



Published in final edited form as:

J Law Med Ethics. 2011 ; 39(1): 79–90. doi:10.1111/j.1748-720X.2011.00552.x.

Grassroots Marketing in a Global Era: More Lessons from BiDil

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Introduction

Since the first phase of the formal effort to sequence the human genome, geneticists, social scientists and other scholars of race and ethnicity have warned that new genetic technologies and knowledges could have negative social effects, from biologizing racial and ethnic categories to the emergence of dangerous forms of genetic discrimination.ⁱ Early on in the Human Genome Project (HGP), population geneticists like Luigi Luca Cavalli-Sforza enthusiastically advocated for the collection of DNA samples from global indigenous populations in order to track the history of human ancestry, migration, and languages, while social scientists like Troy Duster insisted that the new genetics was in danger of ushering in insidious practices of eugenics.ⁱⁱ The Human Genome Diversity Project's 1991 proposal to archive human genetic variation around the world quickly came under intense scrutiny by indigenous peoples and advocacy groups who worried that such measures could exploit indigenous groups as research populations and even resurrect racist taxonomies from the nineteenth century.ⁱⁱⁱ Ongoing sensitivity to genetic discrimination has been evidenced more recently in the May 2008 passage of the Genetic Information Nondiscrimination Act (GINA), which prohibits employers and health insurance companies from collecting and using genetic information for discriminatory purposes.^{iv} While such measures have been, in many ways, effective in raising awareness about such issues and preventing some forms of genetic discrimination before they become a serious problem, the use and reinforcement of identity categories in genomics research continues to be contested terrain in legal, ethical, and public policy debates.^v Over the past few years, issues related to race, ethnicity, and genetics have appeared in more subtle and surprising areas, including the domains of intellectual property and pharmacogenomics.^{vi}

Today, the reification of race and ethnicity as genetic is occurring in the development and marketing of racially and ethnically targeted drugs, which are supported by patents that contain identity-based claims.^{vii} The recent case of BiDil, a treatment for heart failure that emerged in 2005 as the first FDA approved drug with a race-specific indication, reveals the complex ways that questions about race and genomics persist into the twenty-first century. After BiDil was initially rejected by the FDA in 1997, researchers sought to resuscitate the drug as a racial medicine by seizing on data from the original clinical trials to make a case to the FDA that black patients responded better to the drug than white patients.^{viii} Many epidemiologists and other critics remain unconvinced by this data.^{ix} Moreover, the underlying mechanism for the purported difference in drug response remains unknown and has not been linked to a population-based genetic polymorphism.^x Stories in the popular media have, nonetheless, continued to suggest that the purported differential response to the drug is rooted in a genetic difference.^{xi} In their survey of the popular news coverage of

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BiDil, Timothy Caulfield and Simrat Harry show that while news coverage explicitly focused on the racial dimensions of BiDil tended to offer a surprisingly nuanced view on the complex relationship between race and genetics, articles that simply mentioned that BiDil was a new “race-based drug” presumed the link between race and biology and in so doing, naturalized racial difference as genetic.^{xii} Other news sources have erroneously argued that BiDil is ushering in the era of so-called personalized medicine, in which drugs are tailored to each individual’s genetic profile.^{xiii}

While scholars have meticulously shown how the BiDil case exploited race as a marketable commodity and transformed race from a socially constructed category into a marker of innate biological difference, another side of the story complicates this line of argument: black interest groups, including the NAACP, the Association of Black Cardiologists (ABC), and the Congressional Black Caucus (CBC), were solicited for their support of BiDil by the drugmaker, NitroMed, and lobbied for the drug’s approval by the FDA.^{xiv} Representatives from the ABC, NAACP, CBC, and members of the black community regarded BiDil as an appropriate response to race-based health disparities in the U.S. and even as, according to Susan Reverby, “reparations for racial wrongs” like the Public Health Service Syphilis Study at Tuskegee.^{xv} This essay seeks to reevaluate the case of BiDil by showing how the community support shown of BiDil was central for drugmakers in promoting and targeting the drug to African Americans. After FDA approval, NitroMed used the support it had gained from black interest groups and community members to market BiDil as a unique “grassroots” pharmaceutical to African Americans. Furthermore, we seek to complicate the domestic understanding of race in the discourse surrounding BiDil in order to highlight the global nature of racial and ethnic categories as well as health disparities.^{xvi} Finally, we highlight red flags that BiDil raises for the future of personalized medicine.^{xvii} While BiDil has ultimately performed poorly on the market, it is imperative that we better understand the complex factors that brought BiDil to market in the first place. The BiDil case was covered widely in both specialized journals and the popular media and we should expect that scientists and pharmaceutical companies have learned important lessons from its successes and failures, including how to repackage a failing drug through race-based indications, how to use the tools of ethnic niche marketing to target pharmaceutical consumers, and perhaps even how to mobilize grassroots organizations and interest groups in advocating and marketing new drugs.^{xviii} By better understanding the BiDil story, including how race was mobilized from the clinical phase through the patenting process, FDA approval, marketing and final dissemination to patients, we might be better poised to respond once the next BiDil story hits the headlines, as it inevitably will.

Background

On June 23, 2005, the U.S. Food and Drug Administration (FDA) approved BiDil—a single pill combination of two generic drugs, isosorbide dinitrate and hydralazine hydrochloride (hereafter, “the H-I combination”)—for the treatment of heart failure in “self-identified black patients” as an adjunct to other standard treatments.^{xix} The 2001 hearings for the drug revealed serious disagreements about the propriety and dangers of race-based medicines. By 2005, the controversies surrounding the patenting and approval of BiDil had quickly absorbed the popular media. But BiDil’s history with the FDA goes almost a decade further back, when the H-I combination pill was first brought in front of the FDA in 1997 without a race indication. In that 1997 hearing, the FDA said no to the use of BiDil to treat heart failure in the general population. Thus began the complex transformation of BiDil into a race-based medicine. As Jonathan Kahn notes, BiDil was not originally intended to be sold as an “ethnic drug,” but was rather repackaged and eventually rescued from the pharma grave through a “complex array of legal, commercial, and medical circumstances that transformed the drug’s identity.”^{xx}

The pre- and post-approval histories of BiDil have been well documented by Jonathan Kahn and others; thus, here we provide only a brief review of the drug's trajectory to help frame our discussion.^{xxi} The first Vasodilator Heart Failure Trial (V-HeFT I) was conducted between 1980 and 1985 and studied the effects of vasodilator therapy on mortality among 642 patients with chronic congestive heart failure. This study found that "the addition of hydralazine and isosorbide dinitrate to the therapeutic regimen of dioxin and diuretics in patients with chronic congestive heart failure can have a favorable effect on left ventricular function and mortality."^{xxii} V-HeFT II ran from 1986 through 1991 and this time, the trial compared the effects of the H-I combination to the effects of the angiotensin converting enzyme (ACE) inhibitor called enalapril. The results of this study showed that enalapril was highly effective in treating heart failure and suggested that enalapril and hydralazine-isosorbide dinitrate should be used in combination in treatment regimens because of their differing effects.^{xxiii}

