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DO THE PATIENT PROTECTION AND AFFORDABLE CARE ACT’S PROVISIONS RESCUE COMMERCIAL GENETIC RESEARCH AFTER ASSOCIATION FOR MOLECULAR PATHOLOGY, ET AL. V. U.S. PATENT AND TRADEMARK OFFICE, ET AL.?

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INTRODUCTION

In Association for Molecular Pathology, et al. v. U.S. Patent and Trademark Office, et al., the U.S. District Court for the Southern District of New York invalidated a claim to patent genetically developed material on the basis that “[t]he patents issued by the [United States Patent Office] are directed to a law of nature and were therefore improperly granted.”1 The court’s decision pertained to Myriad’s claims to patent isolated DNA for breast cancer susceptibility genes 1 and 2, “BRCA 1/2,” and applicable processes. Rejecting Myriad’s patent theory, the court stated that “the patents at issue directed to ‘isolated DNA’ containing sequences found in nature are unsustainable.”2 Although the Federal Circuit reversed in part the district court’s decision, the case could still be appealed to the Supreme Court.3 At that point, progress in commercial patent-centric genetic research is at risk. If the Supreme Court reverses the Federal Circuit Court decision, very few incentives will exist for commercial patient-centric genetic research.4

In light of the Association for Molecular Pathology decision, the Patient Protection Affordable Care Act (PPACA) has important implications for commercial personalized research. Specifically referencing genetic research and personalized medicine in several provisions, PPACA offers several guarantees to ensure the progress of commercial personalized medical research.5

This paper will provide the legal framework for patents and genetic research, focusing on the applicable constitutional provisions, federal statutes, and federal cases. It will also discuss PPACA’s provisions and its potential to rescue commercial genetic research if the Federal Circuit’s decision in Association for Molecular Pathology is reversed by the Supreme Court.

I. Patents and Genetic Research

A. U.S Constitution

Congress is authorized by the U.S. Constitution to enact legislation, “To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.”6

B. Federal Statutes

As background, it is noted that:

The idea of having the federal government encourage authorship and invention through the grant of temporary monopolies was derived by the framers of the Constitution from the English experience. James Madison, in the Federalist Papers., in advocating that the national government have the power to provide therefor, specifically alluded to the recognition of copyright in Britain, beginning his argument with the statement: “The utility of this power will scarcely be questioned.”7

The Patent Act of 1793, which replaced the original Patent Act of 1790,8 defined patentable subject matter and provided:

That when any person or persons, being a citizen or citizens of the United States, shall allege that he or they have invented any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement on any art, machine, manufacture or composition of matter [emphasis added], not known or used before the application, and shall present a petition to the Secretary of State, signifying a desire of obtaining an exclusive property
in the same, and praying that a patent may be granted therefor, it shall and may be lawful for the said Secretary of State, to cause letters patent to be made out in the name of the United States.9

As the U.S. Supreme Court stated in Diamond v. Chakrabarty, “The Act embodied [Thomas] Jefferson’s philosophy that ‘ingenuity should receive a liberal encouragement.’”10

In 1952, the most recent substantive revisions were enacted.11 The Patent Act of 1952, which applies to the analysis in this paper, is codified in Title 35 of the United States Code and provides in pertinent part:

§ 100. Definitions: When used in this title unless the context otherwise indicates—

(a) The term “invention” means invention or discovery.
(b) The term “process” means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.

§ 101. Inventions patentable: Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

§ 102. Conditions for patentability; novelty and loss of right to patent: A person shall be entitled to a patent unless—(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or (c) he has abandoned the invention. . . .

