Exploring Apparent Relationships between Race and Health

ANGELL*BIO 150

The medical conditions below are often used to illustrate the relationship between race and health. Use this table to compare and contrast these two conditions and expose some of the complexities of these apparent "relationships."

	Sickle Cell Disease	Hypertension (high blood pressure)
Does this condition have a genetic basis? If yes… is this a single locus, multilocus or multifactorial trait (a function of many loci along with the environment)?	Single locus-is an example of heterozygote advantage	Multilocus, multifactorial trait
Is there an association between skin color and this trait?	There is some correlation	There is some correlation
What is the basis of this association? In other words, what might cause the association or why does this association exist? (one gene/locus, many genes/loci, potential role of epigenetic modifications?)	At the sickle cell locus individuals that are heterozygotes are resistant to malaria and do not have severe symptoms of sickling and so have in the past been selected for. At the population level this means that allele persists in the population. Each generation however some individuals that have two copies of the allele are born and they may be selected against. Those living in areas with malaria that do not have the allele (who are homozygous dominant) may also be selected against. The parts of the world with high levels of malaria are sometimes also the places in the world where light skin has not been selected for (parts of the world around the equator).	We have not found that any of these loci to be higher or lower in frequency in one group of people with one skin color relative to another group with a different skin color. Since it is a multifactorial trait the role of the environment is important. The environment (diet, exercise, stress) may have long term cumulative epigenetic effects on the expression of some loci and may also have short term effects on gene expression due to effects on transcription factors which directly alter transcription and then translation.
Is this condition only found in people of color?	No-the correlation is not perfect, so there are places where people with lighter skin have the allele and many places where people with darker skin do not have the	No-We find hypertension to be common wherever people have higher fat/salt "Americanized" diets and a don't get enough exercise

	allele. Plus people have moved around a lot and interbred through history so these alleles do not line up with past exposure.	
What is the role of the environment in evolution of this trait? (Has the environment meant this trait has been selected for? OR does the environment play a role in gene expression?)	The different environments peoples found themselves in selected for these traits.	The environment probably affects gene expression. This trait probably has not been selected against since in the past we did not have access to such high fat/high salt diets and were always forced to get lots of exercise!

Centers for Disease Control

https://www.cdc.gov/nchs/products/databriefs/db289.ht

Examine these three graphics and reflect on how they might help us understand the apparent correlation between hypertension and race.

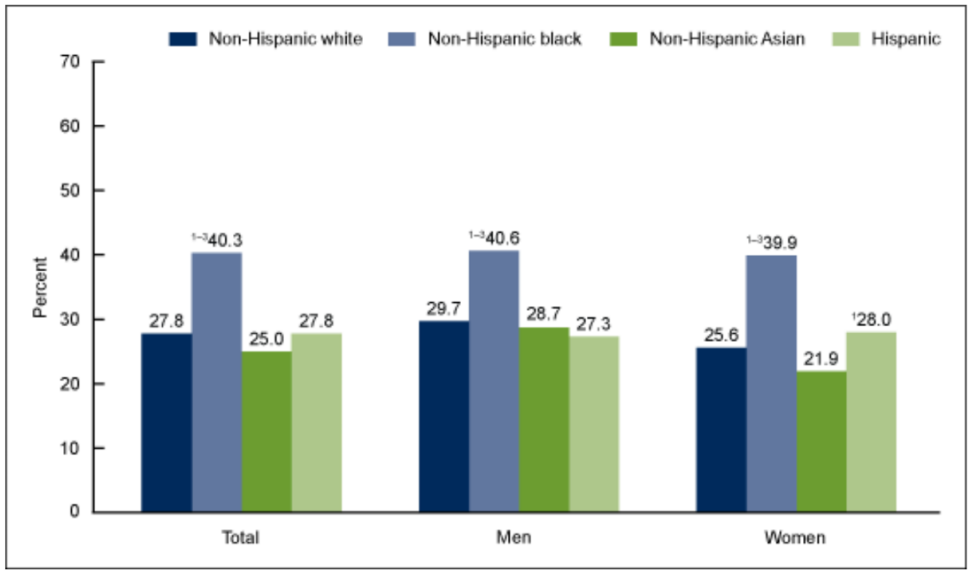

Figure 2. Age-adjusted prevalence of hypertension among adults aged 18 and over, by sex and race and Hispanic origin: United States, 2015–2016

J Hypertens. 2017 Dec; 35(12): 2380–2387.
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Hypertension among U.S.-born and Foreign-born Non-Hispanic Blacks: NHANES 2003–2014 data

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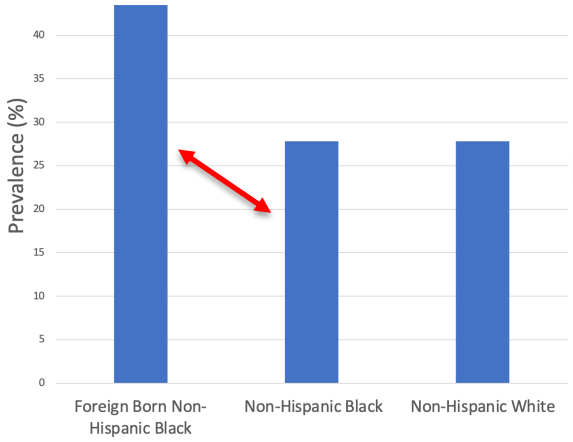

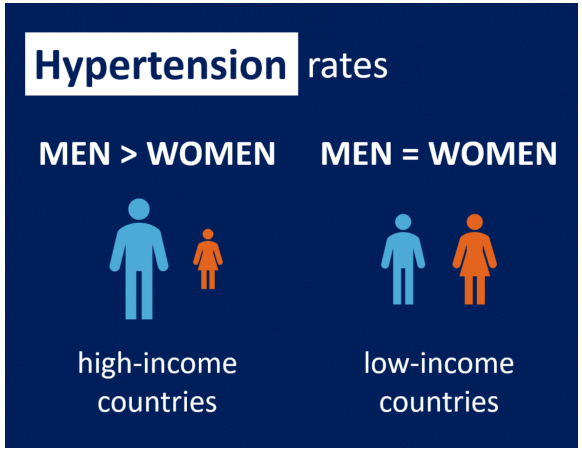

https://www.who.int/multi-media/details/inequalities-are-not-the-same-everywhere