e)(1) to exempt the alleged use of the patented inventions, stating there were no prior cases which held that the scope of § 271(e)(1) was broader than that of § 156.[103] Because neither the patented process nor the patented culture media fit into any of the categories listed in § 156, the court found the inventions fell outside of the scope of § 271(e)(1).[104]

In reaching its conclusion, the Infigen court misread Abtox II as adopting the narrower justification of Eli Lilly.[105] As a result, this case has little precedential ***37** value, and merely evidences the futile effort of a district court to limit the impact of § 271(e)(1) on non-drug related patented inventions.

2. "Solely for Uses Reasonably Related"

i) Early Cases Focusing on "Solely"

Early cases seeking to interpret the term "solely for uses reasonably related" have relied heavily on the legislative history of the statute and have limited the application of § 271(e)(1) to use of an invention for the sole purpose of obtaining FDA approval. In Scripps Clinic & Research Foundation v. Genentech, Inc.,[106] for example, Genentech made and used Scripps's patented protein for the purposes of producing bioequivalency data required by the FDA, developing a method for commercial scale production of the protein, and preparing for European patent application.[107] The district court rejected Genentech's argument that its use of the protein was exempt under § 271(e)(1).[108] The court reasoned that the legislative history made it clear that the only acceptable use of the patented invention under § 271(e)(1) was bioequivalency testing for FDA approval.[109] Because Genentech's use of the protein was not "solely for the purpose" of development and submission of data to the FDA, the court concluded that Genentech's use of Scripps's patented protein constituted infringement.[110] Similarly, in Ortho Pharmaceutical Corp. v. Smith,[111] the district court held that § 271(e)(1) was limited to permitting generic manufacturers to establish the bioequivalency of generic drugs and did not permit any other collateral uses such as using the FDA data to promote or market the product.[112]

ii) More Recent Cases Focusing on "Reasonably Related"

Five years later, the Northern District of California implicitly reversed its holding in Scripps.[113] In Intermedics, the plaintiff contended that § 271(e)(1) did ***38** not exempt the making, selling, or using of an infringing device in connection with supplying data to the FDA if the manufacturer intends to commercialize the device.[114] The court rejected the plaintiff's argument, stating that "the availability of the exemption turns on actual uses, not the 'purposes' of the party's doing the using."[115]

The court further held that one should instead ask whether the activities were reasonably related to obtaining FDA approval.[116] The court reasoned that Congress used the phrase "reasonably related" in order to "communicate its intention that the courts give parties some latitude in making judgments about the nature and extent of the otherwise infringing activities they would engage in as they sought to develop information to satisfy the FDA."[117] The court indicated the appropriate question to ask is:

> Would it have been reasonable, objectively, for a party in defendant's situation to believe that there was a decent prospect that the "use" in question would contribute (relatively directly) to the generation of kinds of information that was likely to be relevant in the processes by which the FDA would decide whether to approve the product.[118]

Applying this test, the court found the defendant's activities were either reasonably related to obtaining FDA data, and thus fell within § 271(e)(1) safe harbor provision, or the activities did not constitute infringement under § 271(a).[119]

The Federal Circuit affirmed the district court's decision in an unpublished opinion, stating "[r]eliance on Section 271(e)(1) is not precluded by manifestation of an intent to commercialize upon FDA approval."[120] In other words, conduct that is "reasonably related" to securing FDA approval does not lose the immunity if that same conduct has other purposes.

The Federal Circuit further clarified its interpretation of the "solely for uses reasonably related" language in Teletronics Pacing Systems, Inc. v. Ventritex, ***39** Inc.[121] In Teletronics, the defendant Ventritex conducted clinical trials on its allegedly infringing devices in order to obtain FDA approval, displayed those devices at medical conferences, and disseminated the clinical trial data for fund raising purposes.[122] The district court followed Intermedics and dismissed the case, holding that such activities were exempt under § 271(e)(1).[123]

On appeal, the Federal Circuit conducted a two-step analysis of Ventritex's activities. It first determined whether they fell within the definition of infringement set forth in §271(a), and then determined whether the activities fell within the § 271(e)(1) safe harbor.[124] The court found that the only alleged infringing activity, that is, Ventritex's demonstration of its devices at medical conferences, was exempt under § 271(e)(1).[125] Such activity was reasonably related to obtaining FDA approval because Ventritex had to find qualified investigators at medical conferences to conduct clinical trials.[126]

As for activities such as using the clinical data for fundraising purposes and presenting clinical data at medical conferences, the court found that the activities were either not acts of infringement under § 271(a), or exempt by § 271(e)(1).[127] The court noted that Ventritex's dissemination of its clinical trial data did not turn its otherwise exempt uses of the patented device into acts of infringement.[128] The court reasoned that there was no such "repeal" provision in the statute and stated that "if the language is clear, the plain meaning of the statute will be regarded as conclusive."[129] The court further reasoned that the Congressional intent "to allow competitors to be in a position to market their products as soon as it was legally permissible" was sufficiently broad to encompass fundraising activities.[130] The court refused to impose any limitation on collateral uses of clinical data initially developed for submission to the FDA and noted that preventing competitors from ***40** using their clinical data for "fundraising and other business purposes" would inhibit their abilities to compete in the market place.[131]

Since Teletronics, the Federal Circuit has consistently applied § 271(e)(1) to exempt a broad range of activities. In the Abtox cases, for example, the defendant allegedly used a patented medical device for the primary purpose of promoting and marketing the devices.[132] Although the test was limited to collecting test data that would be necessary for FDA approval, defendant had not yet applied for FDA approval at the time of the alleged infringement.[133] The Federal Circuit found that the defendant's activities were exempt under § 271(e)(1). The court stated that as long as the use is reasonably related to collecting test data necessary for FDA approval, a court "does not look into the underlying purposes or attendant consequences of the activities."[134]

iii) The Broad Scope of "Reasonably Related" Activities

The Federal Circuit has made it clear that the underlying purpose of the alleged infringer's activities was irrelevant to the analysis of § 271(e)(1).[135] That is, the phrase "solely for uses reasonably related" was not equivalent to the phrase "solely for purposes reasonably related." The Federal Circuit has not yet had an opportunity to define the scope of activities that are "solely for uses reasonably related" to FDA approval.[136] Furthermore, the reasoning in the Federal Circuit cases has shifted away from the legislative history of § 271(e)(1).[137] District courts are therefore provided with little guidance as to how the line

should be drawn between uses that are reasonably related to FDA approval and those that are not.

***41** a) Amgen, Inc. v. Hoechst Marion Roussel, Inc.[138]

Prior to Bristol, perhaps the broadest reading of § 271(e)(1) could be found in Amgen. In that case, Amgen sued Transkaryotic Therapies, Inc. ("Transkaryotic") and its collaborator Hoechst Marion Roussel, Inc. ('Hoechst '), who were involved in a number of activities that allegedly infringed Amgen's patent on the protein EPO.[139]

In addressing the issue of whether Transkaryotic and Hoechst's uses of EPO were reasonably related to FDA approval and thus exempt under § 271(e)(1), the district court first cited Teletronics and Abtox II for the proposition that "[u]ses, such as animal testing, human clinical trials, or chemical composition analysis, may be related to FDA approval, and yet be conducted for purposes other than, or in addition to, obtaining FDA approval."[140]

The court then went on to assess the scope of "reasonably related" activities. The court acknowledged that even though the Federal Circuit had yet to squarely address this issue, it was significant that the Federal Circuit has adopted the test laid out in Intermedics and cited that case with approval.[141] The court found that the Intermedics test was appropriate because the test's objective inquiry acknowledged the "inherently unpredictable nature of the FDA approval process."[142] That is, under the Intermedics test, an activity could fall within the scope of § 271(e)(1) "even if the results were later discarded or abandoned for reasons unrelated to FDA approval."[143]

Applying the Intermedics test, the court found a number of the defendants' activities fell within the scope of § 271(e)(1). For example, Hoechst exported a quantity of EPO to its Japanese affiliate for use as a reference standard in evaluating and improving an alternative manufacturing process.[144] The court found that although Hoechst had not yet sought FDA approval of the alternative manufacturing process, it was reasonable to assume that such a process would require a separate ***42** FDA approval.[145] The court further reasoned that the FDA guideline supported the use of a reference sample from one process to evaluate an alternative process.[146] Accordingly, the court found that Hoechst's export of EPO to Japan was reasonably related to the development and submission of data for FDA approval.[147]

Defendants also engaged in an in vivo purity test of the product.[148] Defendants did not submit the in vivo purity test data to the FDA--they never intended to do so--because the dosage used in the test was unacceptable to the FDA.[149] Nevertheless, the court agreed with the defendants that the test was reasonably related to the FDA approval process because it was "conducted to confirm the purity and safety of [the product] for use in clinical trials, which would produce data that would itself be submitted to FDA."[150] The court reasoned that "so long as a use is calculated to lead to relevant information for submission, that use falls within the section 271(e)(1) exemption."[151]

b) Nexell Therapeutics v. AmCell Corp.[152]

In Nexell I the plaintiff owned a patent on a method to purify human stem cells, and the defendant was pursuing FDA approval of a cell separation device that used the patented method.[153] In an effort to recruit clinical investigators, the defendant allegedly advertised the devices on its website, in medical and scientific journals, at academic conferences, and at trade shows.[154] Defendant also sent information packets about its devices to clinicians.[155] Defendant claimed that its activities were exempt under § 271(e)(1) and moved for summary judgment of noninfringement.[156]

The district court initially held that it would defer to the FDA for findings on the issue of whether the defendant's uses of the patented method were reasonably ***43** related to FDA approval.[157] The court reasoned that the FDA was "in a better position than the courts to determine what activities [were] reasonably related to obtaining regulatory approval because the FDA established regulations to oversee the development and testing of drugs and medical devices."[158] The court then granted the defendant's motion for summary judgment, "with the understanding that the judgment will not preclude [the plaintiff] from revisiting the issues in the future."[159]

Because the language of the Nexell I opinion was ambiguous, the parties disagreed about the exact holding of the court.[160] The defendant argued that the court, in granting its motion for summary judgment, had already deferred to the FDA and made the determination that its alleged activities were reasonably related to obtaining FDA approval and thus exempt.[161] The plaintiff, on the other hand, contended that the court did not rule in the defendant's favor, but was merely deferring to the FDA for a resolution of the "reasonably related" issue.[162] The plaintiff wrote a letter to the FDA and asked it to clarify which of the defendant's activities were reasonably related to FDA approval.[163] The FDA declined to make such finding and stated

that it was not the FDA's duty to construe patent law in private litigations.[164] The FDA further noted that the standard the FDA used to evaluate the defendant's conduct was different from the standard of § 271(e)(1).[165]

Realizing the ambiguity of its previous opinion, the court issued a modified opinion a year later.[166] In the modified opinion, the court explained that it did not intend for parties to solicit an advisory ruling from the FDA.[167] Rather, the court was merely underscoring the important role of the FDA in ensuring that the activities of the party seeking approval were reasonably related to clinical trials.[168] The court adopted the Intermedics test and held that if a party objectively believed that ***44** its activities could generate information that is likely to be relevant to the FDA approval process, the court would not find otherwise except in extreme cases.[169] That is, unless it was clear that the alleged activities were outside of the FDA approval process, or alternatively, the FDA itself had affirmatively indicated that a party's activities were not reasonably related to obtaining its approval, the court would pay "a large degree of deference" to the party's activities.[170] The court reasoned that deference to activities "conducted under the auspices of FDA-approved clinical trials" was warranted because, as a policy matter, prohibiting such activities "would chill parties from engaging in the very pre-approval testing that Congress sought to encourage."[171]

c) Wesley Jessen Corp. v. Bausch & Lomb, Inc.[172]

