No. 11-725

IN THE

# Supreme Court of the United States

THE ASSOCIATION FOR
MOLECULAR PATHOLOGY, *et al.*,

*Petitioners,*

*v.*

MYRIAD GENETICS, INC., *et al.*,

*Respondents.*

**ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT**

## BRIEF FOR CANAVAN FOUNDATION, CLAIRE ALTMAN HEINE FOUNDATION, MARCH OF DIMES FOUNDATION, FACING OUR RISK OF CANCER EMPOWERED, NATIONAL ASSOCIATION FOR PSEUDOXANTHOMA ELASTICUM, AND OVARIAN CANCER NATIONAL ALLIANCE AS *AMICI CURIAE* IN SUPPORT OF PETITIONERS

JOHN L. HENDRICKS
*Counsel of Record*
MEGAN M. O'LAUGHLIN
JOHN T. TOWER
HITCHCOCK EVERT LLP
750 North St. Paul Street,
Suite 1110
Dallas, Texas 75201
(214) 953-1111
jhendricks@hitchcockevert.com

239950

## TABLE OF CONTENTS

## TABLE OF AUTHORITIES

**Statutes**



**Supreme Court Rules**

## Other Authorities

## STATEMENT OF INTEREST OF *AMICI CURIAE*[1]

Each of the patient groups who submit this Amicus Brief have a direct and immediate need for the Court to address the issues in this patent case and to correct the errors in the analysis and decision produced in this matter by the U.S. Court of Appeals for the Federal Circuit.

**Canavan Foundation** is a non-profit organization founded by the parents and friends of children affected by the Canavan disease. Canavan disease is a rare but fatal, inherited degenerative brain disorder that primarily affects children of eastern and central European Jewish (Ashkenazi) descent. The disease causes loss of body control and death, generally before the children reach their teens. The Canavan Foundation's mission is to provide funding for research efforts to find an effective therapy, raise awareness of the disease,

[1] No counsel for a party authored this brief in whole or in part, and no such counsel or a party made a monetary contribution intended to fund the preparation or submission of this brief. No party or entity other than amici, their members, or their counsel, made a monetary contribution to this brief's preparation or submission. Counsel of record received timely notice of the intent to file the brief under Supreme Court Rule 37. Petitioners have filed a letter with the Clerk of the Court granting consent to the filing of any and all amicus curiae briefs. Respondents' letter granting amici consent to file has been filed with the Clerk of the Court.

and to help avoid Canavan disease through carrier screening and prenatal testing. Although it is believed that research advances may eventually lead to treatments or even a cure, there is currently no cure for the disease.

Genetic testing is an important part of prevention and early detection of Canavan disease. Despite the Foundation's efforts to sponsor low cost screening for potential carriers of Canavan's disease, a doctor and hospital who patented the relevant gene has prevented the group's efforts to provide free or even inexpensive screening programs.

**Claire Altman Heine Foundation (CAHF)** is a non-profit organization and a publicly supported charity. The Foundation is dedicated to establishing population-based pan-ethnic carrier screening for Spinal Muscular Atrophy (SMA), which is the number one genetic killer of children under two. The Foundation aims to raise awareness by educating the public and medical communities, and it works closely with medical associations, genetic counselors, leading SMA researchers, clinicians, laboratories, the NIH, Congress, industry and federal agencies such as the National Human Genome Research Institute, and others in the field of genetics research, prevention, treatment, and counseling.

In CAHF's direct experience, the enforcement and use of patent rights relating to the

gene responsible for SMA, similar to the patent claims at issue in this case, adversely affects clinical access to SMA carrier screening.

**Facing Our Risk of Cancer Empowered (FORCE)** is a non-profit organization whose mission includes providing people with information and resources to determine whether they are at high risk for breast and ovarian cancer due to family history or genetic predisposition and to make informed decisions about their health care options. FORCE supports efforts to improve patient access to genetic information, counseling and testing, improve the patient experience and quality of information that patients receive when undergoing genetic testing, and broaden access to genetic testing for researchers studying ways to improve care for individuals and families affected by hereditary cancer. Many of FORCE's members have obtained genetic testing to determine whether they have a BRCA1 or BRCA2 mutation. However, on a regular basis, FORCE receives phone calls from people who do not have access to genetic testing due to the prohibitively high cost of testing. Testing can be life-saving, as many women will opt for more intensive surveillance or preventive measures if they learn that they are at increased risk for hereditary cancer, yet many people cannot afford this valuable test. FORCE is concerned about the BRCA1 and BRCA2 gene patents because they stifle access to knowledge about genetic status, affecting knowledge and behavior around

risk of breast and ovarian cancer as well as research and potential treatment options.

