

PATENTING RACE: THE PROBLEMS OF ETHNIC GENETIC TESTING PATENTS

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Genetic tests which target specific ethnicities are fraught with problems, and will become commonplace unless action is taken to stop them. The first has already been patented in Europe by the U.S. company Myriad Genetics, despite vigorous opposition. Myriad's patent covers testing for a mutation in the breast cancer gene BRCA2 in Ashkenazi-Jewish women. The patenting and approval of BiDil, a heart medication for African-Americans, provides strong evidence that patenting ethnically based medicine has become more acceptable in the United States. In allowing race-based drugs, the United States is much closer to allowing ethnic genetic testing, which has deeper, more insidious, and more widespread negative effects. As such, action must be taken to avoid the patenting of ethnic genetic tests. While existing anti-discrimination law may provide one reactive means to challenge these tests, its extent is unclear, and that route is slow and uncertain. Instead, Congress should proactively enact narrow legislation specifically tailored to prohibit these tests.

INTRODUCTION

Imagine that you are a middle aged woman, and your sister has just been diagnosed with breast cancer. You are worried that you might be at risk, and decide to find out. Your doctor tells you that there exists a straightforward genetic test, which will reveal whether or not your genes have one of the mutations that make breast cancer likely. Even better, the test is almost completely covered by most insurance plans. The doctor asks you one last unexpected question: "are you of Ashkenazi-Jewish decent?" Uncertain of the consequences, you answer truthfully that you are. "Oh," the doctor

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replies. “We can’t test you, then. You’ll have to go to a private clinic, and the test will probably cost you about \$4,750.”

This scenario seems like a far-fetched nightmare, but it is all too real. Myriad Genetics, a Utah company, has a patent in Europe that covers genetic testing for the breast cancer gene BRCA2, but only in Ashkenazi-Jewish women. For all other women, testing is covered by a patent belonging to a British cancer foundation, and the foundation has permitted all public and nonprofit laboratories to use it free of charge. Thus far, this appears to be the only genetic testing patent with claims limited to an ethnic group,¹ and it applies only in Europe. It would be naïve to expect the status quo to remain. Thus, the problems of ethnic genetic testing need to be addressed now before their widespread use becomes a *fait accompli* and we are left to deal only with the consequences.

The patenting of genetic sequences² and genetic tests is inherently controversial. Much has been written about policy issues and moral problems that are raised in patenting living creatures or parts of them.³ The patenting of genetic sequences for use in diagnosing human diseases raises similar issues.⁴ The most prominent controversy among genetic testing patents, Myriad Genetics’ widespread patenting of the breast cancer predisposition genes BRCA1 and BRCA2, has been previously addressed on those grounds.⁵ This paper will not seek to rehash the issues raised by genetic testing patents in general, which include inventiveness, the appropriateness of patenting human gene sequences, and healthcare policy effects.⁶ Rather, it will address the novel issues which have arisen with regard to Myriad’s European BRCA2 patent.

¹ “Race” and “ethnicity” are challenging, perhaps impossible, to define precisely, and their definition depends on the context in which they are used. *See, e.g.*, Margaret A. Winker, *Measuring Race and Ethnicity: Why and How?*, 292 JAMA 1612, 1612-15 (2004). As such, the two terms will be used interchangeably throughout this paper.

² In the United States, genetic sequences cannot be patented *per se*; however, an isolated DNA sequence molecule can be patented as a novel chemical composition which has the same effect as patenting genetic sequences. *See* Utility Examination Guidelines, 66 Fed. Reg. 1092 (Jan. 5, 2001), available at <http://www.uspto.gov/web/offices/com/sol/notices/utilexmguide.pdf>.

³ *See, e.g.*, Rachel E. Fishman, *Patenting Human Beings: Do Sub-Human Creatures Deserve Constitutional Protection?*, 15 Am. J.L. & Med. 461 (1989); Michael E. Sellers, *Patenting Nonnaturally Occurring, Man-Made Life: a Practical Look at the Economic, Environmental, and Ethical Challenges Facing Animal Patents*, 47 Ark. L. Rev. 269 (1994); Ned Hettinger, *Patenting Life: Biotechnology, Intellectual Property, and Environmental Ethics*, 22 B.C. Env’tl. Aff. L. Rev. 267 (1995).

⁴ *See, e.g.*, Lori B. Andrews, *The Gene Patent Dilemma: Balancing Commercial Incentives with Health Needs*, 2002 Hous. J. Health L. & Pol’y 65, 79-95 (2002).

⁵ Jordan Paradise, *European Opposition to Exclusive Control Over Predictive Breast Cancer Testing and the Inherent Implications for U.S. Patent Law and Public Policy: A Case Study of the Myriad Genetics’ BRCA Patent Controversy*, 59 Food & Drug L.J. 133 (2004).

⁶ *See, e.g.*, Andrews, *supra* note 4, at 79-95.

Originally, Myriad sought a broad patent covering the BRCA genes. However, after substantial challenges were mounted against the original patent application, Myriad narrowed their request for coverage to only the test for a specific mutation to diagnose breast cancer predisposition in Ashkenazi-Jewish women.⁷ By taking this course, Myriad trod new ground in patent law by including an ethnic specificity in the claim of a genetic testing patent.

Given the potential to extract significant profits from genetically constrained testing patents, to categorize new drugs on the basis of ethnic information so obtained, and to game the system by both creating and extending new patents based on racial characteristics, the commercial proliferation of ethnic genetic testing patents seems inevitable.

Setting a worrisome precedent in the United States, the Patent and Trademark Office (PTO) recently granted a patent for BiDil, a drug specifically targeted at African-Americans.⁸ The Food and Drug Administration (FDA) approved BiDil shortly after the patent was granted.⁹ Troublesome as ethnically targeted drugs are, however, they have far different and less worrisome implications than an ethnic genetic testing patent. This paper explores the central differences between the two types of patents, the details of ethnic genetic testing's negative implications, and the steps that should be taken to avoid extending the approval of ethnic drugs to ethnic genetic testing.

I. THE FACTS

The story of Myriad's breast cancer patents is tangled and complex.¹⁰ The basic research underlying the patents occurred in the early 1990s, performed by a variety of groups including the University of Utah Research Foundation, the Hospital for Sick Children at the University of Toronto, the University of Pennsylvania, and Myriad Genetics, all of which were involved in the discovery of BRCA2.¹¹ The United States patents are relatively straightforward: in 1995, BRCA2 was finally cloned at the University of Utah by Myriad-affiliated researchers; they filed the first U.S. BRCA2

⁷ Myriad Genetics, *Main Request*, <http://www.epoline.org/portal/public/registerplus> (enter publication number EP785216; follow "All Documents" hyperlink; then follow "Claims" hyperlink) (filed Nov. 24, 2004) [hereinafter *Main Request*].

⁸ U.S. Patent No. 6,465,463 (issued Oct. 15, 2002).

⁹ *FDA Approves BiDil Heart Failure Drug for Black Patients*, FDA News, June 23, 2005, <http://www.fda.gov/bbs/topics/NEWS/2005/NEW01190.html>.

¹⁰ For an engrossing account of Myriad's BRCA patent acquisition, see Karen Van Kampen, *Owning the Code [The Golden Cell]*, *Financial Post Business*, Sept. 1, 2005, at 56.

¹¹ William Rusconi, Presentation to the National Academies Committee on Intellectual Property Rights in Genomics and Protein-Related Research (Feb. 11, 2005) (PowerPoint available at http://www7.nationalacademies.org/step/Presentation_Rusconi_February2005_proteomics.ppt).

patent the same year.¹² That U.S. patent was granted in 1998.¹³ Myriad's clinical service to detect BRCA1 and BRCA2 mutations, BRACAnalysis, was commercially launched in the United States in 1996.¹⁴

The patent situation in Europe is somewhat more complicated, because there Myriad faced both opposition and competition. Myriad filed for a patent concerning BRCA2 on December 17, 1996.¹⁵ The patent was awarded on January 8, 2003.¹⁶ Shortly afterwards, joint opposition proceedings, whereby third parties can challenge patents within nine months of their issuance,¹⁷ were filed by the Institut Curie, the Assistance Publique-Hôpitaux de Paris, the Institut Gustave-Roussy, and the Belgian Society of Human Genetics.¹⁸ They objected to a single company essentially controlling breast cancer genetic research and testing for commercial gain.¹⁹

Competition galvanized Myriad's subsequent maneuvering just as much as the opposition proceedings did. BRCA2 was essentially identified by two groups racing towards the same goal, Myriad in the United States and Cancer Research UK ("CRUK") in Europe.²⁰ Myriad filed a U.S. patent application first on December 18, 1995,²¹ but a team from CRUK, led by Michael Stratton, had already submitted their sequence-defining paper to the journal *Nature* nearly two weeks before.²² Furthermore, CRUK had filed UK patents on parts of the sequence, giving priority claims for the full sequence

¹² U.S. Patent No. 5,837,492 (issued Nov. 17, 1998).

¹³ *Id.*

¹⁴ Rusconi, *supra* note 11.

¹⁵ Eur. Patent No. 785,216 (issued July 23, 1997).

¹⁶ *Id.*

¹⁷ Convention on the Grant of European Patents, Oct. 5, 1973, art. 99, *available at* <http://www.european-patent-office.org/legal/epc/e/ar99.html> (last visited Jan. 21, 2007).

