

# Genetic Environment

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The researchers used every medium from Canadian lab mice to Indian Rhesus monkeys to human twins, all in the pursuit of deciphering a condition that profoundly changes the way humans function.

The disease is alcoholism, and while researchers know the necessary condition for its appearance – alcohol – they are continually baffled by the reasons for its manifestation.

“Alcoholism is a product of both genetics and environmental behavior. But it’s often hard to find someone who has an expertise in these two areas,” said Ellen Witt, a researcher from the National Institute on Alcohol Abuse and Alcoholism and chair of a symposium discussing the disorder at the APS 17th Annual Convention in Los Angeles.

It is generally agreed that the answers to alcoholism will most likely come from the interface between genetics and social behavior and so the symposium, entitled “Gene-Environment Interactions: Human and Animal Models to Study the Effect of Genes and the Environment on Alcohol-Related Behaviors,” was meant to address the issue of how exactly a multidisciplinary approach could be taken.

“Wherever we look, the relationships are substantially mediated by genetics ... but we also need to take into account people don’t just passively accept their environment,” said Robert Plomin, a researcher from King’s College in London who discussed the panelists’ research. Plomin essentially summed up the symposium’s debate by defining gene-environment interactions and gene-environment correlations. With a gene-environment correlation there is simply a connection between the two, whereas with gene-environment interactions the environment moderates the genetic affect.

“I’m fully convinced we can find genes for the environment as we look for genes for behavior. Right now, there’s modest evidence for gene-environment interactions, but considerable evidence for gene-environment correlations,” Plomin said.

An in-depth look at just how social and environment factors could affect the genetic element in alcoholism, and vice versa, was the main idea that panelists tackled.

“The problem is that interactions are highly specific and depend on a specific gene. But, genes don’t all respond to the environment together. It just doesn’t work that way,” said Doug Wahlsten, a researcher from the University of Windsor in Ontario.

Stationed in his lab, Wahlsten used lab mice and conducted identical experiments with researchers across the country in Edmonton. The researchers all got different results, leading them to believe that “it was all due to the environment,” he said.

At the same time, Wahlsten was also able to come to the surprising conclusion that if raised by peers, the

lab mice were more likely to drink.

All of his work has led Wahlsten to believe that any animal model for complex disorders like alcoholism may not be sufficient, but that individual components may still be studied.

When studying colonies of rhesus monkeys on Morgan Island, J. D. Higley of the National Institute on Alcohol Abuse and Alcoholism also agreed that genes are not independent of the environment and that “it’s the phenotype, stupid.”

Andrew Heath, a researcher from the Washington University School of Medicine conducted the “twin study approach,” and added that “alcoholism is one paradigm for doing that.”

Heath essentially explained that the twin approaches focus on the outcome of the twins themselves, as well as the outcome of the offspring. He further hypothesized that “alcoholism is maybe a joint effect of genetic transmission and gene interactions.”

Finding many relationships between alcoholism and environmental factors, such as the fact that in alcoholic families there is a much higher heritability of depression, and that individuals with high genetic risks create high risk environments driven by the genetics of the individual, Heath was still weary of making strong connections.

“We can’t preclude the importance of shared family environment. For alcoholism, there is a strongly predicative of high risk environment exposure for offspring,” he said.