

New Application for the Provost's Common Fund 2008-2009

RACE, GENETICS, AND HEALTH

Research Network on Racial and Ethnic Inequality

Co-conveners:

William Darity Jr. (Public Policy, Economics, and African American Studies)

Charmaine Royal (Center for Genome Ethics, Law and Policy)

Keith Whitfield (Psychology and Neurosciences and Geriatrics)

Race and Health

The composition of the U.S. is quickly becoming more demographically diverse, particularly in terms of people of color (e.g., Macera, Armstead, & Anderson, 2000). The significant increase in ethnic diversity has contributed to policy makers, social scientists, and medical researcher's recognition of the enormous disparities that exist in health across subgroups of the American population. Investigations into the origins of health disparities across ethnic groups traditionally have emphasized environmental hypotheses that concentrate on social and economic inequities related to differential health outcomes. The recent genomics revolution clearly shows how genes affect individual variation in many aspects of health and illness (Foster, Sharp & Mulvihill, 2001). Consequently, the role of genes in the search for the origins of health disparities is receiving increasing attention (Sankar, 2004). It has been proposed that one key to understanding the origins of differences among traditionally defined racial groups in risk for specific diseases or sensitivity to therapeutic drugs is to explore differences among the groups in respect to relevant genetic factors. (e.g., Exner et al., 2001; Karter et al., 2002; Splawski et al., 2002; Taioli et al., 1995). Simultaneously there also have been discussions of using DNA-based diagnostic tests and pharmacogenetic screens to make social categories like race and ethnicity largely irrelevant in the field of health care provision by allowing clinicians to base diagnosis and treatment decisions on the genetic features unique to individual patients (Foster, Sharp & Mulvihill, 2001); hence the goal of the development of personalized medicine has evolved, in contrast with the goal of racialized medicine.

Race, Disease, and Medicine

Nevertheless, there continues to be strong sentiment for the development of racialized medicine most apparent in two tendencies, the tendency to link race with diagnosis and the tendency to link race with prescription. The first tendency -- to link race with diagnosis -- emerges from the recognition that particular diseases occur with greater frequency in some groups than others. This would include the greater incidence of sickle cell trait, hypertension, prostate cancer, infant mortality and diabetes among black Americans relative non-black Americans, the elevated prevalence of Tay-Sachs disease among Sephardic Jews, or the higher risk of the occurrence of Alzheimer's disease among Asians (Grant 2007; Graves, Ch.5, 2004; Whitfield et. al. 2002; Wolf-Maier et. al. 2004).

For some medical diagnosticians, these differences in disease incidence can be explained in significant part by genetic variations across the groups consistent with conventionally normed racial groupings. A self-described "racially profiling doctor", Sally Satel, would make exactly such a case in the interest of best practices; for Satel, the "racially profiling doctor" is the good doctor (see Graves 2004, pp.107-108).

The second tendency -- to link race with prescription -- is evident in the emergence of "race-specific" medications. The most dramatic recent example is the development and marketing of BiDil for the treatment of congestive heart failure. Purportedly the drug has been demonstrated to be uniquely effective in the treatment of the disease among African Americans (see Sarkar and Kahn 2005). Ostensibly black Americans' genetic makeup results in a more favorable therapeutic response to the drug. Therefore, Sally Satel's good doctor should be a "racially profiling doctor" not only as a diagnostician but also when prescribing treatment (see the discussion in Barr 2005).

Implicit and sometimes explicit in these two tendencies is a critical assumption that runs counter to the collective position taken by the anthropologists in the late 1990s. Here the assumption is that there is indeed a genetic basis for establishing divisions among human beings that, at least, approximate conventionally construed "racial" groupings.

Indeed race as a means of classification of human beings continues to be one of the most politically charged subjects in American life because its associated sociocultural component often has led to groupings that have been misleading as well as inappropriately and dangerously applied (Kittles & Weiss, 2003). One of the problems with attempts to categorize race by using genetic approaches continues to be the identification of enough genes responsible for unique relationships to be identified within these groups. The results from these attempts are often contradictory, signalling the difficulty in conducting race classification on the basis of genetics (Cavalli-Sforza, 2000).

