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Research teams unite for research on Lou Gehrig's Disease

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Lisa Miller and Paul Gelfand, biophysical chemists at the U.S. Department of Energy's Brookhaven National Laboratory, recently visited the Advanced Photon Source at Argonne National Laboratory to supplement their research into the cause of amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's disease.

They're studying the genetic form of the disease, which is caused by a mutation in a gene that instructs cells to make a particular protein within the spinal cord. When the gene is mutated, the protein folds abnormally, clumping into aggregates that cause paralysis and eventually death.

"This protein uses two metals to fold correctly – copper and zinc," says Gelfand. "We can use the x-ray beams at a synchrotron to look at the status of the copper and zinc relative to the motor neurons in the spinal cord."

Getting a clear picture of structural deformations in extremely small biological samples requires tiny x-ray beams—smaller than what's currently available at Brookhaven's National Synchrotron Light Source (NSLS).

"We're using the very tiny beams at the Advanced Photon Source in order to focus in on those tiny aggregates, to understand how much copper there is, how much zinc there is, if there's any, to help us understand why the aggregates form and why paralysis happens," says Miller.

"If we understand why the protein is misfolding, it's possible to create drugs or develop techniques to rescue the protein before it misfolds," Gelfand says.

The scientists' work will continue at the National Synchrotron Light Source II at Brookhaven, using the nanoscale-size beams at the Submicron Resolution X-Ray Spectroscopy Beamline when it begins operation in 2015.

Provided by Brookhaven National Laboratory