The Wesley Jessen court addressed the question of whether post-approval studies can be reasonably related to development and submission of data for FDA approval. The district court answered the question in the affirmative.[173] In Wesley Jessen, the defendant's allegedly infringing soft-lens contact products were approved by the FDA for thirty-day extended wear, conditioned on the defendant conducting a post-approval study to collect follow-up data on the adverse effects associated with using the products.[174] The district court found that the defendant's activities pursued in carrying out the post-approval study were exempt by § 271(e)(1).[175] The court reasoned that § 271(e)(1) did not make a distinction between pre-approval and post-approval activities.[176] Furthermore, the court noted that exempting the defendant's post-approval activities was consistent with the purpose of § 271(e)(1) to allow a drug developer to engage in commercial activities as soon as the relevant patent expires.[177]

iv) Activities That May Fall Outside of § 271(e)(1)

The few cases that have recognized the limit of § 271(e)(1) and declined to apply it all involved commercial activities. It is generally accepted that commercialization ***45** of the allegedly infringing product would take the activities outside of the scope of the § 271(e)(1) safe harbor.[178] However, courts have had a hard time drawing the line between impermissible commercialization of the product and permissible use of the patented invention for obtaining FDA approval. This section addresses two situations when courts have sought to draw such a line: dual uses and stockpiling products.

a) Dual Uses

In American Standard v. Pfizer,[179] the patent in dispute was directed to a prosthetic device that can be fixated to a patient's bone either by bone cement or by bone tissue ingrowth. In conjunction with a clinical trial for FDA approval of its device, the defendant made its allegedly infringing prosthetic devices for investigational use.[180] The devices for such investigational use will be fixated to a patient's bone by bone tissue ingrowth. In the meanwhile, the defendant also manufactured and marketed the same allegedly infringing prosthetic devices, although the marketed devices' labels indicated the devises were to be fixated by bone cement only.[181]

The district court held that because there was no difference between the products made for investigational use and those made for sale, that is, the devices were capable of being fixated both by bone tissue ingrowth and by bone cement, the defendant's devices were not made "solely for uses reasonably related" to the development and submission of information to the FDA.[182] Accordingly, the court broadly held that neither the devices made for investigational use nor those made for sale were exempt by § 271(e)(1).[183] The court opined that it "strained the bounds of logic" for the alleged infringer to stay under the protective umbrella of § 271(e)(1) when it was manufacturing infringing products for commercial use as well.[184] It then took one step back from its broad holding, stating that even if ***46** § 271(e)(1) could be construed to exempt the devices made for investigational use, it would clearly not exempt those made for sale.[185]

American Standard was decided at the time when the majority of the courts held that § 271(e)(1) was inapplicable if the alleged infringer used the patented invention for non-FDA purposes.[186] Nevertheless, American Standard was not overruled by later cases seeking to expand the scope of § 271(e)(1).[187] Under current judicial interpretation of § 271(e)(1), the fact that

the allegedly infringing activities were conducted for purposes in addition to, or other than, obtaining FDA approval was irrelevant for the § 271(e)(1) analysis. American Standard, by contrast, can be understood as taking the position that if the defendant has engaged in non-FDA uses of the patented invention, its activities would not be exempt under § 271(e)(1). Thus, American Standard seems to suggest that the term "solely," as a modifier of "uses" in the statute, may still have a meaning.

Wesley Jessen, however, may have cast doubt on the broad holding of American Standard. Wesley Jessen held that the defendant's post-approval activities pursuant to a conditional FDA approval for its soft-lens contact product for thirty-day extended wear were reasonably related to FDA approval.[188] Notably, the defendant had also obtained unconditional FDA approval of the same soft-lens contact product for one-day or seven-day wear.[189] Since the products the defendant made were capable of both uses that are reasonably related to the FDA approval (for thirty-day extended wear) and uses that are not reasonably related to the FDA approval (for one-day or seven-day wear) one could argue that under American Standard the products were not made and sold "solely for uses reasonably related" to development and submission of information for FDA approval. The Wesley Jessen court, however, did not follow this reasoning.[190] Instead, the Wesley Jessen court stated that the fact "defendant does have other approved uses for its product does not preclude defendant from seeking approval for the full range of uses for its product within the bounds of § 271(e)(1)."[191]

***47** Given the trend among the courts to expand the scope of § 271(e)(1), one may wonder whether the broad holding of American Standard remains good law. No matter how American Standard stands, it is clear that where the alleged infringer's "uses" has both FDA-related and non-related components, those uses that are not reasonably related to the FDA approval process are not protected by § 271(e)(1).[192]

b) Stockpiling Products

The legislative history of the Hatch-Waxman Act states that § 271(e)(1) "does not permit the commercial sale of a patented drug" apart from the sale of research quantities.[193] Courts are inconsistent, however, in drawing the distinction between "commercial sale" and "sale of research quantities."

In Biogen, Inc. v. Schering AG,[194] for example, the plaintiff sought a declaratory judgment that its drug product did not infringe a particular patent. At the time of the lawsuit, the plaintiff had spent more than $150 million in developing its drug product and over $24 million stockpiling and preparing to sell the drug in anticipation of the FDA approval. The district court found that the plaintiff was not immune under § 271(e)(1); therefore, the court had subject matter jurisdiction over a declaratory judgment.[195] The court reasoned that the plaintiff's substantial and expensive effort to produce its drug for sale in anticipation of FDA approval removed it from the safe harbor.[196]

By contrast, the court in NeoRx Corp. v. Immunomedics, Inc.[197] found that the defendant's manufacturing and stockpiling of "commercial quantities" of its allegedly infringing products were exempt by § 271(e)(1) and granted the defendant's motion for summary judgment. The court reasoned that the FDA required applicants to demonstrate their ability to manufacture commercial-scale batches of the products.[198] The court further stated that because how much data the FDA would ***48** need for approving its product was unforeseeable, it was reasonable and prudent for the defendant to manufacture a large scale of products.[199]

Notably, in Biogen, and all the other cases that declined to apply § 271(e)(1) to stockpiling activities, it was the alleged infringer who argued that it was not exempt by § 271(e)(1) and thus had standing to sue for declaratory judgment. Accordingly, NeoRx, rather than Biogen, presented a better set of facts for drawing a distinction between impermissible commercial sale and permissible sale of research quantities.[200] Unfortunately, NeoRx provided little guidance for determining a line of distinction. Moreover, the reasoning in NeoRx, in conjunction with the Wesley Jessen holding that post-approval activities can still fall within the scope of § 271(e)(1), makes it extremely uncertain as to the outer boundary of § 271(e)(1) at the commercial end of drug development.

## III. Impact of § 271(e)(1) on Biotechnology Research Tools

### A. Definition of Biotechnology Research Tools

Before discussing the impact of § 271(e)(1) on biotechnology research tools, it is necessary to first define the term. Because biological cascades and processes are interconnected and interdependent with each other,[201] a biotechnological discovery may serve dual roles as a valuable end product for sale to customers and a basic tool for further research.[202] For example, a candidate pharmaceutical may be viewed as an end product for immediate development, yet it may also be used to facilitate future discovery of new drug candidates. Even basic biological discoveries such as DNA sequences, cell lines, animal models, or laboratory techniques used to create or identify these discoveries, might ultimately prove to be therapeutic or diagnostic products in their own rights.[203] Therefore, it makes more sense to define biotechnology research tools by use rather than product.

In this article, "biotechnology research tool" refers to "a tool used in development of drug products, therapeutic devices or diagnostic methods that do not themselves physically incorporate the tool."[204] The term will be used to embrace ***49** the full range of resources that biologists use in the drug discovery process, including: cell lines, monoclonal antibodies, reagents, animal models, growth factors, combinatorial chemistry libraries, clones and cloning tools, methods, laboratory equipment and machines, databases, and computer software.[205]

### B. Bristol-Myers Squibb v. Rhone-Poulenc Rorer, Inc.[206]

Bristol-Myers Squibb involves a patent dispute between two large pharmaceutical companies, Bristol-Myers Squibb ("Bristol") and Rhone-Poulenc Rorer, Inc ("RPR"). RPR owned a patent that disclosed and claimed intermediate compounds for the synthesis of Taxol, a prominent anti-cancer drug.[207] In an attempt to discover a second-generation drug that could replace Taxol as soon as RPR's exclusive right to market Taxol expired, Bristol used RPR's patented intermediate compounds, along with thousands of other compounds, as a starting point to screen for Taxol analogs.[208] Bristol also developed a structure-activity relationship ("SAR") database based on the in vivo and in vitro data collected during its research using thousands of compounds, including the Taxol intermediates.[209] RPR moved for summary judgment on the ground that Bristol's use of the intermediate compounds infringed its patent.[210] The district court for the Southern District of New York found that Bristol's activities were exempt under § 271(e)(1) and denied RPR's motion.[211]

***50** 1. "Patented Invention"

The court first addressed the issue of whether RPR's intermediate compounds were "patented inventions" within the meaning of § 271(e)(1). The court stated that nothing in the statute indicated that Congress intended to restrict the scope of the term "patented invention," and thus the term should be interpreted consistently with other subsections of § 271, for example, § 271(a) to refer to all patented inventions.[212] The district court also noted that the Federal Circuit found that Eli Lilly, a Supreme Court decision, had defined the term to include all inventions.[213] The court cited Abtox II and Chartex as clear Federal Circuit precedent for this proposition.[214] Accordingly, the court found that RPR's intermediate compounds were "patented inventions" within the meaning of § 271(e)(1).[215]

In a long, elaborate footnote, the court rejected RPR's argument that such a broad interpretation of § 271(e)(1) to encompass all patented inventions was contrary to the legislative history.[216] The court found that the legislative history contained contrary indicia and was insufficient to outweigh the plain language of the statute.[217] The court further emphasized that this interpretation of § 271(e)(1) was consistent with the legislative purpose of encouraging innovation and allowing new drug products to be brought to market in a quicker fashion.[218] The court also found that an appropriate balance is maintained because potential competitors would be prohibited from entering the commercial market until after the expiration of the patent.[219]

2. "Solely for Uses Reasonably Related"

After it found that RPR's intermediate compounds were the kind of "patented inventions" that fall within the scope of § 271(e)(1), the court went on to address the issue of whether Bristol's use of the intermediate compounds as a starting point to screen for drug candidates was reasonably related to the development and submission of information to the FDA.