¹⁸ Press Release, Institute Curie, Assistance Publique-Hôpitaux de Paris & Institut Gustave-Roussy, Another Victory for Opponents of Patents Held by Myriad Genetics: European Patent Office Rejects the Essential Points of BRCA1 Gene Patents (Jan. 31, 2005), <http://www.curie.fr/upload/presse/myriadpatents310105.pdf> [hereinafter Joint Press Release].

¹⁹ *Id.*

²⁰ *See* Van Kampen, *supra* note 10, at 57.

²¹ *See* U.S. Patent No. 5,837,492, at [63] (filed Apr. 29, 1996) (issued Nov. 17, 1998) (claiming priority from Ser. No. 08/573,779 (filed Dec. 18, 1995)).

²² Richard Wooster et al., *Identification of the Breast Cancer Susceptibility Gene BRCA2*, 378 *Nature* 789 (1995).

patent to follow, on November 23,²³ and December 14,²⁴ just before Myriad's U.S. filing date.²⁵ CRUK's European patent issued on January 5, 2004, and took effect five weeks later.²⁶ That patent broadly covers BRCA2's sequence and all alleles, including any disease mutations.²⁷ CRUK promptly announced that it would make free licenses available for research and testing in public and nonprofit laboratories.²⁸

Myriad instituted opposition proceedings against Cancer Research UK, but then proceeded to defensively narrow its own patent so it could exist alongside CRUK's broad patent. On November 24, 2004, Myriad submitted a new Main Request, replacing all of the claims of its original patent application with one new claim: "Use of an isolated nucleic acid . . . [containing] the mutation associated with a predisposition to breast cancer, wherein T at nucleotide position 6174 is deleted, for diagnosing a predisposition to breast cancer in Ashkenazi-Jewish women in vitro."²⁹ Opposition proceedings continued, and the opposition parties raised new arguments against the insertion of an ethnicity restriction into the claim of the patent.³⁰ Oral arguments took place before the

²³ U.K. Patent App. No. 9523959 (filed Nov. 23, 1995). The U.K. patents were actually filed by CRC Technology, the technology transfer office of the Institute for Cancer Research, which is the parent organization of CRUK. *See* National Research Council, *Reaping the Benefits of Genomic and Proteomic Research: Intellectual Property Rights, Innovation, and Public Health*, 62-63 (National Academies Press 2006) [hereinafter *Reaping the Benefits*].

²⁴ U.K. Patent App. No. 9525555 (filed Dec. 14, 1995).

²⁵ CRUK licensed the U.S. rights of U.K. Patent No. GB2307477 to OncorMed, a U.S. company. Myriad, after a legal battle with OncorMed, licensed the BRCA2 rights from OncorMed for the United States, securing a U.S. breast cancer testing monopoly. *See* *Reaping the Benefits*, *supra* note 23, at 62-63.

²⁶ European Patent Office, *Decision to Grant a European Patent Pursuant to Article 97(2) EPC*, <http://www.epoline.org/portal/public/registerplus> (enter publication number EP858467; follow "All Documents" hyperlink; then follow "Decision to Grant a European Patent Pursuant to Article 97(2) EPC" hyperlink) (filed Jan. 5, 2004). European patents take effect when published in the European Patent Bulletin; here, the decision was published in Bulletin 04/07 on Feb. 11, 2004.

²⁷ Eur. Patent No. 0858467, <http://www.epoline.org/portal/public/registerplus> (enter publication number EP858467; follow "All Documents" hyperlink; then follow "Claims" hyperlink) (filed Mar. 18, 1998).

²⁸ Press Release, Cancer Research UK, Charities to Make Breast Cancer (BRCA2) Gene Freely Available Across Europe (Feb. 11, 2004), <http://info.cancerresearchuk.org/news/pressreleases/2004/february/38944> [hereinafter CRUK Press Release].

²⁹ Main Request, *supra* note 7.

³⁰ Press Release, European Society of Human Genetics, Geneticists Oppose Singling Out Jewish Women in European Breast Cancer Patent (June 15, 2005), <http://www.eshg.org/PressReleaseESHG15-06-2005.pdf> [hereinafter Geneticists Oppose].

Opposition Division of the European Patent Office on June 29, 2005, and the modified patent was upheld.³¹

The end result, in terms of patent coverage, is that CRUK has a broad European patent on BRCA2, its sequence, and mutations in it generally, including the mutation that is the subject of Myriad's patent. CRUK's patent is freely available for research and diagnostic testing. CRUK does not itself distribute tests, but once the sequence of a gene and its mutations is made public, testing is readily conducted by any equipped laboratory.³² Myriad, on the other hand, has a narrow patent that covers diagnostic testing for a specific mutation in Ashkenazi-Jewish women, which it provides itself.

Geneticists have already criticized the decision to uphold Myriad's ethnically restricted testing patent.³³ The ruling broke new ground for patents, dealing for the first time with a claim for an ethnically limited genetic test. The arguments on both sides, and the rationale for the Division's decision, require close scrutiny as the first legal analysis of this type of claim. The model of how this novel situation played out the first time provides a useful template in avoiding the issue when it arises again.

II. THE ARGUMENTS AND DECISION OF THE OPPOSITION PROCEEDINGS

In the BRCA2 opposition proceedings, several arguments were brought against the patent. The arguments included standard objections on the grounds of obviousness and lack of novelty.³⁴ These standard objections are common in patent oppositions, and

³¹ Press Release, European Patent Office, Patent on "Breast Cancer Gene 2" Patent Maintained in Amended Form After Public Hearing (June 29, 2005), http://www.european-patent-office.org/news/pressrel/2005_06_29_e.htm.

³² For an easily understood overview about genetic testing, *see generally* National Academy of Sciences, *Human Gene Testing*, <http://www.beyonddiscovery.org/includes/DBFile.asp?ID=85> (last visited Jan. 21, 2007).

³³ Press Release, European Society of Human Genetics, EPO Upholds Limited Patent on BRCA2 Gene: Singling Out an Ethnic Group is a 'Dangerous Precedent' Says European Society of Human Genetics (July 1, 2005), <http://www.eshg.org/ESHGPressRelease01July2005.pdf>; *see also* Sabine Steimle, *Critics question BRCA2 patent decision in Europe*, 97 J. Nat'l Cancer Inst. 1326 (2005). For the decision itself, *see* European Patent Office, *Interlocutory Decision in Opposition Proceedings*, <http://www.epoline.org/portal/public/registerplus> (enter publication number EP785216; follow "All Documents" hyperlink; then follow "Interlocutory Decision in Opposition Proceedings" hyperlink) (filed Sept. 12, 2005); *see also* European Patent Office, *Grounds for the Decision (Annex)*, <http://www.epoline.org/portal/public/registerplus> (enter publication number EP785216; follow "All Documents" hyperlink; then follow "Grounds for the Decision (Annex)" hyperlink) (filed Sept. 12, 2005) [hereinafter *Grounds*].

³⁴ Letter from William E. Bird to the European Patent Office 3-10 (Apr. 29, 2005), <http://www.epoline.org/portal/public/registerplus> (enter publication number EP785216; follow "All Documents" hyperlink; then follow the second hyperlink dated Apr. 29, 2005, entitled "Letter Regarding the Opposition Procedure"). To be granted a European patent, an invention must be novel and involve a nonobvious inventive step. *See* Convention on the Grant of

are too general, because of their application to all sorts of patents, and too specific, because of their disproportionate focus on the facts of Myriad's actual patents, to be of use in teasing apart the issue of ethnic genetic testing.

Three arguments, however, were made which typify the most significant objections against ethnicity-based genetic testing. First, the Belgian Society of Human Genetics opposed the patent on the grounds that the term "Ashkenazi-Jewish women" is unclear in meaning – essentially, that the ethnicity defined in the patent is too nebulous a term to be legally invoked.³⁵ Second, the Institut Curie claimed that the patent would have deleterious and discriminatory economic effects.³⁶ Third, both opposition parties as well as representatives from the Jewish community argued that the patent would be contrary to morality or "ordre public," in which case the patent would be prohibited by Article 53(a) of the European Patent Convention.³⁷ These three arguments, along with the written grounds for the Opposition Division's decision, foreshadow the issues that are central to ethnic genetic patents.

A. Clarity of Patent Terms and the Definition of Ethnicity

The Belgian Society of Human Genetics argued that "Ashkenazi Jewish women" is an unclear term and, therefore, unfit to be the subject of a patent claim.³⁸ Furthermore, the opposition argued, even if the term is sufficiently clear for the scientific community using it in research, legal applications require a different standard of clarity.³⁹ Myriad

European Patents, Oct. 5, 1973, arts. 52, 54, 56. Here, the novelty and nonobviousness requirements were challenged, with opposition parties arguing that the mutation data available in CRUK's patents on BRCA2 sequence portions were enough for an individual skilled in the art to develop the test Myriad patented. The European Patent Office disagreed, and held that the patent was both novel and nonobvious. *See* Grounds, *supra* note 33, at 9-11.

³⁵ Bird, *supra* note 34, at 10.

³⁶ Letter from Frederique Faivre Petit & Jacques Warcoin to the European Patent Office 3 (Apr. 29, 2005), <http://www.epoline.org/portal/public/registerplus> (enter publication number EP785216; follow "All Documents" hyperlink; then follow the third hyperlink dated Apr. 29, 2005 entitled "Letter Regarding the Opposition Procedure").