In 1987, Jay N. Cohn, who was one of the principal investigators in the study, filed a patent for the H-I combination proven to be effective in V-HeFT I.^{xxiv} That patent (U.S. Patent No. 4,868,179) was granted on September 19, 1989.^{xxv} At that time, the racial future of BiDil could not have been anticipated. The 1989 patent does not mention race in any part of the patent, including the claims section, which outlines the scope of protection for the invention and is the legal center of every patent. The complete absence of race in the 1989 H-I patent is particularly significant since biomedical patents that do not contain race-based claims will often present data organized by race and ethnicity in the background section detailing the invention. For example, a cluster of patents related to the detection and diagnosis of Familial dysautonomia (FD), or Riley-Day syndrome, which is found primarily in the Ashkenazi Jewish population, refers to ethnicity in the abstract and background sections of the patents but does not do so in the claims section.^{xxvi} Another example is a 2008 patent that details a newly isolated selenoprotein differentially expressed in cancer cells to be used in the detection or treatment of cancers: the abstract notes that this polymorphism is more prevalent in the African American population.^{xxvii} However, no reference is made to race in the claims section since, in all likelihood, doing so would narrow the scope of patent exclusivity. In general, patent attorneys seek to make the claims of inventors as wide as possible in order to maximize the legal coverage of the patent. In the case of BiDil, the more narrow, race-based claim became a necessity after the FDA's 1997 rejection of the drug for the general population.

The V-HeFT I and V-HeFT II trials were composed of black and white male patients but investigators did not find race a significant enough variable to foreground it in their initial published reports.^{xxviii} The new drug application (NDA) was submitted to the FDA in July of 1996 by Medco, a North Carolina pharmaceutical benefits management company, but was rejected as a treatment for heart failure in the general population because the mortality reduction in the V-HeFT trials was not significant enough for approval.^{xxix} The sequel to BiDil's history began in 1999 when Peter Carson and colleagues, including Jay Cohn, returned to the original V-HeFT I and II trials and parsed the data by the racial classification of the patients.^{xxx} The group's analysis showed that the H-I combination was effective in prolonging survival in black patients while enalapril had a more favorable effect on the white population. The study suggested that ACE inhibitors should remain the primary treatment for white patients while the "the H-I combination could be an attractive alternative" for black patients.^{xxxi} Even though the underlying mechanism remained, and remains, unknown (the indications label notes that "the basis for the beneficial clinical effects of BiDil is not known"), Carson and his colleagues implied that these racial differences were rooted in biological, or "pathophysiological" differences.^{xxxii} Postulating that "cardiovascular disease may affect whites and blacks differently," Carson, Cohn, and colleagues walked a thin line between asserting a population-based difference in drug

response and reifying race as a biological category by implying that there exist innate physiological differences between white and black patients.

NitroMed, Inc., a Lexington Massachusetts biotech company specializing in nitric-oxide based therapies, quickly acquired the NDA for BiDil and its attendant intellectual property. A second patent for the H-I combination was filed on September 8, 2000, but this time the claims indicated that the method was for a “black patient.”^{xxxiii} The patent was likely filed at this point in anticipation of further clinical trials with African American patients. An issued patent would give NitroMed grounds for infringement suits if other entities attempted to market the drug to African Americans or referred to their clinical trial data. The first BiDil patent was issued on October 15, 2002 (U.S. Patent No. 6,465,463), was assigned to NitroMed, and specified a “method of reducing mortality associated with heart failure, for improving oxygen consumption, for improving the quality of life, or for improving exercise tolerance in a black patient.”^{xxxiv} A 2004 patent (U.S. Patent No. 6,784,177), which originated in the same provisional application as the 2002 patent and shares the same language including the race-based claims, covers fixed dose for the combination pill.^{xxxv} NitroMed filed the revised NDA for BiDil in 1999 and in 2001 the company received the go-ahead from the FDA to conduct clinical trials on the newly refashioned drug targeted to self-identified black patients. The African American Heart Failure Trial (A-HeFT) studied the effects of a fixed dose of hydralazine and isosorbide dinitrate or placebo in 1050 black patients who were already receiving standard therapy for heart failure.^{xxxvi} In 2004, the A-HeFT trial was stopped early because of the high response rate to the drug. After a lengthy hearing that included emotional testimonies about both the promises and dangers of giving the governmental stamp of approval to such a drug, the FDA approved NitroMed’s application.^{xxxvii}

Advocates of BiDil and financial experts alike predicted that BiDil would make significant economic gains in the marketplace. Gregory Michael Dorr and David S. Jones note, “financial analysts speculated that, if NitroMed received a race-specific approval for BiDil from the FDA, then the company could expect profits in excess of \$825 million per year as some 750,000 African American heart failure patients switched to the new therapy.”^{xxxviii} As a combination of two generics that already existed on the market, BiDil was pitched as a drug of convenience. Drug makers banked on the hope that patients would prefer to replace a multiple pill regimen with a single pill taken three times a day.^{xxxix} The company may have also hoped its market would expand as doctors prescribed BiDil off-label (the prescription of a drug for uses other than those indicated by the FDA), in this case to patients who do not self-identify as black.^{xl} In April of 2007, Jane Kramer, NitroMed’s then vice-president of corporate affairs, articulated the company’s rationale for reaching a wider market: “We often say that our indication for self-identified blacks is a very uncomfortable and a very uncertain proxy for patients with heart failure who could benefit from the drug.”^{xli} However, BiDil did not live up to initial market expectations and continued to struggle in the marketplace. In January of 2008, the company laid off most of its staff and halted promotional activities and advertisements for the drug.^{xlii} On January 27, 2009, NitroMed announced that the company had been sold to Deerfield Management, a healthcare investment company.^{xliii} NitroMed claimed that it was simply too small a company to advertise the drug properly and that insufficient marketing was to blame for poor revenues.^{xliv} While this may have been a factor that contributed to the drug’s failure, physicians may be also reluctant to prescribe BiDil because of its high price relative to generic equivalents or because of worries about prescribing a pill dubbed as a “racial medicine.” In addition, several insurance companies either do not cover the drug or require a hefty monthly co-pay for the branded BiDil, with much lower co-pays for the separately prescribed generics. Such financial factors have clearly affected BiDil’s marketability.^{xlv}

One important lesson from this history is that while NitroMed sought and obtained market protection for the specific use in black patients, that patent protection seems to have done little work in the actual marketplace because it did not command a price premium compared to the separately prescribed generics. The patent may have prevented competitors from marketing the same H-I combination pill, but it did not affect payers and physicians who favored cheaper generics. If the component medicines had not been generic, the business strategy may have been more successful because NitroMed would have had a patented medicine that could be marketed to a niche market without competition from generics. In this way, the failure of BiDil as a business story may have more to do with the availability of cheap generics than with its racial marketing strategy.