***51** The court recognized that the Intermedics test was the controlling legal standard.[220] Applying the Intermedics test, the court found that Bristol's screening activities were "solely for uses reasonably related" to the development and submission of data for FDA approval because it was objectively reasonable for a party in Bristol's position to believe that there was a "decent prospect" that its use of the intermediate compounds in the screening would contribute more or less directly to the

generation of information sought by the FDA.[221] The court rejected RPR's argument that Bristol's use of the intermediate compounds in "early stage research to develop numerous . . . analogs, each of which ha[d] only a small probability of being sufficiently useful to warrant an application to the FDA," did not generate "a 'decent prospect' that a FDA filing will result" from each specific use of the intermediate compounds.[222] The court reasoned that the "decent prospect" referred to in the Intermedics test was the likelihood of the information generated being relevant to information sought by the FDA, rather than the likelihood of submission of the new product to the FDA.[223]

The court further rejected RPR's contention that § 271(e)(1) should only apply after a particular drug candidate was selected or filed with the FDA. The court stated that RPR's interpretation was contrary to the case law, which held that the use of a patent is protected as long as it is objectively likely to generate useful information, even if the end result of the use was later discarded or abandoned.[224] The court further noted that adopting RPR's interpretation "would have the effect of preventing competitors from experimenting with patented invention in order to create new or improved drugs" and "would thus seem to negate Congress' intent to have new drugs come to market without delay upon expiration of a patent."[225] The court reasoned that if the exemption were to apply only after a drug candidate had been identified, the exemption would never be reached because the underlying preliminary ***52** research and development work leading to that candidate would never be undertaken.

The court echoed the position of the Special Master's Report and concluded that the court should consider uses of the patented intermediate compounds as reasonably related to an FDA application, including:

> (1) even where each such use does not directly result in an FDA application being filed, so long as the use was made in order to determine whether or not an application for approval would be sought; and (2) even though each such use of the patented intermediates may not directly yield information that could be submitted to the FDA, but relates to a preliminary activity that may facilitate or be useful in generating information that could be submitted to the FDA.[226] Having found that Bristol's research on RPR's intermediate compounds was reasonably related to the development and submission of information to the FDA, the court held that its subsequent use of the research data to generate an SAR database was also exempt under § 271(e)(1).[227] The court similarly found that preparing and filing patent applications for its new analogs did not constitute infringement.[228]

3. Bristol-Myers Squibb Extended the Reach of Legal Precedents

Bristol-Myers Squibb significantly extended the application of § 271(e)(1) with regard to the "patented invention" issue. Most of the prior cases addressing the issue involved patented drugs or medical devices. Bristol-Myers Squibb is the first case to apply § 271(e)(1) to patented research tools that are only remotely related to the FDA approval process. Furthermore, in the majority of prior case law, the product seeking FDA approval was identical to the patented invention, or would at least fall within the claimed scope of the allegedly infringed patent. In Bristol-Myers Squibb, however, the developed product resulting from the use of the patented intermediate compounds was different from the patented intermediate compounds, and, thus, could possibly not infringe the patent. Therefore, Bristol-Myers Squibb significantly expanded the scope of § 271(e)(1) to include patented research tools, which may have no relationship to the product seeking FDA approval besides the fact that they have been used during the research leading to the identification of the product.

Apparently, Congress intended § 271(e)(1) to cover only patented inventions that are directly related to the product seeking government approval.[229] However, ***53** such a requirement is not a provision of the statute itself.[230] Similarly, neither Eli Lilly nor the Federal Circuit decisions mentioned above required that the patented invention be related to, or subject to the same limitation as, the product seeking approval. Instead, Eli Lilly made clear that the phrase "patented invention" includes all inventions.[231] Thus, it is reasonable to assume that any kind of patented inventions, including, but not limited to, drugs and medical devices, are within the scope of § 271(e)(1) as long as the uses of those inventions are "solely for uses reasonably related to" the development and submission of information for FDA approval.[232] Although Bristol-Myers Squibb has broadened the scope of § 271(e)(1), it is consistent with legal precedents on the "patented invention" issue.

Bristol-Myers Squibb also extended the application of § 271(e)(1) with regard to the "solely for uses reasonably related" issue. In most of the previous cases addressing this issue, the alleged infringers were, or at least would soon be, in the process of obtaining FDA approval of their product.[233] By contrast, in Bristol-Myers Squibb, the alleged infringer was conducting primary basic research, prior to the identification of any potential product, and long before the submission of data to the FDA. According to Bristol-Myers Squibb, as long as the ultimate goal is to market an FDA-approved drug, even basic research activities can be reasonably related to FDA approval and thus exempt under § 271(e)(1).[234] Furthermore, the

Bristol-Myers Squibb court stressed that even if the allegedly infringing uses do not directly generate information relevant to the filing of an application for FDA approval of a product, § 271(e)(1) applies as long as the uses are related to a preliminary activity that may facilitate or be useful in generating information that would be submitted to the FDA.[235]

Although the facts in Bristol-Myers Squibb are significantly different from those in prior cases, the reasoning in Bristol-Myers Squibb is consistent with the trend among the courts to broadly interpret § 271(e)(1). Because most of the prior ***54** cases addressing the "reasonably related" issue have relied primarily on the statutory language and the general policy justification that competitors should be allowed to market their products as soon as possible,[236] they have provided little guidance regarding the outer boundary of the statutory scope. Bristol-Myers Squibb, therefore, can be considered as a natural extension of legal precedents on the issue of "solely for uses reasonably related."

### C. Impact of Bristol-Myers Squibb on Biotechnology Research Tools

The Bristol-Myers Squibb court applied § 271(e)(1) exemption to the use of patented intermediate compounds in early stage drug discovery. It held that as long as the ultimate goal of the use is to market an FDA-approved drug, such use is exempt. Today, virtually all biotechnological research can be considered as aiming towards the ultimate goal of developing a drug product for FDA approval.[237] Since biotechnology research tools by definition are used to facilitate the development of drug products, the use of virtually all of the patented biotechnology research tools would be exempt by § 271(e)(1) under the reasoning of Bristol-Myers Squibb.[238]

While Bristol-Myers Squibb may not have significant precedential value about the scope of § 271(e)(1), it certainly creates a cloud of uncertainties for biotechnology research tool patent rights. Research tool developers will now be unsure about whether the tools they develop will be protected by the patent system. Similarly, research tool users will be unsure about whether their uses will be protected by § 271(e)(1). Such uncertainties will certainly hinder the developments of both new biotechnology research tools and new drug products.

Curiously, some members of the legislature do not seem to view § 271(e)(1) as being so expansive. For example, since the enactment of the Hatch-Waxman Act, three members of Congress have introduced legislative proposals to implement new types of biotechnology research exemption provisions in the Patent Act.[239] ***55** Had the legislature believed that § 271(e)(1) is so broad as to cover all biotechnology research tools, it would be unnecessary to consider such new proposals. Similarly, the biotechnological research community has not realized the breadth of the § 271(e)(1) exemption. Instead, many researchers believe that their uses of research tools should be protected by a novel "research exemption."[240]

## IV. Carving Out a Biotechnology Research Tool Exception to § 271(e)(1)

### A. Biotechnology Research Tools Should Be Excluded from the § 271(e)(1) Safe Harbor

1. Congress did not intend to exempt biotechnology research tools

As discussed previously, the biotech industry was in its infancy when the Hatch-Waxman Act was enacted, and biotechnology research tools have gained their more prominent status in the biotech industry only over the past twenty years. It is therefore unlikely that Congress had even considered the important role of biotechnology research tools in drug development, putting aside the impact of § 271(e)(1) on those tools.

Furthermore, exempting use of research tools from infringement liability is contrary to the underlying purpose of the Hatch-Waxman Act--to create a balance between the need to stimulate innovations on the one hand and the public interest in gaining unrestricted access to those innovations on the other.[241] Although the optimal level of balance is hard to determine,[242] it is clear that the application of § 271(e)(1) to biotechnology research tools would tip the balance too heavily against the initial innovators. When the exempted use is directed to developing a patented invention into a drug product, the patent owner will still enjoy a right to exclude others from commercializing the drug product. However, when the exempted use is directed to basic research leading to the development of a different drug product it will be impossible for the patent owner to prevent others from commercializing the drug product. For example, a patented cell line can be used to screen for a cancer drug, but the ultimate cancer drug will not infringe on the cell line patent. Accordingly, the owner of the cell line patent cannot sue the alleged infringer even after the cancer drug goes to the commercial market. This makes it impossible for ***56**

the owner of a research tool patent to recoup the resources spent in developing the patented invention. The end result is the destruction of any incentive for biotech companies to invest in the development of research tools. As a consequence, companies whose business it is to develop research tools may cease to exist altogether. Such an outcome is inconsistent with legislative intent.[243]

The more palatable alternative is to allow the owner of a biotechnology research tool patent to enjoy a limited exclusive right. Because most would-be infringers are users of the research tool, rather than competitors of the company developing the research tool, it would be relatively easy for parties to negotiate for a license on the patent. Encouraging research tool developers to license their patented tools at a reasonable cost would both preserve the incentive for research tool developers and allow a broad use of patented inventions. Because the patent owner only enjoys a limited exclusive right and because licensing is possible, the Bristol-Myers Squibb court's concern that research and development activities would never be undertaken unless they are protected by § 271(e)(1) is unwarranted. Preserving patent rights on biotechnological research tools would therefore provide a better balance between supporting innovations in research tools and furthering the public interest of gaining access to the tools.

2. Application of § 271(e)(1) to Biotechnology Research Tools Is Unwarranted by Policy Justifications

i) Common Law Experimental Use Doctrine

The legislative history provides little support for the application of § 271(e)(1) to biotechnology research tools. Therefore, the only policy justifications for a broad interpretation of § 271(e)(1) would be those typically invoked in support of an experimental use exception, for example, that users should be encouraged to develop new products and be in a position to market their products as soon as the relevant patent expires.[244] The common law experimental use doctrine, however, has been found to be "truly narrow."[245] In Roche,[246] the Federal Circuit held ***57** that the experimental use doctrine should not apply to Bolar's generic drug testing prior to the expiration of Roche's patent.[247] The court reasoned:

> we hold the experimental use exception to be truly narrow, and we will not expand it under the present circumstances. Bolar's argument that the experimental use rule deserves a broad construction is not justified . . . Bolar's intended "experimental" use is solely for business reasons and not for amusement, to satisfy idle curiosity, or for strictly philosophical inquiry . . . .[248] Therefore, according to the Federal Circuit in Roche, the experimental use doctrine is unavailable whenever the defendant's research has been motivated by a commercial purpose.

Roche led Congress to enact § 271(e)(1), which legislatively overruled part, but not all, of Roche by creating a safe harbor for activities that are "solely for uses reasonably related to" development and submission of information for FDA approval.[249] Recent Federal Circuit decisions, however, have affirmed Roche's holding regarding the experimental use doctrine. For example, in Embrex, Inc. v. Service Engineering Corp.,[250] the Federal Circuit cited Roche for the proposition that the experimental use doctrine was very narrow and limited to activities performed "for amusement, to satisfy idle curiosity, or for strictly philosophical inquiry."[251] The Federal Circuit in Madey v. Duke University[252] further emphasized that so long as the alleged act is in furtherance of the alleged infringer's legitimate business the experimental use doctrine is inapplicable.[253]

ii) Arguments for Broader Scope of the Experimental Use Doctrine

Given the narrow scope of the existing experimental use doctrine, some commentators have argued for a broader experimental use exception.[254] In her ***58** seminal article on experimental use doctrine, Professor Rebecca Eisenberg proposed a three-pronged model.[255]

First, Eisenberg argues that use of a patented invention to check the adequacy of the specification and the validity of the patent holder's claims about the invention should be exempt from infringement liability.[256] This exemption falls within the current "truly narrow" scope of the common law experimental use doctrine. Since use of the patented invention to check the validity of the patent is not "reasonably related" to the development and submission of information for FDA approval, such use would fall outside of the scope of § 271(e)(1).

