Patenting race

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As genetic databases continue to yield new insights and inventions, the commercial incentive to conflate race and genetics may be hard to resist.

A new phenomenon is emerging in biotechnology research and product development—the strategic use of race as a genetic category to obtain patent protection and drug approval. This article does not attempt to present a definitive characterization of the meaning of race and/or ethnicity, but is concerned more with how these terms are being invoked in biotech patents. Both are assumed to be socially constructed categories that nonetheless have come to have biological implications as they play out in real-world biomedical contexts. Thus, for example, African-Americans currently have higher rates of such biological conditions as infant mortality, diabetes, hypertension and prostate cancer than other groups. These are significant biological differences, but are not necessarily inherent or genetic. In the interests of economy and manageable syntax, I will often refer only to 'race' when speaking generally of racial and ethnic categories.

The introduction of race into the field of patent law as an adjunct to biotechnological inventions may have profound implications for broader scientific and social understandings of race. When the federal government grants a patent to an invention that is based on an asserted or implied genetic basis for a particular racial group, it gives its imprimatur to a potentially inappropriate reification of race as genetic[1]. As a recent editorial in *Nature Biotechnology* put it, "Race is simply a poor proxy for the environmental and genetic causes of disease or drug response…. Pooling people in race silos is akin to zoologists grouping raccoons, tigers and okapis on the basis that they are all stripey"[2]. Beyond this, such patents are providing the basis for similarly race-based clinical trial designs, drug development, capital raising and marketing strategies that carry the implication of race as a genetic construction out to ever-widening and consequential segments of society. As these new patents proliferate, commercial imperatives may be coming to eclipse scientific considerations of how or whether to use racial categories in biotechnology.

Changing the playing field: The rise of racial categories in biotechnology patents distorts the underlying science, with potentially profound consequences.

Data collection and use

A typical patent is divided into several sections. The most important of these, the claims section, specifies the legally operative scope of the patent, defining the formal legal boundaries of the territory covered by an invention. The abstract is the basic summary presentation of the central purpose of the patent. Other sections typically include a background or description of the invention, drawings and/or other supporting data.

A review of claims and abstract sections of gene-related patents and patent applications filed since 1976 indicates a significant trend toward using racial categories in gene-related patents, with a marked increase in just the past few years (**Table 1**). The specific categories were chosen to reflect those employed by the US Office of Management and Budget's Revised Directive 15, which governs the collection of data in federal and federally sponsored projects[3]. The results are indicative of an emerging phenomenon that deserves increased attention. The rise is clearly coincident both with an increase in genetic information being produced through such federally sponsored initiatives as the Human Genome and International Haplotype Map Projects, and also with rising federal emphases on requiring the use of racial and ethnic categories in the collection of data relating to clinical trials and drug applications. Although the table does not capture possible patent applications that may have been filed before 2001 and subsequently abandoned, it nonetheless remains highly suggestive of a recent trend toward the increasing use of race in biotech patents. Thus, for example, of the twelve uses identified in granted patents, the earliest relates to diagnostic testing for the *BRCA1* genetic mutation for breast cancer and was granted only in 1998. There has been a more than five-fold increase in the use of racial and ethnic categories in gene-related patent applications over existing patents issued since 1976. This is not because race has not previously been used in biomedical research, but rather because it is taking on increasing significance in the commercial world of biotech patenting. Whereas there are some overlapping uses (patents that use more than one OMB category), the trend remains powerful and clearly

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Table 1 Racial and ethnic categories mentioned in US patent filings, 1976–present

Category	Issued patents 1976–1997	Issued patents 1998–2005	Patent applications filed since 2001
Race	0	2	15
Ethnic	0	0	2
African-American/black	0	4	11
Alaska native	0	0	0
Asian	0	0	13
Caucasian/white	0	6	18
Hispanic/Latino	0	0	3
Native American	0	0	2
Pacific Islander	0	0	1
Total	0	12	65

Results from a search of the USPTO patent database (http://www.uspto.gov/) conducted between 8/25/05 and 9/15/05. Search terms used included: Race, Racial, Ethnic, Ethnicity, Caucasian, Caucasoid, African, African-American, Negro, Negroid, Asian, Oriental, Mongoloid, Hispanic, Latino, Native American, Alaska Native, Pacific Islander. The terms 'black' and 'white' alone were too broad to be useful and so were qualified with the additional terms of 'biology' or 'gene' or 'genetic' or 'DNA.' The categorization is meant to include only those patents that use racial/ethnic categories as a basis for asserting a distinctive prevalence or etiology for a physiological condition, genetic variation and/or drug response.

parallels the availability of vast new amounts of genetic information being produced and classified in federally sponsored databases. The quantitative scope of the trend remains to be assessed fully, but its qualitative significance is already emerging.