³⁷ Convention on the Grant of European Patents, Oct. 5, 1973, art. 53(a), *available at* <http://www.european-patent-office.org/legal/epc/e/ar53.html#A53> (last visited Jan. 21, 2007) ("European patents shall not be granted in respect of: (a) inventions the publication or exploitation of which would be contrary to 'ordre public' or morality, provided that the exploitation shall not be deemed to be so contrary merely because it is prohibited by law or regulation in some or all of the Contracting States.").

³⁸ Bird, *supra* note 34, at 10.

³⁹ Minutes of the Oral Proceedings Before the Opposition Division, 5.1 (June 29, 2005), <http://www.epoline.org/portal/public/registerplus> (enter publication number EP785216; follow "All Documents" hyperlink; then follow "Annex to the communication – Opposition" hyperlink) (filed Sept. 12, 2005).

replied by citing various examples in scientific and patent literature using the term “Ashkenazi-Jewish.”⁴⁰ Because studies have used and continue to use ethnicity as an analytical factor, and “Ashkenazi-Jewish” has acquired meaning in the scientific community through that use, the Opposition Division’s ruling agreed with Myriad that the term is sufficiently well defined in scientific literature as to constitute a distinct genetic subpopulation.⁴¹ Thus far, no significant problems arise.

However, the Division’s written decision proceeds to further justify the term’s clarity. The ruling points out that the patent’s description mentions ethnic identity as a self-reported characteristic.⁴² This conflation of definitions ignores the problematic nuances involved in justifying the clear boundaries of an ethnic group as scientific fact on the one hand and as personal self-identification on the other. In terms of scientific studies, self-identified race may prove a useful correlative factor for future analysis, future probing, and links to other research. In the legal world, however, such links are rarely benign; the legal conception of race connects to discrimination as well as constitutional and statutory prohibitions.

The ruling glosses over the crucial difference between scientific and legal clarity. Science relies on operational definitions, which are essentially hypotheses of use in the context of current understanding. Legal definitions are precedents used for enforcement, which tend to become ossified through extensive use. Patents live on the boundary between the two, to be sure, but in an area as fraught with peril as defining racial and ethnic minorities, blurring operational scientific terms with precedent-creating legal definitions can lead to serious problems.

B. Negative Economic Effects

Focusing on an area of more immediate concern to those women who would be affected by the patent, the Institut Curie criticized the negative economic effects of granting an ethnic genetic testing patent.⁴³ Since CRUK, which owns the broad European patent on BRCA2, has allowed free licenses for research and testing,⁴⁴ the only people charged a licensing fee for BRCA2 testing are those who fall under Myriad’s specific patent – that is, Ashkenazi-Jewish women. Myriad charges between \$2,500 and \$3,000 for BRACAnalysis, which tests for both BRCA1 and BRCA2 mutations, if

⁴⁰ Letter from Hans-Rainer Jaenichen to the European Patent Office 4-5 (Apr. 29, 2005), <http://www.epoline.org/portal/public/registerplus> (enter publication number EP785216; follow “All Documents” hyperlink; then follow “Letter regarding the Opposition procedure (no time limit)” hyperlink) (filed June 29, 2005).

⁴¹ Grounds, *supra* note 33, at 6-7.

⁴² *Id.*

⁴³ Petit & Warcoin, *supra* note 36, at 3.

⁴⁴ CRUK Press Release, *supra* note 28, at 1.

purchased directly from Myriad.⁴⁵ The charge is €4,000, or approximately \$5,150, if purchased from Bioscientia, a German firm which Myriad has licensed for BRACAnalysis.⁴⁶ In comparison, European clinics charged approximately €900, approximately \$1,160, for testing prior to Myriad's patent.⁴⁷ In Canada, prices more than quadrupled in the shift from local testing to Myriad's testing;⁴⁸ Ontario rejected Myriad's patent claims⁴⁹ and continues to test locally for the mutations.⁵⁰ The high charges for Myriad's test pose a significant burden, and if the patent is enforced, some geneticists fear that clinics will be financially unable to offer the tests to Ashkenazi-Jewish women.⁵¹

The Institut Curie stressed the discriminatory nature of the potential economic fallout.⁵² Dismissing this argument, the Opposition Division replied: "the economic effects of a patent on a group of persons who may choose to use the teachings of a patent are not one of the criteria of patentability according to the EPC."⁵³ They argue, essentially, that economics are not their problem to consider. Taken at face value, this may be true: the patent system represents a policy choice to grant limited monopolies, and that policy choice is made in choosing to use the patent system in the first place, not in the granting of individual patents. However, this limited viewpoint overlooks the reality that some economic effects are more than merely economic. If the economic impact of a patent is substantively discriminatory, if it increases risks to the health of a limited minority group, or if it results in changes to health policy in general, then it is no longer a question of pure economics, but strays into the realm of endangering "ordre public," contrary to Section 53(a) of the European Patent Convention. Ethnic genetic testing patents have the capacity for all of these impacts, as shall be shown below in Section IV(C).

⁴⁵ Steimle, *supra* note 33, at 1326.

⁴⁶ *Id.*

⁴⁷ See Raphael Brenner, *Whose Gene is it Anyway?*, 2 CancerFutures 52, 53 (Feb. 2003), available at www.cancerworld.org/CancerWorldAdmin/images/static_modules/images/1428/CF_1_Vol2_52.pdf.

⁴⁸ Caroline Mallan, *Gene Test for Cancer Won't Stop*, Toronto Star, Sept. 20, 2001, at A3.

⁴⁹ *Id.*

⁵⁰ See Van Kampen, *supra* note 10, at 56.

⁵¹ Steimle, *supra* note 33, at 1326.

⁵² Petit & Warcoin, *supra* note 36, at 3.

⁵³ Grounds, *supra* note 33, at 12.

C. Moral Concerns of Singling Out an Ethnic Group

In the third major objection to Myriad's patent, all opposition parties argued that an ethnic genetic testing patent is against "ordre public." Third party submissions from Israeli doctors claimed the patent was racist and would engender racist ideas.⁵⁴ Furthermore, those submissions opined that Myriad's claim lacked morality because it introduced genetically discriminating considerations into patent language.⁵⁵ Similarly, the two main opposition parties argued that the patent was morally problematic because of its limitation to a minority group.⁵⁶ Once again, the Opposition Division answered the charges without accounting for the broader context. The Division judged these arguments without merit because the patented test would prove beneficial to Ashkenazi-Jewish women, not detrimental, and that therefore any discriminatory effects could only be positive.⁵⁷

While perhaps true in the purely local context of Myriad's BRCA2 patent, this rationale becomes vanishingly weak when considered in light of CRUK's broader and freely available BRCA2 patent. The patent does not cover a new test, for which just compensation is needed; instead it singles out data from an older test which is freely available to all others. Even the specific BRCA2 mutations covered by Myriad's test can be tested for in non-Ashkenazi women free of Myriad's patent licensing fees.⁵⁸ Only Ashkenazi-Jewish women must be tested using Myriad's method under its patent, though any mutation they might have would be detected using the broad and free BRCA2 tests otherwise available. It is hard to see how this could be a positive development for those women.

III. PRACTICAL MATTERS: DO WE REALLY NEED TO WORRY?

Before considering the implications of Myriad's patent, and others that might arise like it, a reality check is in order. Two questions need to be addressed. First, are ethnic genetic testing patents enforceable? The mere existence of a patent is not enough

⁵⁴ Letter from Eliezer Robinson & Dorit Lev to the European Patent Office 1-2 (June 27, 2005), <http://www.epoline.org/portal/public/registerplus> (enter publication number EP785216; follow "All Documents" hyperlink; then follow "Letter regarding the Opposition procedure" hyperlink) (filed June 27, 2005).

⁵⁵ *Id.*

⁵⁶ Petit & Warcoin, *supra* note 36, at 3; Minutes of the Oral Proceedings Before the Opposition Division, *supra* note 39, at 6.

⁵⁷ Grounds, *supra* note 33, at 12-13.

⁵⁸ Fees are charged for testing, but the cost is much less without Myriad's pricing policies, and the generic test is almost completely covered by national healthcare systems in many cases. In Belgium, the test costs about \$1,200, but at-risk individuals pay only \$11 out of pocket. Steimle, *supra* note 33, at 1326.

cause for worry; it must have effects in the world outside the patent office, and for that, it must be enforceable at some level. Second, will companies seek ethnic genetic testing patents? If Myriad's ethnic patent was produced solely by its own specific circumstances, with vehement opposition and the existence of the CRUK patent, then there is no need for concern about the proliferation of genetic testing patents. If, on the other hand, companies are likely to encounter similar circumstances in the future, or have other reasons to pursue ethnic genetic testing patents, then the problems caused by these patents are worth considering. Unless ethnic genetic testing patents are both desirable to corporations and realistically enforceable, the implications of Myriad's patent are seriously limited. Unfortunately, these patents probably are desirable to inventors, and will become more so; they are also enforceable enough to influence real-world behavior at the individual and group levels.

