OSU monkey business

Funded by an $84,840 grant form the National Institute of Aging, assistant professor Esturo Uemura is employing sensitive computer technology to analyze the human brain's neuronal processes, and the changes that occur over time in the composition of the brain's ribonucleic acid (RNA), which is responsible for the protein synthesis in cell bodies.

Subjects of the study are rhesus monkeys -- small, brownish-colored, short-tailed primates native to India -- that are housed at the University of Wisconsin's Primate Research Center in Madison.

"Most of the monkeys we use are born and raised at the Primate Research Center," said Uemura, "So we know their complete histories, what medical problems there have been and what medications have been administered. Whereas, with humans, you never know for sure what type of medical problems there were, what the medical histories were."

Uemura said another reason for using rhesus monkeys is the absence of neuro-fibrillary tangles and senile plaque in the primates' brain tissues.

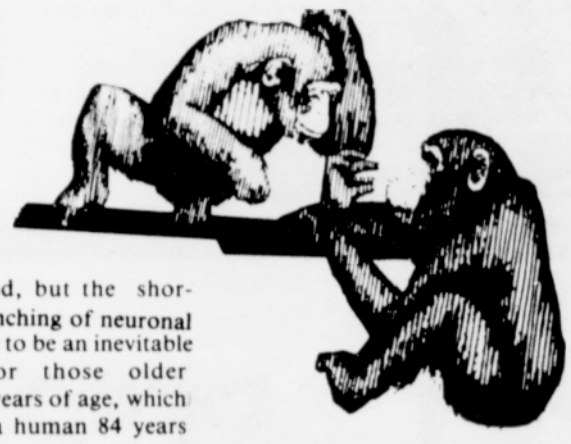
The tangles and plaque are lesions, pathological alterations of nerve cells, that are often found in old human brain tissue and also in the brain tissue of persons suffering from dementia, where the intellectual faculties have deteriorated.

"It has been hypothesized that some of the aging changes we see in humans are associated with those lesions," said Uemura. "But I can see the same type of aging changes in the rhesus monkey which has an absence of these lesions. That seems to indicate the neurofibrillary tangles have nothing to do with the aging process, but rather are a byproduct unique to the aging human brain."

Monkeys and computer technology are being utilized to study the aging processes of the human brain in research being conducted at Oregon State University's school of veterinary medicine.

"What I'm interested in," added Uemura, "are the neuronal processes and how these processes change as we get older. A brain's neuron is like a tree, with branches going up and roots descending down. It has been clearly established that these neurons, like a tree, continue to branch out and down as we mature."

"But what happens when we reach our 70s and 80s? My study indicates the rhesus brain continues to maintain its neuronal processes



during adulthood, but the shortening and debranching of neuronal processes appears to be an inevitable phenomenon for those older monkeys over 28 years of age, which is equivalent of a human 84 years old."

Uemura is also interested in the change that occurs in the brain's RNA as a person gets older.

"In humans, we have found there is a drastic decrease -- about 20 percent -- in the amount of RNA present in the brain as we get older, particularly in persons over 60. We've found the same thing happening in rhesus monkeys, which indicates some metabolic change occuring in old neurons."

In his research, Uemura is employing computerized laboratory equipment that allows him to analyze changes in neuronal processes and in RNA on a single-cell basis.

"The problem with using a microscope as your primary tool is you can miss very minute changes," he said. "It's a difficult process, even for a highly trained pathologist."

"But with a computerized microscope, we can detect minute changes of neuronal processes and analyze the quantity of ribonucleic acid. I can take a single nerve cell from a specific area, and I know where that neuron came from and I can tell what quantity and quality of RNA is there."

"So the changes I'm observing are changes in RNA per cell, rather than per area. Using computer technology gives the research a preciseness that is invaluable, and which was unavailable up until a few years ago," added Uemura.

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