Mother's hepatitis B supports chronic infection in children, study finds

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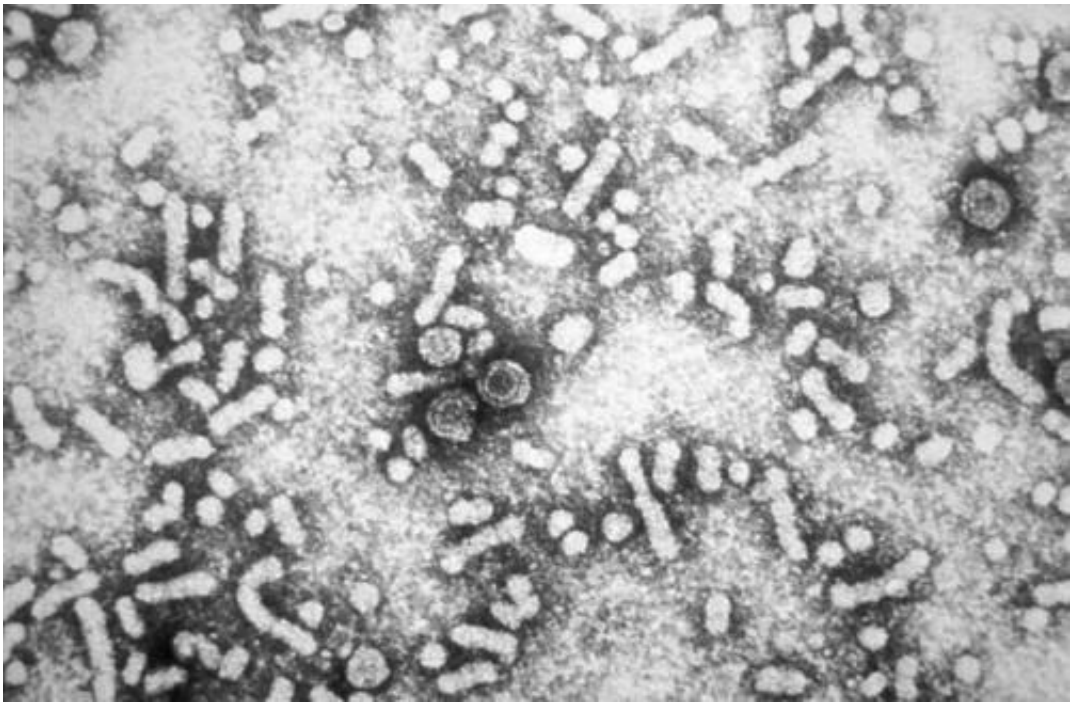

Electron micrograph of hepatitis B virus. Credit: Centers for Disease Control and Prevention

Chronic hepatitis B infection, a lifetime disease with no effective cure, could one day be cleared from a person's system with a series of shots, according to a new USC study.

Most healthy adults infected with HBV will develop protective immunity, healing their own bodies within a few months. But children

who acquired the virus from their mothers are unable to scrub HBV from their systems. Instead these individuals are fated to live with the virus for the rest of their lives.

About 1.1 million people in the United States have chronic HBV infection, reported the Centers for Disease Control and Prevention in 2013. USC is devoted to attacking today's "wicked problems," which include infectious diseases.

"Hepatic macrophages"—liver immune cells that eliminate foreign substances and toxins like a garbage disposal system—could be the target of future treatment, said Jing-hsiung James Ou, a professor of molecular microbiology and immunology at the Keck School of Medicine of USC.

"Maternal viral antigens teach the offspring's hepatic macrophages to suppress foot soldier white blood cells called CTLs," said Ou, senior author of the article published May 3 in *Immunity*, a Cell journal. "Therefore, when babies are exposed to the virus, the baby's 'garbage disposal units' will suppress its own immune system from fighting off the infection. We were able to deplete macrophages in a mouse model, activate CTLs and clear the virus."

The study paves a path to curing chronic HBV infection, Ou said. His research unveils the function of HBV e antigen, which was previously a mystery, Ou added.

In a mouse model, the experimental group came from mothers with HBV, whereas the control group came from mothers without HBV. Scientists introduced HBV-inducing DNA into offspring mouse liver to produce HBV.

Measurements taken throughout the 28-week experiment found that the test group's hepatic macrophages turned against their foot soldier CTLs.

In other words, white blood cells in the offspring of HBV-positive mice were weakened because of renegades within the ranks.

To remove macrophages that prevented the immune system from eliminating HBV infection, Ou and his colleagues injected the test group with a drug that slays these traitors. Researchers performed the procedure two days before and once every five days after HBV DNA was administered. In total, researchers dispensed the drugs four times.

The drug removed macrophages and restored normal CTL white blood cell activity, leading to HBV clearance after about four weeks. Ou said he will further his research in animal studies, which is essential to ensure the safety of the drug before the initiation of clinical trials.

"This study opens doors," he said. "In the future, clinical treatment for chronic HBV infection may last merely one month rather than a lifetime."

Provided by University of Southern California