A. Companies Will Pursue More Ethnic Genetic Testing Patents.

Given that ethnic genetic testing patents are more limited than patents on testing for the same mutations in all people, companies need additional reasons to pursue ethnically limited patents. There are two such reasons. First, in situations analogous to Myriad's, it may be the case that the mutation itself is already known; it might have already been published, or patented broadly by another company in a general gene patent like CRUK's. Finding an ethnic link may be enough for a new patent, and will allow that inventor to carve out a profitable niche. Second, if the company already owns a general patent on the gene, presenting a new use for the patent by means of a new racial link or limitation may be sufficient to extend patent coverage. The situation where general knowledge of a gene is public but specific ethnic disease links are unknown will become more frequent over time. Advances in biology, particularly in the fields of genomics and bioinformatics, mean that genes and their mutations can increasingly be isolated and identified in an automated fashion; data from these experiments are often posted online almost immediately.⁵⁹ With large amounts of such data becoming public, acquiring patents on the genes themselves, or on mere lists of their mutations, will become increasingly difficult. Determining ethnic links of disease genes, however, involves another step, one that the Opposition Division found sufficiently inventive and novel to merit a patent.⁶⁰ Given the ability to obtain new patents on otherwise unpatentable gene products and to profitably market them to ethnic or racial subgroups, the discovery of ethnic genetic links seems a promising growth area for companies.

Furthermore, in the case of pre-existing patents, new ethnic links may be sufficient to be a new use for a patented product, and therefore to extend its life. For the clearest example, one need look no further than BiDiI, which shifted from a patent set to

⁵⁹ See, e.g., Pascale Anderle et al., *Gene Expression Databases and Data Mining*, 34 *BioTechniques* 3, 36-44 (2003), available at <http://vortex.cs.wayne.edu/papers/GeneExpressionDatabases.pdf>.

⁶⁰ Grounds, *supra* note 33, at 9-11.

expire in 2007 to a new ethnic patent expiring in 2020.⁶¹ If companies can use ethnic links to extend the life of a lucrative patent, the proliferation of ethnic genetic testing patents should be expected.

Whether as a method to get new patents from large datasets already public or as a technique to extend the effective life of older patents, ethnic limitations on genetic testing patents are an attractive option for companies to pursue.

B. Ethnic Genetic Testing Patents Are Sufficiently Enforceable to Influence Patient and Doctor Behavior and Healthcare Dynamics.

Myriad's BRCA2 patent presents undeniable enforcement challenges. Since CRUK's patent, with free licenses available, covers generally the mutation in Myriad's patent, the mutation can be detected both by Myriad's proprietary test and by generic tests. For an Ashkenazi-Jewish woman to avoid Myriad's costlier test, her doctor need only refrain from asking about ethnicity, or simply look the other way. If asked about her ethnicity, a woman need only lie, and she can then be tested with the cheaper generic test. Since these decisions take place in the privacy of a doctor's office, it seems that Myriad would find it nearly impossible to broadly enforce its patent.

This is true: Myriad cannot effectively police its patent at every clinic throughout Europe. But it doesn't need to. It can reap significant economic gains from limited compliance; more importantly, in the broader context, limited compliance can still have real effects on doctors, research scientists, and patients.

Myriad faces significant obstacles enforcing its patent, but some possible scenarios can be imagined. In a few situations, the information that an Ashkenazi-Jewish woman had been tested by someone other than Myriad might be made inadvertently public, whether through an identifiable clinical report or an incautious weblog. One could conceive of the implausible situation of a bounty being offered by Myriad for such information. Such a bounty would cause public relations problem, but so does the very existence of an ethnically limited patent. A clinic employee, for whatever reason, could divulge the fact that Ashkenazi women had been improperly tested. There are many ways – most, admittedly quite uncommon – by which the information about a patent infringement could slip out of the privacy of a doctor's office. Once Myriad had this information about patent infringements, it could bring suit against the test provider or against the individual.

Is this type of enforcement by Myriad unlikely? Yes. But so is being caught driving through a red light at 3 a.m. at a deserted intersection. While no one believes that all drivers stop for early-morning deserted stoplights, many do. Publicized patents can be frequently obeyed even without easy external enforcement mechanisms. In this regard, patents do not differ from other types of prohibitions. In some European countries, patent infringement is a crime; throughout Europe and the United States, patent infringement

⁶¹ See Sankar & Kahn, *infra* note 68, at 456-58.

subjects the infringer to civil liability.⁶² Like many other crimes and torts, numerous patent infringements are likely to remain undetected, but that does not imply that most people will wantonly disobey the prohibition in the first place.

For evidence, consider the varied reactions of European geneticists to the news of Myriad's patent. Alfons Meindl, head of the gynecological tumor genetics department at the Technical University of Munich, said, "I think the recent decision is grotesque, and we do not see any need to suspend our current practice of genetic testing."⁶³ But Gert-Jan van Ommen, at the Center of Human and Clinical Genetics of Leiden University Medical Center in the Netherlands, thinks that "[w]hat it means in practice is that genetic centres that do not have licences [sic] for this test – or where the healthcare systems cannot afford to pay for it – may be forced to deny it to Ashkenazi Jewish women."⁶⁴ Some geneticists think that enforcement is not likely, and are content to ignore the patent, like some drivers are happy to drive through a deserted red light. But some will stop, and therein lies the source of the practical repercussions of Myriad's patent.

Furthermore, consider that enforcement will not always be as challenging as in the case of Myriad's patent. Ashkenazi-Jewish ancestry is particularly difficult to spot visually; African descent, on the other hand, is often obvious. Certainly, there will always be cases of ancestry which are only revealed through self-identification, but for some ethnic or racial categories, there will be many more clear cases. In those situations, doctors can no longer maintain ignorance by not asking, nor can patients so simply lie about their ancestry. There may be situations in which genetic testing information is more easily available for other reasons, unforeseeable without knowledge of the specific patents yet to come. With a greater likelihood for enforcement comes a higher rate of compliance with patent terms. It is hard to envision a genetic testing patent harder to enforce than Myriad's, and therefore, the situation is likely to deteriorate as enforcement becomes easier.

Finally, and perhaps most importantly, the evidence of patent use and infringement will not only be found at the level of individual doctors. Larger healthcare entities, including state agencies, hospital networks, and insurance companies will need to set policies regarding genetic testing. If they make no mention of the different tests required by a patient's ethnicity, they could potentially be liable under grounds of patent inducement. If they do mention these requirements, as their lawyers might well advise them, then the individual doctors face possible punishment not only in the form of suits from Myriad, but also in the form of disciplinary action from the overseeing healthcare organization.

The challenge in directly enforcing ethnic genetic testing patents makes it tempting to dismiss them as paper tigers, absent any real economic or social impact. These patents are likely to achieve at least partial compliance, however, through self-

⁶² For the United States, see 35 U.S.C. § 281 (2000). For a compendium of European patent laws, see generally George Metaxas-Maranghidis, *Intellectual Property Laws of Europe* (John Wiley & Son Ltd. 1995).

⁶³ Steimle, *supra* note 33, at 1326.

⁶⁴ Geneticists Oppose, *supra* note 30, at 1.

enforcement motivated by the chance of unlikely but potentially financially catastrophic enforcement by Myriad, and through the policies of larger healthcare entities. Even partial compliance is enough cause for worry.

C. Ethnic Genetic Testing Patents are Enforceable and Desirable Enough for Substantial Economic, Social, and Policy Implications.

Genetic testing patents limited by ethnicity are certainly hard to enforce, and they are not as desirable as broad patents on disease genes. However, they are desirable enough for companies to pursue them, whether to obtain limited patents on otherwise publicly available and therefore unpatentable genes, or to extend the life of preexisting patents. They are enforceable enough for companies to profit, and for doctors, patients, scientists, and healthcare entities to change their behavior based on their existence. Thus, ethnic genetic testing patents are real enough to demand thoughtful consideration, not merely of their academic implications, but also of the real world problems they will cause.

IV. WIDER IMPLICATIONS OF ETHNIC GENETIC TESTING PATENTS

The decision of the Opposition Division has no weight as legal precedent in the United States, but it is still an important exemplar of cases yet to come. Myriad's U.S. patent covers all uses of the BRCA2 gene, including many mutations and potential diagnostic and therapeutic applications. In the United States, therefore, the restriction of the patent to Ashkenazi-Jewish women does not apply, and U.S. courts will not be faced with the enforcement of this particular ethnic limitation. However, this does not change the fact that new ground has been broken. Myriad's patent was the first of its kind in Europe. More are likely to follow in Europe and in the United States, particularly as more specific correlations are drawn between genetic disorders and specific racial groups or subgroups.⁶⁵ In light of recent challenges to patenting pure correlations,⁶⁶ the association of those bare correlations with genetic diagnostic tests is more likely to withstand judicial scrutiny, and will be of increasing value to biomedical corporations. As a result, patents involving ethnic genetic testing such as Myriad's may begin to proliferate.

⁶⁵ For now, many ethnic diseases are known, as well as many drugs with different ethnic responses. The specific genetic factors underlying these connections are much less well understood. See, e.g., Tate & Goldstein, *infra* note 77, at S34-35.

⁶⁶ See, e.g., *Metabolite Labs, Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1361 (Fed. Cir. 2004), *cert. granted*, 126 S. Ct. 601 (Nov. 2, 2005), *cert. dismissed as improvidently granted*, 126 S. Ct. 2921 (June 22, 2006).

A. *The Case of BiDil Illustrates the New Issues Raised by Ethnic Genetic Testing Patents.*

It would appear that this issue has already been raised in the United States by the patenting and FDA approval of BiDil. The case of BiDil itself has been closely examined,⁶⁷ and is made murkier by the accusation that the racial targeting was designed only to extend the life of the patent.⁶⁸ The patent for BiDil does indeed include many claims with ethnicity specified; the first claim, on which all others are dependent, is for “[a] method of reducing mortality associated with heart failure . . . in a black patient.”⁶⁹ BiDil inspired a flurry of responses from commentators worried about its implications for racial disparity in healthcare, about the ability to game the patent system by adding new racial classifications to extend patent life, and about the underlying validity of self-identified race as a proxy for genetic or environmental variables.⁷⁰ However, the issues involved with BiDil, while serious, fail to span the range of problems raised by Myriad’s ethnicity-targeted BRCA2 patent and other ethnic testing patents which may follow.