In the mid-1990s an unprecedented consensus had emerged in anthropology -- the discipline most closely associated with taxonomic classification of human beings -- that there is no biological-cum-genetic basis for categorizing humans by race. To the extent that such categorization was undertaken, for whatever purpose, it could not be justified on the basis of distinctions rooted in group based differences anchored at the level of the human genome. In the language that has now become customary, race is solely a "social construct", and it is mere myth in biogenetic terms (Graves 2004). Both the American Anthropological

Association (1998) and the American Association of Physical Anthropologists (1996) issued official statements on the concept of race to clarify the terms of the new consensus.

But there are others that suggest that race also reflects deeply intertwined cultural as well as biological factors, and a careful distinction must be made between race as a statistical risk factor and causal genetic variables (Kittles & Weiss, 2003). Discussions of genetic differences among individuals refer to their specific configurations of alleles at the loci under examination. With the exception of identical multiple births, each individual human being's genetic configuration (genotype) is unique. Thus, genetics by themselves cannot provide a single all-purpose human classification scheme that will adequately address all of the multifaceted dimensions of health differentials.

It is also clear that there are dynamic processes such as mutation, differential fitness, differential reproduction, and migration that affect stability and change in allelic frequencies within and between populations. Differences among populations in allelic frequencies have been described for a large number of genetic loci by the Hapmap project, among which are many that influence health- or disease-related phenotypes.

However, it has been shown that the extent of genetic differences among individuals within populations typically exceeds that found between groups. For example, Nei (1975) found that, out of the total genetic variation of so-called Caucasoid, Negroid, and Mongoloid racial groups with respect to a group of protein electrophoretic phenotypes, only about 7 percent could be assigned to differences among the groups. Ninety three percent of the variation was within groups (see Hartl & Clark, 1997, for discussion). Such results suggest that designation as a member of a particular socially-defined race may provide little predictive value concerning the likelihood of an individual possessing any particular allele of any particular locus.

Environment and Health

There is ample information that differences in environmental factors between ethnic groups account for disparities in health status. Much of the previous research has focused on the behaviors and social structures that produce differences in health and disease across ethnic groups.

There is considerable literature concerning how environmental processes, events, and circumstances contribute to health. These sociocultural influences contribute to differences in late life between socially defined racial groups as well as variability within groups (Jackson, 1986; Krauss, 1980). For example, individual differences in health histories and health behaviors within the African American community have implications for the quality as well as quantity of later life. The multiple jeopardy hypothesis holds that negative environmental, social, and economic conditions during the early years of life for African Americans will have detrimental effects on social, psychological, and biological conditions in late life (Jackson, 1988). In addition to perceptions of environmental influences, there is also support that macro level social factors such as neighborhood characteristics (e.g., crime or age of residents) and economic conditions (e.g., poverty status) can contribute to health status outcomes (Mayer & Jencks, 1989).

An integration of micro (individual) and macro (institutional) encompasses both psychological and social factors. Both levels are required in attempting to explain the possible ways that the environment impacts health status. These relationships are complex and interrelated. Identifying these sources of individual variation for risk factors for poor health and covariates of successful aspects of aging (positive health outcomes such as absence of disease) are the elements necessary for the ultimate creation of guidelines for social and health policies. For example, understanding how shared events or behaviors experienced in early life by two members of the same family have deleterious health outcomes in late life for both individuals represents an important risk factor whose influence may be reduced by providing programs that change behaviors. However, this simplistic combination of individual and social level environmental factors lacks a basic source of variability because in this simple figure potential genetic effects that impact health are not controlled in this model.