§ 103. Conditions for patentability; non-obvious subject matter (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.12

C. Federal Cases

Diamond v. Chakrabarty

In 1972, the microbiologist Ananda Mohan Chakrabarty filed a patent application consisting of thirty-six claims that related to Chakrabarty’s invention of a bacterium that was capable of dissolving components of crude oil.13 The commercial value for the treatment of oil spills with Chakrabarty’s invention was undisputed. Additionally, there was no naturally existing bacterium that demonstrated the same impact during the treatment of oil spills.14 As the U.S. Supreme Court noted, the existing method for treating oil spills consisted of a combination of naturally occurring bacteria, each of which would degrade a single component of the oil.15 Chakrabarty’s bacterium, however, proved to be more efficient at controlling oil spills because it broke down multiple components of the oil rather than a single component.16

Chakrabarty’s claims consisted of three components. The first component was the process; the second was the “carrier” or water surface vehicle, e.g., straw; and the third was the actual bacterium.17 The patent examiner who reviewed Chakrabarty’s application granted the first two components and rejected the third on the following grounds: “(1) that micro-organisms are ‘products of nature,’ and (2) that as living things they are not patentable subject matter under 35 U.S.C. 101.”18

The Court further clarified the issue by explaining that it must decide whether the micro-organism constitutes a “manufacture” or a “composition of matter” within the meaning of the statute.19 After considering various judicial and treatise-derived definitions of the terms “manufacture” and “composition of matter,” the Court stated, “In choosing such expansive terms as ‘manufacture’ and ‘composition of matter,’ modified by the comprehensive ‘any,’ Congress plainly contemplated that the patent laws would be given wide scope.”20 Further, after discussing the Patent Act of 1793 and the authorship of Thomas Jefferson, the Court added that the legislative history supported a broad interpretation of the statute.21

The Court, however, stated that section 101 is not unlimited. For example:

[A] new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. Likewise, Einstein could not patent his celebrated law that E=mc²; nor could Newton have patented the law of gravity. Such discoveries are “manifestations of . . . nature, free to all men and reserved exclusively to none.”22

Nevertheless, the Court sustained Chakrabarty’s patent application, explaining that Chakrabarty’s bacterium had “markedly different characteristics” from any naturally made bacterium, and noted its “potential for significant utility.” 23

Bilski v. Kappos

On writ of certiorari from the Federal Circuit, the Supreme Court reviewed a patent claim that consisted of a business application.24 The patent application included two claims that consisted of a procedure designed to assist buyers and sellers in protecting themselves from price fluctuations in commodities that are connected to the energy market. Both claims together consist of procedures and a mathematical formula.25

The patent examiner reviewing the application rejected the patent application on the grounds that the claim is an attempt to patent a mere abstract idea that does not have any specific limitation
to practical application.

Citing Chakrabarty, the Court began its analysis by noting three exceptions to section 101’s patent-eligibility principles: “laws of nature, physical phenomena, and abstract ideas.” The patent claims in this case may include methods of doing business, which might be considered a “process” as the term “method” fell within 101(b)’s definition of “process.” The Court went on to say, “In searching for a limiting principle, this Court’s precedents on the unpatentability of abstract ideas provide useful tools.”

Facilitating this theory, the Court rejected the patent claims because it did not agree with patenting “abstract ideas.” Continuing, the Court cautioned against the ramifications of patenting risk hedging in this context, claiming that it would “effectively grant a monopoly over an abstract idea.” Here, the abstract idea was a mathematical formula.

Prometheus Laboratories v. Mayo

The Supreme Court remanded Prometheus (Mayo v. Prometheus) to the Federal Circuit for re-adjudication in light of the Supreme Court’s decision in Bilski, particularly the portion of the Bilski holding that rejected the “machine-or-transformation test” as the exclusive test for determining whether process-type claims are patent eligible. The claimed patents were designed to maximize their “therapeutic efficiency” and minimize toxicity.

Rather than reject the “machine-or-transformation” test, the Federal Circuit in Prometheus explained that the test could be used, as set forth by the Supreme Court in Bilski, as an “investigative tool” for deciding whether certain inventions fall under section 101. Additionally, the Federal Circuit noted that the Supreme Court moderated the “abstract idea” limitation, stating, “The Supreme Court has also established that while a law of nature, natural phenomenon, or abstract idea cannot be patented, ‘an application of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.’”

