

# Hidden Potential

*Brain cells once considered secondary are found to work as stem cells.*

**R**esearchers have found an unexpected source of stem cells in the adult human brain. They have demonstrated for the first time that certain human astrocytes—starlike cells of the central nervous system classically thought to play more of a supportive role for the neuron—can actually function as stem cells. These astrocytes form a ribbonlike structure lining the ventricles—inner cavities of the adult human brain—and are capable of generating all three types of mature brain cells (neurons, astrocytes, and oligodendrocytes). The finding opens the possibility that such human stem cells could be used one day to regenerate damaged areas in the adult central nervous system.

“This ribbon of human astrocytes represents a significant departure from other species,” says Nader Sanai, a former HHMI medical student fellow who is currently a neurosurgery resident at the University of California, San Francisco (UCSF). Sanai led the work with Arturo Alvarez-Buylla, professor of neurological surgery at UCSF. “The differences we see imply that this region in the human brain doesn’t necessarily do the same things as its primate and rodent counterparts,” Sanai adds. Stem cells from a comparable area in the rodent brain follow a distinct path from their

place of origin to the olfactory bulb (a brain region that processes smells), where they create new neurons. In humans, “this cell population does not appear to serve this purpose, but has the potential to regenerate other parts of the brain, though it’s not clear which regions those may be.” With millions of dollars invested in animal models of stem cells, he says, the team’s findings might call into question the fidelity of those models in predicting the human brain. Sanai, Alvarez-Buylla, and colleagues reported their findings in the February 19, 2004, issue of *Nature*.

These findings are provocative because astrocytes have traditionally been considered simple helper cells, Sanai says. “This speaks to the plasticity of the human brain. Certain cell types may have hidden potential.” And because these subtypes of astrocytes appear no different from any other astrocytes, he says, “it’s possible that other astrocytes, in other regions of the brain, have the same potential.”

Other research, by scientists at the Salk Institute for Biological Studies in La Jolla, California, has shown that neurons are generated in the adult human hippocampus, says HHMI investigator Sean J. Morrison at the University of Michigan Medical School. As a result, there’s at least the pos-



**Nader Sanai found an unexpected source of stem cells.**

sibility that stem cells in the human subventricular zone (the source of these astrocytic neural stem cells) “could well be giving rise to new neurons in the adult human brain, at least at a low rate, and the rate of neurogenesis by these stem cells could increase in response to injury,” says Morrison.

Sanai and colleagues want to know still more about astrocytes’ work as stem cells. “We know the cells are dividing,” says Alvarez-Buylla, “yet it leaves us with the question: What are these cells doing if they are not going to the olfactory bulb?” The researchers now plan to better characterize this region of the human brain and investigate potential relationships between these stem cells and brain tumors.

—DENNIS MEREDITH

## Remembering Santiago

The family and friends of Nestor V. Santiago, the Institute’s vice president and chief investment officer until his death in 2003, gathered in a courtyard at HHMI headquarters for the dedication of a granite sculpture in his memory (right). At the ceremony, HHMI President Thomas R. Cech presented a check for \$107,060.77 to the Santiago Fund, established by Santiago and his siblings in 2000 to benefit the Nueva Ecija National High School in the Philippines. The gift resulted from contributions by HHMI employees, business associates, Trustees, and members of HHMI’s investment advisory committee, with a matching contribution from the Institute. Santiago had attended Nueva Ecija, in a province approximately 70 miles north of Manila, where he was valedictorian of his class in 1965. After the government abolished tuition at public schools, enrollment at his alma mater at first grew rapidly, but government funding for the school did not keep pace. Crowded conditions, a shortage of materials, and a gradual decline in the quality of education led affluent students and well-qualified teachers to seek better schools, leaving talented but needy students at Nueva Ecija with limited educational opportunities, particularly in science and math. Under Santiago’s leadership, he and his siblings created a fund to provide resources and well-qualified faculty for a special

science school within the high school. HHMI’s contribution will help endow the salary of a highly qualified science teacher, who will have the title Nestor V. Santiago-HHMI Teacher of Science. The first Santiago Teacher is expected to be named later this year.

—JENNIFER BOETH DONOVAN