**March of Dimes Foundation** is a non-profit organization dedicated to improving the health of babies by preventing birth defects, premature birth and infant mortality. For over 70 years, March of Dimes has carried out its mission through research, community services, education, and advocacy, originally to fight polio and, for the past 50 years, more generally to save babies' lives. March of Dimes funded Jonas Salk's revolutionary research into polio vaccine. On the day the field tests were pronounced a success, Edward R. Murrow interviewed Salk live on his television show. "Who owns the patent on this vaccine?" Murrow asked. "Well, the people, I would say," Salk replied, "There is no patent. Could you patent the sun?"

Historically, March of Dimes has played an important role in the key advances of genetics, having donated substantial funds in seed money to the early research of James Watson, resulting in his milestone discovery of the double helix structure of DNA. Today, March of Dimes funds research into genetic diseases and therapies, among many other fields. March of Dimes' mission and research are directly adversely affected by patents on gene sequences and correlations with disease, like the patents-in-suit.

**National Association for Pseudoxanthoma Elasticum (NAPE)** is a non-profit organization and

the original Pseudoxanthoma Elasticum (PXE) patient support group in the United States, committed to providing education for afflicted individuals and families. PXE is a recessively inherited systemic genetic disorder which causes blindness, cardiovascular and other health problems. NAPE also supports research seeking treatments and eventually a cure. NAPE provided the DNA and family histories for a lab at Harvard University which led to the identification of our mutant gene, ABCC6. The NAPE Board of Directors was shocked and disappointed when ABCC6 was patented, giving one individual control over PXE research. NAPE strongly opposes such patents which we believe interfere with free unfettered research.

Ovarian Cancer National Alliance (OCNA) is a non-profit organization and the foremost advocate for women with ovarian cancer in the United States. To advance the interests of women with ovarian cancer, the organization advocates at a national level for increases in research funding for the development of an early detection test, improved health care practices, and life-saving treatment protocols. OCNA educates health care professionals and raises public awareness of the signs and symptoms of ovarian cancer. Approximately 10 percent of ovarian cancer cases are related to hereditary genetic mutations. Mutations in the BRCA genes account for approximately 90% of hereditary ovarian cancer

cases. Women with BRCA1 mutations have an average lifetime risk of 55% of developing ovarian cancer, while women with BRCA2 mutations have an average lifetime risk of 31%. OCNA is opposed to affording patient protection for the BRCA1 and BRCA2 gene patents because such monopolies impede research on ovarian cancer and restrict access to genetic testing for the disease.

## SUMMARY OF THE ARGUMENT

This case presents the issue of whether human genetic material, or a segment of the human genome, upon isolation and/or extraction from the body, constitutes patent eligible subject matter as defined in 35 U.S.C. § 101. To be clear, the patents now at issue do not claim a means of isolating or extracting the gene; they claim the gene itself as invention. The U.S. District Court held that the genes as defined in the patent claims are "products of nature" and fall squarely within the judicially recognized exceptions to patentable subject matter. On appeal, the Federal Circuit panel affirmed the lower court's invalidation of method claims but reversed its invalidation of composition claims holding that the genetic sequences themselves were indeed patent eligible. The panel was divided and produced three separate opinions, including one concurrence and one dissent. Writing for the majority, Judge Lourie concluded that the mere *isolation* of a gene sequence was alone sufficient to qualify the genetic material as a product of human invention, despite the fact that the nucleotide sequence of the gene had not been altered, added to, reduced, or manipulated in any way.

The Federal Circuit's decision as presented in the majority opinion is irreconcilable with this Court's prior teachings on the scope of § 101.

