HANSEN CLINIC

'Anti-aging' hormone found to boost brain cell growth

https://news.wisc.edu/dhea-boosts-growth-rate-of-human-neural-stem-cells/

2/18/2004 - Human neural stem cells, exposed in a lab dish to the steroid DHEA, exhibit a remarkable uptick in growth rates, suggesting that the hormone may play a role in helping the brain produce new cells, according to a new study published this week in the online edition of the *Proceedings of the National Academy of Sciences* (PNAS).

The new work, conducted by a team of scientists at the University of Wisconsin-Madison, provides some of the first direct evidence of the biological effects of DHEA on the human nervous system, according to Clive Svendsen, the study's senior author and an authority on brain stem cells at UW-Madison's Waisman Center.

"What we saw was that DHEA significantly increased the division of the cells," said Svendsen, a UW-Madison professor of anatomy and neurology. *"It also increased the number of neurons produced by the stem cells, prompting increased neurogenesis of cells in culture."*

DHEA or dehydroepiandrosterone is among the most abundant naturally occurring steroids in the blood of young humans, but levels decline with age and its physiological effects are poorly understood. A synthetic form of the hormone is sold over-the-counter as a dietary supplement.

It is thought to have anti-aging properties and to offer prevention against cancer and heart disease, Alzheimer's and other diseases.

But while DHEA is readily available in health-food stores and other venues, scientists know relatively little about the drug and its basic biological effects on humans. Many experts familiar with DHEA caution against its overuse.

"We don't know much about DHEA, but this new work adds a piece to the puzzle," said Svendsen, who conducted the study with colleagues Masatoshi Suzuki, Lynda S. Wright, Padma Marwah and Henry A. Lardy, all of UW-Madison. *"This is the first real evidence of DHEA's effects on human neural cells."*

Svendsen and Suzuki carried out the experiments by growing human fetal neural stem cells in culture. The cells form aggregates known as 'neurospheres,' which were exposed to a cocktail of DHEA and growth and inhibitory factors, and observed a 29 per cent increase in new brain cells compared to cells grown in a medium with the same factors, but without DHEA.

"We saw such a pure effect of DHEA," Svendsen said.

"It's the only steroid we tested that had such a direct effect on stem cell growth and new neuron formation," according to Suzuki.

The new work is important because it provides a direct window to the controversial hormone's effects on critical human cells. Similar studies have been conducted in mice and rats, but those models have shortcomings that are difficult to address, Svendsen notes.

"There are previous studies in rats that suggest DHEA is neuroprotective, but the problem with DHEA in rats is that it is not a major metabolite in that animal so its effects may not be the same as those seen in humans," he said. According to Lardy, metabolic products of DHEA hormone have also been shown to aid memory retention in old mice.

Despite hints from the studies in rodents that DHEA may play a role in enhancing the brain and memory, the new findings reported in the PNAS article were a surprise, he said.

"We assumed the compounds we were testing would be more active than DHEA in brain stem cells," Lardy explains. In previous studies, Lardy, with Wisconsin biochemistry colleagues James Ntambi and Brian Fox, showed that DHEA blocked a step in fat synthesis.

"The effects of DHEA on brain stem cells is a completely new finding," said Lardy. *"The problem of whether DHEA itself is having this effect, or if there's another metabolite of the hormone involved, still exists."*

One of the intriguing aspects of the new work, according to Svendsen, is the possibility that DHEA could have some positive effects on the adult human brain.

It is known that DHEA amounts fall progressively during aging, and reduced levels of DHEA have been reported in both adolescents and adults with major depressive disorders. And given the fact that adult humans have neural stem cells that continue to make new neurons in some parts of the brain, there is a possibility that DHEA could play a role in moderating the genesis of new brain cells.

However, Svendsen cautions that it is also clear that DHEA is a powerful neurosteroid and may have other side effects. He says it is not advisable to ingest the hormone in the hope of increasing brainpower.