The Federal Circuit, in the concluding stage of its analysis, explained that patent eligibility in this case depended upon whether Prometheus’s claims were based on a “natural phenomenon” or “a particular application of that phenomenon.” The Federal Circuit decided in favor of Prometheus’s claims. Concluding, the Federal Circuit found that Prometheus’ patents met the transformation test prong of the machine-or-transformation test because they changed the state of an article.

Association for Molecular Pathology v. U.S. Patent & Trademark Office

The plaintiffs in Association for Molecular Pathology challenged as invalid fifteen patent claims in seven patents that pertain to human BRCA1 and BRCA2 genes, or breast cancer susceptibility genes 1 and 2 (collectively referred to as “BRCA1/2”). The plaintiffs challenged patent claims on isolated DNA, which contained the BRCA1/2 gene sequences, and patent claims on the methods used to analyze the BRCA1/2 gene sequences. The court determined the central issue was whether the comparison of isolated human genes is patentable.

Breast cancer is the most commonly diagnosed cancer in the world. It is also one of the highest causes of cancer-related death among women. It is important to consider BRCA1/2 mutations in providing clinical care for breast and ovarian cancer. The hope is that testing will inform a woman of her risk and help clinicians determine how to prevent and/or treat the cancer.

Prefacing its decision, the district court quoted Justice Breyer, who had written that “sometimes too much patent protection can impede rather than ‘promote the Progress of Science and useful Art,’ the constitutional objective of patent and copyright protection.” The court acknowledged that Supreme Court precedent has established that patents cannot apply to products of nature unless a change results in a fundamentally new product. Taking this into consideration, the court held that the structural and functional differences cited by Myriad do not render isolated BRCA1/2 “markedly different” from native BRCA1/2, thereby designating the isolated BRCA1/2 an unpatentable product of nature.

D. Discussion of Cases

The Federal Circuit essentially following its analysis of section 101 in Prometheus and reversed the district court. In its decision, the Federal Circuit did not follow Bilski. If the Supreme Court overturns the Federal Circuit (assuming the case is appealed to the Court), the Supreme Court’s decision would be based on the reasoning that isolating the BRCA1 and BRCA2 genes would merely constitute or equate to “manipulat[ing] [an] abstract idea,” absent any change or transformation, retaining only the abstract nature of an “idea.” This result would follow a narrow interpretation of the Supreme Court’s decision in Chakrabarty.

The Chakrabarty Court, however, relied upon the writings of Thomas Jefferson.

III. Patient Protection and Affordable Care Act (PPACA)

A. Background – Commercialization of Genetic Research

The National Institutes of Health (NIH) published Best Practices for the Licensing of Genomic Inventions in 2005 and recommended that, if possible, non-exclusive licensing should be used. Exclusive licensing, however, is appropriate when private partners are needed to drive research and development. Additionally, in 2006, the National Research Council recommended educational and non-commercial patent infringement exemptions and judicial deference to patents related to genetic research and public health.
B. PPACA

a. Overview

The following PPACA provisions, as stated below, target genetics or personalized medicine:

- Section 3011 provides for “patient-centeredness of health care.”
- Section 3113 provides for “Treatment of certain complex diagnostic laboratory tests,” which includes an analysis of “gene protein expression, topographic genotyping, or a cancer chemotherapy sensitivity assay.”
- Section 4103 provides for “Medicare coverage of annual wellness visit providing a personalized prevention plan.”
- Section 6301, “Patient-centered outcomes research,” provides, in part, that “medical, treatments, services, and items,” include “drugs and biologicals.”