To this point, we have attempted to make the argument that investigations of health differentials across ethnic groups solely on the basis of genetic differences or environmental factors will not yield comprehensive identification of the mechanisms responsible for health disparities. Furthermore, preconceived notions about genetically based racial inferiority have hindered advances in understanding and reducing health disparities. There is trepidation by some social scientists and behavioral medicine researchers about the use of genetic approaches in the study of health (Whitfield, Brandon, & Wiggins, 2003). The apprehension may arise from previous research that used poorly or inappropriately defined phenotypes to make generalizations about group differences (Bowman, 1991; Gamble, 1993; King 1992). Attempts to explain the differential health burden experienced by ethnic groups relying solely on genetic explanations is illogical given considerably smaller genetic differences across rather than within each group with respect to any particular disease or health-related phenotype. Overemphasis on genetics as the single major explanatory factor in health disparities could lead researchers to overlook factors that contribute to

disparities in more substantial ways and may also reinforce the kind of racial stereotyping that contributed to disparities in the first place (Sankar, 2004). Nonetheless, the role of genetic influences cannot be completely dismissed. Population differences can and do exist with respect to major disease-related loci (not only between majority and minority populations but also between majority groups of varying European origins). Of course, whether those population differences correspond to conventional norms of race classification is another matter altogether.

Complementary, interdisciplinary approaches are needed to utilize information that has been provided from the Human Genome Project so that informative explorations of the underlying causes of health and illness and the related psychosocial behaviors can be performed. The utility of increasingly sophisticated statistical designs of structural equation models in quantitative genetics can be amplified by incorporating measures of theoretically relevant environmental variables, specific genetic loci, and the physiological mediators of the causal nexus. Such programs of research will clearly require expertise of teams of scholars and deployment of considerable resources. Outcomes of this interdisciplinary work will address the issue of health disparities and provide a knowledge base relevant to the health of all human beings, considered as individuals. Briefly stated, the basic question is whether knowledge of racial identity adds significantly to the information required in processes of diagnosis, remediation, therapeutics, and prevention to advance health in the public.

Goals, Proposed Activities and Sustainability

_____ We seek to establish an interdisciplinary team of experts and scholars based primarily at Duke who will engage in an extended research-centered conversation on the issues involving race and health disparities. This group will consist of members from the Research Network on Racial and Ethnic Inequality, the Center for the Study of Race, Ethnicity, and Gender in the Social Sciences, the IGSP Centers of Population Genomics and Pharmacogenetics and Genome Ethics, Law, and Policy, Psychology and Neurosciences, Public Policy, Political Science, and the Program on Health Disparities.

We believe that due to the unique faculty who reside here, Duke University can be a national leader in the discussion of race, genetics and health. The central aims of our proposed activities are to expand and advance the discussion of genes, race and health by hosting a year long monthly seminar series (8 sessions) culminating in a June 2009 conference and producing a published monograph on the theme of the project. Both local and national scholars will participate in the activities. Duke and local area university participants represent a wide array of disciplines including sociology, psychology, anthropology, economics, political science, public health, molecular genetics, and population/epidemiological genetics. During the course of the year we will identify potential projects that merit further development and will form the basis for two major interdisciplinary proposals for extramural funding. Also we will identify areas of inquiry that can provide a foundation for ongoing activities of the assembled group of local researchers in succeeding years.

Questions to be addressed

1. How can the current dialogue about race and the lack of genetic underpinnings be advanced?
2. What can our knowledge of genes tell us about group-based health disparities?
3. Are there health conditions typically explained by environmental etiology that can be better understood by the addition of genetic information?
4. Are there examples of disease processes that have identifiable genetic origins that are modified by environmental influences (e.g., sickle cell)?
5. How can examinations of gene and environment interactions inform us about the variability observed in health outcomes?
6. What are the ethical issues involved in the use of genetics to examine "racial" differences in health outcomes?
7. If race does not have a genetic basis, does this also mean that race classification cannot be used for the purpose of remedying historic or contemporary injustices consequent upon the use of race categories?

Budget Justification

(Please see attached budget) We are seeking a total of \$47,700 to support the activities of Race, Genetics, and Health interdisciplinary group during 2008-2009. General administrative support of \$5000 is being sought for staff person who will coordinate project activities. \$17000 is sought to support two graduate research assistants. One will be responsible primarily for organizing the monthly seminar series and the capstone conference to be held in June. The second will be responsible primarily for editing the papers to be assembled into the volume, publicizing the activities of the group, related communication with the mass media, and assisting the team in the development of two major research proposals for extramural funding. \$13,000 is requested to support the provision of \$500 honoraria and \$500 in travel and lodging expenses for a total of thirteen scholars from outside of Duke who will present at the seminar series and the conference. The \$6200 in conference, workshop, and seminar support is primarily for catering expenses, space rental expenses, and parking for the three day conference. The remainder of the budget is devoted to equipment (computer expenses), Webinar development, and other materials and supplies to supplement the needs of the interdisciplinary group.