The Domestication of Race

While some might argue that BiDil no longer warrants attention since it represents a failed business model, it is clear that this case has set important precedents for future attempts to resuscitate failed drugs as racial medicines, buttressed by race-based biomedical patents and race-specific clinical trials.^{xlvi} BiDil also raises important red flags about the potential use and abuse of racial, ethnic, and other identity categories on the frontier of personalized medicine. Jonathan Kahn has argued that BiDil is already helping to usher in a wave of patent applications with race-based claims.^{xlvii}

Kahn's patent analysis reveals that the increase in genetic information related to race and ethnicity produced through the Human Genome Project and Hap Map Project along with federal guidelines mandating the use of racial and ethnic categories in the collection of data for clinical trials are coincident with significant increases in the use of race in gene-related patents.^{xlviii} As Kahn has shown, issued patents that deploy "black" and "African-American" are most frequent, followed closely by "Caucasian" patents.^{xlix} While 0 racial/ethnic biomedical patents were issued between 1976 and 1997, 7 "African-American/black" patents and 6 "Caucasian/white" patents were issued in 1998-2007. Other racial and ethnic patents have been less common: Kahn reports that between 1998 and 2007, 1 "Asian" patent, 1 "Native American patent, and 3 "Hispanic/Latino" patents were issued by the United States Patent and Trademark Office (USPTO).¹ Our review of the patents that evoke African ancestry revealed claims that are more likely to suggest an underlying physiological or genetic difference in this population than in other kinds of race-based biomedical patents, especially when compared to patents with claims referring to whites.

While it is not clear that BiDil has caused a general increase in race-based biomedical patent applications, it does appear that NitroMed's business strategy of marketing to an ethnic niche market has influenced the rise of biomedical patent applications that specifically make claims about African Americans, suggesting that other companies and actors are taking steps to follow BiDil's footsteps in developing racialized therapies, treatments, or drugs. For example, one post-BiDil patent filed in 2005 makes a much more explicit race-based claim than earlier patents: the first claim of the patent cites "A method of assessing the risk of prostate cancer in an African American man."^{li} The 2002 BiDil patent (US Patent No. 6,465,463), which was filed on September 8, 2000, was the first biomedical patent to refer to "black" peoples in the claims section. An unrelated patent filed just two weeks later (on September 28), "Mammalian selenoprotein differentially expressed in tumor cells," refers to African Americans in the abstract of the patent, but not in the legal claims section.^{lii} The 2002 and 2004 BiDil patents are unique in their use of "black" in the claims section of the patent. These are the only biomedical patents related to peoples of African descent to use that term: "African American" is much more common.^{liii} The abstract section of the 2002 and 2004 patents are identical and state that the present invention is intended to treat and prevent mortality "associated with heart failure in an African American patient with

hypertension [...]” The racial language used in the claims section of both patents changes, however, stating that the invention is intended to reduce “mortality associated with heart failure in a black patient.” The use of “black” throughout the claims section of the BiDil patents is significant since no other biomedical patents use the language of “black” in the claims section. Most race-based patents related to persons of African descent deploy “African American” in the abstract and claims sections.

Both the 2002 and 2004 patents are unusual compared to other race-based biomedical patents due to the sheer number of times “black” is used in the patent claims. While other patents that make claims targeted to a specific racial or ethnic group may begin with an explicit claim related to race or ethnicity, no other patents depend so heavily on such language. In fact, most other race-based patents either mention race or ethnicity in the very first claim, foregrounding but not repeating the race claim, or, on the opposite end of the spectrum, the race claim is a very minor claim, subordinated under several other claims. The subordination of race-based claims under other claims makes sense since inventors want to secure the most general claims possible for their inventions, and race-specific subordinate claims would be used only if the more general claims fall victim to legal challenge. The phrase “black patient” is used nearly twenty times in the claims section of the 2002 BiDil patent and over forty times in the claims section of the 2004 patent. The repetitive use of this racialized language is compelling and points to the true break and innovation that BiDil represents, not only with respect to FDA approval, but also in the U.S. patent system. The bold use of racial language in the 2002 and 2004 BiDil patents has set an important precedent for the inclusion of stronger claims about race in biomedical patents.

In the definition section of the 2002 and 2004 patents, which delineates “definitions [that] are used throughout the specification,” “black patient” is defined as such:

‘Patient’ refers to animals, preferably mammals, most preferably humans, and includes males and females.

‘Black’ refers to a person of African descent or an African-American person.”^{liv}

The BiDil patents, like the U.S. census, present “black” and “African American” as interchangeable terms. This terminological slippage is significant and betrays a lack of awareness on the part of the lawyers and the patent examiners about the precise meanings of these terms, and the differences between them. The A-HeFT trial enrolled men and women 18 years and older who “self-identified as black (defined as of African descent).”^{lv} The study was conducted using patients drawn from 161 centers in the U.S. and thus, participants were likely persons of African descent born in the U.S. (African Americans). However, “black” refers to diverse geographic populations that span the African diaspora; In other words, the category “black” exceeds a domestic population of African Americans. From the fluidity of blackness in Brazilian contexts to its status in Britain as an ethnic instead of racial category, “black” has different meanings in different regional and national contexts.^{lvi} The imprecise use of race and population in the clinical trials, patenting, and FDA trials for BiDil ultimately allowed marketers to continue to use the categories of “black” and “African American” in strategic, but technically imprecise, ways to market the drug within the U.S.

The promotional materials for BiDil and related advertisements used the language of black and African American loosely and often vary the terms for the purposes of sentence variation. The inconsistent use of both black and African American in advertisements may be also related to concerns with political correctness, reflecting an uneasiness about repeating and overusing a charged and politicized word like “black,” as we saw in the technical language of the patents. The specific use of African American and/or black was also strategically deployed in marketing materials and promotional events in order to target sub-populations in the U.S. that might, for example, identify more with the label “black”

than “African American,” or vice versa. While our focus on specific terminology may seem like a minor point, BiDil should be recognized as a case in which the choice of just a few words not only mattered, but was essential in developing and then bringing the drug to market. In other words, racial categories were first used without careful thought in the V-HeFT trials but later in the process were mobilized and then deployed strategically in order to rescue a failed drug and spawn a multi-million dollar effort to target an ethnic niche market.^{lvii} We argue that it behooves scientists, policy makers, and governmental offices to pay closer attention to the use of racial and ethnic categories in research, even in non-race based research that simply collects data on race and ethnicity.

BiDil and the Rise of Grassroots Drug Marketing

While the background of BiDil’s approval has been well documented, the complex role of black interest groups in lobbying for the approval of the drug, including the NAACP, the Congressional Black Caucus (CBC), and the Association of Black Cardiologists (ABC) remains a relatively enigmatic piece of this history.^{lviii} The role of these groups and their commitment to the claim that BiDil would address severe race-based health disparities challenges claims that BiDil was nothing other than a commercial ploy to resurrect a failed drug. But insofar as advocacy groups are also held accountable by the communities they represent, their involvement with NitroMed also points to a genuine demand among minority populations for a comprehensive response to the health disparities crisis.