Despite the broad language set forth in 35 U.S.C. § 101, the scope of what is eligible for patent protection is not limitless. This Court consistently has recognized boundaries of eligibility for patent protection by identifying general areas and subjects that are off limits to private monopolization. These subjects for exclusion are often described in terms including "natural phenomena," "laws of nature," and "abstract ideas." *See Diamond v. Diehr*, 450 U.S. 175, 185 (1981); *Parker v. Flook*, 437 U.S. 584 (1978). But this Court has used other phrases such as "products of nature,"[2] "physical phenomena,"[3] and "forces of nature"[4] interchangeably with "natural phenomena" and "laws of nature."

The rationale behind such exceptions is rooted in the idea that innovation requires unfettered access to a strata of basic concepts and natural phenomena that are prerequisite to and foundational of any advances in science and commerce. In *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127 (1948), this Court reiterated this point on its way to declaring products of nature unpatentable. "Patents cannot issue for the discovery of the phenomena of

---

[2] *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124, 130 (2001); *Diamond v. Chakrabarty*, 447 U.S. 303, 311 (1980).

[3] *Bilski v. Kappos*, 130 S. Ct. 3218, 3221 (2010); *Chakrabarty*, 447 U.S. at 309.

[4] *Dolbear v. Am. Bell Tel. Co.*, 126 U.S. 1, 532 (1888).

nature...[They] are part of the storehouse of knowledge of all men. They are manifestations of laws of nature, free to all men and reserved exclusively to none." *Id.* at 130.[5]

Gene patents create a monopoly over information that is foundational for biological and medical sciences. By authorizing such monopolies, the Federal Circuit's decision sets a precedent that impedes research and innovation in the natural sciences. It is therefore inimical to the goals of innovation and growth for which the U.S. patent laws were designed.

In addition to its deviation from this Court's jurisprudence on fundamental issues affecting the scope and purpose of patent law, the Federal Circuit's decision authorizes patent practices that will severely compromise efforts in the U.S. to diagnose and treat chronic and life threatening diseases. The adverse effects of gene patents on science and healthcare are profound and wide ranging. In the present case the composition patents at issue, if valid, would provide Myriad Genetics a monopoly on any use of the BRCA1 and BRCA2 genes within the United States. Certain mutations in these genes are known to correlate with a measurable predisposition to breast cancer and ovarian cancer. By virtue of its patents, Myriad is currently the only provider of a genetic

---

[5] *See also Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 548 U.S. 124, 136 (2006) (Breyer, J., dissenting).

test for breast cancer. Myriad can and does seek to exclude other diagnostic testing protocols involving these genes and their mutations. If the Federal Circuit's decision is allowed to stand, Myriad's patents would entitle the company to exclude all others in the United States from doing further research on these genes that might reveal other mutations having correlations with breast and ovarian cancer, and other diseases as well. As a consequence of Myriad's patents and the monopoly they provide, further research on breast and ovarian cancer has been stifled, better diagnostic tools have not been developed, and patient access to genetic testing and to follow up testing has been restricted.

If allowed to stand, the Federal Circuit's decision in the present case will significantly impede, rather than encourage, innovation in the field of research and applied genetics. As the patient groups who submit this brief are keenly aware, the Federal Circuit's decision not only subverts the constitutionally grounded purposes of the patent laws but ushers in a set of commercial practices that are inimical to the health and welfare of U.S. citizens. For these reasons, we urge the Court to grant Petitioner's request for Writ of Certiorari.

## ARGUMENT

### I. THE FEDERAL CIRCUIT MAJORITY'S ANALYSIS OF PATENT ELIGIBLITY OF HUMAN GENETIC SEQUENCES IS IRRECONCILABLE WITH THIS COURT'S PRIOR DECISIONS GOVERNING THE SCOPE OF PATENTABLE SUBJECT MATTER

#### A. *The District Court Opinion and Three Separate Opinions of the Federal Circuit Panelists Each Differ on the Pivotal Question of What Demarcates Products of Human Manufacture from Products of Nature*

The need for this Court's resolution of the issue presented—whether isolated DNA is patent-eligible—is facially apparent from the fact that the four federal judges addressing it employed different analyses. The judiciary needs clarification from this Court.

