Genetics 101:

Intelligence, creativity, personality and your baby

By Brette McWhorter Sember

Expectant parents all wonder what their baby will be like. Will he have Grandma's nose or Uncle Joe's sense of humor? Will she have mom's blond hair or perfect pitch like Grandpa? The answers to all of these questions are hidden inside your baby from the moment he is conceived. Genes are an important key to who your baby will be. Now that the Human Genome Project has completed the sequencing of the human genetic code, we understand more about genes than ever before.

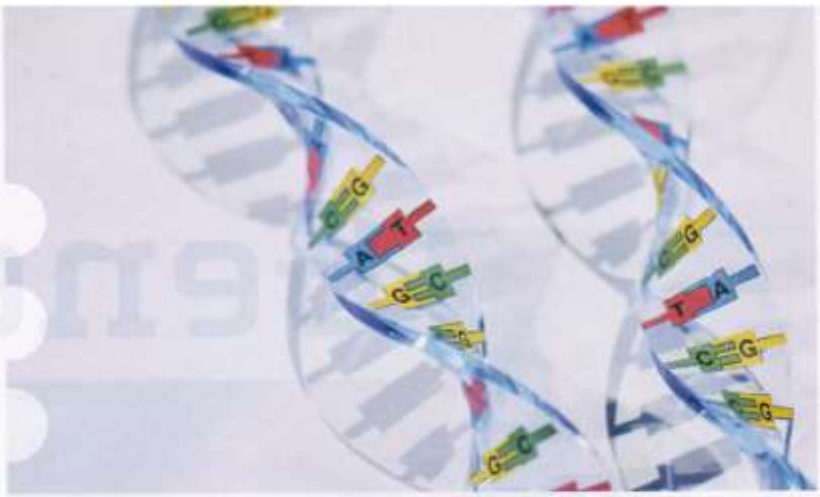
What Are Genes?

When a baby is conceived, each parent provides the child with 23 chromosomes. The chromosomes from the mother and father match up and create pairs. Each baby has a total of 46 chromosomes that create 23 matched pairs of chromosomes. Almost all of your child's biological information is encoded here. "All the important genes that run in our biology are housed in chromosomes," explains Dr. Paul Billings, vice president and national director of Genetics and Genomics Lab Corporation of America. These chromosomes are then reproduced in the nucleus of every cell in your baby's body, providing instructions for how the body will be built and how it should function.

Genes are smaller pieces of the chromosomes. "There are about 30,000 genes in the human genome and they are distributed across the chromosomes," says Dr. Billings. These genes are what determine what our bodies will look like and, to some extent, how the brain will work. They may also predetermine certain medical conditions.

Struggles Between Genes

Some genes are either dominant or recessive. A dominant gene is one that will trump the other gene in the pair. For example, the gene for flat feet is dominant. If a child inherits a gene for flat feet from



ıe parent and a gene for regular feet om the other parent, she'll have flat feet, cording to Dr. Hope Northup, director the Division of Medical Genetics at e University of Texas Medical School Houston.

A recessive gene is one that will ıow its trait only if the child inherits the cessive gene from each parent. "Cystic brosis and sickle cell disease are auto- ımal recessive disorders requiring both ırents to be carriers," says Dawn Allain, esident of the National Society of enetic Counselors.

But the concept of dominance and cessiveness does not apply to all, or even ıost, genes. "In general, genes act in a lended fashion," says Dr. Billings. Most ınes are multigenic, which means they ork together to create a trait. In fact, ıost physical-appearance traits, such s height, facial characteristics and body ıape, are multigenic. James Manser, asso- ate professor of biology at Harvey Mudd ollege, explains, "They are multigenic aits, meaning they are controlled by mul- ple genes whose individual contributions ıay not be well understood."

low Genes Are Lost

ıuessing at your child's genetic makeup is sually difficult. Parents look at each other nd at their own parents to try to guess hat their baby will look like, but this is ery complicated because we inherit only ne chromosome from each parent to ıake up the chromosome pairs. The other hromosome that a parent carries is not assed on. Dr. Northrup says, "Each person receives 50% of their DNA from each parent. Therefore, roughly half the genes from each grandparent are 'lost' to any individual grandchild." There is no way for a person to know which genes he or she inherited from his or her parents and no way to know which half of his or her own chromosome pairs will be passed to a baby.