The support shown for the drug by black interest groups is in many ways surprising considering the tortuous history of race, racism, and medicine in the United States. Racially-targeted medicines and therapies might, for example, reinforce the view that differences between racial groups are due to biological differences and thus help to resurrect racist classification schemes that place racial and/or ethnic groups into hierarchies of physiological “fitness.” The contemporary use of racial terms in medicine raises the specter of a nineteenth-century race science that sought to prove the anatomical, and subsequent psychological, differences between racial and ethnic groups with the tools of comparative anatomy.^{lix} Harriet A. Washington has argued that a history of sacrificing African American bodies for the pursuit of scientific advancement, beginning in the colonial period, produced a suspicion of the American medical establishment that continues today.^{lx} The infamous U.S. Public Health Service Syphilis Study at Tuskegee has been particularly instrumental in producing distrust of the U.S. medical system among African Americans. Ever since Peter Buxtun leaked the details of the Tuskegee Study to the Associated Press in 1972, the study has come to represent perhaps the grossest of medical ethics violations in U.S. history.^{lxi} African Americans have continued to resist questionable medical practices and experimental therapeutic regimes in the name of Tuskegee while artists, poets, and other cultural workers have insisted through their artistic creations that Tuskegee retain a central location in historical consciousness.^{lxii}

Considering the centrality of the Tuskegee Study in U.S. cultural memory, it is surprising that the study was not an explicit referent in the debates and hearings surrounding BiDil. Susan Reverby notes that Tuskegee was a silent, yet omnipresent force at the June 2005 FDA hearings.^{lxiii} NitroMed was also clearly attuned to the dangers of BiDil being linked to Tuskegee and to a dark history of medical experimentation on African Americans. Reverby notes that the company’s vice president of marketing told a reporter that BiDil was the “antithesis of Tuskegee” and after the hearing, the chairman of the FDA Advisory Committee, Steven Nissen, said that the approval of BiDil was about putting Tuskegee to rest.^{lxiv} However, the Tuskegee Study did not serve as an important historical source or rallying point in cautioning against the hasty sanctioning of race-based medicine for black interest groups in their testimonies at the FDA trial. Instead, community members and

representatives made strong and at times, emotional appeals to the Committee, arguing that the approval of BiDil could help to reverse centuries of neglect and denial of proper medical treatment to African Americans.^{lxv} It is clear that community groups saw BiDil as a long awaited response to an ongoing and growing crisis in race-based health disparities throughout the U.S. The approval of a race-targeted drug was viewed not only as an important response to high rates of heart disease in the African American population but also as a symbolic gesture made by the government which finally acknowledged the scale of the health disparities crisis and the need for a comprehensive national response.

The approval of BiDil was also a powerful way to empower interest groups, especially the Association of Black Cardiologists (ABC). At the same time, members of the African American community may have backed BiDil in an attempt to wrest control from an increasingly bureaucratic and privatized healthcare system. BiDil, in many ways, is not only a pioneer case in the terms of its status as a race-based drug, but also because of the unprecedented support it received from minority interest and activist groups. While one side of the BiDil story may be about how a drug company targeted a minority population with an expensive drug while co-opting the discourse and history of health disparities for profit, another side highlights the desire of African American advocacy groups and communities to wield some degree of control within a healthcare system increasingly dominated by HMOs, pharmaceutical companies, and corporate interests. The attempts of the NAACP, ABC, and CBC to address health disparities through an alliance with pharmaceutical interests make sense considering the virtual privatization of health itself in the United States, and increasingly, across the globe. The necessity of addressing health disparities through recourse to the pharmaceutical industry, however, also points to the paucity of public domains and institutions through which such concerns might be adequately addressed.

In December of 2005, NitroMed and the NAACP announced a “strategic alliance” to address healthcare disparities, including a \$1.5 million grant from NitroMed to be used by the NAACP to develop health advocacy programs within the organization.^{lxvi} On its end, NitroMed launched a patient assistance program called NitroMed Cares, which aimed to lower healthcare disparities by providing BiDil free of charge to low-income patients without health insurance coverage. Bruce S. Gordon, who was then President and CEO of the NAACP, noted that the NAACP was “proud to partner with NitroMed and is committed to assisting at the grass root and legislative levels. The availability of new life-saving treatments such as BiDil, supported by NitroMed’s innovative program to make the drug accessible, is consistent with our guiding principle that affordable health services without bureaucratic and financial barriers should be considered a fundamental societal obligation.”^{lxvii} Gordon’s emphasis on “grassroots” work would prove to be key both to the ultimate rationale for approving the drug and for subsequent marketing efforts.

The marketing of BiDil should also be placed in the context of a long history of ethnic and niche marketing in the United States. African American trade and entrepreneurship magazines widely celebrated BiDil as a racially targeted marketing success story. In 2004, *Target Market News*, which covers news and trends in marketing to African Americans, named BiDil among its top 25 news stories in African American marketing and media for that year, noting that in December 2004, the Vigilante ad agency was hired by NitroMed to advertise the drug.^{lxviii} Vigilante is a Manhattan-based advertising company specializing in marketing to minority groups, especially African Americans, and urban communities; the company’s other clients have included Nike, General Motors, Heineken, the USTA, and Western Union.^{lxix} In some ways, BiDil represents a savvy extension of ethnic niche marketing techniques into the field of drug marketing. Following its approval in 2005, BiDil was covered in the media not only as an appropriate response to health disparities but also as a commercial success story suggesting the viability of many kinds of racially-targeted

products, not just drugs, in the marketplace. However, BiDil differs from other racially-targeted products because racial medicines are more likely to reify race as genetic given the entangled links between drugs, disease, and biology.^{lxx}

The ethnic niche marketing press quickly co-opted BiDil into a narrative about the impressive buying power of African Americans and the promises of what one reporter called a “blacks-only” drug.^{lxxi} Following the 2005 FDA hearings, NitroMed used the support it received from advocacy groups and community organizations to launch a unique marketing campaign targeted at African American consumers. An April 2006 article from *Target Market News* enthusiastically announced in its title, “Drug maker breaking new ground with grassroots marketing of BiDil.”^{lxxii} The article goes on to detail NitroMed’s narrowly targeted, “homespun-style” pitches in U.S. metropolitan areas with large African American populations. Focusing on community gathering places like African American churches and health fairs, readers are told that at the time (in April 2006), “there’s no plan to abandon NitroMed’s grassroots-style marketing in favor of mass-media ad campaigns that accompany many drug launches.”

The history and concept of the grassroots was central to both the marketing and approval of BiDil. The FDA Advisory Committee was clearly swayed by the ground-up support for the drug shown by the NAACP and many members of the African American community. The perceived authenticity of these community groups and their viewpoints about health disparities likely played an important role in legitimizing the view that BiDil would effectively address health disparities. After the FDA approval in 2005, NitroMed capitalized on this phenomenon through what the press referred to as a “grassroots-style” marketing approach. Of course, the very notion of grassroots pharmaceuticals is at its base a contradiction in terms, a bizarre pairing between corporate (the pharmaceutical industry) and decidedly non-corporate (grassroots) interests. At the same time, the attempt to fashion pharmaceutical marketing as an organic, ground-up effort to get drugs to “the people,” is one that should be taken note of, as it represents a new and potentially powerful model of drug development and marketing for future racial medicines. Despite its ultimate failure in the marketplace, BiDil’s grassroots angle marks an emerging model of drug marketing and a potential avenue for drug development in the future.

