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Genetics, race, ethnicity, and health

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Genetics plays only a small part in ethnic differences in health, and other factors are often more amenable to change.

In the past few decades spectacular advances have occurred in molecular biology techniques. Researchers have been eager to use these new techniques to study ethnic or racial differences in health that are commonly assumed to have genetic causes. We argue that this assumption is based on confusion between three very different concepts: genetics, race, and ethnicity. This is invalid both scientifically and in terms of public health policy. We concentrate on research in Maori and Pacific (Polynesian) people, but the issues considered are of more general relevance.

Genotypes and phenotypes

It is a common misconception that the genotype determines the phenotype. Genetic factors do have a large influence on health, but they are just one piece of a much larger picture. We are all continuously developing throughout our lives with a constant interaction between our genes and the environment. Any discussion of genetic tendencies thus makes assumptions about who is normal and what is a normal environment. For example, some researchers have argued that Polynesians have a thrifty genotype with a greater tendency towards obesity and non-communicable diseases such as diabetes when they adopt a European diet. It now seems, however, that almost everyone except Europeans may have the thrifty genotype.

Race

So what does this have to do with race? The term race has been commonly defined in terms of biological differences between groups that are assumed to be genetic. For example, Risch et al argued that five major racial groups can be identified (Africans, Caucasians, Pacific Islanders, Asians, and Native Americans).

However, human races are not and never were pure, and such broad continental groupings explain little in terms of the overall genetic variation of humanity. For example, Lewontin writes that: Skin colour, hair form, and nose shape are certainly influenced by genes, but we do not know how many such genes there are, or how they work. On the other hand…
about 85 percent of all identified human genetic variation is between any two individuals from the same ethnic group. Another 8 percent of all the variation is between ethnic groups within a race—say, between Spaniards, Irish, Italians, and Britons—and only 7 percent of all human genetic variation lies on the average between major human races such as those of Africa, Asia, Europe, and Oceania.

This is not to say that there are no genetic differences between races, but very few differences have been found which directly relate to health. Those that have been shown are usually not absolute; rather, they concern differences in the percentage of people that have particular gene types. Furthermore, most known genetic variants that are health related are random mutations in subpopulations or result from regional selection and are not related to continental race.

**Race and health**

A New Zealand study of alcoholism provides one example of a health related genetic difference. The authors found that the ADH2-2 gene, which is believed to protect against alcoholism, was relatively common in Maori people but was not found in New Zealand Europeans. In fact, alcohol related health problems are more common in Maori, suggesting that the hypothesised protective genetic factors are being outweighed by social, economic, cultural, and political factors.

Further evidence that genetic factors are unlikely to explain racial differences in health is provided by trends in death rates. Maori death rates fell steeply in the last century, although the rate of progress has slowed in the last two decades. Major problems remain, but the rapid reduction in many of these diseases strongly suggests that they are not primarily genetic.

**Ethnicity and health**

The fact that racial categorisation based on genetic criteria is inaccurate and misleading does not change the historical reality of the effects of colonisation on indigenous peoples, nor the realities of indigenous health today. It does, however, change our interpretation of the causes of high mortality and morbidity in indigenous peoples, which primarily relate to issues of ethnicity, rather than of race or genetics.

Ethnicity is a complex construct that includes biology, history, cultural orientation and practice, language, religion, and lifestyle, all of which can affect health. The lack of major systematic genetic differences between ethnic groups, together with the extensive differences in lifestyle (diet, alcohol, housing, smoking, etc), means that ethnic differences in mortality and morbidity to some extent provide evidence against the importance of genetic factors and for the importance of environmental factors.

For example, the European colonisation of the Pacific and the Americas after 1492 saw indigenous populations decimated by imported communicable diseases. In the Pacific, indigenous people experienced high mortality from imported infectious diseases mainly when their land was taken, disrupting their economic base, food supply, and social networks. When land was not taken in large amounts by European settlers, the death rate was relatively low. Similar effects of social disruption resulting in increased mortality have been seen more recently in Eastern Europe and again in the Pacific.

**Ethnic differences in access to health care**

Access to health care is also important for ethnic differences in health. For example, the high death rates from asthma in Maori people in the 1980s led some researchers to assume that Maori have a genetic tendency to asthma. However, the high death rate was primarily due to the drug fenoterol, which affected Maori people particularly severely. This is probably because problems accessing health care meant that Maori people were more likely to overuse the drug. When fenoterol was restricted in 1989, the asthma death rate fell sharply and is now low in both Maori and non-Maori populations. Furthermore, until recently the prevalence of asthma was about the same in Maori and non-Maori children, but non-Maori children tended to lose the disease as they grew older whereas Maori children did not, producing a greater prevalence in adult Maori. This is probably due to poor access to health care and asthma education.

Similar considerations may apply to other diseases requiring long term medical management, such as diabetes and cardiovascular disease. Ibrahim and colleagues recently argued that issues of access to care include a complex mix of cultural factors and individual preferences of patients, characteristics, and practices of healthcare professionals (such as racism, stereotyping, bias, discrimination, and lack of cultural safety), and the system of delivery of health care (such as composition of the workforce, location of facilities, costs of access, and involvement of different ethnic groups in shaping health policy and allocation of resources). They argued that “racial and ethnic disparities in health and health care are rooted in historic socioeconomic inequalities that persist…today.” Thus race may be important in terms of the perceptions of healthcare workers, rather than in terms of the underlying disease aetiology.

**Gene hunting: the new research colonialism**

Genetic research will undoubtedly lead to important discoveries and new forms of treatment. However, such
Effects of ginkgo extract

Question
What are the benefits and side effects of *Ginkgo biloba*? Does it cause high blood pressure?

Mahmood M Althahabi, *pilot, Bahrain*

Answer
The dried leaf of the ginkgo tree has been used in medicine for thousands of years. More than 400 studies over the past 30 years have investigated its ability to improve blood flow in a variety of conditions including memory impairment, dementia, peripheral vascular diseases, and tinnitus. The results have shown modest improvements, not to some remarkable levels. The results much depend on the patient’s psychological framework.

In general, it is well tolerated. Allergic skin reactions, gastrointestinal upset, and headaches occur in fewer than 2% of patients. There are theoretical concerns about a risk of increased bleeding because of inhibition of platelet activating factor. Although no bleeding complications have been reported in any clinical trials, caution should be exercised when taking ginkgo with aspirin, warfarin, or other anticoagulant. No effects on blood pressure have been documented.

Ali K Yousuf, *senior house officer, Karachi, Pakistan*

Answer
*Ginkgo biloba* is said to have neutral effects on blood pressure. However, there are reports suggesting that it may have antihypertensive actions.

In a study on healthy, young volunteers, ginkgo in a dose of 120 mg given twice daily for seven days was not found to have any immediate or short term effects on systolic or diastolic blood pressure.1 In a randomised, double blind trial a significant decrease in diastolic blood pressure was reported in elderly patients with age related cognitive dysfunction who were given an extract of ginkgo (EGb 761, 120 mg) was found to reduce stress induced rise in blood pressure without affecting the heart rate.2

Vikas Soni, *medical advisor, Ahmadabad, India*