How exactly is race being used in these patents? At the most pragmatic level, patent applicants appear to be invoking race in a strategically defensive manner to provide added protection against possible patent challenges. The structure of a typical claims section of a patent begins with claim no. 1 being as broad as possible. Successive claims generally provide narrower and narrower focus to the territory covered by the patent. The idea is that if the broadest claim is struck down by the patent examiner or a subsequent challenge, the narrower claims may still survive. Patent claims are thus structured something like a medieval castle, with an outer ring encompassing the most territory with successively smaller rings providing additional layers of protection back to the core area. Thus, a typical race-specific biotech patent may begin with a first claim that covers the use of a particular invention in a 'mammal,' followed by a second claim covering use in a 'human,' and a third claim covering use in a 'Caucasian' or 'Asian' individual.

There is not an inherent problem with looking at race in biomedical research. Many of the studies discussed in the background sections of these patents deal effectively with the nuances of variation in the relative frequencies of particular alleles across specified populations. In the legally operative claims sections, however, all such nuance is lost as relative gene frequencies tend to be replaced by blanket assertions of efficacy or appropriateness for use in a specific race. The legal and commercial imperatives of patent law demand definitive and bounded categories of race to make the claims appear stronger. Patent examiners are unlikely to consider such slippage between claims of correlation and identity. Rather, they evaluate an application according to whether it meets the basic statutory criteria of novelty, non-obviousness, utility and specification. The claims thus supplant the more complex presentation of data in the underlying studies, in effect distorting the science. The result is a patent that presents a simplistic and reified conception of race as genetically constituted and bounded.

The BiDil precedent

Racial categories can also be used more aggressively in patent law to expand or extend monopoly control over products and services. This is most evident in the case of BiDil, which, in June 2005, became the first drug approved by the US Food and Drug Administration with a race-specific indication. Underlying BiDil's new drug application (NDA) for FDA approval is a 2002 race-specific patent: to use the drug for treatment of heart failure in an African-American patient[4]. NitroMed, BiDil's corporate sponsor, also holds the rights to an earlier patent to use BiDil in the general population, regardless of race[5]. This patent, however, expires in 2007, whereas the race-specific patent lasts until 2020, granting an additional 13 years of monopoly control over the market for BiDil, which NitroMed currently estimates as reaching $1–3 billion annually. Currently, BiDil is NitroMed's only product on the market.

NitroMed's second BiDil patent is premised on underlying assumptions regarding race and the genetic basis of heart disease. As NitroMed CEO Michael Loberg put it, "Illnesses that seem identical in terms of symptoms…may actually be a group of diseases with distinct genetic pathways. This would help explain blacks' far higher mortality rates for a host of conditions, including diabetes, cancer and stroke"[6]. NitroMed conducted a race-specific clinical trial, called the African-American Heart Failure Trial (A-HeFT), to support its NDA submission. All indications from the trial results seem to show that the drug is highly effective at treating heart failure, but the single-race design of the trial does not support any claims as to whether the drug works differently or better in African-Americans than in anyone else[7]. Indeed, designing a larger, racially diverse clinical trial would have provided better information about BiDil's efficacy, most likely showing it worked in non-African-Americans as well. Such a trial, however, would have threatened NitroMed's commercial interest in obtaining the extra 13 years of patent protection ensured by a race-specific FDA approval[8].

NitroMed's race-specific BiDil patent provided the underlying support that drove its subsequent development of a race-specific trial design, its campaign to raise money in capital markets, its approach to the FDA for race-specific approval, and its massive marketing campaign to third-party payers, individual doctors, and the public at large[8]. As biotech patents become racialized, they are thus coming to drive broader scientific, political and public understandings and uses of racial categories.