BiDil and Global Health

While it is clear that the goals of black interest groups and NitroMed cannot be neatly mapped onto each other, the focus on a grassroots, identity-based approach to race-based health disparities has ironically, on every side of the debate, obfuscated the global nature of both race and health disparities. Virtually all of the actors involved in developing and approving BiDil presented health disparities as solely a national issue while domesticating race, in this case, blackness, within a U.S.-centric framework. As discussed earlier, NitroMed strategically deployed the categories of “black” and “African American” when it made most business sense to do so. In the case of the 2002 and 2004 patents, the abstract section notes that the invention refers to an “African American patient with hypertension,” naming a domestic population geographically situated within the U.S. However, the claims section, the legal heart of the patent, goes on to broaden this category to “black,” a much wider category that cannot be reduced to a domestic population. However, once approved, advertisements and promotions for BiDil turned back to the category of “African American” in order to target black patients and consumers in the U.S. Despite the multinational nature of drug development and testing under the rise of neoliberal regimes of production and governance, the marketing of drugs primarily occurs through domestic channels, in BiDil’s case, through U.S. radio, print media, health fairs, community organizations, and churches. Ultimately, the domestic nature of drug marketing, which in the case of BiDil focused on

black metropolitan centers throughout U.S., obscures the complex global networks that bring drugs to market in the twenty-first century. At the same time, the easy substitutability of “black” for “African American” elides the fact that the category “black” denotes diverse geographical populations scattered across the African diaspora. Ultimately, the transformation of BiDil into a heart failure medication for African Americans in the United States obscured the globality of blackness as well as the global nature of health disparities.

The strategic deployment of racial categories for a domestic drug market also obscures the increasingly global orientation of clinical trials themselves. An increasing number of drugs tested in clinical trials are being transformed into racially or ethnically targeted pharmaceuticals for the U.S. drug market. Ian Whitmarsh has traced the use of the predominantly black nation of Barbados as a key site of U.S. biomedical research into the relationship between race and asthma. According to Whitmarsh, Barbadians have become an “exchangeable” population with black populations in the U.S. and Britain.^{lxxiii} In transnational biomedical research on race and ethnicity, outcomes observed in a particular geographical population are mapped onto racial or ethnic categorizations in order to make the drug or other treatment marketable to populations in particular national contexts. Crestor (rosuvastatin calcium), a drug that has been shown to lower cholesterol (LDL-C), recommends a lowered daily dosage for “Asian” patients, citing clinical evidence concerning increased environmental exposure to rosuvastatin among Asian populations. While the packaging insert notes that one of these trials was conducted in the U.S., it seems likely that “environmental exposure” to rosuvastatin in Asian peoples varies in populations occupying different environments.^{lxxiv} This instance of translating geography and local environment into race is particularly questionable considering the geographical and genetic diversity of populations who self-identify as “Asian” not only in the United States but around the world. In many cases, race-based trials conducted abroad do not control for environment and ignore key differences between national contexts or geographical regions (including diet, stress, exposure to environmental hazards and access to medical care) that may affect study outcomes. In such trials, geographical or regional differences in drug response revealed in clinical studies in the developing world are translated into racial or ethnic differences in order to make such drugs marketable among U.S. populations. Adriana Petryna’s comprehensive study of the recent growth of a truly globalized clinical trials industry suggests that as more and more clinical trials are shipped “off-shore,” opportunities to package or re-package drugs with racial and ethnic indications will also continue to grow.^{lxxv} Petryna’s eye-opening account also chronicles a worrying trend in which clinical trials situated in poor countries produce a local demand for expensive first-world drugs or highly experimental treatments that are tested in developing countries but commercialized in more profitable markets.^{lxxvi} There is a particular irony in the idea that future race-based medicines developed in the so-called Third World might be marketed to Americans as remedies for health disparities while such drugs remain unavailable to global populations outside of the U.S. The move toward racial and ethnic pharmaceuticals by drug makers is in some respects unexpected because of how it potentially narrows a drug market from the general population to a more select group of consumers. However, in an age of incredibly competitive patenting in the drug industry, racial and ethnic categories are becoming increasingly attractive to drug companies seeking to carve out valuable pockets of intellectual property protection. Even though BiDil was a commercial failure, Jonathan Kahn has shown that other companies are following NitroMed’s business model by using race to differentiate their drug from others in a crowded marketplace.^{lxxvii}

While programs like NitroMed Cares as well as the company’s alliance with the NAACP and ABC stressed BiDil’s role in addressing health disparities, the U.S.-centered horizon of the drug’s market and dissemination posed a serious barrier to such attempts. NitroMed’s commitment to redressing health disparities might be rightly questioned, but it is clear that

many individual actors involved in the BiDil case were sincere and passionate about the strides that BiDil could make in addressing health inequalities. A 2007 HHS report on pharmacogenomics, however, suggested otherwise, claiming that race-based drugs like BiDil could actually work against efforts to address health disparities by ignoring more global disparities.^{lxxviii} In addition to arguing that race-specific drugs potentially biologize race, the report also suggests that drugs like BiDil might actually divert money away from drug production in poorer countries while granting U.S.-based companies dangerous monopolies over specific racial or ethnic groups. In this account, BiDil emerged not as a grassroots pharmaceutical aimed at the “people” but as a highly specialized first-world designer drug that actually *contributed* to global health disparities by creating a new access problem.

The recent rise and fall of BiDil suggests many possible routes and potential pitfalls for the future of racial and ethnic medicine. The HHS Report on pharmacogenomics notes that although the FDA collects data on race and ethnicity for statistical purposes, it is not always clear that the collection of such data is relevant to scientific and medical research. Instead, they suggest that the FDA should be recommending gene-based population stratification, rather than self-identified race-based studies, in part to avoid the potential racism and exploitation that comes with the territory of race-based medicine.^{lxxix} In the 2004 article reporting the results of the A-HeFT study, the authors cite BiDil as an important stepping stone in the development of so-called personalized medicine, noting that “A future strategy would be to identify genotypic and phenotypic characteristics that would transcend racial or ethnic categories to identify a population with heart failure in which there is an increased likelihood of a favorable response to such therapy.”^{lxxx} However, it is not yet clear how the shift toward gene-based research, moving in the direction of personalized medicine, will work pragmatically in a consumer-based, pharmaceutical driven healthcare industry. It is telling that five years after FDA approval of BiDil, the population response differences are still unexplained. The combination of patent exclusivity and FDA approval for a racially specific clinical indication apparently did not provide incentives to create knowledge about whether it is genetic risk, stage or severity of illness, access to health care, or other factors that explain why an initial trial found an insufficient effect of BiDil, but a follow-up trial in self-identified African American patients was stopped early because the effects were so strong.

Even if the age of personalized medicine becomes a reality in the near future as some predict, racial and ethnic categories will continue to serve as important tools for the marketing of drugs. As several critics have noted, race, as in the case of BiDil, often operates as a convenient proxy for genetic make-up.^{lxxxi} While identity has long been important for the marketing of all kinds of products, the growth of the ethnic niche marketing industry has made racial and ethnic categories even more important for the marketing world. We should not be surprised if ethnic niche marketing and personalized medicine form a strong partnership. It is even possible that the categories of race, ethnicity, gender, and sexuality will become even more appealing to drug companies because of personalized medicine’s focus on the genetic make-up of the individual patient.