Second, Eisenberg argued that those who use a patented invention in a manner that leads to improvements in the technological field of that patent, or for the purpose of "designing around" the patent's claims to avoid infringement, should

not have to negotiate for a license prior to their use.[257] This prong of Eisenberg's model would extend the scope of the common law experimental use doctrine. As Eisenberg argues in her article, such an extension may be desirable "in order to enable valuable subsequent research to proceed."[258]

It is difficult, however, to apply this theory of experimental use exemption to the § 271(e)(1) context. Suppose, for example, a firm uses a patented research method to develop an improved version of the research method. The use of the patented research method would fall outside the scope of § 271(e)(1) because it is not "reasonably related" to the development and submission of information for FDA approval. Alternatively, a firm may be conducting research on a patented drug product in order to develop an alternative drug product.[259] On the one hand, ***59** the use can be characterized as a research to design around the patented drug product, that is, to obtain a noninfringing alternative drug product. On the other hand, such use could also be characterized as use of the patented drug product as a research tool, that is, a tool for identifying a new drug. Because the distinction between these two characterizations is virtually impossible to make, exempting one but not the other would be unworkable.

Third, Eisenberg argued that use of a patented invention with a primary or significant market among research users should not be exempt from infringement liability when the user is an ordinary consumer of the patented invention.[260] The use of biotechnology research tools fits best into this prong of Eisenberg's model.[261] As discussed previously, most of the would-be infringers of research tool patents are users of the research tool. They are, therefore, potential customers rather than hostile rivals of the patent holder. As Eisenberg suggested in her article, it would be desirable for the patent holder to extend licenses to users in order to extract the full value of the patent monopoly, and it would be unlikely that a research exemption necessary to ensure that the public has access to the invention.[262]

Furthermore, as Eisenberg pointed out, an exemption of such use would "effectively eliminate the benefits of patent protection for the invention."[263] The development of biotechnology research tools is both risky and costly.[264] Patents assure biotech companies that they have a definite window of time when they can invest in developing research tools without worrying about competitors. Although different biotech companies may have different perspectives regarding to their patented research tool products,[265] many companies rely primarily on licensing their patented products to generate revenue.[266] If every use of research tools were exempt under § 271(e)(1), the values of the research tool patents would be nonexistent.

***60** iii) Tragedy of the Anticommons in Biomedical Research

There is some concern that the growing numbers of biotechnology research tool patents may be retarding the pace of biomedical discovery.[267] For example, Heller and Eisenberg argue that biomedical innovation has become susceptible to what they called a "tragedy of the anticommons."[268] Such a situation may arise in one of two ways--either by producing "too many concurrent fragments of intellectual property rights in potential future products or by permitting too many downstream patent owners to stack licenses on top of the future discoveries of upstream users."[269] Heller and Eisenberg maintain that a proliferation of intellectual property rights upstream might stifle innovations further downstream in the course of research and product development.[270] As a result, fewer useful biomedical products will be developed.[271]

A recent survey study, designed to solicit information about the different activities and institutions associated with biomedical research and drug development, suggests that the situation may not be as dire as Heller and Eisenberg predict.[272] The study reveals that few worthwhile projects are being stopped because of the lack of access to intellectual property related to research tools.[273] The study also reveals that, although there are often a large number of patents potentially relevant to a given project, the actual number of licenses that are needed to conduct a drug development project is often substantially smaller. Accordingly, licensing has been routine in the drug industry and the problem of access can often be settled contractually.[274] Moreover, the study suggests that firms will only aggressively defend against infringement of their core patents and will show considerable tolerance to potential infringing activities due to a general reluctance to upset the norms of open access.[275]

***61** Thus, ameliorating the challenges posed by these patents would not necessitate completely undermining the value of biotechnology research tool patents through a § 271(e)(1) exemption. Instead, a better solution would be to follow what Heller and Eisenberg have suggested: ensure coherent boundaries of upstream patents and minimize restrictive licensing practices that interfere with downstream product development.[276]

**B. Proposals to Limit the Impact of § 271(e)(1)**

As discussed above, the trend among the courts is to broadly interpret § 271(e)(1) to exempt use of patented biotechnology research tools.[277] Absent a reversal of this judicial trend, legislative modification to expressly exclude all uses of research tools from § 271(e)(1) is necessary to prevent further expansion of § 271(e)(1).[278]

1. Previous proposals

One way to minimize the impact of § 271(e)(1) on biotechnology research tools is to completely eliminate the safe harbor provision.[279] Engelberg proposes that both the safe harbor provision, § 271(e)(1), as well as the patent term extension provision, § 156, should be repealed because they are no longer relevant to the current economic environment of the pharmaceutical industry.[280] He argues that because § 271(e)(1) and § 156 were "self-canceling provisions which, taken together, [have] no net effect on the length of the exclusive marketing period of most new ***62** drugs," elimination of both provisions would maintain the balance between pioneer drug developers and generic drug developers.[281]

It is unlikely that repealing the safe harbor provision would be the best solution to the problem presented in this article. It is undisputed that the number of generic drug companies has increased dramatically since the enactment of the Hatch-Waxman Act.[282] A review of earlier cases indicates that these same companies have relied heavily on § 271(e)(1) in bringing newly developed generic drugs to market as soon as the relevant patents expire.[283] Furthermore, even if § 271(e)(1) and § 156 were self-canceling, they benefit different parties and serve distinct purposes.[284] Completely eliminating § 271(e)(1) would therefore create more harm than benefit.

A less dramatic way of minimizing the impact of § 271(e)(1) on biotechnology research tools is to limit the scope of § 271(e)(1) to only generic drugs. In 1999, after failing to assert its patent right against Transkaryotic and Hoechst in Amgen,[285] Amgen lobbied for the "Fairness in Pharmaceutical Testing Act of 1999." The Act "would amend the Hatch-Waxman Act by specifying that § 271(e)(1) does not apply to the development or submission of information under a new drug application . . . or biologics license application."[286] The amended statute would continue to exempt activities directed toward the development of generic drugs, but would no longer protect research and development activities leading to new drugs, biologics, or medical devices.[287] Supporters of the proposal believed that the proposal would limit the scope of § 271(e)(1) to what was originally intended by Congress, and, if enacted, would stop the trend among the courts to broadly interpret § 271(e)(1).[288] Opponents of the bill argued that such a bill was ***63** contrary to the Supreme Court's decision in Eli Lilly[289] and that enactment of the bill would stifle innovation and impede competition.[290] They further asserted that the current safe harbor imposed little disadvantage on patent holders because it only precluded litigation until the allegedly infringing product was approved by the FDA.[291]

The Amgen proposal has not borne any legislative result. However, it is worth noting that the arguments the opponents relied upon did not justify an exemption for uses of biotechnology research tools. As discussed previously, the ultimate drug product for FDA approval does not incorporate the patented research tool. Accordingly, § 271(e)(1) would completely preclude an owner of a research tool patent from asserting his right. Because the main focus of the Amgen proposal was on the distinction between a generic drug and a new drug, the opponents to the proposal have virtually ignored the potential impact of § 271(e)(1) on biotechnology research tools. Consequently, the opponents to the Amgen proposal have left open the possibility that a narrower exception can be made to carve out biotechnology research tools from the § 271(e)(1) safe harbor.[292]

2. Carving Out a Biotechnology Research Tool Exception

i) The Proposal

The author proposes that § 271(e)(1) be amended to state that the safe harbor provision "does not apply to uses of the patented invention to research and develop products that do not reasonably incorporate the patented invention." Such an amendment would create an exception that takes biotechnology research tools out of the broad scope of § 271(e)(1). Specifically, a distinction is made between research on the patented invention, such as bioequivalency testing and development of the patented invention as a drug product, and research using the invention, such as using the patented invention as a research tool to develop other drug products.[293] The amendment, if enacted, would leave the former kind of activities exempt under ***64** the scope of § 271(e)(1), but would take the latter kind of activities out of the coverage of the § 271(e)(1) safe harbor.[294]

Because the proposed exception is limited only to biotechnology research tools, it will not affect the ability of generic drug

developers to bring their generic version of a patented product to the market as soon as the patent expires. Such an exception will also not affect pioneer drug manufacturers from developing a patented invention into a drug product before the patent expires. Furthermore, the proposed exception will leave the majority of the legal precedents intact, overruling only the holding of Bristol-Myers Squibb.

ii) Application and Illustration of the Proposed Amendment

a) Application of the Biotechnology Research Tool Exception

A simple hypothetical scenario illustrates the application of the proposed amendment. In this hypothetical, Company A uses a novel screening method to look for small molecules that interact with protein alpha and to identify small molecule compound beta. After confirming that compound beta is worth pursuing, Company A engages in a range of activities to develop compound beta into a commercial drug product. The screening method, protein alpha, and compound beta are patented by Company B, Company C, and Company D, respectively. Under the current interpretation of § 271(e)(1), none of the above-mentioned patent owners may assert their patent rights because A's uses of the inventions are "reasonably related" to the development of compound beta for FDA approval.

With the biotechnology research tool exception, however, the result of the hypothetical situation will be different. Company B's patented screening method cannot be incorporated into a drug product. The research tool exception therefore applies, taking A's activities out of the § 271(e)(1) safe harbor. Company B can assert its patent rights against Company A. Procedurally, Company B should be able to sue Company A as soon as it is put on notice of Company A's activities. Although prior § 271(e)(1) cases have held that a patent owner cannot file a declaratory judgment lawsuit against an alleged infringer until the infringer's product ***65** is approved by the FDA,[295] such a procedural bar should not apply to cases involving biotechnology research tools. Because biotechnology research tools are generally used in the early stage of drug discovery, waiting until the alleged infringer has obtained FDA approval to assert patent right will clearly counter the purpose of the proposed amendment.

Similarly, Company C can assert its patent right to protein alpha against Company A at any time. If Company C sues Company A before any small molecule drug candidate has been identified, the research tool exception applies because there is simply no identifiable "product" that requires FDA approval. If, on the other hand, Company C sues Company A after compound beta has been identified, the research tool exception again applies because the compound beta drug product does not "incorporate" protein alpha. In either case, the research tool exception takes Company A's activities out of the § 271(e)(1) safe harbor provision.

Company D, however, will not be able to assert its patent right to compound beta against A at the development stage. Because Company A's drug product incorporates Company D's patented invention, the research tool exception would be inapplicable and A's activities would fall within the § 271(e)(1) safe harbor. Nevertheless, since Company D can sue Company A for patent infringement once Company A's drug product enters the market, Company D will not be completely deprived of its patent right to compound beta.

b) "Reasonably Incorporated" Under the Research Tool Exception

Due to the inherently unpredictable nature of the FDA approval process, a company may start with a plan to develop a patented invention into a drug product and end up with an approved product that is completely different from the patented invention. For example, in the previous hypothetical, Company A may have started with a plan to develop compound beta as a drug candidate for FDA approval, but in reality the approved product is quite different from compound beta. A literal reading of the research tool exception would suggest that Company A's use of compound beta would be taken out of § 271(e)(1) safe harbor protection. On the other hand, because Company A intended to develop compound beta as a drug product, it would be unfair to apply the research tool exception to its otherwise exempt activities.