##### 1. The District Court Opinion.

The district court held that Myriad's composition claims are invalid because they seek to monopolize products of nature that are ineligible for patent protection as established under a long line of this Court's precedents. The district court determined that the subject matter of these claims, "isolated DNA," did not possess "markedly different characteristics" from DNA as it occurs naturally in the human body. *Association for Molecular*

*Pathology v. U.S. Patent and Trademark Office*, 702 F. Supp. 2d 181, 227-232 (S.D.N.Y. 2010). Specifically, the process of extracting DNA sequences from human cells and (in some cases) further purifying DNA sequences to eliminate noncoding portions "cannot transform it [DNA] into patentable subject matter." *Association for Molecular Pathology*, 702 F. Supp. 2d at 227. Simply put, the claimed invention was nothing other than a sequence of nucleotides that function exactly as nature intended and in the same manner as they did before isolation and purification.

### 2. The Federal Circuit Opinions

On appeal, the Federal Circuit upheld the district court's finding of invalidity with respect to the method claims, but—in a split two-to-one majority decision—reversed the district court's holding that "isolated DNA" claims were patent-ineligible. Although each of the three judges relied on the *Chakrabarty* and *Funk Bros.* cases, there was no consensus on the legal and factual underpinnings of these binding precedents. Indeed, each justice interpreted and applied the cases differently, highlighting the judiciary's need for instruction and clarification from this Court.

Notably, the two judges who concluded that isolated DNA claims were patent eligible did so for decidedly different reasons. Judge Lourie relied on an unargued for premise that slight and arbitrary structural changes to the composition alone made

the isolated DNA markedly different from the natural DNA. Judge Moore disagreed with this premise, stating "I do not think this difference alone necessarily makes isolated DNA so 'markedly different,' from chromosomal DNA so as to be per se patentable subject matter." *Association for Molecular Pathology v. U.S. Patent and Trademark Office*, 653 F.3d 1329, 1365 (Fed. Cir. 2011) (J. Moore concurring). Despite her rejection of the premise that *all* isolated DNA is markedly different, Judge Moore asserted that new utility considerations enabled by shorter sequences of DNA could transform what was natural into something human-made. However, because the claims covered short and long sequences of DNA, Judge Moore relied upon deference to PTO history and expectations in the industry to support a finding of patent eligibility. Her ultimate legal conclusion was predicated in part on her belief that the PTO's practice of granting patents on isolated DNA warranted a finding of patent eligibility despite some claims covering isolated DNA that was not markedly different from natural DNA (*i.e.* the longer sequences of claimed isolated DNA).

Thus, the majority opinion represented a two-judge consensus on the ultimate conclusion but not on the legal bases for such conclusion. Indeed, it appears that Judge Moore's deference to the PTO—rather than her application of the legal principles culled from this Court's precedents—played a substantial if not predominant role in her

conclusion. *See Id.* at 1366-67 ("If I were deciding this case on a blank canvas, I might conclude that an isolated DNA sequence that includes most or all of a gene is not patentable subject matter. Despite the literal chemical difference, the isolated full length gene does not clearly have a new utility and appears to simply serve the same ends devised by nature, namely to act as a gene encoding a protein sequence.").

Dissenting from this ultimate conclusion, Judge Bryson—like Judge Moore—rejected the premise that any structural change in a chemical composition is sufficient to render the product markedly different from products of nature.[6] Moreover, Bryson observed that inherent functional properties were important characteristics to consider in the effort to distinguish natural from manmade products. Judge Bryson concluded isolated DNA was patent-ineligible because the differences between the BRCA genes after transcription in nature and the isolated DNA after cleaving accord with "nature's predefined boundaries." *Id.* at 1377 (J. Bryson dissenting). He found that naturally occurring DNA and isolated DNA are not markedly different either structurally or functionally.

---

[6] Judge Bryson disagreed with Judge Moore that shorter sequences of isolated DNA could be considered markedly different.

### B. *Contrary to the Federal Circuit Majority's Decision, Patents on "Isolated" DNA are Invalid Under Section 101*

#### 1. Arbitrary Physical Differences Incidental to Isolation or Extraction Are Insufficient to Constitute "Markedly Different Characteristics"

In asserting criteria for distinguishing products of nature from products of human manufacture, Judge Lourie's opinion relied on two premises not found or even suggested by this Court—namely (1) that arbitrary physical differences alone are a sufficient basis to find a marked difference, and (2) evaluation of patent eligibility need not consider the functional characteristics of the product or the patent's language. This Court's key precedents—including *Funk Bros.* and *Chakrabarty*——do not support either premise, or the ultimate conclusion that isolated DNA is patent-eligible.