What is the link between genetics research and individual medical treatment? What does the term “personalized medicine” mean? According to the Mayo Clinic, pharmacogenomics is the link between prescription drugs and genetic research. It potentially allows physicians to predict how certain medicines will affect individuals before actually taking the drugs, which would allow physicians to better treat patients.60

Researchers at the Howard Hughes Medical Institute, Duke University, and the Koo Foundation-Sun Yat Sen Cancer Center addressed these concepts in greater detail in the context of researching breast cancer.61 Generally, the authors opined that “the value in genomic data is its scale and complexity; when combined with clinical and demographic factors, multiple forms of molecular data provide information that has the potential to identify unique characteristics of the individual and so lead to customized health care strategies.”62

The concept is apparently straightforward; however, developing efficient analytic methods to capture and integrate this data into a personalized diagnostic setting is the current challenge for researchers.63 For example, in the treatment of cardiovascular disease, many drugs are available. However, typically only a few of the drugs actually work for any particular patient. Additionally, patients often experience negative side effects. The goal is to identify which drug works for a particular person, without negative side effects, within the context of an individualized treatment plan.64

Regarding breast cancer, the researchers noted that many women who are diagnosed with early stage breast cancer undergo chemotherapy; however, women who are determined to be low-risk cases also frequently undergo chemotherapy.65 Genetic research has the potential of targeting or personalizing the treatment of breast cancer and reducing the incidents of unnecessarily invasive treatments, such as chemotherapy. Researchers have profiled gene expression in recent years and have shown that it is possible to identify the characteristics that relate to how cancer tumors behave.66 Using this information to predict if an individual will develop a disease would help clinicians create personalized treatment plans for patients.67

b. Does the PPACA rescue commercial genetic research if the Federal Circuit’s reversal of the district court’s decision in Association for Molecular Pathology is overturned?

How is the federal government planning to spend money in the 2012 fiscal year in connection with personalized medicine? The answer to this question creates the path to determining whether the PPACA will rescue genetic research.

1. Budgetary clues

The 2012 Budget for the Department of Health and Human Services (HHS) includes two primary references to the PPACA and personalized medicine.68 First, the 2012 HHS budget contains $620 million for the Patient-Centered Outcomes Research Institute (PCORI), a not for profit non-governmental entity that was created by the PPACA.69 The PCORI was created to “help get relevant, high quality information to patients, clinicians and policy-makers so that they can make informed health care decisions.”70 The 2012 HHS Budget, which relates to the PPACA, includes within the $620 million, $30 million from the Trust Fund, to be used for research on core patient-centered health.71 In total, when department-wide 2012 funding is considered to include all sources, including the American Recovery and Investment Act, a total of $1.1 billion is allocated although not fully budgeted, for patient-centered health research/ comparative effectiveness.72

Second noting that section 6301 of the PPACA, which provides for “[p]atient-centered outcomes research,” includes “medical treatments, services, and items” such as “drugs and biological,” the 2012 HHS budget contains the following provision:

Modify Length of Exclusivity to Facilitate Faster Development of Generic Biologics: The Affordable Care Act created a pathway for the FDA approval of generic biologics, providing a 12 year exclusivity period. This proposal would shorten the exclusivity period from 12 to 7 years.73

Additionally, although not directly linked in the 2012 HHS budget to the PPACA, the National Institutes of Health (NIH) was allocated $32 billion, part of which is intended for genetic research.74 According to the HHS, breakthroughs in determining what causes diseases and how to create better therapeutics can be found using genomic research.75

According to the House Report 708, section 4103 provides for wellness visits each year, comprehensive health risk assessments and personalized prevention plans.76 Additionally, the House Report stated that provisions in Title IV of PPACA relate to disease prevention and public health and along with section 4103 provide for Annual Wellness Visits and personalized prevention plans under Medicare.77
The House Report explained, regarding section 6301, that a Patient-Centered Outcomes Research Institute, a not for profit non-governmental entity, will be established in accordance with this section. Additionally, under section 6301, funding will be given to the Agency for Health Research and Quality, an entity established to publish the Institute’s findings and train researchers in comparative research methods.

According to Senate Report 112-11, the Senate Finance Committee, on April 21, 2009, conducted a roundtable to discuss “Reforming America’s Health Care Delivery System.” The discussion focused on possible methods to increase the availability of patient-centered, affordable health care services. The roundtable was preceded by a February 25, 2009 report from the Congressional Budget Office (CBO) regarding CBO reports that included “provisions aimed at expanding coverage or health care affordability.”