We suggest that BiDil is a cautionary tale for those who express uncritical optimism or rash enthusiasm about the future of personalized medicine. The contemporary biologizing of race in science today is most likely to occur, not in the text of a few biomedical patents or in a single clinical study, but at the intersection between science and commerce, the point at which fuzzily conceived or carelessly deployed racial categories in scientific contexts and studies are mobilized by an increasingly global pharmaceutical and marketing industry, both of which stand to profit from the commodification of identity. In other words, the biologizing of race in scientific discourse becomes significant when such ideas leave

technical documents like patents and clinical trial reports and are mobilized within wider popular discourses or embedded in larger institutional structures and industries.

A certain imprecision and at times, ignorance, about racial and ethnic categories in scientific research, patent examination, and clinical trials sets the stage for savvy market manipulations of racial categories later down the line. We argue for increased education with respect to the history of race and ethnicity by a number of actors, including researchers, actors at the FDA, patent attorneys and examiners. Since they make judgments about race and ethnicity that are cloaked as technical decisions, members of the FDA and USPTO should fully understand the meaning and history of the terms to which they give authority (as patent claims or as indications for drug labels). Patent agents submitting claims to the PTO and those making regulatory submissions to the FDA should also be aware of the veritable minefield they are walking through when it comes to the use of racial and ethnic categories. In addition, increased knowledge about these histories among researchers as well as relevant actors at the FDA might lead to different decisions about if and how to use racial and ethnic categories in research. Increasing attention to the specificity of these terms, and to what groups of people they actually refer, might ultimately avoid the misappropriation of race and ethnicity that we have seen with BiDiI. Finally, discussions and debates about BiDiI and related drugs need to be reoriented to understand how they are part of a larger global story about the use of racial categories and racialized populations around the world for pharmaceutical profits. Ironically, the grassroots advocacy aspect of the BiDiI case, which focused on inequalities in healthcare within the U.S., ultimately obscured a much wider, global crisis in health disparities.

Acknowledgments

Many thanks to Robert Cook-Deegan, Karla Holloway, Jonathan Kahn, and the anonymous reviewer at *JLME* for their helpful comments and suggestions. The authors gratefully acknowledge the support of the National Human Genome Research Institute and the Department of Energy (CEER Grant P50 HG003391, Duke University, Center of Excellence for ELSI Research) and the Greenwall Foundation.

Biography

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Notes

- i. For a comprehensive overview of the Human Genome Project (HGP), its roots in the development of new technologies, its relationship to an earlier history of genetics, as well as public policy debates, funding history, and major landmarks throughout the 1980s and 1990s, see Cook-Deegan R. *The Gene Wars: Science, Politics, and the Human Genome*. 1994 W.W. Norton & Company New York
- ii. See, for example, L.L. Cavalli-Sforza, "Genes, peoples, and languages," *Scientific American*, 265, no. 5 (November 1991): 104-10, at 110. At the end of the article, Cavalli-Sforza suggests that geneticists should collect indigenous DNA samples now and ask questions later since aboriginal populations are rapidly disappearing under the forces of modernization. He concludes, "Priceless

evidence is slipping through our fingers as aboriginal populations lose their identity. Growing interest in the Human Genome Project may, however, stimulate workers to gather evidence of human genetic diversity before it disappears.” On the reanimation of eugenics in the genomic era, see Duster T. *Backdoor to Eugenics*. 1990RoutledgeNew York

- iii. Cavalli-Sforza LL, et al. Call for a Worldwide Survey of Human Genetic Diversity: A Vanishing Opportunity for the Human Genome Project. *Genomics*. 1991; 11:490–91. [PubMed: 1769670] Jenny Reardon details the history of the Human Genome Diversity Project in *Race to the Finish: Identity and Governance in an Age of Genomics* (Princeton, N.J.: Princeton University Press, 2005): at 3. Reardon insists that the story behind the HGDP is much more complicated than one of “imperialist” Western science exploiting colonized, non-Western groups: “claims that the Project would lead to the end of racism by producing reliable scientific knowledge were just as unconvincing as some of the critics’ claims that the Project would propagate racism and colonialism by exploiting the genes of indigenous peoples.”
- iv. The Genetic Information Non-Discrimination Act (P.L. 110-233, 122 Stat. 881) was signed into federal law on May 21, 2008. It is available at the U.S. Government Printing Office, <http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ233.110.pdf>.
- v. Two recent collections of essays offer a comprehensive look into the various ethical, legal, social, and policy dilemmas raised by the use of race in genomic research and medicine. On emerging issues surrounding population genetics, ancestry testing, health disparities, race-targeted research and therapies, and race and genetics in the popular media, see Koenig BA, Lee SS, Richardson SS. *Revisiting Race in a Genomic Age*. 2008Rutgers University PressNew Brunswick, N.J. Whitmarsh I, Jones DS. *What’s the Use of Race?: Modern Governance and the Biology of Difference*. 2010MIT PressCambridge, M.A.
- vi. On the use of racial and ethnic categories in the development of personalized medicine and how such medicines might contribute to health disparities in the future, see Tate SS, Goldstein DB. Will Tomorrow’s Medicines Work For Everyone? *Nature Genetics*. November; 2004 36(11s):S34–S42. [PubMed: 15508001]
- vii. Kahn J. Race-ing Patents/Patenting Race: An Emerging Political Geography of Intellectual Property. *Iowa Law Review*. February; 2007 92(2):353–416.Kahn J. How a Drug Becomes ‘Ethnic’: Law, Commerce, and the Production of Racial Categories in Medicine. *Yale Journal of Health Policy, Law, and Ethics*. 2004; 4(1):1–46.
- viii. Carson P, et al. Racial Differences in Response to Therapy for Heart Failure: Analysis of the Vasodilator-Heart Failure Trials. *Journal of Cardiac Failure*. 1999; 5(3):178–87. [PubMed: 10496190] Taylor A, et al. Combination of Isosorbide Dinitrate and Hydralazine in Blacks with Heart Failure. *The New England Journal of Medicine*. November 11; 2004 351(20):2049–57. [PubMed: 15533851]
- ix. For a thorough critique of the retrospective analysis, including a disputation of the statistical significance of the observed difference between white and black patients in the trials, see Ellison GTH, et al. Flaws in the U.S. Food and Drug Administration’s Rationale for Supporting the Development and Approval of BiDil as a Treatment for Heart Failure Only in Black Patients. *Journal of Law, Medicine & Ethics*. 2008 Fall;36(3):449–57.
- x. See Carson, *supra* note 8; and Taylor, *supra* note 8.
- xi. For example, a 2008 article wrongly suggests that BiDil is a personalized medicine, a drug tailored to an “individual’s genetic make-up.” See “NitroMed suspends marketing of heart drug BiDil,” *Target Market News*, January 16, 2008, at <<http://www.targetmarketnews.com/storyid01310802.htm>> (last visited October 10, 2010).
- xii. Caulfield T, Harry S. Popular Representations of Race: The News Coverage of BiDil. *Journal of Law, Medicine & Ethics*. 2008 Fall;36(3):485–90. at 488-89.
- xiii. Saul S. F.D.A. Approves a Heart Drug for African-Americans. *The New York Times*. June 24, 2005 Even the initial FDA press release announcing the approval of the drug noted that BiDil represented an important step toward the promise of personalized medicine. See “FDA Approves Heart Failure Drug for Black Patients,” *FDA News Release*, June 23 2005, at <http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2005/ucm108445.htm> (last visited October 15, 2010).

