NEWS & EVENTS

NIH Funds Synchrotron Beamlines to Advance Studies of Molecular Structures

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by Alisa Zapp Machalek (301) 496-7301
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"If you build it, they will come."

This statement is certainly true in synchrotron-based X-ray crystallography, an area of study committed to solving detailed structures of molecules. The field has exploded in recent years, and a major threat to its continued growth is limited synchrotron resources.

Synchrotrons are the enormous machines that produce powerful X-ray beams used by researchers to tease apart the three-dimensional structures of molecules. The scientists must schedule their data-collection visits to synchrotrons months in advance. They must then work feverishly before and during these few days to make the best use of their scarce synchrotron "beam time."

To advance structural studies of biological molecules, the National Institute of General Medical Sciences (NIGMS) and the National Cancer Institute (NCI) are supporting the design and construction of a user facility consisting of three new beamlines at Argonne National Laboratory's Advanced Photon Source, the newest and most advanced synchrotron in the country.

The beamlines themselves will be custom designed and constructed by ACCEL GmbH, a company located in Bergish Gladbach, Germany. NIGMS and NCI plan to spend a total of around $23 million on the project and estimate that the three beamlines will be fully operational in about three years.

"The primary motive for the project is to benefit the scientific community by facilitating access to synchrotron beamlines. This is particularly important as the structural genomics effort at NIGMS begin to pick up speed," said Dr. Marvin Cassman, director of NIGMS.

NCI is particularly interested in how the synchrotron facilities will advance the study of cancer-related molecules. "A detailed understanding of protein structure will help cancer researchers develop drugs targeted to specific types of cancer," said Dr. Dinah Singer, director of NCI's Division of Cancer Biology.

X-ray crystallographers determine the three-dimensional shape of a molecule by blasting a beam of X-rays through a crystallized sample of the molecule and then analyzing the pattern of the scattered beam. Synchrotrons are powerful tools for such work, because they generate extremely intense, focused X-ray radiation. Some scientists have compared synchtrotron radiation to a beam of light 30 times more powerful than the sun focused on a spot smaller than the head of a pin. These brilliant X-rays allow researchers to solve structures faster and and more easily than ever before. Radiation generated by synchrotrons is also "tunable," meaning that scientists can select the wavelengths of X-rays that are optimal for their experiments.

The NIGMS/NCI beamlines will be designed to optimize certain properties of X-rays most useful for specific biological studies. NIGMS and NCI anticipate that these studies will reveal the structures of proteins and other molecules involved in human health and disease. Scientists can use information about these structures to help develop new medicines and diagnostic techniques. In addition to such structural studies, the new synchrotron beamlines can be used for work in cancer biology, immunology and virology, and basic studies in biochemistry, cell biology, molecular biology and biophysics.

CONTACTS

For comment on the APS beamline, call Alisa Machalek in the NIGMS Office of Communications and Public Liaison at (301) 496-7301 to arrange an interview with NIGMS director Dr. Marvin Cassman.

The NCI press office can be reached at (301) 496-6641.

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