2. Discussion of budgetary and legislative history considerations

The 2012 HHS budget contains specific funding allocations for private research related to patient-centered outcomes. Department-wide 2012 funding is $1.1 billion, and as part of this amount, $620 million is dedicated to PPACA-related patient-centered outcomes through the non-governmental PCORI. Additionally, the HHS 2012 budget contains resources that pertain to the PPACA requirement to reduce from twelve to seven years the exclusivity period for generic biologics, which relates to the PPACA section 6301 provisions that mandate patient-centered outcomes research to include “drugs and biologicals.”

The legislative history of the PPACA suggests an open legislative path to patient-centered and non-governmental research. As a Senate report indicated, “[PPACA section 6301] provides funding for the Institute [PCORI].” Prior to enactment of the PPACA in 2010, congressional committees conducted hearings and roundtable meetings during which presenters endorsed programs and funding for patient-centered, affordable health care services.

The 2012 HHS budget and House and Senate reports suggest that both the legislative and executive branches view the PPACA as mandating support for non-governmental patient-centered health care research. Does this include for-profit, commercial research? Or is PPACA support for patient-centered health care research limited to the not-for-profit arena?

IV. Conclusions

Government funded research that is related to patient-centered health care outcomes, as mandated by the PPACA, will eventually track and find its way to the private sector, both not-for-profit and for-profit. As a Senate report discussed, the PPACA allocates funding to both PCORI and the Agency for Health Research and Quality, allowing for the training of researchers in comparative effectiveness methods and the dissemination of research findings.

The PPACA would provide some relief to offset the theories propounded by the district court and Federal Circuit dissents in Association for Molecular Pathology, although it most likely would not be a direct substitute for private venture capital. Government funding, as required by the PPACA and evidenced in the 2012 HHS budget, could form a precursor to eventual private investment, indirectly offsetting the impact of these theories. A partial rescue for commercial personalized medicine and genetics research, courtesy of the PPACA, would likely await Myriad and similarly situated private enterprises.
stable energy-generating plasmids, each of said plasmids providing a separate hydrocarbon degradative pathway.