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Hair and Eye Color

Geneticists used to believe that there was one gene pair that determined eye color, but now that thinking has changed. "Eye color is determined through the action of multiple genes," explains Dr. Northrup. There is no simple way to predict eye color, but blue and green are generally thought to be recessive traits, meaning a child must inherit two blue recessive genes to have blue eyes. Brown is usually a dominant trait.

Hair color is known to be a multigenic trait, which explains the wide variety of shades and colors possible.

Hand Use

Whether your baby will be right or left handed is not clearly determined by genes. "We don't understand the genetic basics of 'handedness,'" says Dr. Billings. "There is no predictive test. It is probably encoded by several genes. There are biological and genetic influences as well as environmental influences."

Height

Height is another multigenic trait that takes into account both parents' genes. However, if you want to know what height your baby will probably reach as an adult, you can try out an online height predictor by going to ePregnancy.com, scrolling down the home page to the Go Codes section and entering 8159.

Intelligence, Creativity, and Personality

Parents often wonder if their child will inherit some of their characteristics like dad's sense of humor or mom's artistic ability. "Surely there are important genetic effects on the various ways of measuring intelligence and creativeness," suggests Dr. Billings. "The way the brain is formed, how it is connected and the ways it interacts with the rest of the body [are all] biological. Are there genetic tests for intelligence? No."

Personality is determined in a similar way. "Since so much of personality arises from the mind and brain, surely genes will play a role in its development and characteristics, but it is not likely that much of character will be significantly determined by our genetics," says Dr. Billings.

"Now that the entire human genome has been sequenced, it should be possible to identify all of the genes necessary to build and run a human. Linking each gene to a particular trait will be difficult, but it is a goal of modern biology," says Manser.

While the future may lead to much more detailed genetic testing, right now genetic tests can only provide a certain amount of information. "No currently available genetic tests can accurately predict physical characteristics," points out Dr. Billings.

There's no way to know if your baby will have Grandma's nose until delivery, but Dr. Manser suggests that in general, your baby will look — and act — like "a blended version of the two parents."

About the author: Brette McWhorter Sember is a mother of two, a former attorney and the author of twelve books.

Do You Need Genetic Counseling?

Genetic counselors help those who are either considering pregnancy or already pregnant evaluate their risks for certain inherited diseases and conditions. Research shows that many medical conditions are linked in some way to genes, even if it only means having a predisposition to develop the condition.

So how do you know if genetic counseling is something you should consider? Allain explains, "Individuals who are concerned about the risks of passing on an inherited disease... may want to see a genetic counselor. Other reasons include couples who have had two or more miscarriages, a stillbirth or an infant death, women who are pregnant and will be 35 years of age or older at the time of delivery, and women who have had abnormal genetic tests during a pregnancy."

Family history of diseases such as cystic fibrosis, sickle cell disease, hemophilia, Duchenne muscular dystrophy, fragile X syndrome and others are indications that genetic counseling may be useful. Additionally, people of Jewish descent may wish to be screened for Tay-Sachs diseases, African Americans for sickle cell disease and people of Greek, Italian or Asian descent for thalassemias.

Genetic counseling done before pregnancy can offer couples options including pre-implantation genetic diagnosis, in which embryos are tested before implantation, or the use of egg or sperm donors. Counseling done during pregnancy can usually only inform the couple about what to expect. "There are only a few programs in the United States that provide fetal surgery for a limited number of birth defects," says Allain.

For more information about genetic counseling, contact the National Society of Genetic Counselors at Go Code 8160, or call (610) 872-7608. Allain also recommends visiting The Dolan DNA Learning Center at Go Code 8161. To learn more about the Human Genome Project, visit Go Code 8162.