At first glance, the situations appear to be quite similar. In both, medical techniques were developed which were initially to be applied to an entire population. BiDil was designed for all sufferers from heart failure,⁷¹ and Myriad sought patents on testing for breast cancer predisposition in all women; indeed, Myriad’s current U.S. patents are not racially limited.⁷² A new BiDil patent, reworked to apply only to African Americans, was filed after reanalysis of the original study data, and resubmitted to the

⁶⁷ See, e.g., Jonathan Kahn, *How a Drug Becomes “Ethnic”: Law, Commerce, and the Production of Racial Categories in Medicine*, 4 Yale J. Health Pol’y L. & Ethics 1 (2004).

⁶⁸ Pamela Sankar & Jonathan Kahn, *BiDil: Race Medicine or Race Marketing?*, Health Affairs Web Exclusive, Oct. 11, 2005, <http://content.healthaffairs.org/cgi/reprint/hlthaff.w5.455v1> (pointing out that the patent for BiDil was set to expire in 2007, and that the racial limitation allowed a new patent, which will grant exclusivity through 2020. However, once the FDA has approved a drug, the racial criteria under which it was approved do not create enforceable limits on doctor prescriptions.).

⁶⁹ U.S. Patent No. 6,465,463 (issued Oct. 15, 2002).

⁷⁰ See, e.g., Kahn, *supra* note 67; Sankar & Kahn, *supra* note 68; Tate & Goldstein, *infra* note 77, at S35; Jonathan Kahn, *Misreading Race and Genomics After BiDil*, 37 Nature Genetics 655, 656 (2005). For a view supporting the FDA’s decision to approve BiDil, see Rick J. Carlson, *The Case of BiDil: A Policy Commentary on Race and Genetics*, Health Affairs Web Exclusive, Oct. 11, 2005, <http://content.healthaffairs.org/cgi/content/full/hlthaff.w5.464/DC1>.

⁷¹ Kahn, *supra* note 67, at 13.

⁷² U.S. Patent No. 6,033,857 (issued Mar. 7, 1998); U.S. Patent No. 5,837,492 (issued Nov. 17, 1998).

FDA.⁷³ Similarly, Myriad's European patent, once challenged, was restricted to the clear-cut mutation prevalent in Ashkenazi-Jewish women.⁷⁴

The apparent similarities lead to the easy conclusion that this argument has been had, and these factors have been considered. After all, BiDil has been approved in the U.S., and is an easy target for criticism as a concrete product involving a historically prominent minority. On the other hand, only one ethnic genetic test has been patented so far in Europe, and it targets a group historically less threatened in the U.S. To accept BiDil as a test case for all uses of race or ethnicity in biomedical applications, however, is to ignore the complex implications that arise uniquely in the arena of genetic tests. Those implications can in fact be most clearly elucidated in comparison with BiDil – while race-based drugs are far from the exemplar of all race-targeted biomedicine, they make an excellent foil to demonstrate the new dangers from ethnic genetic testing.

1. Race or Ethnicity Functions Differently as a Biomedical Proxy in Drugs Than in Genetic Tests.

Drugs like BiDil use self-declared race as a proxy.⁷⁵ Something is different about the population that self-identifies as African-American, and that variable – whatever it is – leads to differences in the way those patients react to treatment with BiDil. The companies that develop the drugs, and the scientists that test them, have not identified that variable. Race-specific drugs like BiDil are developed through analysis of mixed race testing to spot racial disparities, followed up by testing racial subgroups.⁷⁶ Race could be a proxy for genetic factors, like increased frequencies of a problematic mutation, but it could just as easily be a reasonable proxy for environmental factors, like a high-fat diet, or poor access to preventative healthcare. For drug development, it usually doesn't matter.

The uncertainty of this racial proxy is well known. In an article cataloging medical studies of race and drug response, Sarah Tate and David Goldstein of University College London wrote that ethnicity may well be important in looking at environmental factors, as well as genetic variables, and eliminating overall healthcare disparities.⁷⁷ Research to tease apart the exact variables underlying race's proxy would be challenging and uncertain, and likely to yield ambiguous results. Scientists and doctors often

⁷³ Kahn, *supra* note 67, at 16-18.

⁷⁴ Main Request, *supra* note 7.

⁷⁵ For opinions both lauding and criticizing the use of race in medicine generally, see Richard S. Cooper et al., *Race and Genomics*, 348 *New Eng. J. Med.* 1166 (2003) (criticizing the use of race in healthcare); Esteban G. Burchard et al., *The Importance of Race and Ethnic Background in Biomedical Research and Clinical Practice*, 348 *New Eng. J. Med.* 1170 (2003) (arguing that linking race with medicine is overall worthwhile).

⁷⁶ See, e.g., Kahn, *supra* note 67, at 11-18.

⁷⁷ Sarah K. Tate & David B. Goldstein, *Will Tomorrow's Medicines Work for Everyone?*, 36 *Nature Genetics* S34, S37 (2004).

simultaneously lament this uncertainty and praise the progress – again, by using racial proxies – towards more specifically targeted treatments. Lawrence Lesko, director of the Office of Clinical Pharmacology and Biopharmaceutics at the FDA, describes race-targeted medicine as a first step on the path towards individually tailored treatment.⁷⁸ It is “like telling time with a sundial instead of looking at a Rolex watch” until that watch – targeting drugs based on individual genetic testing – becomes available.⁷⁹ For drugs, with race as a proxy for variables unknown and likely to remain that way, the heuristic is problematic but perhaps worthwhile for the value in present treatment possibilities.⁸⁰

For genetic testing, the story is substantially different. Genetic testing looks past proxies: genetic tests directly examine the genes of a patient, like a diet diary, for instance, might directly record the effect of food, an environmental variable, on that same patient. Using race as a proxy to limit who can get a genetic test, as patenting an ethnic version of the test and the resulting price differentials effectively do, ignores this desirable specificity.

This is not to suggest that race has no place in the realm of genetic tests. Indeed, testing everyone for every predisposition would be prohibitively costly for the foreseeable future, and race is a convenient tool to identify at-risk populations for further testing. For example, Ashkenazi Jews have a much higher incidence of the mutation which leads to Tay-Sachs syndrome than other populations, so it makes sense to test for Tay-Sachs more frequently in that population.⁸¹ The crucial difference is in who decides, and what that decision means. Using race as a proxy to determine who is a better candidate for testing keeps the ultimate decision in the hands of the informed patient. Using race to limit the application and price of a test through the patent system takes the decision from the patient and places it in corporate hands. For a patient, race may be a clue for to how to go about gathering health information. For a patent holder and commercial developer, race functions as an economic overlay discounting the direct information revealed by the test.

2. The Use of Ethnicity as a Biomedical Proxy in Genetic Tests is Not an Intermediate Step Toward Individually Targeted Treatment.

A closely related justification of race-based medical treatments is that they represent a necessary step towards individualized medicine, which many see as the ultimate goal of modern medical science.⁸² This characterization is usually unchallenged because it seems intuitively correct. Patients are provided treatment based on age, or

⁷⁸ Ben Harder, *The Race to Prescribe: Drug for African Americans May Debut Amid Debate*, 167 *Sci. News* 247 (2005), available at http://www.findarticles.com/p/articles/mi_m1200/is_16_167/ai_n13724918.

⁷⁹ *Id.*

⁸⁰ See Tate & Goldstein, *supra* note 77, at S36-37.

⁸¹ Joel Charrow, *Ashkenazi Jewish Genetic Disorders*, 3 *Familial Cancer* 201, 201-04 (2004).

⁸² See, e.g., B.S. Shastri, *Pharmacogenetics and the Concept of Individualized Medicine*, 6 *Pharmacogenomics J.* 16, 16-17 (2006).

known behavior, or, less sanguinely, by socioeconomic status or national identity. Patients could be imagined as grouped into classes by these traits – young children, for instance, are treated differently from adults and from the elderly. However, patients are not always classed, at least explicitly, by racial or ethnic identity.⁸³ Therefore, it seems that tailoring treatments to ethnic or racial groups would be reducing the size of classes, and smaller treatment classes are further along the road toward individualized treatment. This is an appealingly simple argument. It is also wrong.

Individualized medical treatment must eventually be based on individual genetic testing, coupled with analyses of behavioral and environmental risk and response factors. An intersection of race, age, and national origin, and the few other easily identifiable group traits will never be specific enough to be truly individual. For today, it may well make sense to target drugs to specific racial groups, particularly if self-identification with that group serves as a useful proxy for immediate successful treatment.⁸⁴ This is far from decided – some argue that no matter the therapeutic effects, race-based drugs are too problematic to allow in the marketplace, and the troublesome social implications of race-based drugs should not be ignored.⁸⁵ But there is also strong evidence that race may help target some drugs,⁸⁶ and so the arguments about their acceptability depend upon weighing health considerations against the potential social and economic problems.

