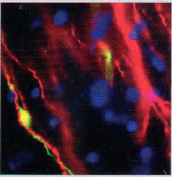


# The Genetics of

# EMOTIONS



What if it were possible to pinpoint the genetic basis of human emotion? Is there such a thing as a gene that evokes compassion? Empathy? Anxiety? Aggression? If so, might this finding spawn new drugs to cure certain psychiatric disorders?

These are queries that absorb Julie R. Korenberg, MD, PhD. Hers are no ordinary ponderings. As a contributor to the Human Genome Project, she is a pioneer in understanding the genetic origins of brain structure and function. Dr. Korenberg holds the Geri and Richard Brawerman Endowed Chair in molecular genetics at Cedars-Sinai Medical Center, where she is director of the Neurogenetics Division in the Department of Pediatrics. For the past three decades, she has been at the forefront of modern genetics, pioneering the field of human molecular cytogenetics and answering basic questions of genome structure and evolution. Her research has appeared in more than 200 leading scientific publications.

Answers may lie in her groundbreaking, NIH-funded research in Williams syndrome, a rare disorder affecting one in 20,000 people. Those with Williams syndrome are missing no more than 20 genes from one chromosome of the seventh chromosome pair. That minutely small difference in genetic makeup results in heart problems, mental retardation, and characteristic facial features. People with Williams often feel music in a keenly emotional way. Their language is rich and engaging. Experts describe them as genetically predisposed to increased anxiety, combined with hyper-sociability; they have a strong drive toward social interaction.

Over the years, Dr. Korenberg and her team have studied the DNA of more than 300 families with Williams syndrome. Their pioneering work has led them to develop new techniques to identify the location of the missing genes, integrating behavioral testing, human gene sequencing and brain imaging.

In 1999, a colleague introduced Dr. Korenberg to a little girl in the Cedars-Sinai Genetics Clinic who exhibited an unusual form of the syndrome: She was shy. She scored lower on sociability tests than other two-year-olds with Williams. It turns out that she carried at least one of the genes, or a small cluster of genes, that others with the disorder lacked. "These genes appear to modify hyper-sociability, and we identified them," says Korenberg. "This little girl provided us with a dramatic clue to the influence of genetics on human behavior."

The implications were powerful. "For a long time we've known that the brain circuitry in people with anxiety or depression is somehow deregulated. But we've never understood why," she says. "We also know that certain medications are somehow changing the activity in some brain circuits in people with mood disorders. Yet we do not know exactly why the circuit is faulty to start with, what controls it, what the genetic component is."

Now Dr. Korenberg and her colleagues have found a genetic gateway into exploring that circuitry and identified the cerebral pathways underlying human emotion and social behavior. "We are incredibly excited," she says. "We know that if you change this small genetic region, you can affect social behavior."

Their discoveries may lead to novel new therapies for depression and anxiety and may also help us gain a better understanding of compassion, empathy, and what makes us human.

—IDELLE DAVIDSON