

SO WHY AREN'T IDENTICAL TWINS IDENTICAL? NOVA EXPLORES HOW ENVIRONMENT AND LIFESTYLE CAN ALTER GENETIC DESTINY



Produced for PBS
by the WGBH
Science Unit

One Guest Street
Boston, MA 02135

617.300.2000

www.pbs.org/nova

Funding for NOVA is
provided by The DOW
Chemical Company, David
H. Koch, the Howard
Hughes Medical Institute,
the Corporation for Public
Broadcasting, and public
television viewers.



DAVID H. KOCH

HHMI cpb

NOVA® is a registered
trademark of WGBH
Educational Foundation

Ghost in Your Genes

Tuesday, October 16 at 8pm ET/PT on PBS

www.pbs.org/nova/genes

Scientists have long puzzled over the different fates of identical twins: both have the same genes, yet only one may develop a serious disease like cancer or autism. What's going on? Does something else besides genes determine who we are? NOVA explores this startling possibility on ***Ghost in Your Genes***, airing Tuesday, October 16 at 8pm ET/PT on PBS (check local listings).

The "something else" turns out to be a network of chemical switches that sit on our DNA, turning genes off and on. Called collectively the epigenome, the switches appear to play a major role in everything from how our cells keep their identity to whether we contract diseases. Epigenetic switches may even help mold our personalities—or so it appears to Canadian researchers studying a group of epigenetically modified rats.

"We're in the midst of probably the biggest revolution in biology that is going to forever transform the way we understand genetics, environment, the way the two interact, and what causes disease," says Mark F. Mehler, Professor of Neurology at Albert Einstein College of Medicine. "It's another level of biology, which for the first time really is up to the task of explaining the biological complexity of life."

In a fascinating scientific whodunit, NOVA reveals the clues that have led scientists to this new picture of genetic control and expression.

One such clue is the surprisingly modest number of genes that turned up when technology made it possible to map the human genome. The Human Genome Project was originally expected to find at least 100,000 genes defining the human species. Instead the effort yielded only about 20,000—about the same number as in fish or mice—too few, some believe, to account for human complexity. Researchers now suspect that it's how genes are regulated that distinguish species. What turns them on and off? Among other things, epigenetic switches.

Another clue is that a single abnormality in a chromosome may result in two completely different diseases, depending on whether the defect is inherited from the mother or the father. The different fates may be due to different settings of epigenetic switches.

And still another clue comes from a strain of mice that eats without limit if given the chance, which leads to obesity, diabetes, and cancer. Amazingly, their young can be rendered slim, healthy, and longer-lived through a change in diet that leaves their genes intact, but alters their epigenetic switches.

The program closes at the controversial cutting edge of this burgeoning new field. In Washington State, a researcher finds that a toxin given to rats still affects their offspring four generations later, without producing any changes in their genes. And in Sweden, a study of historical records seems to show that the lifespan of grandchildren is affected by their grandparents' access to food.

more

Might these effects be epigenetic? Might our experiences, by changing our epigenomes, literally change the fate of our offspring...and *their* offspring...and theirs in turn? And might our own states of health owe something to the diets and exposures of our forebears?

Some researchers are already convinced. Says Marcus Pembrey of the Institute of Child Health at University College London, a co-investigator in the Swedish study: "You live your life as a sort of... guardian of your genome. It seems to me you've got to be careful of it because it's not just you. You can't be selfish...you can't say well I'll smoke or I'll do whatever it is because I'm prepared to die early. You're also looking after it for your children and grandchildren...."

Epigenetics, he says, "is changing the way we think about inheritance forever."

Now in its 34th year of broadcasting, NOVA is produced for PBS by the WGBH Science Unit at WGBH Boston. The director of the WGBH Science Unit and senior executive producers of NOVA is Paula S. Apsell. Funding for NOVA is provided by The DOW Chemical Company, David H. Koch, the Howard Hughes Medical Institute, the Corporation for Public Broadcasting, and public television viewers.

NOVA is closed captioned for deaf and hard of hearing viewers and described for people who are blind or visually impaired by the Media Access Group at WGBH. The descriptive narration is available on the SAP channel or stereo TVs and VCRs. ***Ghost in Your Genes*** will be available on DVD wherever videos are sold. To order direct from WGBH Boston Video, visit shop.wgbh.org or call 800.949.870.

###



Production Credits

Senior Executive Producer Paula S. Apsell
Produced and Directed by Sarah Holt and Nigel Paterson
Executive Producer for the BBC Andrew Cohen
A NOVA Production by Holt Productions LLC and the BBC

Pressrooms

pbs.org/pressroom
pressroom.wgbh.org

Press Contacts

Eileen Campion
Dera, Roslan, & Campion PR
212.966.4600
eileen@drcpublicrelations.com

Yumi Huh
NOVA National Promotion
617.300.4287
yumi_huh@wgbh.org

Photography Contact

Lindsay de la Rigaudiere
NOVA National Promotion
617.300.4258
lindsay_delarigaudiere@wgbh.org

© 2007 WGBH Educational Foundation