Cholesterol-reducing drugs may lessen brain function

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Research by an Iowa State University scientist suggests that cholesterol-reducing drugs known as statins may lessen brain function.

Yeon-Kyun Shin, a biophysics professor in the department of biochemistry, biophysics and molecular biology, says the results of his study show that drugs that inhibit the liver from making cholesterol may also keep the brain from making cholesterol, which is vital to efficient brain function.

"If you deprive cholesterol from the brain, then you directly affect the machinery that triggers the release of neurotransmitters," said Shin. "Neurotransmitters affect the data-processing and memory functions. In other words -- how smart you are and how well you remember things."

Shin's findings will be published in this month's edition of the journal *Proceedings of the National Academy of Sciences* of the United States of America.

Cholesterol is one of the building blocks of cells and is made in the liver. Low-density lipoprotein (LDL) -- often referred to as bad cholesterol -- is cholesterol in the bloodstream from the liver on the way to cells in the body. High-density lipoprotein (HDL) -- so-called good cholesterol -- is cholesterol being removed from cells. Too much LDL going to cells and not enough being removed can lead to cholesterol deposits and hardening of the cells.

"If you have too much cholesterol, your internal machinery is not going to be able to take away enough cholesterol from the cells," said Shin. "Then cells harden and you can get these deposits."

Cholesterol-reducing statin drugs are helpful because they keep the liver from synthesizing cholesterol so less of the substance is carried to the cells. This lowers LDL cholesterol.

It is the function of reducing the synthesis of cholesterol that Shin's study shows may also harm brain function.

"If you try to lower the cholesterol by taking medicine that is attacking the machinery of cholesterol synthesis in the liver, that medicine goes to the brain too. And then it reduces the synthesis of cholesterol which is necessary in the brain," said Shin.

In his experiments, Shin tested the activity of the neurotransmitter-release machinery from brain cells without cholesterol present and measured how well the machinery functioned. He then included cholesterol in the system and again measured the protein function. Cholesterol increased protein function by five times.

"Our study shows there is a direct link between cholesterol and the neurotransmitter release," said Shin. "And we know exactly the molecular mechanics of what happens in the cells. Cholesterol changes the shape of the protein to stimulate thinking and memory."

While reducing the cholesterol in the brain may make you have less memory and cognitive skills, more cholesterol in the blood does not make people smarter. Because cholesterol in the blood cannot get across the blood brain barrier, there is no connection to the amount of cholesterol a person eats and brain function.

Shin says that for many people taking cholesterol-lower statins can be very healthful and they should listen to their doctor when taking medication.

Source: Iowa State University