The fairness of application concern can be addressed by requiring that when the FDA-approved product is not identical to the patented invention, a prima facie ***66** case of research tool exception is established. The burden then shifts to the alleged infringer to show that (1) it intended to develop the patented invention into a drug product[296] and (2) the FDA-approved product is different from the patented invention because of changes made during the process of seeking FDA approval. To prove the second prong, the defendant needs to show that the FDA-approved product "reasonably incorporates" the patented invention. For example, the defendant can show that the FDA-approved product infringes the patent. Alternatively, it can

demonstrate that the development of the patented invention into the FDA-approved product was relatively straightforward and only involved steps that are typically taken during clinical trial and testing.

c) Dual Uses

Suppose Company A develops compound beta as a drug candidate. At the same time, Company A also uses compound beta as a research tool to identify other potential drug targets. The latter use of compound beta would fall within the research tool exception. Under the broad holding of American Standard,[297] none of Company A's activities would be exempt under § 271(e)(1) because they are not "solely for uses reasonably related" to the development and submission of data to the FDA.[298] Such a result would be too harsh and would act to counter the purpose of the proposed amendment. It is thus more reasonable to exempt Company A's activities that are related to the development of compound beta as a drug candidate. Nevertheless, Company A should still be held liable for patent infringement by using compound beta as a research tool.

One might argue that the policy justification for the research tool exception is absent in such "dual uses" case because Company D will be able to recoup benefits once Company A's drug product goes to the market. Exempting both uses in "dual uses" situations, however, will create loopholes to the proposed amendment and encourage potential infringers to hide behind the drug development veil and engage in otherwise infringing activities. Moreover, because A is allowed to use compound beta for drug development, it would be difficult for Company D to prove that Company A has also used compound beta as a research tool. As the patent owner, Company D should therefore be given ample opportunity to conduct discovery of Company A's research activities regarding compound beta.

***67** A different scenario arises if Company A's additional activity is limited to use of the data obtained during its drug development to generate bioinformatics tools. The Federal Circuit has stated that use of data obtained from exempt activities does not constitute patent infringement and therefore may not even come within the ambit of § 271(e)(1).[299] In this case, Company D cannot sue Company A for patent infringement based on such activity.

## V. Conclusion

The safe harbor provision of patent infringement, 35 U.S.C. § 271(e)(1), was enacted to allow generic drug developers to use patented drugs to gain regulatory approval of their generic products. Courts interpreting this provision, however, have broadened its scope to potentially exempt all uses of biotechnology research tools. Because biotechnology research tool patents are vital to the success of biotech companies, a broad reading of § 271(e)(1) would create significantly harmful impact on the biotechnology industry. This article reviews the legislative history and judicial interpretations of § 271(e)(1). It argues that extending the safe harbor to biotechnology research tool patents would frustrate the underlying purpose of § 271(e)(1) and hinder the developments of both new biotechnology research tools and new drug products. This article further proposes that § 271(e)(1) should be amended to create a clearly defined exception that carves biotechnology research tools out of the § 271(e)(1) safe harbor.

Footnotes

a1 Associate, Morrison & Foerster LLP, Palo Alto, CA; Ph.D., Biological Chemistry, 2000, University of California, Los Angeles; J.D., 2003, University of California at Berkeley School of Law (Boalt Hall).

1 See Jungen Drews, Drug Discovery: A Historical Perspective, 287 Science 1960 (2000).

2 Based on studies conducted in year 2002, "nearly one quarter of all medicines on the market today are biotechnology-derived ... [and] 82% of drugs in phase III clinical trials are developed by biotech companies ...." Suzanne Berry, Biotech Meets the Investors, 20 Trends in Biotechnology 370 (2002).

3 Aris Persidis, Biotechnology in a Snapshot, 18 Nature Biotechnology IT2, IT2 (2000); See Aris Persidis, Signal Transduction as a Drug-Discovery Platform, 18 Nature Biotechnology IT37, IT38 (2000) [hereinafter "Persidis, Signal Transduction" ].

[4] See Elizabeth Pennisi, The Human Genome, 291 Science 1177 (2001).

[5] Aris Persidis, Combinatorial Chemistry, 18 Nature Biotechnology IT50, IT50 (2000) ("Using traditional methods, it takes, on average, one medicinal chemist one month to generate four compounds directed against a particular target - at a total cost of about $30,000, or $7,500 per compound. By comparison, combinatorial chemistry applied by one chemist over a one-month period can produce 3,300 compounds for $40,000, or about $12 per compound.").

[6] Drews, supra note 1, at 1963 (stating that the drug discovery process "has become so complex that it cannot be contained within the confines of the pharmaceutical industry.").

[7] Today there are over 1,300 biotech companies in the United States. Lila Feisee, The Role of the Private Sector in Biotechnology: Research and Development, 12 Health Matrix 357, 360 (2002). See Riku Lahteenmaki & Liz Fletcher, Public Biotechnology 2001- The Numbers, 20 Nature Biotechnology 551 (2002).

[8] "Even the simplest phase I clinical study can cost about $250,000-considerably more than the cost of a single experiment at the bench." Anthony W. Fox, Clinical Development - Look Before You Leap, 19 Nature Biotechnology BE27, BE27 (2001).

[9] See John M. Golden, Biotechnology, Technology Policy, and Patentability: Natural Products and Invention in the American System, 50 Emory L.J. 101, 118-19 (2001) (discussing the cooperative nature of the biotechnology industry); see also Fox, supra note 8, at BE27 (2001).

[10] For example, 90% of all the publicly traded biotechnology companies generated $50 million or less revenue. Lahteenmaki & Fletcher, supra note 7, at 551. Although there seems to be a current trend of big pharma mergers in the biotech industry, it is unrealistic to expect that a big pharmaceutical company can develop a drug completely independent of outside collaborations. See Drews, supra note 1, at 1963.

[11] See Harold C. Wegner & Stephen B. Maebius, The Global Biotech Patent Application, Practicing Law Institute: Patents, Copyrights, Trademarks and Literary Property Course Handbook Series 87 (Aug. - Sept. 2001); See also Golden, supra note 9, at 169.

[12] Golden, supra note 9, at 169-70.

[13] Id. at 118-19.

[14] See Orton Huang et al., Biotechnology Patents and Startups, Online J. Pat., Trademark and Copyright Res. Found., at http:// www.ptcforum.org/BIOTECHNOLOGYPATENTSANDSTARTUPS.pdf (last visited Oct. 5, 2003) (stating that the majority of companies that were surveyed felt that patents were responsible for their initial funding, and that their protection position convinced ventral capitalists of the application and exclusivity of their technologies); Aris Persidis & Francesco De Rubertis, Spin-offs Versus Start-ups as Business Models in Biotechnology, 18 Nature Biotechnology 570 (2000) (stating that a company at startup stage, with granted patents for an industry-relevant application, can be worth around $5-10 million).

[15] (1994).

[16] See, e.g., Carl Massey, Biotech Research Benefits from Patent Infringement Exception (May 29, 2002), at http://www.wcsr.com/FSL5CS/news% 20bites/news%20bites1295.asp (last visited Nov. 25, 2003); Gregory J. Glover, Emerging Trends in Pharmaceutical Patent Policy: Implications for Biotechnology, at http://www.biotechnology-investor.com/bioweb/12002/glover.htm (last visited Nov. 25, 2003).

[17] 95 Civ. 8833, 2001 U.S. Dist. LEXIS 19361 (S.D.N.Y. Nov. 27, 2001).

[18] See generally Richard J. Findlay, Originator Drug Development, 54 Food Drug L.J. 227 (1999).

[19] 21 U.S.C. § 355 (2003).

[20] 21 C.F.R. § 312.23 (2002).

[21] Findlay, supra note 17, at 27.

[22] 21 C.F.R. § 312.21 (1987).

[23] 21 C.F.R. § 312.21(a).

[24] Id.

[25] 21 C.F.R. § 312.21(b).

[26] Id.; Findlay, supra note 17, at 227.

[27] 21 C.F.R. § 312.21(c).

[28] Id.; Findlay, supra note 17, at 227.

[29] 21 U.S.C. § 355(a), (b); 21 C.F.R. § 314.50 (2002).

[30] 21 U.S.C. § 355(a), (b); 21 C.F.R. § 314.50.

[31] Findlay, supra note 17, at 227 (If the FDA approves the marketing of the drug product, the company may have to engage in post-marketing testing "for, inter alia, side effects, clinical education, and possible new indications.").

[32] H.R. Rep. No. 98-857 (1984); see infra part II.A.3.

[33] See, e.g., Thomas F. Poche, The Clinical Trial Exemption from Patent Infringement: Judicial Interpretation of Section 271(e)(1), 74 B.U.L. Rev. 903, 912 (1994).

[34] See Eli Lilly & Co. v. Medtronic, 496 U.S. 661, 670, 15 U.S.P.Q.2d (BNA) 1121, 1127 (1990) ("[T]he patentee's de facto monopoly would continue for an often substantial period until regulatory approval was obtained.").

[35] Id. at 669-70, 15 U.S.P.Q.2d at 1126-27.

[36] 733 F.2d 858, 221 U.S.P.Q.2d (BNA) 937 (Fed. Cir. 1984).

[37] Id. at 860, 221 U.S.P.Q.2d at 938.

[38] Id.

[39] Id.

[40] See id.

[41] Roche Products, Inc. v. Bolar Pharmaceutical Co., Inc., 572 F. Supp. 255, 256 (E.D.N.Y. 1983).

[42] See id. at 258 ("First, Bolar realizes no benefit during the term of the patent; its activities are in no way connected with current manufacture or sale here or abroad. Nor do its activities lessen Roche's profits during the patent's term."); see also Roche, 733 F.2d at 861, 221 U.S.P.Q.2d at 939 (noting that the lower court held that Bolar's use was de minimis and experimental).

[43] Roche, 733 F.2d at 862, 221 U.S.P.Q.2d at 939.

[44] Id. at 863-865, 221 U.S.P.Q.2d at 941-42.

[45] Id. at 864, 221 U.S.P.Q.2d at 941.

[46] Id.

[47] Id. at 865, 221 U.S.P.Q.2d at 942 (citations omitted). Id. at 863-64, 21 U.S.P.Q.2d at 941 ("We decline the opportunity here ... to engage in legislative activity proper only for the Congress.").

[48] Id. at 863, 867, 221 U.S.P.Q.2d at 941, 943-44.

[49] Susan Kopp Keyack, The Drug Price Competition and Patent Term Restoration Act of 1984: Is It a Healthy Long Term Solution?, 21 Rutgers L.J. 147, 155 (1989).

[50] Id. at 154-55.

[51] Id. at 154.

[52] See generally Gerald J. Mossinghoff, Overview of the Hatch-Waxman Act and its Impact on the Drug Development Process, 54 Food Drug L.J. 187 (1999) (describing creation of Hatch-Waxman).

[53] H.R. Rep. No. 98-857, pt. 2, at 3-7 (1984).

[54] Mossinghoff, supra note 52, at 188.

[55] Title I was incorporated into 21 U.S.C. § 355.

[56] See H.R. Rep. No. 98-857 (1984).

[57] Id. See also 35 U.S.C. § 156 (2002) and 35 U.S.C. § 271(e)(1), respectively.

[58] H.R. Rep. No. 98-857, pt. 1, at 15, and pt. 2, at 5-6 (1984).

[59] 35 U.S.C. § 156(a)(1)-(5) (1999). The specific conditions for patent term extension are beyond the scope of this article.

[60] 35 U.S.C. § 156(f)(1) (1988). The calculation of the patent term extension is beyond the scope of this article.

[61] See H.R. Rep. No. 98-857, pt. 2, at 27 (1984) (stating that "[t]he provisions of [§ 271(e)(1)] have the net effect of reversing the holding of the court in [Roche].").

