MedicalXpress

Virus weaves itself into the DNA transferred from parents to babies

September 2 2008

Parents expect to pass on their eye or hair color, their knobby knees or their big feet to their children through their genes. But they don't expect to pass on viruses through those same genes.

New research from the University of Rochester Medical Center shows that some parents pass on the human herpes virus 6 (HHV-6) to their children because it is integrated into their chromosomes. This is the first time a virus has been shown to become part of the human DNA and then get passed to subsequent generations. This unique mode of congenital infection may be occurring in as many as 1 of every 116 newborns, and the long-term consequences for a child's development and immune system are unknown.

"At this point, we know very little about the implications of this type of infection, but the section of the chromosome into which the virus appears to integrate is important to the maintenance of normal immune function," said Caroline Breese Hall, M.D., professor of Pediatrics and Medicine at the University of Rochester Medical Center, and author of the study which publishes in Pediatrics this month. "With further study, we hope to discern whether this type of infection affects children differently than children infected after birth."

HHV-6 causes roseola, an infection that is nearly universal by 3 years of age. The typical roseola syndrome produces several days and up to a week of a high fever and may have variable other symptoms including mild respiratory and gastrointestinal symptoms. With roseola, just as the

fever breaks, the child may briefly develop a rash. A congenital infection of HHV-6 – or one that is present at birth – produces high levels of virus in the body but scientists (doctors) do not know whether it produces any developmental or immune system problems.

Some congenital infections can cause serious problems in fetuses. If a mother contracts cytomegalovirus (CMV) while pregnant, her fetus is at risk of hearing or vision loss, developmental disabilities and problems with the lungs, liver and spleen. Some of those health problems don't show up until months or years after birth. HHV-6 virus is a closely related virus to CMV, and the congenital infection rate of CMV is similar to that of congenital HHV-6 – about 1 percent. However, this research shows that a congenital HHV-6 infection differs greatly from a congenital CMV infection in that it is often integrated into the chromosomes of the baby rather than passed through the placenta.

"This is the first time a herpes virus has been recognized to integrate into the human genome. To think that it's actually a part of us – that's really fascinating," said Mary Caserta, M.D., associate professor of Pediatrics at the University of Rochester Medical Center and one of the paper's authors. "This opens up a whole new realm of exploration."

Of 254 children enrolled in this study between July 2003 and April 2007, 43 had congenital HHV-6 infections based on cord blood samples. Of 211 children without congenital infection, 42 were children who acquired an HHV-6 infection during the study. Of the infants who had congenital infections, 86 percent of them (37) had the virus integrated into their chromosomes. Only six of the congenitally infected babies were infected by the mother through the placenta .

Children who had integrated HHV-6 had higher levels of virus in the body than those who were infected through the placenta. HHV-6 DNA was found in the hair of one parent of all children with integrated virus

with available parental samples (18 mothers and 11 fathers), which means the children acquired the integrated infections through their mother's egg or father's sperm at conception. The virus's DNA was not found in hair samples of parents of children who were infected after birth.

Source: University of Rochester