In *Funk Bros.*, the patent applicant claimed a new product for inoculating plants comprising six well-recognized species of bacteria. This Court, while acknowledging that the product was a "new" and useful composition, concluded that "[i]t is no more than the discovery of some handiwork of nature and hence is not patentable." *Funk Bros.,* 333 U.S. at 131. Crucial to the Court's analysis was its understanding of functional characteristics of the claimed bacteria. Specifically, that "[t]he

bacteria perform in their natural way. Their use in combination does not improve in any way their natural functioning. They serve the ends nature originally provided and act quite independently of any effort of the patentee." *Id.* As these statements reflect, the critical inquiry in *Funk Bros.* is whether naturally occurring characteristics lie at the core of the claimed invention. When the claimed advantages of an invention are little more than natural properties of the ingredients behaving in the manner for which nature intended them, the subject matter is not patent-eligible.

In *Chakrabarty*, the Supreme Court held that where an inventor introduced new genetic material within a bacterium cell that altered the function of the bacterium, he had created something that was not a product of nature and was thus patentable subject matter under 35 U.S.C. § 101. The Court explained that the subject matter at issue fell outside of these categories because the "patentee has produced a new bacterium with *markedly different characteristics* from any found in nature and one having the potential for significant utility. His discovery is not nature's handiwork, but his own; accordingly, it is patentable subject matter under § 101." *Chakrabarty*, 447 U.S. at 310.

In arriving at the conclusion that invented bacterium had "markedly different characteristics from any found in nature," this Court noted that "[Chakrabarty's] claim is not to a hitherto unknown

natural phenomenon, but to a nonnaturally occurring manufacture or composition of matter—a product of human ingenuity "having a distinctive name, character [and] use." *Chakrabarty*, 447 U.S. at 309-10 (citing *Hartranft v. Wiegmann,* 121 U.S. 609, 615 (1887)).

Contrary to this Court's precedents, the majority opinion simply dismissed, as irrelevant, any consideration of the functional characteristics of the claimed product and the understanding of the claimed product by one skilled in the art. This was error.

### 2. Isolation and Purification of Natural Elements Does Not Transform Them Into Products That are Patent Eligible

A long line of cases have held that an isolated and purified product of nature is not patentable if the product functions in a way that is not significantly different than what occurs in nature. As the Supreme Court wrote over a century ago:

> There are many things well known and valuable in medicine or in the arts which may be extracted from...substances. But the extract is the same, no matter from what it has been taken. A process to obtain it from a subject from which it has never been taken may be the creature of invention, but the thing itself when

> obtained cannot be called a new manufacture.

*American Wood-Paper Co. v. Fibre Disintegrating Co.*, 90 U.S. (23 Wall.) 566, 593-94 (1874); *accord Cochrane v. Badische Anilin & Soda Fabrik*, 111 U.S. 293 (1884) (holding a synthetic version of a dye that already existed in nature was not patentable); *In re Marden* (Marden I), 47 F.2d 957 (C.C.P.A. 1931) (purified uranium); *In re Marden* (Marden II), 47 F.2d 958 (C.C.P.A. 1931) (purified vanadium); *In re Merz,* 97 F.2d 599 (C.C.P.A. 1938) (purified ultramarine dye not patentable); *Dennis v. Pitner,* 106 F.2d 142 (7th Cir. 1939) (purified cube plant root not patentable); *Gen. Elec. Co. v. De Forest Radio Co.*, 28 F.2d 641 (3d Cir. 1928), *cert. denied*, 278 U.S. 656 (1928) (purified tungsten not patentable); *Ex parte Latimer*, 1889 Dec. Comm'r Pat. 123 (purified pine needle fiber not patentable).[7]

---

[7] The one notable exception is *Parke-Davis & Co. v. H.K. Mulford Co.*, 189 F. 95 (C.C.S.D.N.Y 1911), *aff'd in part, rev'd in part,* 196 F. 496 (2d Cir. 1912), where Judge Learned Hand held that purified adrenaline met the statutory requirement for novelty. *Parke-Davis & Co.*, 189 F. at 101-102. Despite Judge Learned Hand's reputation as a jurist, *Parke-Davis* has been widely criticized. For a history and analysis of that case, *see* "Dicta on Adrenalin(e): Myriad Problems with Learned Hand's Product of Nature Pronouncements in *Parke-Davis v. Mulford*," Jon M. Harkness, Journal of the Patent and Trademark Office Society, Vo. 93, No. 4 (2011).

