

A Thick Head of Hair Is in the Genes

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Variants in a single gene could explain why East Asians have thicker hair.

Credit: Jupiter Images By Jocelyn Kaiser

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SAN DIEGO, CALIFORNIA--Whether you have a poker-straight black mane or frizzy blond locks, your hair depends on your ancestry. Now researchers have come closer to figuring out just how hair traits are passed down. According to a talk presented here last week at the annual meeting of the American Society of Human Genetics, a single genetic variant may explain why East Asians have thicker hair fibers than other populations. The discovery is part of a wave of newly found genes that determine what individuals look like.

Anthropologists have long noticed that populations across the world differ in hair type, skin color, and facial features. Finding the genes that explain these differences became easier in 2005, when researchers unveiled the , a catalog of human genetic variation that helps scientists home in on genes more quickly (ScienceNOW, 26 October 2005). Geneticists at the University of Tokyo and several other institutions in Japan, Thailand, and Indonesia have now used the HapMap to explore why Japanese and Chinese people have thick hair: The cross-sectional area of East Asian hair fibers averages about 30% larger than that of Africans and 50% larger than that of Europeans.

The researchers started with 170 candidate genes known to be involved in hair development based on mouse studies and rare inherited human diseases. They then narrowed this list by looking at how these genes varied in three HapMap populations--Yoruba from Nigeria, Europeans, and Japanese and Chinese. A variant in a gene called EDAR was present in 88% of the Japanese and Chinese but not at all in the two other groups. To see how this gene affected hair thickness, the researchers examined hair fiber dimensions and DNA from 186 individuals from two ethnic groups in Southeast Asia who have a variety of hair types. Hair fibers were thickest in people who have two copies of the East Asian version of EDAR.

The EDAR gene codes for ectodysplasin A receptor, which is part of a molecular pathway that signals hair precursor cells to begin forming a follicle. The variant may have been selected for in East Asians either because thicker hair was beneficial in the cold north Asian climate or because it is linked to some other trait, such as tooth shape, that gave East Asians an advantage, concluded presenter Akihiro Fujimoto of the University of Tokyo.

The EDAR allele wouldn't be all that useful for figuring out what someone looks like from their DNA because it doesn't determine whether hair is straight or curly, and hair thickness also varies with sex and age, says co-author Ryosuke Kimura of Tokai University School of Medicine in Kanagawa, Japan. However, he says it could be used as a marker for East Asian ancestry. Indeed, notes molecular anthropologist Mark Shriver of Pennsylvania State University in State College, the EDAR allele had already jumped out in the HapMap analysis as being distinctly East Asian. 'It was only a matter of time before somebody focused in on what the phenotype was,' he says. And more genes for physical traits are coming. At the same session, researchers from Iceland and the Netherlands described several newly discovered genes that contribute to eye and hair color--and freckling--in Europeans. The finding, published online last week in Nature Genetics, and others like it could be useful for investigating crime, as well as for genetic anthropology, notes co-author Kri Stefansson, CEO of deCODE genetics in Iceland. For example, knowing the gene for red hair allowed researchers to report last week that some Neandertals were redheads (Science, 26 October). Using such traits for DNA forensics 'is clearly where we're headed,' says Shriver. Related site

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