Understanding Alzheimer’s

The Need: The Alzheimer’s Association estimates that more than 5 million Americans suffer from Alzheimer’s Disease, the progressive brain disorder that gradually destroys a person’s memory and ability to learn, reason, make judgments, communicate and carry out daily activities. A cure and effective treatments are needed for this and other neurodegenerative diseases like Huntington’s that cause such heartache for those afflicted and those who are close to them.

Serving the Need: Dr. John Cavanagh, professor of molecular and structural biochemistry in the College of Agriculture and Life Sciences, teamed with colleagues from the Mayo Clinic and Duke University to better understand how a protein called calbindin-D$_{28K}$ functions. Using nuclear magnetic resonance imaging, Cavanagh and other scientists were able to characterize the structure of calbindin-D$_{28K}$.

Impact beyond North Carolina: Calbindin-D$_{28K}$ either grabs calcium from areas that have too much or serves as an on/off switch for further chemical reactions. It is known for its flexibility; it is found in the kidneys, pancreas, ocular nerve and in abundant quantities in the brain. Recent studies show that it acts as a bodyguard in the brain, binding to and inhibiting caspase-3, a protein that stimulates plaque formation and tangle formation, which are hallmark characteristics of neurodegenerative disease. Until now, the structure of calbindin-D$_{28K}$ remained a mystery. What Cavanagh and his colleagues have learned about the structure of the protein, about how it binds to caspase-3, could lead to ways of exploiting those interactions to develop treatments for Alzheimer’s and other neurodegeneratives diseases.

Cavanagh’s laboratory is also a center of graduate and undergraduate education. Four undergraduate students and four graduate students are actively involved in research in the lab, gaining an invaluable, hands-on educational experience.

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