These cases further support the conclusion that Myriad's labor in isolating the DNA sequence or isolating the coding region does not transform the natural product into a markedly different manufacture or composition, or warrant a finding that the claimed "isolated DNA" is patent eligible subject matter. The resulting molecules and genetic sequences obtained are "fit only for the same beneficial uses as theretofore." *American Fruit Growers, Inc. v. Brogdex, Co.*, 283 U.S. 1, 12 (1931).

### 3. Chemically Removing Portions of a Natural Product Does Not Transform it to a Human Invention

Although not a patent case, this Court's decision in *Hartranft* is instructive regarding whether arbitrary physical differences alone—namely, a chemical change to a natural product that does not result in any markedly different characteristics from the product as found in nature—are sufficient bases to find the marked difference necessary for patent-eligibility.[8]

In *Hartranft*, this Court determined that tariffs for manufactures of shells were not applicable to shells that had been chemically cleaned and sometimes etched with acid. *Hartranft*, 121 U.S. at 613-15. This Court noted:

---

[8] This Court cited *Hartranft* in *Chakrabarty.* 447 U.S. at 309-10.

> We are of opinion that the shells in question here were not manufactured, and were not manufactures of shells …, but were shells not manufactured, and fell under that designation in the free list. They were still shells. They had not been manufactured into a new and different article, having a distinctive name, character, or use from that of a shell. The application of labor to an article, either by hand or by mechanism, does not make the article necessarily a manufactured article.

*Hartranft*, 121 U.S. at 613-15.

Human gene sequences (i.e., the subject matter of Myriad's BRCA1 and BRCA2 patents), whether isolated from cells or extracted and further purified into cDNA, are structurally and functionally identical to human gene sequences as they naturally occur. The characteristics and function of a gene reside in the gene sequence—that is, the As, Cs, Gs, and Ts that code for the expression of a specific protein. These characteristics and functions (the active portion of the gene sequence) have not been changed in "isolated" DNA. The person claiming ownership of an isolated gene is seeking a monopoly on its natural functions—the ability of a gene sequence to anneal to its complementary strand (which allows diagnosis) and the ability to produce proteins.

Accordingly, the standard and criteria adopted in *Funk Bros.* and *Chakrabarty* for distinguishing unpatentable products of nature from patentable products of human manufacture—when properly applied—establish the unpatentability of "isolated DNA," whether it be merely extracted or further purified to cDNA.

Just as in *Hartranft*—where removing unwanted layers of the natural shell structure by acid cleaning and etching did not make the remaining shell product a manufacture—removing portions of natural DNA by an enzyme to isolate DNA fragments does not make the remaining "isolated DNA" a manufacture or composition of matter with "markedly different characteristics." The shell remains a shell.

## II. ALLOWING PATENTS ON HUMAN GENE SEQUENCES STIFLES INNOVATION AND ADVERSELY AFFECTS HEALTHCARE AND PATIENT OUTCOMES

This case exemplifies how too much patent protection can impede our collective efforts to minimize the pain and suffering caused by fatal diseases. Patents like those at issue raise testing costs and simultaneously impede the development of more accurate and reliable diagnostic tools. The results are concretely and tragically experienced by patients and their families whose suffering might have been minimized or prevented altogether by more effective and less expensive means of testing

for the genetic disposition to certain life threatening diseases. It is therefore no exaggeration to say that the consequences of affording patent protection to human genes can be lethal.[9]

Advocates of gene patenting, such as the Respondent, argue that upholding the district court's opinion would impede innovation and compromise patient diagnosis and treatment. But there is no factual support for those assertions. To the contrary, unless the district court's decision is upheld, the result will be less research, deficiency in diagnosing diseases, and worse outcomes for patients.