Invoking the same arguments to support ethnic genetic testing fails more decisively. Genetic testing reaches past racial proxies to examine the underlying genetic traits which themselves influence the efficacy of treatments. Tate and Goldstein, even when supporting the use of race in evaluating some aspects of drug response, write that “when genetic factors have a role, identifying the genetic factors themselves so that they can be considered directly will reduce the need to consider race or ethnicity as a loose proxy for predicting drug response.”⁸⁷ More broadly, genetic tests look forward to identify predispositions for diseases in patients regardless of race, or internally to examine genetically determined individual responses to treatments. These tests, therefore, may provide an eventual foundation for tailored medicine. Nowhere does race play into this form of tailored medical utility.⁸⁸ It remains merely a convenient proxy,

⁸³ Race is often, though certainly not always, explicitly taken into account. *See* Tate & Goldstein, *supra* note 77. However, there is strong evidence that race is involved in healthcare decisions in a non-explicit fashion. *See, e.g.,* Kevin A. Schulman et al., *The Effect of Race and Sex on Physicians’ Recommendations for Cardiac Catheterization*, 340 *New Eng. J. Med.* 618 (1999). Specific treatment guidelines for race would likely transform these effects from implicit to explicit.

⁸⁴ Tate & Goldstein, *supra* note 77, at S37-38.

⁸⁵ *See* Richard S. Cooper, *Race and Genomics*, 348 *New Eng. J. Med.* 1166, 1169 (2003).

⁸⁶ Tate & Goldstein, *supra* note 77, at S37-38; *see also* Burchard, *supra* note 75.

⁸⁷ Tate & Goldstein, *supra* note 77, at S37.

⁸⁸ Again, this is not to deny that race has utility as a triaging function to determine who is at risk and who may need more extensive testing, as described above. In the context of patients who

but this time not for patient behavior or medical advancement. Instead, it identifies a patentable relationship, a source of profit, and a chance to restrict medical applications and advances. None of the benefits of racial proxies are present, but all of their social and economic ill effects remain.

For a clear instance of the false proxy provided in the commercialization of ethnic genetic testing, consider Myriad's actions with its BRACAnalysis testing. Myriad created an extensive direct marketing campaign designed to promote to consumers its tests for breast cancer predispositions in the United States.⁸⁹ General concerns exist with direct marketing of genetic tests: without physician intermediaries, patients may receive unnecessary tests, experience added anxiety, and interpret test results without mediating information from genetic specialists.⁹⁰ In the case of ethnic genetic tests, like the Ashkenazi-specific test, direct marketing campaigns could have other worrisome effects. Direct consumer marketing of race-based genetic medicine could easily lead to the medical reification of race in the minds of the consumer, especially granted the imprimatur of new science in the form of genetic tests.⁹¹ The idea that race is medically controlling is perfidious enough – the widespread promotion of that idea to consumers, with specific profit motivations, is even more problematic.

B. The Existence of Ethnic Genetic Testing Patents Leads to State Determination and Enforcement of Ethnic Identity.

Perhaps the biggest danger of ethnic genetic testing patents comes from the state's role in granting them. Patents are government-enforced monopolies on intellectual property. While infringing on a patent is not a crime in the United States, it is a civil wrong. In enforcing an ethnically limited patent, courts must consider the ethnicity of the persons involved and rule on that ethnicity. If the person tested is of a certain ethnicity, a tort has occurred; if not, then the patent has not been violated. This seems anathema to a society striving for racial equality. Justice Stewart concurring in *McLaughlin v. Florida*, a case challenging a racial anti-miscegenation law, stated that he could not “conceive of a valid legislative purpose . . . which makes the color of a person's skin the test of whether his conduct is a criminal offense.”⁹² Although ethnic patents are based on governmental

have already made the decision to be tested, however, race does not function as an effective proxy for patient response or predisposition.

⁸⁹ *Breast Cancer: Myriad Launches Direct-to-Consumer Advertising Campaign for Breast Cancer Test*, Health & Med. Wk., Oct. 21, 2002, at 12. See also Press Release, Myriad Genetics, Myriad Genetics Improves Patient Access to Predictive Medicine (Feb. 19, 2004), <http://www.myriad.com/news/release/496695>.

⁹⁰ See Paradise, *supra* note 5, at 148.

⁹¹ Some of these issues arise already in the marketing of ethnic drugs like BiDil, but drugs appear to be transitory and external, while genetic predispositions are internal and immutable.

⁹² *McLaughlin v. Florida*, 379 U.S. 184, 198 (1964) (Stewart, J., concurring).

creation and enforcement of a property-based tort rather than on a criminal offense as in *McLaughlin*, the situation with ethnic patents presents a close parallel.

It must be noted that ethnic patents ostensibly provide some benefit to the targeted ethnicity, since they provide incentive for scientists to do research that will benefit the targeted groups. It can be argued that by granting these patents the government is promoting racial classifications that benefit a particular ethnic group. A similar scenario is played out in the context of affirmative action policies enacted at publicly run state institutions. Thus, the affirmative action decisions rendered by the Supreme Court may shed light on the problems that ethnic patents present.

The Supreme Court has held that affirmative action policies are permissible to the extent that they take individual circumstances into account, and are part of a constellation of other factors.⁹³ An ethnic drug like BiDil may well satisfy this requirement; BiDil is patented and approved for use in African-American patients but physicians can prescribe it to whichever individual patients need it in their professional judgment. However, the Court has held that state sponsored affirmative action policies are impermissible when they draw sharp lines, whether by assigning points based on race⁹⁴ or by separating individuals into different applicant pools on the same basis.⁹⁵ A patent like Myriad's seems to run afoul of the Courts guidelines in the affirmative action context because it similarly draws sharp lines. Ashkenazi-Jewish women must be tested by Myriad, while other women can use other tests. Individual circumstances are not important, and those circumstances defer to an absolute racial distinction that must be enforced by the courts. This type of patent seems contrary to the spirit of jurisprudence on government enforcement of racial classifications in the United States.

Unfortunately, while the analogy to the affirmative action decisions seems logical, the legal parallel is less straightforward. The property rights created by the whole patent system are not racially segregated, and the specific grounds for granting or refusing patents tend not to take moral arguments into account.⁹⁶ Since the discrimination on ethnic grounds is neither a direct result of law nor the direct action of a state agency, the effect is government enforcement of racial discrimination without the legal grounds for a straightforward challenge.⁹⁷ It is unlikely that the Patent and Trademark Office would

⁹³ *Grutter v. Bollinger*, 539 U.S. 306, 334 (2003).

⁹⁴ *Gratz v. Bollinger*, 539 U.S. 244, 271-72 (2003).

⁹⁵ *Regents of Univ. of Cal. v. Bakke*, 438 U.S. 265, 289-90 (1978) (plurality opinion).

⁹⁶ For an analysis of the application of the moral utility doctrine in the patent system, see *infra* Section V(A).

⁹⁷ The other line of cases which may be relevant to the vulnerability of ethnic patents on these grounds centers on racial discrimination in jury selection. In *Edmonson v. Leesville Concrete Co., Inc.*, 500 U.S. 614, 622 (1991), the Court held that “[a]lthough private use of state-sanctioned private remedies or procedures does not rise, by itself, to the level of state action, our cases have found state action when private parties make extensive use of state procedures with ‘the overt, significant assistance of state officials’” (quoting *Tulsa Prof'l Collection Servs. v. Pope*, 485 U.S. 478, 485-86 (1988)). The question then arises whether the patent system involves

reject a patent simply because it is racially targeted or restricted, and it is similarly unlikely that a court challenge would be either simple or speedy. Thus, for a time following the issuance of ethnic genetic testing patents, the government would be obligated to enforce them, and such an outcome should be strenuously avoided.

C. The Economic Effects of Ethnic Genetic Testing are Predominantly Negative.

Aside from the problems of inadequate proxies, the economic consequences of patenting ethnic genetic tests are immediate and far-reaching. Most obvious, of course, are the immediate discriminatory effects on members of the involved ethnic group based on increased testing costs. This is clearest in cases like Myriad's BRCA2 patent, where a broad test exists for a set of mutations in a large population and a patent is granted for a specific subset of mutations and increased disease predisposition for an ethnic subpopulation. If a disease were to be exclusively found and studied within a specific ethnic group, on the other hand, this discriminatory differential would not be present. To see which situation should be more common, consider the way genetic diseases are discovered.

Many genetic diseases are initially genetically identified by increased prevalence in an ethnic group, or through family linkages, which generally fall within ethnic boundaries.⁹⁸ These genetically concentrated situations make it easier to locate genes and to initially point out the genetic factor in the disease.⁹⁹ The disease alleles themselves, however, are almost never limited to just one ethnic group or family, but are instead distributed throughout the larger population.¹⁰⁰ Because of this frequency concentration, tests are easier to develop and market to the specific ethnic group; Myriad's patent is an example of this. If the tests cover genes found throughout the population, but are patented only for the ethnicity with higher disease prevalence, members of that ethnicity pay more for an equivalent test than the population at large. Thus, in the majority of cases ethnically limited genetic tests would result in disparate economic effects between the initial ethnicity and the larger population. This disparity would clearly answer the concern that patent offices are not tasked with examining economics: when monetary effects are discriminatory on grounds other than wealth, they fall outside the realm of the purely economic and enter the sphere of morality and public policy.

“overt, significant assistance.” *Id.* Arguments could be made on either side since a federal office grants patents, but post-issue matters can be either court-enforced or privately agreed. In any case, the issue is debatable and therefore likely unavailable for immediate use in challenging ethnic patents.