[62] 35 U.S.C. § 271(e)(1).

[63] See Courtenay C. Brinckerhoff, Can the Safe Harbor of 35 U.S.C. § 271(e)(1) Shelter Pioneer Drug Manufacturers?, 53 Food Drug L.J. 643, 645 (1998).

[64] Id.

[65] H.R. Rep. No. 98-857, pt. 1, at 15 (1984); id., pt. 2, at 29 (1984); Brinckerhoff, supra note 63, at 643-45.

[66] H.R. Rep. No. 98-857, pt. 1, at 15.

[67] Brinckerhoff, supra note 63, at 643. See also Samuel M. Kais, A Survey of 35 U.S.C. § 271(e)(1) as interpreted by the Courts: The Infringement Exemption Created by the 1984 Patent Term Restoration Act, 13 Santa Clara Computer & High Tech L.J. 575, 578 (1997); Edward V. Filardi, Patent Issues that both Regulatory Affairs Personnel and Patent Attorneys Should Understand, 54 Food Drug L.J. 215, 216 (1999).

[68] Brinkerhoff, supra note 62, at 643. See also Kais, supra note 66, at 579; Filardi, supra note 66, at 16-17.

[69] 496 U.S. 661, 15 U.S.P.Q.2d (BNA) 1121 (1990).

[70] Eli Lilly, 496 U.S. at 664, 15 U.S.P.Q.2d at 1124.

[71] Eli Lilly & Co. v. Medtronic, Inc., 696 F. Supp. 1033, 1041, 7 U.S.P.Q.2d (BNA) 1447 (E.D. Pa. 1988).

[72] 696 F.Supp. at 1041, 7 U.S.P.Q.2d at 1447.

[73] Eli Lilly & Co. v. Medtronic, Inc., 872 F.2d 402, 406, 10 U.S.P.Q.2d (BNA) 1304, 1307 (Fed. Cir. 1989).

[74] Eli Lilly, 496 U.S. at 679, 15 U.S.P.Q.2d at 1130. See also David J. Bloch, If It's Regulated Like a Duck ... Uncertainties in Implementing the Patent Exceptions of the Drug Price Competition and Patent Term Restoration Act, 54 Food & Drug L.J. 111, 113-16 (1999) (discussing Eli Lilly).

[75] Eli Lilly, 496 U.S. at 665, 15 U.S.P.Q.2d at 1125 (citing 35 U.S.C. § 100(a) (1952) ("When used in this title unless the context otherwise indicates ... [t]he term 'invention' means invention or discovery.")).

[76] Id. at 667, 15 U.S.P.Q.2d at 1125. For example, the Court noted that the provision might have read, "It shall not be an act of infringement to make, use, or sell a patented drug invention ... solely for uses reasonably related to the development and submission of information required, as a condition of manufacture, use, or sale, by Federal law." Id.

[77] Id. at 665-69, 15 U.S.P.Q.2d at 1125-26. Eli Lilly seems to suggest that the statutory term "under a Federal law which regulates the manufacture, use, or sale of drugs" only modifies the kind of products seeking government approval and does not limit the kind of "patented inventions" covered by the statute. Id. Because in Eli Lilly the patented invention was identical to the product seeking government approval, however, the Court did not explicitly define the different scopes of the patented invention and the product seeking government approval.

[78] Id. at 666, 15 U.S.P.Q.2d (BNA) 1121, 1125. The Court reasoned that if Congress wanted to refer to a single provision of the federal law rather than an entire scheme, it would use terms like "pursuant to a Federal law" or "in compliance with a Federal law," rather than "under the Federal law." The Court also found it significant that Congress used the phrase "[Federal] law" rather than "provision of [Federal] law." Id. at 666-67, 15 U.S.P.Q.2d at 1125 (emphasis in original).

[79] Id. at 667, 15 U.S.P.Q.2d at 1125.

[80] Id. at 669, 15 U.S.P.Q.2d at 1126.

[81] Eli Lilly, 496 U.S. at 672-73, 15 U.S.P.Q.2d at 1127.

[82] Id.

[83] Id. at 672-73, 15 U.S.P.Q.2d at 1127. See 35 U.S.C. § 156 (2002).

[84] Id. at 673, 15 U.S.P.Q.2d at 1127. "All of the products eligible for a patent term extension under [§156] are subject to [§ 271(e)(1)], since all of them - medical devices, food additives, color additives, new drugs, antibiotic drugs, and human biological products - are subject to premarket approval under various provisions of the FDCA ...." Id. at 674, 15 U.S.P.Q.2d at 1128.

[85] 21 U.S.C. § 360(c)(a)(1) (1976) (Class I medical devices present no unreasonable risk of illness and are subject only to "general control." Class II medical devices are potentially more harmful and are subject to "special control." Class III medical devices, which either present an unreasonable risk of illness or injury or are for a use in preventing impairment of human health, are subject to a much more rigorous premarket approval process.).

[86] Id.

[87] Id. As mentioned previously, § 156 applies to "drug products, medical devices, food additives, and color additives, whose entry into the commercial market place is subject to lengthy delay due to the necessity of review under [the FDCA]." See 35 U.S.C. §156(f)(1).

[88] Abtox, Inc. v. Exitron Corp., 888 F. Supp. 6, 9, 35 U.S.P.Q.2d (BNA) 1508, 1510 (D. Mass. 1995) [hereinafter Abtox I].

[89] Abtox I, 888 F. Supp. at 9, 35 U.S.P.Q.2d at 1510.

[90] Id.

[91] Id. The district court did, however, certify for immediate appeal the legal question of whether § 271(e)(1) precluded infringement. Id.

[92] Abtox, Inc. v. Exitron Corp., 122 F.3d 1019, 1028, 43 U.S.P.Q.2d (BNA) 1545, 1552 (Fed. Cir. 1997) [hereinafter Abtox II].

[93] Abtox II, 122 F.3d at 1028, 43 U.S.P.Q.2d at 1552.

[94] Id. at 1029, 43 U.S.P.Q.2d at 1553.

[95] Id.

[96] Id. (citing Eli Lilly, 496 U.S. at 671-72, 15 U.S.P.Q.2d at 1126).

[97] Prior to Abtox II, the Federal Circuit had already determined that it would follow the broad holding of Eli Lilly. See Chartex Intern PLC v. M.D. Pers. Prods. Corp., 5 F.3d 1505 (Fed. Cir. 1993) (unpublished table decision), available at No. 92-1556, 1993 WL 306169, at *2. This approach has been criticized. See Matthew Buchanan, Medical Device Patent Rights in the Age of FDA Modernization: the Potential Effect of Regulatory Streamlining on the Right to Exclude, 30 U. Tol. L. Rev. 305, 326 (1999) (arguing that expanding the application of § 271(e)(1) to Class I and Class II medical devices may discourage innovation).

[98] Bristol-Myers Squibb, 2001 U.S. Dist. LEXIS 19361, at *4 n. 6.

[99] 65 F. Supp. 2d 967 (W.D. Wis. 1999).

[100] Infigen, 65 F. Supp. 2d at 969-70.

[101] Id.

[102] Id. at 974.

[103] Id. at 980.

[104] Id. Because the court decided that § 271(e)(1) was inapplicable, it did not make the further inquiry of whether the defendant's activities were reasonably related to the development and submission of data for FDA approval. Id. at 981.

[105] See Brain D. Coggio & F. Dominic Cerrito, The Safe Harbor Provision of the Hatch-Waxman Act: Present Scope, New Possibilities, and International Considerations, 57 Food & Drug L.J. 161, 168 (2002).

[106] 231 U.S.P.Q. (BNA) 978 (N.D. Cal. 1986).

[107] Scripps, 231 U.S.P.Q. at 979-80.

[108] Id. at 980.

[109] Id. at 979.

[110] Id.

[111] 18 U.S.P.Q.2d (BNA) 1977 (E.D. Penn. 1990).

[112] Ortho Pharm., 18 U.S.P.Q.2d at 1992.

[113] Intermedics, Inc. v. Ventritex, Inc., 775 F. Supp. 1269 (N.D. Cal. 1991), 20 U.S.P.Q.2d (BNA) 1422; see also Elan v. Cygnus, 24 U.S.P.Q.2d (BNA) 1926, 1932-33 (N.D. Cal. 1992) (distinguishing Scripps and Intermedics); Poche, supra note 32, at 920-23 (arguing that Intermedics proceeded on an inaccurate analysis of the legislative intent underlying the DPC-PTR).

[114] Intermedics, 775 F. Supp. at 1273, 20 U.S.P.Q.2d at 1429.

[115] Id. at 1275, 20 U.S.P.Q.2d at 1425-26.

[116] Id. at 1281, 20 U.S.P.Q.2d at 1430-31.

[117] Id. at 1280, 20 U.S.P.Q.2d at 1430.

[118] Id. This test is considered the current controlling standard for the "reasonably related inquiry." See Nexell Therapeutics v. AmCell Corp., 199 F. Supp. 2d 197, 204 (D. Del. 2002); Amgen v. Hoerchst, 3 F. Supp. 2d 104, 108 (D. Mass. 1998).

[119] Intermedics, 775 F. Supp. at 1284, 20 U.S.P.Q.2d at 1435. See also Brinckerhoff, supra note 63, at 649.

[120] See Intermedics, Inc. v. Ventritex, Co., 26 U.S.P.Q.2d (BNA) 1525, 1528 (Fed. Cir. 1993) (unpublished). Of course, the actual commercialization of the product will fall out of the § 271(e)(1) safe harbor. See infra Part II.B.2.d.2.

[121] 982 F.2d 1520, 25 U.S.P.Q.2d (BNA) 1196 (Fed. Cir. 1992).

[122] Teletronics, 982 F.2d at 1521, 25 U.S.P.Q.2d at 1197.

[123] Id. at 1522, 25 U.S.P.Q.2d at 1197.

[124] Id., 25 U.S.P.Q.2d at 1198.

[125] Id.

[126] Id.

[127] Id. at 1523-24, 25 U.S.P.Q.2d at 1199.

[128] Teletronics, 982 F.2d at 1524, 25 U.S.P.Q.2d at 1199.

[129] Id.

[130] Id. at 1525, 25 U.S.P.Q.2d at 1200.

[131] Id.

[132] Abtox II, 122 F.3d at 1027, 43 U.S.P.Q.2d at 1551.

[133] Id.

[134] Id. at 1030, 43 U.S.P.Q.2d at 1553.

[135] See, e.g., Teletronics, 982 F.2d at 1524, 25 U.S.P.Q.2d at 1199; Abtox II, 122 F.3d at 1030, 43 U.S.P.Q.2d at 1553. See also Chartex, 5 F.3d 1505, available at 1993 WL 306169, at *3 (holding that display of the products at trade shows and consumer studies on the devices are reasonably related to obtaining information for FDA approval and are thus exempt under § 271(e)(1)).

[136] See, e.g., Teletronics, 982 F.2d at 1524, 25 U.S.P.Q.2d at 1199; Abtox II, 122 F.3d at 1030, 43 U.S.P.Q.2d at 1553.

[137] Brinckerhoff, supra note 62, at 654. But see Warner-Lambert Co. v. Apotex Corp, 316 F.3d 1348, 65 U.S.P.Q.2d (BNA) 1481 (Fed. Cir. 2003) (relying extensively on legislative history in interpreting § 271(e)(2)).