- xiv. Few critics have examined the complicated role of black advocacy groups in lobbying for BiDil's approval. Notable exceptions include Yu JH, Goering S, Fullerton S. *Race-Based Medicine and Justice as Recognition: Exploring the Phenomenon of BiDil*. *Cambridge Quarterly of Healthcare Ethics*. 2009; 18(1):57–67. [PubMed: 19091146] at 58; and A. Pollock, *Medicating Race: Heart Disease and Durable Preoccupations With Difference* (Ph.D. Diss., Massachusetts Institute of Technology, 2007); and D.E. Roberts, "Is Race-Based Medicine Good For Us?: African American Approaches to Race, Biomedicine, and Equality," *Journal of Law, Medicine & Ethics*, 36, no. 3 (Fall 2008): 537-545.
- xv. Reverby S. 'Special Treatment: BiDil, Tuskegee, and the Logic of Race. *Journal of Law, Medicine & Ethics*. 2008 Fall;36(3):478–484. at 479.
- xvi. On the recent move toward pharmaceutical globalization and struggles over the meaning and purchase of race in debates about the approval of "Western" drugs in Japan, see Kuo W. *Understanding Race at the Frontier of Pharmaceutical Regulation: An Analysis of the Racial Difference Debate at the ICH*. *Journal of Law, Medicine & Ethics*. 2008 Fall;36(3):498–505. See also Whitmarsh and Jones, "Introduction," *supra* note 5, at 17. The authors remind readers of both "the radically relational character of ethnicity/race" and how racial and ethnic categories shift both across geographical spaces and throughout history.
- xvii. In this article we focus on racial categories because of the specificities of the BiDil case, but our more general recommendations apply to the use of ethnic categories in biomedical research as well. We must also emphasize that the concept of race signifies differently, or may not even translate, in different national contexts and regions of the world.
- xviii. Our use of the term "ethnic niche marketing" is not intended to conflate important distinctions between race and ethnicity, but is rather taken from the marketing literature itself. Marketing directed at racial and ethnic communities is alternatively referred to as just "niche marketing" or "targeted marketing." Marilyn Halter notes that "ethnicity" dominates marketing lingo and is often used to replace the terms "race" as well as "minority." On the transformation of race into ethnicity in marketing, see M. Halter, *Shopping for Identity* (New York: Shocken Books, 2002): at 199-202.
- xix. See "FDA Approves Heart Failure Drug for Black Patients," *supra* note 13.
- xx. Kahn, "How a Drug Becomes 'Ethnic'," *supra* note 7, at 11.
- xxi. See Kahn, *supra* note 7, as well as Kahn J. *Race, Pharmacogenomics, and Marketing: Putting BiDil in Context*. *The American Journal of Bioethics*. 2006; 6(5):W1–W5. [PubMed: 16997802] Kahn. *Beyond BiDil: The Expanding Embrace of Race in Biomedical Research and Product Development*. *St. Louis University Journal of Health Law & Policy*. 2009; 3(1):61–92. Also, see the 2008 issue of *The Journal of Law, Medicine & Ethics*, 36, no. 3 (September 2008) devoted to BiDil.
- xxii. Cohn JN, et al. Effects of vasodilator therapy on mortality in chronic congestive heart failure: Results of a Veterans Administration Cooperative Study. *N. Engl. J Med*. June 12; 1986 314(24): 1547–52. [PubMed: 3520315]
- xxiii. Cohn JN, et al. A comparison of enalapril with hydralazine-isosorbide dinitrate in the treatment of chronic congestive heart failure. *N. Engl. J. Med*. August; 1991 325(2):351–3. [PubMed: 2057038]
- xxiv. U.S. Patent Application No. 41, 210 (Filed April 22, 1987).
- xxv. Method of Reducing Mortality Associated with Congestive Heart Failure Using Hydralazine and Isosorbide Dinitrate. U.S. Patent No. 4,868,179. September 19, 1989
- xxvi. Methods for detecting mutations associated with familial dysautonomia. U.S. Patent No. 7,407,756. August 5, 2008 Gene for identifying individuals with familial dysautonomia. U.S. Patent No. 7,388,093. June 17, 2008 Kits for detecting polymorphisms associated with familial dysautonomia. U.S. Patent No. 5,262,250. July 17, 2001 Use of Genetic markers to diagnose familial dysautonomia. U.S. patent No. 5,998,133. December 7, 1999
- xxvii. Mammalian selenoprotein differentially expressed in tumor cells. U.S. Patent No. 7,442,543. October 28, 2008
- xxviii. See Cohn, *supra* note 22 and 23. The 1991 article includes race as a demographic characteristic in the Table of Base-Line Characteristics but does not expound on the role of race in the body of the text; The 1986 article makes no mention of the racial identity of participants.

- xxix. NDA 20-727. The 1997 rejection letter is available through the Drugs@FDA website. See “Approvable Letters,” at http://www.accessdata.fda.gov/drugsatfda_docs/nda/2005/020727_s000_BiDiITOC.cfm (last visited October 12, 2010).
- xxx. Carson, *supra* note 8, at 178.
- xxxi. *Id.*
- xxxii. Carson, *supra* note 8, at 186. The indications insert for BiDil is available through the Drugs@FDA website, at <http://www.accessdata.fda.gov/Scripts/cder/DrugsatFDA/index.cfm?fuseaction=Search.DrugDetails> (last visited October 12, 2010).
- xxxiii. U.S. Patent Application, 09/658,261 (Filed September 8, 2000).
- xxxiv. Methods of Treating and Preventing Congestive Heart Failure With Hydralazine Compounds and Isosorbide Dinitrate or Isosorbide Mononitrate. U.S. Patent No. 6,465,463. October 15. 2002
- xxxv. Methods Using Hydralazine Compounds and Isosorbide Dinitrate and Isosorbide Mononitrate. U.S. Patent No. 6,784,177. August 31.2004
- xxxvi. Taylor, *supra* note 8; see also, Taylor A, et al. The African American Heart Failure Trial: Background, Rationale, and Significance. *Journal of the National Medical Association*. September; 2002 94(9):762–69. [PubMed: 12392039]
- xxxvii. See the transcripts from the June 16, 2005 hearing of the Cardiovascular and Renal Drugs FDA Advisory Committee at <http://www.fda.gov/ohrms/dockets/ac/05/transcripts/2005-4145T2.pdf> (last visited October 12, 2010).
- xxxviii. Dorr GM, Jones DS. Facts and Fictions: BiDil and the Resurgence of Racial Medicine. *Journal of Law, Medicine & Ethics*. September; 2008 36(3):443–48. at 445.
- xxxix. See dosage on BiDil Indications Insert, *supra* note 32.
- xl. Reverby, *supra* note 15, at 483.
- xli. Cited in Ray T. HHS Report Suggests Genetic Test for BiDil; NitroMed Does Not Rule Out Dx. *Pharmacogenomics Reporter*. April 4.2007
- xlii. NitroMed Stops Marketing for Heart Drug Targeted at Blacks. *FDAnews Drug Daily Bulletin*. January 24.2008 5(16)
- xliii. “NitroMed Announces Agreement to Be Acquired by Deerfield Management; Terminates Agreements with Archemix Corp. and JHP Pharmaceuticals, LLC,” NitroMed Press Release, January 27, 2009, at <http://www.marketwire.com/press-release/NitroMed-Announces-Agreement-Be-Acquired-Deerfield-Management-Terminates-Agreements-NASDAQ-NTMD-942194.htm> (last visited October 12, 2010).
- xliv. *Supra* note 11.
- xlv. Kreimer S. BiDil Not Widely Prescribed. *DOC News*. July.2007 4(7):23.
- xlvi. See Kahn, *supra* note 7.
- xlvii. Kahn J. Patenting Race in a Genomic Age. *Genomics, Society, and Policy*. 2008; 4(3):46–63.
- xlviii. Kahn, *supra* note 47. On the history and impact of the NIH Revitalization Act of 1993, which mandates researchers to include diverse populations in their research, see D. Fullwiley, “The Molecularization of Race: U.S. Health Institutions, Pharmacogenetics, Practice, and Public Science after the Genome,” in Koenig, Lee, and Richardson, *supra* note 5, at 152; see also, S. Epstein, “Beyond Inclusion, Beyond Difference: The Biopolitics of Health,” in Whitmarsh and Jones, *supra* note 5, at 63-87.
- xlix. Kahn, *supra* note 47, at 9.
- l. *Id.*
- li. See U.S. Patent No. 7,402,389, “Compositions and methods for prognosis of cancers” (Issued July 22, 2008).
- lii. U.S. Patent No. 6,849,417 (filed September 28, 2000), “Mammalian selenoprotein differentially expressed in tumor cells,” notes in the abstract: “A 15 kDa selenium-containing protein (“selenoprotein”) is disclosed. The protein is shown to be differentially expressed in cancer cells, such as prostate cancer cells. There is a correlation between the presence of a polymorphism at