The holder of a gene patent is in sole control of how or whether any new research will be incorporated into the tests that it offers—the only tests offered in the United States. In light of its monopoly, gene patent holders lack the competitive incentive to reinvent its test promptly and as necessary to reflect up-to-date research (or, for that matter, to offer its test at a reasonable price). Under current USPTO policy, one can patent a human gene even though one does not know or choose to reveal all that might be known about that patented gene. Under the Federal Circuit's current holding, a patentee may be able to withhold more information than previously required under the USPTO policy. For example, the patentee may only

[9] *See infra* pp. 25-26.

need to disclose the different composition for "isolated DNA" and potentially a generic use of the "isolated DNA," and may be able to withhold the relevance of the selected nucleic acid sequence for any disease, condition, or human characteristic. Yet, such a patent limits other research that may lead to a better understanding of that gene.

In this case, Respondent Myriad's patents give it the exclusive right to perform genetic testing and research on the BRCA1 and BRCA2 genes in the United States, but Myriad cannot claim that it currently knows all there is to be known about the BRCA1 and BRCA2 genes and particularly the mutations thereto. Tom Walsh et al., *Spectrum of Mutations in BRCA1, BRCA2, CHEK2, and TP53 in Families at High Risk of Breast Cancer*, 295 Journal of the American Medical Association 1379 (2006) (12% of the 300 people examined from high risk families had mutations that the Myriad tests missed). Indeed, Myriad reports to many patients that they have an alteration in a BRCA gene but that the alteration has "unknown significance." Ostrer Decl. ¶12. The patient does not know—and Myriad cannot tell the patient because it does not know—whether this alteration is correlated with an increased risk of cancer. Yet, Myriad is the only entity that the patient can look to for such answers because of its right to exclude others from researching and utilizing certain genetic sequences under the patents.

The patents at issue here are but one example of detrimental effects of gene patenting. In April of 2010, the U.S. Department of Health and Human Services issued the Secretary [of Health and Human Services]'s Advisory Committee on Genetics, Health, and Society, *Report on Gene Patents and Licensing Practices and Their Impact on Patient Access to Genetic Tests* (2010) [hereinafter "SACGHS"]. The report examines a large body of empirical studies addressing the effects of gene patents on research, medical practice and patient outcomes. Especially noteworthy are the Committee's findings that research in the field of genetics has already begun to suffer as a consequence of gene patents. "Patents are already hindering the development of multiplex tests. Laboratories utilizing multiplex tests are already choosing not to report medically significant results that pertain to patented genes for fear of liability." SACGHS at 3. As a consequence of their chilling effects on genetic research, the existence and enforcement of gene patents discourage the development of better quality testing methods. "Neither sample sharing nor competition is possible when an exclusive-rights holder prevents others providing testing. As a result, significant concerns about the quality of a genetic test arise when it is provided by a patent protected sole provider." SACGHS at 4.

Perhaps most directly and immediately of concern to the groups who submit this brief, the

practice of patenting human genetic material has already proven to increase the costs of diagnostic procedures, restrict patient access to existing genetic testing and preclude the availability of better tests and of second opinions of the often ambiguous results of current testing methods. SACGHS at 1-6.

There can be no doubt that patents on human genes worsen patient outcomes. The harm that can result from patenting human genes is dramatically illustrated in the case of familial Long QT syndrome (LQTS), a disorder of the heart's electrical system that affects 1 in 3,000 newborns and can result in sudden death. Misha Angrist, et al, *Impact of Patents and Licensing Practices on Access to Genetic Testing for Long QT Syndrome*, SACGHS at Appendix A, F-1. The disease has been correlated to mutations within three particular genetic sequences. *Id.* A company obtained a patent and exclusive license to the mutated genes for purposes of offering a diagnostic test but did not do so for two years because the exclusively-licensed laboratory went into bankruptcy. *Stifling or Stimulating – The Role of Gene Patents in Research and Genetic Testing: Hearing Before the Subcomm. on Courts, the Internet and Intellectual property of the H. Comm. on the Judiciary*, 110th Congress 35 (2007) (statement of Dr. Marc Grodman). During that time, the company nevertheless sought to enforce the patent against other parties who could have provided genetic

testing for LQTS. *Id.* at 40. In the case of at least one patient, a ten year-old girl named Abigail who presented with an arrhythmia, death was preventable. *Id.* If the patent holder had made testing available, the cause of Abigail's arrhythmia would have been identified as LQTS, and the appropriate therapies could have been prescribed, such as beta-blocker drugs, implantable cardioverter-defibrillators, and avoidance of certain arrhythmia triggers. *Id.*; Angrist, SACGHS at Appendix A, F-1.