⁹⁸ Richard S. Cooper, *Genetic Factors in Ethnic Disparities in Health*, in *Critical Perspectives on Racial and Ethnic Differences in Health in Later Life*, 269, 277-89 (Rodolfo A. Bulatao & Norman B. Anderson eds., National Academies Press 2004).

⁹⁹ *Id.*

¹⁰⁰ See, e.g., National Human Genome Research Institute, *The Use of Racial, Ethnic, and Ancestral Categories in Human Genetics Research*, 77 *Am. J. Hum. Genetics* 519, 525-26 (2005).

The more distant economic effects of ethnic genetic patents have to do with their implications for future research and medical treatments. In Myriad's case, testing for breast cancer mutations is done by sending samples to Myriad for testing in Utah.¹⁰¹ Myriad then keeps those samples, and builds and maintains its own database for potential future development of tests and treatments.¹⁰² This scientifically valuable database is currently not made available to other research institutions.¹⁰³ Furthermore, since Myriad is the only company allowed to test Ashkenazi-Jewish women, their samples are exclusively and disproportionately represented in that database. This may lead to skewed data for other companies with regard to population prevalence of disease-related mutations in BRCA2 or other genes, and could consequently hinder future research in that way as well. Because a database containing legally protected proprietary genetic information inherently limits future studies of that information, there may well exist a strong societal interest in keeping this type of data in the public realm where it will be available for future research.

The fact that a private company will be able to monopolize databases that document specific ethnic characteristics may magnify the negative economic impacts noted above. The required generation of proprietary databases centered on ethnic identity makes it easier to identify ethnically targeted testing or treatments in the future, and the ability to effectively extract rents from a specific ethnic group makes it correspondingly easier to extract further rents from that same isolated and identified group. On the other side of the economic equation, restricted access to breast cancer data is likely to slow pharmaceutical development and progress towards other effective treatments. Unlike normal patenting situations where discriminatory effects, rents, and industry-inhibiting effects should decrease over time, ethnic genetic testing patents are likely to have the opposite effect, becoming more troublesome over the years.

This is not to argue that no positive economic effects will arise from ethnic genetic testing. The companies commanding such patents and implementing such tests will of course profit, and this profit, as the Opposition Division pointed out, will tend to drive the development of new tests.¹⁰⁴ Some benefit will come to all who use such tests from their very existence, and the Opposition Division specifically mentioned that the real problem would be if these tests did not exist in the first place.¹⁰⁵ Genetic tests, however, are not about race. Rather, they are about the genes that may or may not underlie race, and therein lies the conflict. Tests for genetic diseases are one thing, and

¹⁰¹ Van Kampen, *supra* note 10, at 58.

¹⁰² Donald J. Willison & Stuart M. MacLeod, *Patenting of Genetic Materials: Are the Benefits to Society Being Realized?*, 167 Can. Med. Ass'n J. 259, 261 (2002).

¹⁰³ *Id.*

¹⁰⁴ Grounds, *supra* note 33, at 12.

¹⁰⁵ *Id.* at 13.

even those patents have been challenged.¹⁰⁶ Ethnically limited genetic tests are another thing entirely, shifting any additional benefit to corporations and placing the undisputed costs unequally on the shoulders of minority groups.

D. The Use of Ethnicity as a Biomedical Proxy Creates Social Problems.

The social problems raised by ethnic genetic tests are more subtle and more insidious. They come from giving new precision and solidity to definitions of a racial or ethnic group. In particular, these effects are different in kind from those of ethnically targeted drugs. Drugs rely on race as a proxy for a genetic or environmental unknown. That characteristic's unknown nature makes it impossible to incorporate into the definition of a racial group; instead, the fundamental characteristic is the response to a drug, which is external and transitory. Genetic testing, on the other hand, reveals internal, inherited, immutable characteristics – and in terms of disease predisposition or treatment efficacy, the primary focus of many current genetic tests, those characteristics are overwhelmingly negative. It may not be a rational connection, but the step from racial predisposition to diseases and racial inferiority is all too easy to take.

One might counter that genetic testing would reveal the weaknesses of all ethnic groups and therefore would not lead to new discrimination. This argument fails on two counts. First, no matter the distribution of disease predispositions, genetic testing would re-segregate racial groups based on inherent characteristics. Such segregation would likely increase both division and stratification of the newly entrenched groups. Second, the majority of new genetic tests in the future would remain focused on minority groups, both because the needs of the majority have already been considered in developing current treatments and, more significantly, because genetic predispositions are easiest to isolate in smaller, more genetically homogenous populations.¹⁰⁷ The Ashkenazi-Jewish mutation covered in Myriad's European patent is probably its focus because that community is genetically similar, with mutations that are easy to identify and test.¹⁰⁸ That general situation is repeated with many minorities, particularly those insular groups the Supreme Court has deemed most needy of special protection.¹⁰⁹

Further arguments can be made that ethnic genetic testing is needed to help resolve ethnic disparities in healthcare. These disparities are certainly problematic, and learning more about the diseases and drug efficacies in different ethnic groups could

¹⁰⁶ See, e.g., Willison & MacLeod, *supra* note 102; see also Andrews, *supra* note 4, at 79-80 (discussing how genetic patents impede medical advances).

¹⁰⁷ See, e.g., Tate & Goldstein, *supra* note 77, at S40. Research on minority diseases and drug responses is probably necessary to, among other things, correct racial disparities in health care. Ethnically limited genetic testing patents, however, provide no direct benefits toward closing those gaps, and in fact may exacerbate them.

¹⁰⁸ Charrow, *supra* note 81, at 201-03.

¹⁰⁹ *United States v. Carolene Prods.*, 304 U.S. 144, 153 n.4 (1938).

certainly contribute to closing that gap. However, there is a genuine concern about the long-term effects of increased scientific knowledge in the field, and about how to balance possible gains in healthcare with possible social problems in stigmatizing ethnicities. Whatever the results when this research is confined to the scientific academy, they seem almost certain to be negative when ethnic disorders are commercialized and commoditized through the patent system.

Overall, the use of ethnicity as a biomedical proxy very likely will create social ills, including the further stigmatization and segregation of particular racial and ethnic groups. There are potential benefits in reducing healthcare disparities, but those are reduced, and the social problems increased, when ethnic genetic disorders are patented and commercially used.

E. To Avert Government Enforcement of Racial Distinctions, Negative Economic Effects, and Significant Social Problems, Ethnic Genetic Tests Should Not be Permitted.

The spread of ethnically limited genetic tests will lead to far greater problems than benefits for society. Ethnic genetic tests will force government entities to adjudicate the boundaries of race, thereby contradicting government policies in the areas of affirmative action jury selection and in civil rights in general. These tests will further lead to negative economic and social effects. Their benefits in medical terms are uncertain, and much less likely in a commercialized setting. Finally, they are not a necessary step towards the goal of individualized medicine. Therefore, ethnic genetic tests should be kept out of the patent system and barred from commercialization in the United States.

V. PROACTIVE MEASURES SHOULD BE TAKEN TO AVOID THE SPREAD OF ETHNIC GENETIC TESTS IN THE UNITED STATES.

A. The Utility Clause of the Patent Act is Most Likely Unavailable to Challenge Ethnic Genetic Tests

To be patentable in the United States, an invention must be novel, nonobvious, and useful.¹¹⁰ The utility requirement is a tempting avenue to challenge ethnic genetic tests, as it has been construed by the courts to include a morality component.¹¹¹ This

¹¹⁰ See 35 U.S.C. §§ 101-103 (2000).

¹¹¹ *Lowell v. Lewis*, 15 F. Cas. 1018, 1019 (C.C.D. Mass. 1817) (No. 8568) (Justice Story wrote that “the invention . . . should not be frivolous or injurious to the well-being, good policy, or sound morals of society.”). This section can only touch briefly upon the issues surrounding the moral utility doctrine; for extensive descriptions of the doctrine and its current status, see Andrew R. Smith, *Monsters at the Patent Office: The Inconsistent Conclusions of Moral Utility and the Controversy of Human Cloning*, 53 DePaul L. Rev. 159 (2003); see also Benjamin D. Enerson, *Protecting Society from Patently Offensive Inventions: The Risk of Reviving the Moral Utility Doctrine*, 89 Cornell L. Rev. 685 (2004).

stands in contrast to Europe, where the patent system has an express morality provision.¹¹² For much of the twentieth century, U.S. courts invalidated patents on the grounds that they were immoral. For example, courts have refused to grant protection to inventions designed to deceive consumers and have overturned patents for gambling machines.¹¹³ However, this practice has recently come into disfavor, and the Court of Appeals for the Federal Circuit announced in *Juicy Whip, Inc. v. Orange Bang, Inc.*, that invalidating patents on morality grounds was not generally a valid interpretation of the law.¹¹⁴ Although the Patent and Trademark Office still asserts that morality enters patent considerations, it tenuously follows *Juicy Whip*, and has requested Congressional guidance to replace its uncertain reliance on the moral utility doctrine.¹¹⁵ Legal scholars are unclear on the precise status of the moral utility doctrine,¹¹⁶ and the PTO has said that if it were to reject human cloning patents on morality grounds, that decision would be challenged in the courts.¹¹⁷ Given that uncertain legal landscape, and the approval of the parallel case of BiDil, the morality prong of the utility requirement appears to be an unlikely avenue to prevent ethnic genetic tests.