Series Organizers: William Darity, Jr., Charmaine Royal and Keith Whitfield

Duke and Area University participants:

Jay Kaufman,
Associate Professor of Epidemiology
UNC at Chapel Hill

Trude Bennett, UNC at Chapel Hill
Associate Professor of Public Health

Dorothy Browne,
Professor of Public Health, North Carolina A&T

Joseph Graves Jr.,
Dean of University Studies and a Professor of Biological Sciences
North Carolina A&T

Goldie Byrd, North Carolina A&T
Professor and Chair of Biology
North Carolina A&T

Matt Cartmill
Professor of Biological Anthropology and Anatomy
Duke University

Robert M. Cook-Deegan
Director, IGSP Center for Genome Ethics, Law and Policy
Duke University

Hunt Williard
Director, IGSP Center for Genome Ethics, Law and Policy
Duke University

Allison Ashley-Koch
Associate Professor of Medicine
Duke University

Geoffrey Ginsburg
Professor of Medicine and Pathology
Director, IGSP Center for Genomic Medicine

Christopher Edwards
Asst Prof of Psychiatry & Behavioral Sciences
Asst Clinical Professor
Duke University

Sherman James
Susan B. King Professor of Public Policy Studies
Duke University

Eduardo Bonilla-Silva
Professor of Sociology
Duke University

Michael Merson
Global Health Institute
Duke University

Paula McClain
Professor of Political Science and Director, Ralph Bunche Institute
Co- Director of REGSS
Duke University

Kerry Haynie
Associate Professor of Political Science, Co Director of REGSS
Duke University

Duke University

Priscilla Wald
Professor of English
Duke University

Gregory Wray
Professor of Biology
Director, IGSP Center for Evolutionary Genomics
Duke University

The seminar and conference also may include interested participants from this year's "Cognitive and Behavioral Genomics" workshop as well as other faculty that we might identify at the start (or during the course) of the project.

Visiting scholars to participate in seminar series and in the conference:

Vanessa N. Gamble, George Washington University
Mark Hayward-University of Texas at Austin
Richard S. Cooper-Loyola University of Chicago Stritch School of Medicine
Eileen Crimmins-University of Southern California
Fatimah Jackson-University of Maryland
Clark Larsen- Ohio State University
J.P. Ioannidis, University of Ioannina School of Medicine, Ioannina, Greece

Evangelia E. Ntzani, Foundation for Research and Technology-Hellas
Thomas A. Trikalinos, Tufts School of Medicine
Hua Tang, Fred Hutchinson Cancer Research Center, Seattle, Washington
Rick Kittles, University of Chicago
Malia Fullerton, University of Washington
Alexandra Shields, Harvard University