The dramatic rise of racial categories in biotech patents indicates that BiDil is not an anomaly. Recent reports of similar race-specific trials for the cancer drug Iressa and the statin Crestor, among others, would seem to indicate that BiDil is ushering in a new era of race-based medicine[9]. A 2005 report from the Royal Society asserted that the promise of truly individualized pharmacogenomic therapies remains decades away[10]. In the gap between present reality and future promises, there may be various strategies for capitalizing on emerging genetic knowledge relating to drug response and efficacy. Targeting a racial audience presents a particularly attractive interim option, because at this point the technology and resources do not exist to efficiently scan every individual's genetic profile. Instead, businesses may market the product to a particular social group that is hypothesized to have a higher prevalence of a relevant genetic variation. Patent protection provides an essential underpinning for such commercial ventures. As race is becoming more relevant to marketing drugs, it is becoming a salient component of underlying biotech patents.

Similar dynamics are at work in Europe. In June 2005, over the strenuous objections of the European Council of Human Genetics, the

European Patent Office upheld a patent owned by Myriad Genetics relating to testing for the *BRCA2* genetic mutation "for diagnosing a predisposition to breast cancer in Ashkenazi Jewish women"[11]. Opponents of the patent noted that the test is currently available for all women regardless of ethnic or religious background. As a practical matter, this new patent means that women identified as Ashkenazi Jews will have to either pay a premium for the test or deny their identity. As with BiDil, here Myriad apparently is marking an ethnic group as genetically distinct primarily to extend patent protection—with potentially profound consequences[12].

Competing imperatives

Race has long been used in biomedical research. The new development of using race in patent law can only fully be understood when viewed in relation to broader federal initiatives that shape the production and use of racial categories in biomedical research. Prominent among these are a wide array of federal mandates that dictate the characterization and application of genetically based biomedical interventions, such as pharmaceuticals and diagnostic tests, in relation to socially defined categories of race[13]. In addition are two subsequent FDA "Guidances for Industry." The first makes recommendations on the use of population pharmacokinetics in the drug development process to help identify differences in drug safety and efficacy among population subgroups, including race and ethnicity[14]. The second recommends a standardized approach for collecting and reporting race and ethnicity information in clinical trials that produce data for applications to the FDA for drug approval[15]. Underlying the standardization of data collection in all of these mandates are the racial and ethnic categories set forth in the Office of Management and Budget's Directive 15.

Collecting data on race for tracking such issues as health disparities, however, is fundamentally different from using racial categories in a genetic context. The former looks at race in relation to an array of social, environmental and biological factors to understand disparity; the latter looks at race primarily as a molecular phenomenon. This is particularly so in drug trials that may not control for any of an array of social, economic or environmental factors that may bear on race and health. The same federal directives that have produced valuable race-specific data to help understand the social phenomenon of health disparities are also producing data that are now being taken up for commercial purposes to use race as a crude genetic marker to exploit the gap between the present state of genetic technologies and the future promise of truly individualized genetic therapeutic interventions. Unlike biomedical research into possible correlations between genes and race, however, biotechnology patents tend to construct race as a clearly bounded, unproblematic genetic category. As racial patents proliferate, they may be coming to impose this reified conception of race as genetic onto the design of basic research, clinical trials and product development.

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As researchers derive new inventions based on mining existing genetic databases, patent law provides powerful commercial incentives to conflate race and genetics. Scientific progress has always existed in a balance with commercial considerations. The rising strategic use of race to obtain extended patent protection for biotechnological inventions, however, portends a serious distortion of this relationship as commercial imperatives drive simplistic and scientifically weak conceptions of the complex relationship between social categories of race and genetics.

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13. For example, the US National Institutes of Health Revitalization Act of 1993, (PL 103-43), which directed the NIH to establish guidelines for inclusion of women and minorities in clinical research; and the Food and Drug Modernization Act of 1997 (111 Stat. 2296), which, in the context of drug development, directed that "the Secretary [of Health and Human Services] shall, in consultation with the Director of the National Institutes of Health and with representatives of the drug manufacturing industry, review and develop guidance, as appropriate, on the inclusion of women and minorities in clinical trials."
14. US Food and Drug Administration. *Guidance for Industry: Population Pharmacokinetics* (February 1999).
15. US Food and Drug Administration. *Guidance for Industry: Collection of Race and Ethnicity Data in Clinical Trials* (September, 2005).