14 Id.
15 Id. at 305 n.2.
16 Id.
17 Id. at 305-06.
18 See id. (discussing how the court succinctly stated the issue as one of interpreting 35 USC §101, which provides, “Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title). 
19 Diamond, 447 U.S. at 307 n.5.
20 Id. at 308.
21 Id.
22 Id. at 309.
23 Id.
25 Id. at 3223.
26 Id. at 3224 (statement of Patent Examiner) (“[T]he claim is not implemented on a specific apparatus and merely manipulates [an] abstract idea and solves a purely mathematical problem without any limitation to a practical application, therefore, the invention is not directed to the technological arts.”).
27 Id.
28 Id. at 3225 (citing Chakrabarti, 447 U.S. at 309).
29 Id. at 3228.
30 Bilski, 130 S. Ct. at 3229.
31 Id. at 3229-30.
32 Id. at 3231.
33 Prometheus Labs. v. Mayo Collaborative Servs., 628 F.3d 1347, 1349-50 (Fed. Cir. 2010) (“Prometheus is the sole and exclusive licensee of the ’623 and ’302 patents, which claim methods for determining the optimal dosage of thiopurine drugs used to treat gastrointestinal and non-gastrointestinal autoimmune diseases. These drugs include 6-mercaptopurine (“6-MP”) and azathioprine (“AZA”), a pro-drug that upon administration to a patient converts to 6-MP, both of which are used to treat inflammatory bowel diseases (“IBD”) such as Crohn’s disease and ulcerative colitis. 6-MP is broken down by the body into various 6-MP metabolites, including 6-thioguanine (“6-TG”) and their nucleotides.”).
34 Id. at 1350.
35 Id. at 1352-53.
36 Id. at 1354 (citing Bilski, 130 S. Ct. at 3230).
37 Id.
38 Id. at 1355 (“[T]he claims recite specific treatment steps, not just the correlations themselves. And the steps involve a particular application of the natural correlations: the treatment of a specific disease by administering specific drugs and measuring specific metabolites. As such … the claims do not preempt all uses of the natural correlations; they utilize them in a series of specific steps.”).
39 See Prometheus Labs., 628 F.3d at 1355 (stating that the transformation of the article was “central to the purpose” of the claimed patent).
41 See id. at 185 (explaining that the comparison of BRCA1 and BRCA2 gene sequences is used to identify the presence of mutations which correlate with a predisposition to breast or ovarian cancer).
42 Id.
43 See id. at 200 (noting that breast cancer is the most frequently diagnosed cancer worldwide and serves as the leading cause of cancer-related death for women in Britain and the second leading cause of cancer-related death for women in the United States).
44 See id. at 203 (illustrating that BRCA1/2 gene mutations correlate with an increased risk of breast and ovarian cancer).
45 See Ass’n for Molecular Pathology, 702 F.Supp.2d at 203 (remarking that this information helps inform the woman’s decision, particularly when she is faced with various treatment options such as prophylactic surgery, hormonal therapy, chemotherapy, and other measures).
46 Id.
48 Id. at 222 (citing Am. Fruit Growers v. Brodgex Co., 283 U.S. 1, 11, (1931)).
49 Id. at 229 (concluding that because DNA’s nucleotide sequence, a defining characteristic, is vitally important in both the natural and isolated form, the structural and functional differences between the two forms does not constitute a marked difference and thus does not constitute a fundamentally new product).
50 See Prometheus, 628 F.3d at 1354 (explaining that a patent which is “[d]rawn to a particular application of that phenomenon,” and not “[d]rawn to a natural phenomenon,” arguably follows the characteristics of isolating the existing or “native” characteristics of a gene).
51 See Ass’n for Molecular Pathology v. U.S. Patent and Trademark Office, 2011 WL 3211513, at *17 (Fed. Cir. 2011) (discussing that the DNA exists in a chemical form when isolated, which is different from the form it exists in inside the human body).
52 Bilski, 130 S.Ct. at 3224.
53 Id. at 3231.
54 See Linda J. Demaine & Aaron Xavier Fellmeth, Reinventing The Double Helix: A Novel and Nonobvious Reconceptualization of the Biotechnology Patent, 55 STAN. L. REV. 303, 317 (2002) (“Chakrabarty, then, opened the door to patenting any living organism that does not occur in nature—a door that Congress itself had declined to approach.”).
55 See Diamond, 447 U.S. at 308 (quoting Thomas Jefferson: “The relevant legislative history also supports a broad construction.”).
57 See id. (arguing that non-exclusive licensing should be used because it enables the scientific community to access technologies and inventions, and that it may be utilized as a complement to existing exclusive intellectual property rights).
58 Id.
59 Id.
63 Id. at 153.
64 Id.
65 Id. at 153-54.
66 Id. at 154.
67 Id.
68 Id. at 13.
70 Id. at 4.
71 Id.
72 Id. at 13.
74 Id. at 36.
75 See id. (opining that developing new therapeutics and understanding the etiologies of diseases will be aided by the use of genomic research and high throughput technology).
78 Id. at 51.
79 See id. (“...provides funding for the Institute and authorizes and provides funding for the Agency for Health Research and Quality to disseminate research findings of the Institute, as well as other government-funded research, to train researchers in comparative research methods and to build data capacity for comparative effectiveness research”).

81 Id. at 14.
82 HHS Budget, supra note 68, at 4, 13.
83 Id. at 58.
84 The Patient Protection and Affordable Care Act as Passed, supra note 76 at 51.
85 Senate Report, supra note 80, at 15.
86 The Patient Protection and Affordable Care Act as Passed, supra note 76.