nucleotide positions 811 and 1125 of the 15 kDa selenoprotein gene, and the presence of cancer. This polymorphism is more prevalent in the African American population” (italics are ours).

- liii. One patent refers to persons of “African ethnicity.” See U.S. Patent No. 6,200,758, “Phenylalanine hydroxylase gene variants, and amino acid and pterin homeostasis, in the definition, detection, treatment and prevention of psychotic, mood and personality disorders” (Issued March 13, 2001).
- liv. Supra note 34 and 35.
- lv. See Taylor, supra note 8, at 2050. It should be noted that the A-HeFT trial enrolled both men and women, while the V-HeFT trial was composed of only male patients.
- lvi. See, for example, Sansone L. *Blackness Without Ethnicity: Constructing Race in Brazil*. 2003PalgraveNew York Gilroy P. *Against Race: Imagining Political Culture Beyond the Color Line*. 2002Harvard University PressCambridge, M.A.
- lvii. On the favoring of “ethnicity” over “race” in marketing, see Halter, supra note 18, at 199-202.
- lviii. On the history of BiDil, see Kahn, supra note 7 and 21. Supra note 14, for accounts that address the history of BiDil’s approval from the perspective of the community groups involved.
- lix. For an overview of the rise of comparative anatomy and polygenism (the theory that the human races are different species, produced in multiple origins), see Gould’s *SJ. American Polygeny and Craniometry before Darwin: Blacks and Indians as Separate, Inferior Species. The Mismeasure of Man* (Revised and Expanded Ed.). 1996:62–104.W.W. Norton and CompanyNew York
- lx. Washington, HA. *Medical Apartheid: The Dark History of Experimentation on Black Americans from Colonial Times to the Present*. Doubleday; New York: 2006. p. 27
- lxi. For comprehensive accounts of the Tuskegee Study, see Reverby S. *Examining Tuskegee: The Infamous Syphilis Study and Its Legacy*. 2009University of North Carolina PressChapel Hill Reverby S. *Tuskegee’s Truths: Rethinking the Tuskegee Syphilis Study*. 2000University of North Carolina PressChapel Hill For an account of the connection of the Tuskegee Study to earlier forms of plantation science in the nineteenth-century U.S. South, see Rusert B. ‘A Study in Nature’: The Tuskegee Experiments and the New South Plantation. *Journal of Medical Humanities*. 2009; 30(3):155–171. [PubMed: 19603260]
- lxii. The Tuskegee Study appears in Ralph Ellison’s *Invisible Man* (1952) and was also featured in a prize-winning play, *Miss Ever’s Boys* (1992), later turned into an HBO film for television. The Marvel Comics Series, *Truth: Red, White & Black*, used Tuskegee as inspiration for a back-story about the super serum that created Captain America.
- lxiii. Reverby, supra note 15, at 478.
- lxiv. Revery, supra note 15, at 478 and 480. Nissen’s comments were from a February 7, 2006 interview with Reverby.
- lxv. Supra note 37, “Open Public Hearing” Section, at 202-262.
- lxvi. “NitroMed, NAACP partnership will help introduction of BiDil,” *Westside Gazette*, January 19-25, 2006, at 4B.
- lxvii. Id.
- lxviii. “Top 25 Stories of the Year,” *Target Market News*, 2004, at <<http://www.targetmarketnews.com/Top%20Stories%20of%202004.htm>> (last visited October 12, 2010).
- lxix. See NitroMed’s press release about Vigilante, at <<http://www.theideamachine.com/Larry-Woodard-BiDil.pdf>> (last visited October 10, 2010).
- lxx. Ian Whitmarsh and David S. Jones note that in recent years, the development of new racialized products, including race-specific running shoes, vitamins, skin care products, and ancestry tests, are being inspired by the new sciences of race. Supra note 5, at 1 and 7.
- lxxi. A 2008 article from the *FDA News* opens, “The maker of the first medication approved for the use in a specific racial group is halting marketing of the *blacks-only heart drug*, laying off most of its 90-person staff and exploring a possible sale of the company” (italics are ours). See “NitroMed suspends marketing of heart drug BiDil, cuts staff,” *FDA News*, January 16, 2008.
- lxxii. Mark Jewell, “Drug maker breaking new ground with grassroots marketing of BiDil,” *Target Market News*, April 11, 2006, at <<http://targetmarketnews.com/storyid04170602.htm>> (last visited October 12, 2010).

- lxxiii. Whitmarsh, I. *Biomedical Ambiguity: Race, Asthma, and the Contested Meaning of Genetic Research in the Caribbean*. Cornell University Press; Ithaca, N.Y.: 2008. p. 6-7.
- lxxiv. See packaging insert for Crestor, at <http://www.crestor.com/c/your-arteries/tools-resources/index.aspx> (last visited October 12, 2010)
- lxxv. Petryna, A. *When Experiments Travel: Clinical Trials and the Global Search for Human Subjects*. Princeton University Press; Princeton, N.J.: 2009. p. 71
- lxxvi. Id.
- lxxvii. J. Kahn, "Beyond BiDil," *supra* note 21, at 62.
- lxxviii. *Realizing the Promise of Pharmacogenomics: Opportunities and Challenges*. *Biotechnology Law Report*. June; 2007 26(3):261–91.
- lxxix. See Ray, *supra* note 41.
- lxxx. See Taylor, *supra* note 8, at 2055.
- lxxxi. See, for example, S. Reverby, *supra* note 15, at 478, and Roberts, *supra* note 14, at 538.