Solving the mystery of DNA repair

Penny Beuning at work in her lab. Photo by Craig Bailey

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Penny Beuning, an assistant professor of chemical biology and biotechnology at Northeastern, this month received a National Science Foundation (NSF) Faculty Early-Career Development grant to study how cells adapt to DNA-damaging agents.

The $994,655 CAREER grant will fund a five-year project that seeks to understand the role protein complexes play in how a cell's DNA molecules react to exposure to a variety of commonplace, potentially damaging agents, including free radicals and ultraviolet light.

Cells encounter more than 30,000 damaging events every day, Beuning notes. Most of the time, the cells are able to repair any DNA damage that occurs. In rare instances, the repair process gets disrupted, and mutations result.

Beuning says she and members of her laboratory—who include undergraduates studying chemistry, biochemistry and biology—will look at the damage response in bacteria, exposing cells to a range of agents and monitoring the ways the cells' proteins react.

This work, she says, "could ultimately lead to a greater understanding of antibiotic resistance in bacteria, and contribute to a body of knowledge surrounding the development of drugs that would prevent antibiotic resistance."

Beuning, who earlier this year was named a Cottrell Scholar in recognition of her research in DNA damage tolerance, says the NSF grant is a major windfall for her work.

"It's a tremendous honor and responsibility," she says, "especially because a major component of the grant involves getting undergraduate students involved in and excited about research. I got really excited about doing research when I was an undergraduate. It's a great time in a student's career to be exposed to the lab."

Graham Jones, professor and chair of chemistry and chemical biology, says the department is delighted with Beuning's achievement.

"This is a significant award that will propel her research in DNA repair forward," Jones says. "It's also an honor for Northeastern. We look forward to many great things from her laboratories in the years ahead."

In addition to her ongoing projects, Beuning plans to develop a summer program that offers undergraduates from diverse backgrounds structured research experiences. The program will help students build science-related communication skills and learn how to conduct research responsibly.

Her interdisciplinary approach to research, she explains, translates into "an excellent training opportunity for students as well."

CAREER grants are given to support junior faculty who serve as exemplary teacher-scholars through outstanding research, excellent education and the integration of education and research.

In May, when Beuning was named Northeastern's first Cottrell Scholar, she received $100,000 from the Research Corporation for Science Advancement, founded in 1912 by Frederick Gardner Cottrell.

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