[138] 3 F. Supp. 2d 104, 46 U.S.P.Q.2d (BNA) 1906 (D. Mass. 1998). See Coggio & Cerrito, supra note 105, at 164-65.

[139] Amgen, 3 F. Supp. 2d at 106, 46 U.S.P.Q.2d at 1909 (These activities include, inter alia, exporting a quantity of EPO to Japan prior to FDA application in order to evaluate an alternative manufacturing process; conducting an in vivo purity test, the data from which was neither submitted nor intended to be submitted to the FDA; and producing at least three more commercial scale production batches of EPO.).

[140] Id. at 107-08, 46 U.S.P.Q.2d at 1910.

[141] Id. at 108, 46 U.S.P.Q.2d at 1910.

[142] Id., 46 U.S.P.Q.2d at 1911.

[143] Id. at 110, 46 U.S.P.Q.2d at 1913.

[144] Id. at 109, 46 U.S.P.Q.2d at 1911.

[145] Amgen, 3 F. Supp. 2d at 109, 46 U.S.P.Q.2d at 1911.

[146] Id.

[147] Id.

[148] Id.

[149] Id.

[150] Id. at 110, 46 U.S.P.Q.2d at 1912.

[151] Amgen, 3 F. Supp. 2d at 110, 46 U.S.P.Q.2d at 1912.

[152] 143 F. Supp. 2d 407 (D. Del. 2001) [hereinafter Nexell I].

[153] Nexell I, 143 F. Supp. 2d at 408-09.

[154] Id. at 415.

[155] Id.

[156] Id. at 409.

[157] Id. at 423.

[158] Id.

[159] Nexell I, 143 F. Supp. 2d at 423.

[160] Nexell Therapeutics v. AmCell Corp., 199 F. Supp. 2d 197, 203 (D. Del. 2002), modifying 143 F. Supp. 2d 407 at 423 (D. Del. 2001) [hereinafter Nexell II].

[161] Nexell II, 199 F. Supp. 2d at 203.

[162] Id.

[163] Id. at 201.

[164] Id. at 202.

[165] Id.

[166] Id. at 204.

[167] Nexell II, 199 F. Supp. 2d at 203.

[168] Id.

[169] Id.

[170] Id. at 204. The Nexell II court did not specify what kind of activities would be "clearly outside of the FDA approval process."

[171] Id.

[172] 235 F. Supp. 2d 370, 376 (D. Del. 2002), aff'd 2003 WL 681706 (Fed. Cir. Feb. 12, 2003) (unpublished).

[173] Wesley Jessen, 235 F. Supp. 2d at 376.

[174] Id. at 371-372.

[175] Id. at 375.

[176] Id. at 376.

[177] Id.

[178] See Glaxo, Inc. v. Torphram, Inc., No. 95-C4686, 1995 U.S. Dist. LEXIS 17343, at *15 (N.D. Ill. Nov. 21, 1995), vacated on other grounds, 153 F.3d 1366, 47 U.S.P.Q.2d (BNA) 1836 (Fed. Cir. 1998) (district court holding that commercial use of a patented invention falls outside of § 271(e)(1)).

[179] 722 F. Supp. 86, 14 U.S.P.Q.2d (BNA) 1673 (D. Del. 1989).

[180] American Standard, 722 F. Supp. at 103, 14 U.S.P.Q.2d at 1686.

[181] Id. (Whether or not the prosthetic devices made for sale infringed the patent was an issue in dispute. However, the court's § 271(e)(1) analysis assumed that they constituted patent infringement.).

[182] Id.

[183] Id.

[184] Id.

[185] Id. (Because the court also found that the patent was invalid, however, the finding of infringement had no impact on the outcome of the case.).

[186] American Standard, 722 F. Supp. at 103, 14 U.S.P.Q.2d at 1686 (even the American Standard court had used the terms "use" and "purpose" interchangeably).

[187] See, e.g., Intermedics, 775 F. Supp. 1269, 20 U.S.P.Q.2d 1422; Teletronics, 982 F.2d 1520, 25 U.S.P.Q.2d 1196.

[188] Wesley Jessen, F. Supp. 2d at 376.

[189] Id. at 371.

[190] Id. at 370. The Wesley Jessen decision, decided by the same district court, did not cite American Standard.

[191] Id. at 375.

[192] See Intermedics, 775 F. Supp. at 1287-89, 20 U.S.P.Q.2d at 1435-1437. See also NeoRx Corp. v. Immunomedics, Inc., 877 F. Supp. 202, 31 U.S.P.Q.2d (BNA) 1433 (D.N.J. 1994) (holding that shipping some of the products abroad to seek access to foreign regulatory agencies not reasonably related to FDA approval even though the majority of the products were used to generate data for FDA).

[193] H.R. Rep. No. 98-857, pt. 1, at 45 (1984).

[194] 954 F. Supp. 391, 42 U.S.P.Q.2d (BNA) 1681 (D. Mass. 1996).

[195] Id. at 399, 42 U.S.P.Q.2d at 1688.

[196] See also Kos Pharm., Inc. v. Barr Lab., Inc., 242 F. Supp. 2d 311, 318 (S.D.N.Y. 2003) (stating that Biogen has not established a decisive threshold a minimum amount of production that a potential infringer must reach in order to demonstrate sufficient ability to infringe).

[197] 877 F. Supp. 202, 31 U.S.P.Q.2d (BNA) 1423 (D.N.J. 1994).

[198] Id. at 206, 31 U.S.P.Q.2d at 1426.

[199] Id. at 206-07, 31 U.S.P.Q.2d at 1427.

[200] See Brian D. Coggio & Francis D. Cerrito, The Application of the Patent Laws to the Drug Approval Process, 52 Food Drug L.J. 345, 348 (1997).

[201] See, e.g., Persidis, Signal Transduction, supra note 3, at IT37.

[202] David L. Parker, Patent Infringement Exemptions for Life Science Research, 16 Hous. J. Int'l L. 615, 617 (1994).

[203] See id.

[204] See Janince M. Mueller, No "Dilettante Affair": Rethinking the Experimental Use Exception to Patent Infringement for Biomedical Research Tools, 76 Wash. L. Rev. 1, 14 (2001) (adopting a similar definition).

[205] See Report of the National Institute of Health (NIH) Working Group on Research Tools (June 1993), available at http://www.nih.gov/news/researchtools/index.htm (last visited October 19, 2003) [hereinafter NIH Research Tools Report].

[206] No. 95 Civ. 8833, 2001 U.S. Dist. LEXIS 19361 (S.D.N.Y. Nov. 28, 2001).

[207] Bristol-Myers Squibb, 2001 U.S. Dist. LEXIS 19361, at *3.

[208] Id. at *14-17 ("Analogs" are compounds that resemble the existing compound but incorporate various structural changes to existing compound. Screening involves a process of evaluating various compounds in primary and secondary tests through hundreds of experiments and then narrowing down the leads until the ultimate lead is found. Id. In Bristol-Myers Squibb, the screen was conducted in the Drug Discovery Department, and a lead, if identified, was then transferred to the Chemical Process Department where the compound is further optimized, synthesized, and scaled up.).

[209] Id. at *15.

[210] Id. at *1.

[211] Id. at *27-28. In a subsequent decision, the district court for the Southern District of New York found that RPR had committed inequitable conduct during the prosecution of the patent and thus rendered the claims in the RPR patent invalid, void, and unenforceable. See Bristol-Myers Squibb v. Rhone-Poulenc Rorer, Inc., No. 95 Civ. 8833, 2002 U.S. Dist. LEXIS 480 (S.D.N.Y. Jan. 16, 2002).

[212] Bristol-Myers Squibb, 2001 U.S. Dist. LEXIS 19361, at *6.

[213] Id. at *8 (citing Abtox II, 122 F.3d at 1029, 43 U.S.P.Q.2d at 1553).

[214] Id. at *9 (citing Abtox II, 122 F.3d 1019, 43 U.S.P.Q.2d 1545; Chartex, 5 F.3d 1505, available at 1993 WL 306169).

[215] Id.

[216] Id. at *10.

[217] Id.

[218] Bristol-Myers Squibb, 2001 U.S. Dist. LEXIS 19361, at *10.

[219] Id.

[220] Id. at *11 (Both parties agreed on the applicability of the Intermedics test. The court declined to follow the "standard industry practice test" recommended by the Special Master's Report. The standard industry test would require Bristol to prove that its uses of patented intermediates follow standard industry practices for (1) the preparation of potential drug products from intermediates; (2) screening and testing products; and (3) evaluating of such tested products for further testing, and/or submission of applications to the FDA for IND or NDA. The court found that such test was "not supported by legal precedent and [was] impractical.").

[221] Id. at *21, n. 11. The court found that this conclusion was buttressed by Bristol's previous success in the clinical development of Taxol. Id.

[222] Id. at *25.

[223] Id.

[224] Bristol-Myers Squibb, 2001 U.S. Dist. LEXIS 19361, at *22 (citing Amgen, 3 F. Supp. 2d at 110, 46 U.S.P.Q.2d at 1910-11).

[225] Id. at *23.

[226] Id. at *24 (citing The Special Master's Report at 10-11, Bristol-Myers Squibb Co. v. Rhone-Poulenc Rorer, Inc., 2001 U.S. Dist. LEXIS 19361 (S.D.N.Y. Nov. 28, 2001) (No. 95 Civ. 8833)).

[227] Id. at *25 (citing Teletronics, 982 F.2d at 1525, 25 U.S.P.Q.2d at 1198).

[228] Id.

[229] See, e.g., H.R. Rep. No. 98-857, pt. 1 at 45 ("The purpose of Section 271(e)(1) and (2) is to establish that experimentation with a patented drug product, when the purpose is to prepare for commercial activity which will begin after a valid patent expires, is not a patent infringement."); id. pt. 2, at 8 ("[T]he only activity which will be permitted by the bill is a limited amount of testing so that generic drug manufacturers can establish the bioequivalency of a generic substitute."); id. at 29 ("[T]he competing claim to the pioneer drug companies holding the patent on these drugs seems much less tangible.").

[230] Parker, supra note 202, at 641.

[231] Eli Lilly, 496 U.S. at 665, 15 U.S.P.Q.2d at 1125.

[232] Id. See generally Buchanan, supra note 97; Brinckerhoff, supra note 63.

[233] Bristol-Myers Squibb, 2001 U.S. Dist. LEXIS 19361, at *22.

234 Id. at *22-23.

235 Id. at *24. See also Gregory Glover, Emerging Trends in Pharmaceutical Patent Policy: Implications for Biotechnology, available at http://www.biotechnology-investor.com/bioweb/12002/glover.htm (last visited Nov. 25, 2003).

236 See, e.g., Teletronics, 982 F.2d at 1525, 25 U.S.P.Q.2d at 1198; Amgen, 3 F. Supp. 2d at 104, U.S.P.Q.2d at 1914.

237 Golden, supra note 9, at 139-40.

238 Coggio & Cerrito, supra note 105, at 169-70 (stating that under the reasoning of Bristol-Myers Squibb, even suits for infringement of patented pipettes or a patented conveyor belt is prohibited, as long as the use of such devices is limited to the drug discovery department).