B. Existing Anti-Discrimination Laws Provide Avenues for Reactive Challenge.

More likely avenues for challenging race-based patents might be found in pre-existing laws specifically addressing race. Erik Lillquist and Charles Sullivan have argued vigorously that race-based medicine, particularly screening applications, are likely to violate laws prohibiting race-based classifications.¹¹⁸ A brief application of these arguments to the specifics of ethnic genetic testing indicates that the same conclusions are likely to hold.

Most relevant in this field are the Equal Protection Clause, Titles II and VI of the Civil Rights Act of 1964, and 42 U.S.C. § 1981. The Equal Protection Clause is the

¹¹² Convention on the Grant of European Patents, art. 53(a), *supra* note 37.

¹¹³ Donald S. Chisum, *Chisum on Patents* 4.03 (2005).

¹¹⁴ *Juicy Whip, Inc. v. Orange Bang, Inc.*, 185 F.3d 1364, 1366-67 (Fed. Cir. 1999).

¹¹⁵ Karen Hauda, Remarks at the Meeting of the President's Council on Bioethics, Session 5, Regulation 3: Patentability of Human Organisms 1, History and Current Law (June 20, 2002), <http://www.bioethics.gov/transcripts/jun02/june21session5.html>. See also Smith, *supra* note 111, at 182-83.

¹¹⁶ See, e.g., Smith, *supra* note 111; see also Enerson, *supra* note 111.

¹¹⁷ Hauda, *supra* note 115.

¹¹⁸ Erik Lillquist & Charles A. Sullivan, *The Law and Genetics of Racial Profiling in Medicine*, 39 Harv. C.R.-C.L. L. Rev. 391, 394 (2004).

narrowest of these three, applying only to government action.¹¹⁹ Obviously, the Equal Protection Clause would not apply to all health care, however, it could potentially be argued to apply to racially limited genetic testing conducted in government-run healthcare facilities, as well as to the FDA and PTO's actions certifying race-based patents for medical techniques and treatments in the first place. When applied, the Equal Protection Clause demands strict scrutiny for racial classifications.¹²⁰ Strict scrutiny, while ostensibly not fatal, is "fatal in fact."¹²¹ Strict scrutiny does not concern itself with pure purposes, were those to be argued in the case of ethnic genetic testing and their patentability.¹²² Finally, strict scrutiny analysis by the Supreme Court has not found facilitating health care equalization among racial groups sufficiently compelling without strong empirical evidence,¹²³ which would almost certainly be lacking in a Myriad-like case. In fact, a compelling justification seems to be absent in the case of BiDil itself.¹²⁴

Titles II and VI of the Civil Rights Act prohibit discrimination in places of public accommodation and federally funded programs, respectively.¹²⁵ Both of these could theoretically be applied to a widespread program of racially restricted genetic testing. However, doctors who merely receive Medicare funding are not "programs" under Title VI,¹²⁶ nor are hospitals,¹²⁷ and the applicability of Title II to hospitals is unclear.¹²⁸ Title

¹¹⁹ U.S. Const. amend. XIV, § 1. Technically, the Equal Protection Clause does not reach the federal government since it is part of the Fourteenth Amendment, which only applies to the states. However, the Supreme Court has ruled that the Due Process Clause of the Fifth Amendment provides an identical equal protection principle, which applies to the federal government. *Adarand Constructors v. Peña*, 515 U.S. 200, 201-02 (1995).

¹²⁰ *Loving v. Virginia*, 388 U.S. 1, 11 (1967).

¹²¹ *Fullilove v. Klutznick*, 448 U.S. 448, 519 (1980) (Marshall, J., concurring).

¹²² See Lillquist & Sullivan, *supra* note 118, at 444. Under strict scrutiny, a law must be "narrowly tailored" to serve "a compelling government interest." *Wygant v. Jackson Bd. of Educ.*, 476 U.S. 267, 274 (1986).

¹²³ See Lillquist & Sullivan, *supra* note 118, at 444-45.

¹²⁴ Sankar & Kahn, *supra* note 68.

¹²⁵ 42 U.S.C. § 2000(a) et seq. (2000); 42 U.S.C. § 2000(d) et seq. (2000).

¹²⁶ Mary Crossley, *Infected Judgment: Legal Responses to Physician Bias*, 48 Vill. L. Rev. 195, 263-68 (2003).

¹²⁷ Joel Teitelbaum & Sara Rosenbaum, *Medical Care as a Public Accommodation: Moving the Discussion to Race*, 29 Am. J.L. & Med. 381, 382-83 (2003).

¹²⁸ Lillquist & Sullivan, *supra* note 118, at 446 (citing *United States v. Med. Soc'y of S.C.*, 298 F. Supp. 145, 147-48 (D.S.C. 1969) (finding that hospital was covered by Title II, partly due to a snack bar and cafeteria) and *Verhagen v. Olarte*, No. 89-CV-300, 1989 WL 146265, at *5 (S.D.N.Y. Nov. 21, 1989) (finding that a hospital was not covered by Title II)).

VI does not permit private enforcement of disparate impact claims,¹²⁹ and Title II is most likely limited to disparate treatment, not disparate impact.¹³⁰ However, since ethnic genetic testing relies on specifically enumerated racial or ethnic restrictions, claims could be based on intentional discrimination, leading to the discriminatory impacts described above.

Similarly, section 1981 bars racial discrimination in contract situations, even between individuals.¹³¹ Genetic screening or medical treatment differentials based on ethnicity would probably run afoul of section 1981, if the difference is undertaken at the choice of the healthcare provider rather than an informed patient.¹³² Genetic tests based specifically on ethnicity, then, which demand such systematic differentials, would be especially likely to violate section 1981.¹³³ In a situation parallel to that of Myriad's BRCA2 patent in Europe, where testing for the same alleles is available to patients of Ashkenazi-Jewish descent as to those not of such descent, but at a significantly higher cost, it seems almost certain that section 1981 could be used to successfully challenge the commercial application of the patent. Section 1981 has no defense for rationally motivated discrimination, nor is there a defense for other benign motivations.¹³⁴

Overall, it seems that existing anti-discrimination laws, coupled with the Equal Protection Clause, could potentially be used against ethnically-targeted genetic testing patents, and against such testing in general. The challenges coming from such an approach are those that normally arise in trying to use litigation to set policy. Changes happen only after the fact, and will most likely take years to enforce and implement. Success will depend on the vagaries of litigation, finding appropriate plaintiffs and specific challengeable conduct, and the eventual issuance of a ruling setting enough precedent to have the needed policy impact. The fear of eventual litigation might be cited as enough to prevent ethnic genetic testing from being patented and utilized in the United States, but given the existence of potentially illegal racial disparities in treatment and screening, as well as the story of BiDil itself, this seems to be an unlikely argument. For a more certain and prospective approach to avoiding this problematic possibility, legislation is needed.

C. Targeted Legislation Provides Attractive Opportunities for Proactive Challenges.

Legislation could deal with ethnic genetic testing either broadly or narrowly. Broad legislation might try to include possible future developments, perhaps

¹²⁹ *Alexander v. Sandoval*, 532 U.S. 275, 293 (2001).

¹³⁰ See Lillquist & Sullivan, *supra* note 118, at 446.

¹³¹ 42 U.S.C. § 1981 (2000).

¹³² Lillquist & Sullivan, *supra* note 118, at 457-461.

¹³³ *Id.*

¹³⁴ *Id.* at 447-48.

implementing a ban on the use of race in medicine. The problems with a broad legislative response would lie both in vagueness and in the challenges of enactment. The uses of race in some fields of medicine are well-entrenched, if perhaps legally problematic on their own, and sweeping legislation in this field would also likely encounter the same conflicting rhetoric as in the repeatedly failed attempts to ban human cloning.

Narrowly tailored legislation, then, would be far more straightforward: the Patent Act could be amended to forbid the granting of a patent for genetic testing specifically targeted based on race or ethnicity. The European Directive on the Legal Protection of Biotechnological Inventions was enacted in similar fashion, though it merely set guidelines for appropriate patenting in biotechnology situations, including a requirement of morality, and did not address specific issues of race or ethnicity.¹³⁵ If patents for ethnic genetic testing are unavailable, both the motive and the ability to implement such tests commercially will be severely hindered. This would have the further benefit of being prospective rather than retrospective, and of removing economic incentives rather than creating the nebulous threat of future litigation.

CONCLUSION

Ethnic genetic tests are highly undesirable and are on their way to widespread use in the United States. The first has already been granted in Europe. The existence of race-targeted patented drugs like BiDil in the U.S. market is a strong indication that racially or ethnically based medical techniques are now in the process of gaining acceptability in the United States. Race-based drugs are a small step compared to the problems involved in allowing ethnic genetic testing, which has deeper, more insidious, and more widespread negative effects. The use and acceptance of ethnic genetic tests can be averted, but that demands action. Existing anti-discrimination legislation provides one avenue to prevent these tests, but that response is uncertain, slow, and reactive. More useful as a prospective tool is the possibility of enacting narrow legislation specifically tailored to avoid these tests. Despite the challenges involved, such a course should be pursued to avoid significant risks to minorities and to protect the integrity of the healthcare system as a whole.

¹³⁵ *Directive 98/44/EC Of The European Parliament And Of The Council of 6 July 1998 on the Legal Protection of Biotechnological Inventions* (July 6, 1998), http://europa.eu.int/eur-lex/pri/en/oj/dat/1998/l_213/l_21319980730en00130021.pdf (last visited Jan. 21, 2007).