In another example, Ashkenazi Jewish families of children with Canavan disease and non-profit foundations provided tissue and money for over a decade to a geneticist so that he could sequence the genetic mutation that caused this devastating neurological disease. The purpose was to provide a low cost screening and prenatal testing program for identifying potential carriers of the disease. Unfortunately, when the doctor identified the relevant gene sequence for carriers of the mutation, he and his hospital patented it without the knowledge or consent of the tissue sources. *See Greenberg v. Miami Children's Hosp. Research Inst., Inc.*, 264 F. Supp. 2d 1064 (S.D. Fla. 2003). When the Canavan Foundation and its constituents convinced medical providers to offer Canavan gene testing for free, the hospital threatened to enforce its patent and shut down the free testing.

In addition to these specific examples, many persons cannot afford the genetic test and are left

with no test option especially when there is no insurance coverage provided. Others who receive genetic testing are left with uncertain outcomes (such as when they learn they have variants of unknown significance). Many patients are prohibited from seeking a second opinion or confirmatory test results from a different provider. This is precisely the case with the Myriad patents. Not only does Myriad control what type of tests to offer, it controls who qualifies for the tests. Swisher Decl. ¶¶27-31; SACGHS at 3. For example, Myriad initially delayed offering a test for large rearrangements that its full sequencing test would miss, which it calls BRACAnalysis Rearrangement Test ("BART"). Swisher Decl. ¶29. When it finally began offering this additional test in 2006—years after its patents issued—it imposed strict criteria on which patients would receive it. Swisher Decl. ¶¶30-31. Those who do not meet Myriad's criteria usually must pay out-of-pocket for BART, as it is not covered by Medicare or many insurance policies. Swisher Decl. ¶30; SACGHS at 3. As a consequence, it is Myriad's judgment, and not a patient's doctor's judgment, that often determines whether BART is available for a patient. Swisher Decl. ¶¶30-31; SACGHS at 3.

Myriad's sole control over the only available tests related to the BRCA1 and BRCA2 genes in the United States thus impedes a doctor's ability to diagnose and treat a patient. The consequences of this interference are especially problematic for

patients who need multiple genetic tests that can each be provided only by a patent holder. At best, it is inefficient and expensive to send a patient's blood or tissue sample to multiple laboratories for genetic tests; at worst, there may simply not be enough of the patient's sample to "split up" among multiple laboratories, forcing the patient's doctor to forego testing that would otherwise be ordered.

In light of the foregoing, it cannot credibly be disputed that gene patents interfere with accurate diagnosis and effective treatment of patients. Nor is the reward of a patent necessary to encourage innovation in the field. Cho Decl. ¶23; SACGHS at 2. A patent on a gene does not foster innovation. To the contrary, the value of the gene lies in the sequences created by nature (whether wild-type or mutations). Such sequences cannot be improved upon, nor can they be designed around: "it is the sequence created by nature that is the entire point of the gene." Jackson ¶16. Patents on genes thus do not advance the constitutional goals of the patent system, but instead obstruct them.

## III. CONCLUSION

As the history and diversity of judicial opinions in this case reveal, the federal courts need guidance in how to distinguish between products that are predominantly, if not entirely, the work of nature and therefore ineligible for patent protection, and those that are sufficiently changed by virtue of human ingenuity to qualify as patent

eligible subject matter under § 101. This case, more than any other, illustrates why the building blocks of human knowledge, including the human genome, should not be subject to monopoly through patent law. Extending patent protection to human genes results in less, not more, innovation in a sphere of research activity where innovation and freedom from monopoly are vital to the prevention and treatment of life threatening diseases. For the reasons herein, Amici respectfully request that this Court accept this case for review.

Respectfully submitted,

John L. Hendricks
HITCHCOCK EVERT LLP
750 North St. Paul Street, Suite 1110
Dallas, Texas 75201
(214) 953-1111 Telephone
(214) 953-1121 Facsimile
jhendricks@hitchcockevert.com

*Attorney for Amici Curiae*
*Canavan Foundation*
*Claire Altman Heine Foundation*
*March of Dimes Foundation*
*Facing Our Risk of Cancer*
*Empowered*
*National Association for*
*Pseudoxanthoma Elasticum and*
*Ovarian Cancer National Alliance*

January 13, 2012