

NSF CAREER Award

- **Title:** CAREER Award: Noradrenergic Regulation of Hippocampal Interneurons
- **Award Number:** 0347259
- **Project Terms:** 2004-2009+
- **Investigator:** Van A. Doze, Ph.D.
- **Institution of Primary Investigator:** University of North Dakota

CAREER Scientific Merit:

- The long-term goal of this investigator's research program is to elucidate the biological effects of norepinephrine (NE) in the brain. NE, also called adrenaline, has been implicated in a variety of neural functions including: regulating the sleep-wake cycle, increasing vigilance, enhancing learning and memory, modulating hyperexcitability and promoting neurogenesis.
- The immediate goal of this project is to examine the effects of NE on the neurons of the hippocampus, an area of the brain critical for learning and memory and prone to hyperexcitability. The hippocampus is also one of the regions of the adult brain where the production of new brain cells or neurogenesis occurs.
- Our findings to date indicate that NE has diverse effects on different types of hippocampal neurons: simultaneously inhibiting some types of neurons while exciting others in a highly coordinated fashion.
- This research is leading to a greater understanding of how NE modulates the hippocampal neural circuits (networks), and providing insight into how NE enhances learning and memory, while inhibiting hyperexcitability.

CAREER Research Highlights

- Recent findings of this project further indicate that norepinephrine (NE) is both increasing the number and survival of neurons in the hippocampus. This suggests that NE may also have a neuroprotective role and that NE may be inducing the proliferation of neuronal progenitor cells in the adult brain (*i.e.*, promoting neurogenesis).
- This latest research should afford important information about the development, regeneration, and aging of the central nervous system. The data generated from this project could have important implications, as it may lead to the development of new strategies for improving learning and memory, controlling hyperexcitability, stimulating adult neurogenesis, and increasing vigilance.
- This data will form the basis of a subsequent research proposal to be submitted to NSF next year.



CAREER Broader Impacts

- Promoted the teaching and training of American Indians and women in a state where research scientists are underrepresented.
- Launched an NSF-funded REU Site designed to broaden the participation of students from groups underrepresented in the sciences – American Indians, first-generation college students, and non-traditional students from rural and tribal colleges lacking undergraduate research opportunities.
- Mentored 27 students (23 undergraduate, 3 graduate and 1 high school) in basic science research, including 19 women of which four were from Tribal Colleges. To date, these students have given 39 presentations at local or regional conferences and presented 19 abstracts at national scientific meetings.
- Integrated research with education by developing and teaching new undergraduate and graduate level neuroscience courses; and participated in numerous outreach programs to encourage middle and high school students to consider careers in science (e.g., Brain Awareness, International Brain Bee, Brain Camp).
- Established a student-based electrophysiology facility and now helping to build a stereology core (using NSF MRI funding).