

Neural Role for Tiny RNA

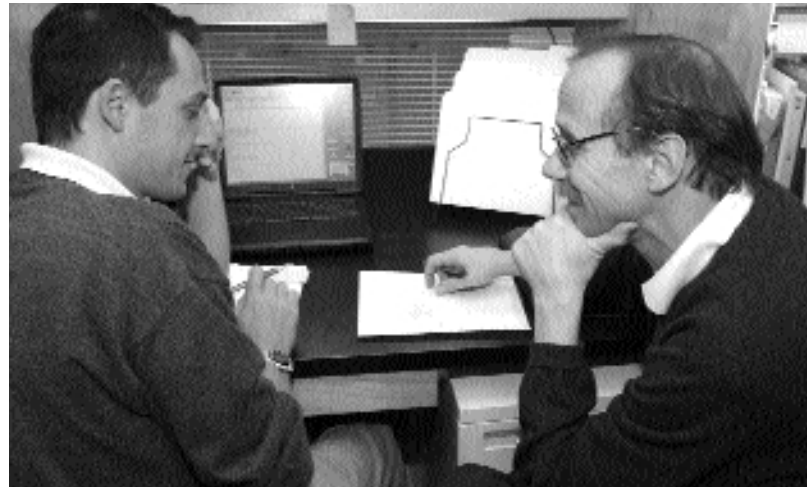
Tiny molecules of double-stranded RNA help prod stem cells to develop into neurons, says Fred H. Gage, the Vi and John Adler Chair for Research on Age-Related Neurodegenerative Diseases, and Salk research associates Tomoko Kuwabara, Jenny Hsieh, and Kinichi Nakashima with colleagues in Japan.

Their study, the first to link tiny double-stranded RNAs to stem cell regulation in the nervous system, reveals a new role for a form of genetic material that was discovered only in the last few years. The report appeared in the March 19 edition of the journal *Cell*.

Gage found that the double-stranded RNA snippets, which do not produce proteins like the more familiar messenger RNA, change the actions of cellular proteins that silence neuron-producing genes in stem cells. These proteins, called NRSF (short for neuronal restricted silencing factor), prevent every cell from turning into a neuron. In stem cells that become neurons, the RNA snippets bind to NRSF proteins, blocking NRSF's ability to silence neuronal production.

"Our findings shed new light on how specialized neurons are created from undifferentiated stem cells, and show an important regulatory role for double-stranded RNAs," said Gage. "Small, non-coding RNA fragments usually silence gene expression, but in this study we found they enhance it, which could help us determine ways to encourage the development of neurons from stem cells."

Recent studies have focused on small RNA fragments because of their suspected role in regulating many cellular activities. In fact, scientists may have underestimated the number of these fragments in cells, mainly due to the fact that this form of RNA is not involved with translating information from DNA to make proteins.



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INSIDE SALK

Outreach

High School Science Day Attracts Diverse Students

■ For the 14th year, Salk Institute scientists shared with top high school science students their experiences about the life of a scientist and how to start a scientific career.

Nearly 150 students, from 21 San Diego County high schools as well as from Sunnyside High School in Tucson, Ariz., heard from Institute President Richard Murphy, and Salk Distinguished Professor and Nobel laureate Roger Guillemin, the founder of the field of neuroendocrinology. Guillemin discovered a host of hormones in the brain that regulate multiple physiological systems in the body. In addition, Mobile Science Lab director Ellen Potter, and postdoctoral fellows Elise Lamar and Sophia Colamarino held a panel discussion on getting started in science and the various steps needed to establish a scientific career.

The students toured several working laboratories at the Institute and took part in ongoing scientific experiments.



Jeff Long (right) discusses the implications of plant biology on the world food supply with a participant at Back to Basics.

The Global Impact of Plant Biology

■ Almost 200 members of the San Diego community attended the Spring 2004 Back to Basics program at the Institute and participated in a discussion on the implications of plant research led by Jeff Long, an assistant professor in the Plant Biology Laboratory.

Long, who joined the Institute

late last year, looks at what influences an embryonic plant to develop shoots on one end and roots on the other, and how these processes can be manipulated to improve crop yields and food supply.

During his presentation, Long focused on how he and his colleagues in plant biology are using the mustard weed *Arabidopsis* as a model plant to understand fundamental questions

about how plants grow and how they can be modified to thrive in adverse conditions. "Only 11 percent of the earth's land is optimal for growing and sustaining crops," Long told the audience. "Our challenge is to find answers that will allow crops to grow and thrive in conditions that are not optimal."

Now in its 14th year, the Back to Basics program is designed to give the public greater insight into the scientific advances at the Salk.