References

- American Anthropological Association Statement on "Race", May 17, 1998.
- AAPA Statement on Biological Aspects of Race *American Journal of Physical Anthropology* 101, 1996, 569-570.
- Barr, D. "The Practitioner's Dilemma: Can We Use a Patient's Race to Predict Genetics, Ancestry, and the Expected Outcomes of Treatment?" *Annals of Internal Medicine*, 143:11. December 6, 2005 809-815.
- Bowman, (1991). Race, class and ethics in research: Belmont principles to functional relevance. In Jones, R.L. (Ed). *Black psychology* (3rd ed.). Pp.747-766. Berkeley, CA.: Cobb & Henry Publishers.
- Cavalli-Sforza, L.L. (2000). *Genes, people, and languages*. Pp. 25-27. New York:North Point Press.
- Exner, D.V., Dries, D.L., Domanski, M.J., & Cohn, J.N. (2001). Lesser response to angiotensin-converting-enzyme inhibitor therapy in Black as compared with White patients with left ventricular dysfunction. *New England Journal of Medicine*, 344, 1351-1357.
- [Foster, M.W., Sharp, R.R., & Mulvihill, J.J.](#) (2001). Pharmacogenetics, race, and ethnicity: social identities and individualized medical care. *Therapeutic Drug Monitoring*, 23(3), 232-238.
- Karter, A.J., Ferrara, A., Liu, J.Y., Moffet, H.H., Ackerson, L.M., & Selby, J.V. (2002). Ethnic disparities in diabetic complications in an insured population. *Journal of the American Medical Association*, 287, 2519-2527.
- Kittles, R.A., & Weiss, K.M. (2003). Race, ancestry, and genes: implications for defining disease risk. *Annual Review of Genomics and Human Genetics*, 4, 33-67.
- Gamble, Vanessa N. (1993). A legacy of distrust: African Americans and medical research. *American Journal of Preventive Medicine*, 9(6, Suppl), 35-38.
- King, P.A. (1992). The dangers of difference. *Hastings Center Report*, 22(6), 35.
- Grant, R.W. "Invited Commentary: Untangling the Web of Diabetes Causality in African Americans" *American Journal of Epidemiology* 166:4 August 15, 2007 388-390.
- Graves, Joseph, Jr. *The Race Myth: Why We Pretend Race Exists in America* New York: Dutton 2004.
- Hartl, D.L., & Clark, A.G. (1997). *Principles of Population Genetics*. 3rd ed. Sunderland, Mass.: Sinauer Associates.
- Jackson, J.S. (1989). Methodological Issues in Survey Research on Older Minority Adults. In M. Powell Lawton and A. Regula Herzog (Eds.), Special Research Methods for Gerontology, . Baywood Publishing Co.: Amityville, New York.
- Jackson, J.S., Chatters, L.M., Neighbors, H.W. (1986). The subjective life quality of Black Americans. In F. Andrews (Ed.) Research on the quality of life. Ann Arbor MI: Institute for Social Research.
- Krauss, I.E. (1980). Between- and within-group comparisons in aging research. In L.W. Poon (Ed.) Aging in the 1980's. (pp. 542-551). Washington, DC: American Psychological Association.
- Mayer & Jencks, (1989). Growing Up in Poor Neighborhoods: How Much Does It Matter? *Science*, 17, (243). 4897, pp. 1441-1445.
- Macera, C.A., Armstead, C.A., & Anderson, N.B. (2000). Sociocultural influences on health. In A. Baum, T. Revenson, and J. Singer, Handbook of Health Psychology (pp. 427-440). Earlbbaum: Mahwah, NJ.
- Nei, M. (1975). *Molecular Population Genetics and Evolution*. New York: American Elsevier.
- Sankar, Pamela and Jonathan Kahn "BiDiI: Race Medicine or Race Marketing?" *Health Affairs* October 11, 2005.
- Splawski, I., Timothy, K.W., Tateyama, M., Clancy, C.E., Malhotra, A., Beggs, A.H., Cappuccio, F.P., Sagnella, G.A., Kass, R.S., & Keating, M.T. (2002). Variant of SCN5A sodium channel implicated in risk of cardiac arrhythmia. *Science*, 297, 1333.
- Taioli, E., Crofts, F., Trachman, J., Bayo, S., Toniolo, P., & Garte, S.J. (1995). Racial differences in CYP1A1 genotype and function. *Toxicology Letters*, 77, 357-362.
- Whitfield, K.E., Brandon, D.T., & Wiggins, S.A. (2003). Genetics and health disparities: Fears and realities. *Journal of the National Medical Association*, 95(7), 539-543.
- Whitfield, K.E., Weidner, G. Clark, R., & Anderson, N.B. (2002). Sociodemographic diversity and behavioral medicine. *Journal of Consulting and Clinical Psychology*, 70(3), 463-481.
- Wolf-Maier, Katharina; Richard S. Cooper; et. al. "Hypertension Treatment and Control in Five European Countries, Canada and the United States" *Hypertension* 43:10, 2004