239 For example, on March 14, 2002, Representatives Rivers and Weldon introduced a bill titled "Genomic Research and Diagnostic Accessibility Act of 2002." H.R. 3967, 107th Cong. (2002). The bill would have amended Title 35 of the U.S. code to declare that "it shall not be an act of infringement for any individual or entity to use any patent for or patented use of genetic sequence information for purpose of research." The measure was referred to the House Subcommittee on Courts, the Internet, and Intellectual Property and no further action was taken. See also Closing the Gaps in Hatch-Waxman: Assuring Greater Access to Affordable Pharmaceuticals: Hearing on Revising the 1984 Waxman-Hatch Act Before the Senate Comm. on Health, Education, Labor, and Pensions, 107th Cong. 11 (May 8, 2002) (Statement of Sen. Orrin Hatch) (pointing out that § 271(e)(1) exempts generic firms, and only generic drug firms, from otherwise infringing activities).

240 See The Tools & Techniques of Drug Discovery: A Benchmark Survey of Pharmaceutical Scientists, at http://www.scienceboard.net/studies/DrugDiscovery.pdf (last visited Nov. 24, 2003).

241 H.R. Rep. No. 98-857, pt. 2, at 30 ("[T]he committee has merely done what the Congress has traditionally done in the area of intellectual property law; balance the need to stimulate innovation against the goal of furnishing the public interest.").

242 Mueller, supra note 204, at 41.

243 See H.R. Rep. No. 98-857, pt. 2, at 8 ("The patent holder retains the right to exclude others from the major commercial marketplace during the life of the patent. Thus, the nature of the interference with the rights of the patent holder is not substantial.").

244 A number of recent cases broadly interpreting § 271(e)(1) rely primarily on such policy justification. See Teletronics, 982 F.2d at 1525, 25 U.S.P.Q. at 1999; Bristol-Myers Squibb, 2001 U.S. Dist. LEXIS 19361 at *23; Amgen, 3 F. Supp. 2d at 104, 46 U.S.P.Q.2d at 1906-1907; Wesley Jessen, 235 F. Supp. 2d at 376.

245 Roche, 733 F.2d at 863, 221 U.S.P.Q. at 940.

246 Id.

247 Id. at 861, 221 U.S.P.Q.2d at 940-41.

248 Id. at 863, 225 U.S.P.Q. at 941.

[249] Mueller, supra note 204, at 26 (arguing that the common law exemption for experimental use survived Congress's enactment of § 271(e)(1)).

[250] 216 F.3d 1343, 55 U.S.P.Q.2d (BNA) 1161 (Fed. Cir. 2000) (holding that defendant's conducting experiment using a patented chicken inoculation method for the purpose of designing around the invention not experimental use).

[251] Embrex, 216 F.3d at 1349, 55 U.S.P.Q.2d at 1164.

[252] 307 F.3d 1351, 64 U.S.P.Q.2d (BNA) 1737 (Fed. Cir. 2002).

[253] Madey, 307 F.3d at 1362, 64 U.S.P.Q.2d at 1746 ("Our precedent clearly does not immunize use that is in any way commercial in nature.").

[254] See Rebecca S. Eisenberg, Patents and the Progress of Science: Exclusive Rights and Experimental Use, 56 U. Chi. L. Rev. 1017 (1998); Mueller, supra note 204, at 36 (contending that Roche's distinction of "pure" experimentation for "philosophical" purposes versus "commercialization" no longer supportable).

[255] Eisenberg, supra note 254, at 1074-78.

[256] Id. at 1074-75.

[257] Id. at 1076-77 (According to Eisenberg's model, such users would still be considered infringers, but their remedies would be limited. That is, the patent owner would not be able to enjoin their uses, but "in some cases" would receive an after-the-fact "reasonable royalty" in recognition of the patent owner's initial investment in developing the patented invention.).

[258] Id. at 1075. But see Jordan P. Karp, Experimental Use as Patent Infringement: The Impropriety of a Broad Exception, 100 Yale L.J. 2169, 2180 (1991) ("Allowing parties seeking to develop commercially either useful improvements or substitute technologies, i.e., design-arounds, to experiment on patented invention is not consistent with the policy of patent law."); Suzanne T. Michel, The Experimental Use Exception to Infringement Applied to Federally Funded Invention, 7 High Tech L.J. 369, 397 (1992) (arguing that if larger, better funded companies were allowed to use the patented inventions of start-ups to design their own commercial alternatives, the smaller companies' patent portfolio would be less attractive and this would have an important dampening effect on innovation).

[259] Eisenberg, supra note 254, at 1075. For example, a firm may be using EPO as a starting material to look for noninfringing EPO analogs that can substitute for EPO in the market.

[260] Rebecca S. Eisenberg, Patents and the Progress of Science: Exclusive Rights and Experimental Use, 56 U. Chi. L. Rev. 1017, 1074 (1998).

[261] Id.

[262] Id. at 1075.

[263] Id.

[264] Lahteenmaki & Fletcher, supra note 7, at 551.

[265] For example, some biotech firms aim at identifying drug targets and licensing the targets to pharmaceutical companies, while other firms may focus on a particular technique and hope to license the technology to biotech researchers.

[266] Golden, supra note 9, at 267.

[267] Michael A. Heller & Rebecca S. Eisenberg, Can Patents Deter Innovation? The Anticommons in Biomedical Research, 280 Science 698, 698 (1998); John H. Barton, Reforming the Patent System, 287 Science 1933, 1933 (2000).

[268] Heller & Eisenberg, supra note 267, at 699.

[269] Id.

[270] Id.

[271] Id.

[272] John Walsh et al., Working Through the Patent Problem, 299 Science 1021, 1021 (2003) (The authors conducted seventy interviews with: intellectual property attorneys, scientists and managers from ten pharmaceutical and fifteen biotech firms; university researchers and technology transfer officers from six universities; and other intellectual property attorneys and government and trade association personnel.).

[273] Id.

[274] Id.

[275] Id.

[276] Heller & Eisenberg, supra note 267, at 701. For example, policymakers should be concerned with extreme forms of restricted access that may come in the form of exclusive licensing of broadly useful research tools or high license fees that may block classes of potential users.

[277] See supra Parts II.B., III.A-C.

[278] After submission of the manuscript, the Federal Circuit in a 2:1 decision has for the first time refused to extend the § 271(e)(1) safe harbor to biotechnology research tool patents. In Integra Life Sciences I, Ltd. v. Merck, KgaA, 331 F3d 860 (Fed. Cir. 2003), the court held that uses of research tool patents for pre-clinical drug screening were not exempt from infringement under § 271(e)(1). The court stated that § 271(e)(1) does not globally embrace research and development activities simply because they may lead to an FDA approval process. Id. at 867. The court further reasoned that to interpret the statute otherwise would ignore the legislative history of § 271(e)(1) and "effectively vitiate the exclusive rights of patentees owning biotechnology tool patents." Id. The Federal Circuit thus has for the first time reversed the judicial trend of broadly interpreting § 271(e)(1).

[279] See Alfred B. Engelberg, Special Patent Provisions for Pharmaceuticals: Have They Outlived Their Usefulness?, 39 IDEA 389, 419-22 (1999) (arguing that the Bolar Amendment no longer serves a useful purpose); Ned Milenkovich, Deleting the Bolar Amendment to the Hatch-Waxman Act: Harmonizing Pharmaceutical Patent Protection in a Global Village, 32 J. Marshall L. Rev.

751, 777-78 (1999) (proposing deleting the Bolar exemption because it conflicts with TRIP).

280 Engelberg, supra note 279, at 421.

281 Id. at 392. Engelberg also points out that "the elimination of these special patent law provisions for pharmaceuticals [would] enhance the ability of the U.S. Trade Representative to harmonize international patent law with respect to pharmaceutical patents." Id. at 421.

282 Pharmaceutical Patent Issues: Interpreting GATT: Hearing on S.1277 Before the Committee on the Judiciary, United States Senate, 104th Cong. 154 (1996) (testimony of Henry G. Grabowski) (stating that the Hatch-Waxman Act has been a tremendous success in terms of facilitating generic competition).

283 See, e.g., Allergan, Inc. v. Alcon Lab., Inc., 324 F.3d 1322, 66 U.S.P.Q.2d (BNA) 1255 (Fed. Cir. 2003); Warner-Lambert Co. v. Apotex Corp., 316 F.3d 1348, 65 U.S.P.Q.2d (BNA) 1481 (Fed. Cir. 2003).

284 H.R. Rep. No. 98-857, pt. 1, at 15, pt. 2, at 29 (1984). See also supra Part II.A.3.

285 See supra Part II.B.2.c.1.

286 Patent Fairness Act of 1999: Hearing on H.R. 1598 Before the House Comm. on the Judiciary, 106th Cong. 214 (1999) (statement of Richard F. Seldon, President, Transkaryotic Therapies, Inc.).

287 See id.

288 See id. at 194-203 (statement of Gordon M. Binder, CEO, Amgen); id. at 222-35 (statement of Richard P. Burgoon, Jr., Vice President, Arena Pharmaceuticals).

289 See supra Part II.B.1.a.

290 Patent Fairness Act of 1999: Hearing on H.R. 1598 Before the House Comm. on the Judiciary, 106th Cong. 94 (1999) (statement of Richard F. Seldon, President, Transkaryotic Therapies, Inc.); id. at 20 (statement of Hon. Henry A. Waxman, Member, House Comm. on Government Reform, and Hon. Pete Stark, Member, House Comm. on Ways and Means).

291 Id. at 94 (statement of Richard F. Seldon, President, Transkaryotic Therapies, Inc.).

292 Another possible approach to limit the scope of § 271(e)(1) is to adopt the narrower justification of Eli Lilly and limit the term "patented invention" to only those covered in § 156. However, such an approach would require the legislature to overrule the well-established Federal Circuit precedent.

293 "Research on the patented invention" in the § 271(e)(1) context does not include improving upon or designing around the patented invention. See supra Part IV.A.2.b.

294 See NIH Research Tools Report, supra note 205, at App. D-8 (suggesting that such a distinction is a "sensible distinction," because "[a]n excessively broad research exemption could eliminate incentives for private firms to develop and disseminate new research tools, which could on balance do more harm than good to the research enterprises."). A similar distinction is also made in some foreign patent systems. For example, Germany patent law provides that "[t]he rights conferred by the patent shall not extend to acts performed for experimental purposes relating to the subject-matter of the patented invention." See Heinz Goddar, The

Experimental Use Exception: An European Perspective, 7 CASRIP 10 (2001). The Federal Supreme Court of Germany recently interpreted this provision to absolve from liability certain clinical trials of a patented pharmaceutical, but not using the patent to conduct further research. Id. at 12.

[295] See Farmaceutisk Lab. Ferring, A/S v. Solvay Pharm., Inc., 25 U.S.P.Q.2d (BNA) 1344 (N.D. Ga. 1992); Infinitech v. Vitrophage, 842 F. Supp. 332, 20 U.S.P.Q.2d (BNA) 1201 (N.D. Il. 1994); Amgen, 3 F. Supp. 2d 104, 46 U.S.P.Q.2d 1906.

[296] While intent of the alleged infringer is irrelevant for a traditional patent infringement analysis, a commercial intent has been a touchstone for the common law experimental use doctrine. It is therefore appropriate to infuse an intent inquiry into the biotechnology research tool exception. Furthermore, the Intermedics test also adopts a "reasonable believe" inquiry. Intermedics, 26 U.S.P.Q.2d at 1528.

[297] See Part II.B.2.d.1.

[298] See Part II.B.2.d.

[299] Teletronics, 982 F.2d at 1523, 25 U.S.P.Q.2d at 1198.