HIV Medication Epivir Could Possibly Treat Alzheimer's

Research in human cells and mice found the antiretroviral suppressed harmful chronic inflammation linked to age-related disorders.

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The antiretroviral (ARV) Epivir (lamivudine) reduced inflammation in human cells and mice, a finding that suggested the drug could be used to treat age-related disorders in humans, including Alzheimer's.

Epivir (lamivudine), which was approved in 1995 and is available as a generic stand-alone tablet, belongs to the nucleoside/nucleotide reverse transcriptase inhibitor (NRTI) class of ARVs. It is included in many combination tablets, including the HIV drugs Delstrigo (doravirine/lamivudine/tenofovir disoproxil fumarate), Symfi (efavirenz 600 mg/lamivudine/tenofovir disoproxil fumarate) Symfi Lo, (efavirenz 400 mg/lamivudine/tenofovir disoproxil fumarate), Triumeq (dolutegravir/abacavir/lamivudine), Cimduo (lamivudine/tenofovir disoproxil fumarate), Combivir (zidovudine/lamivudine), Epzicom (abacavir/lamivudine) and Trizivir (abacavir/zidovudine/lamivudine).

Publishing their findings in the journal Nature, researchers studied the activity of what are known as retrotransposons, which are sequences of DNA that can self-replicate and transpose into the genome of cells. HIV does the same thing, although the virus's genetic code is in the form of single-stranded RNA, which the virus transcribes into double-stranded DNA inside immune cells in order to hijack the cellular machinery and turn the cell into a factory that churns out new copies of the virus.

Our cells are capable of warding off retrotransposons, although this line of defense wears down as they age.

The study authors examined a particular retrotransposon called L1, which has the capacity to replicate in human cells that are in a state of senescence, meaning they are old and no longer dividing. L1 can also replicate in the cells of old mice. This form of replication prompts the immune system to produce interferon, which gives rise to inflammation. Chronic inflammation, to which even well-treated HIV also gives rise, can be harmful and is associated with numerous health problems.

HIV and L1 both use the protein reverse transcriptase to replicate. Because NRTIs inhibit this protein, scientists tested six drugs from this class to see whether they inhibited L1 and found that Epivir was the most preferable for its high efficacy and low side effects. The drug reduced the interferon response as well as another factor that promotes inflammation in senescent cells, what is called the late-stage senescence-associated secretory phenotype.

The study authors treated mice that were 26 months old (about 75 years old in human age) with Epivir and found that even as little as two weeks of therapy reduced signs of the interferon response and inflammation. Six months of treatment in 20-month-old mice had the additional benefit of reducing signs of fat and muscle decline as well as scarring of the kidneys.

The investigators hope to move their research of Epivir into humans to see whether the drug can have an effect on age-related conditions such as frailty, Alzheimer's disease and arthritis. They also hope to develop an NRTI specific to L1.

To read a press release about the study, click here.

To read the study abstract, click here.

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