news THE UNIVERSITY OF TEXAS
HEALTH SCIENCE CENTER AT DALLAS
southwestern medical school ▪ graduate school of biomedical sciences ▪ school of allied health sciences

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DALLAS--Scientists at The University of Texas Health Science Center here are struggling to open a window on the complex world of muscle proteins with a goal which includes understanding the failing heart and muscular dystrophy.

Dr. Robert M. Dowben and associates in the Biophysics Department at the center are using a highly sophisticated--and cranky--system of shining extremely pure light from a laser through solutions of proteins and then jogging the solution with electrical pulses to see how the molecules line up and polarize the light.

The question: Do proteins from diseased hearts and victims of muscular dystrophy behave differently than those from normal muscles? There is some reason to believe they do and, if further refinements of their apparatus are successful, the researchers may be able to put together a theoretical model of the protein molecule which might suggest possibilities of treatment. A similar thing was done in arriving at an aspirin-like drug which lessens sickle-cell anemia crises.

"There are a large number of genetic diseases where the structural proteins are abnormal," explains Dr. Dowben, "This includes gargoylism, India rubber people, cystic fibrosis--each is not so terribly common but if you take the whole group of birth defects, you might be talking about one out of every 30 or 40 births."

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Some of these afflictions are categorized as dominant genetic defects--that is, the child is likely to have the problem if only one parent does. While more is known about the recessive defects--where two parents must carry recessive genes to produce a child with a problem--there is very little knowledge about dominant structural protein defects.

"The hangup is that there haven't been good analytical techniques," comments Dr. Dowben, who is professor of Physiology and acting chairman of the Department of Biophysics.

The electronics and equipment at the Health Science Center are among only four or five such setups in the world. Part of the reason analysis is now a possibility is the emerging competence of computer programs. Without the computer to analyze the complex data obtained in the measurements, understanding would be impossible, say Dr. Dowben's associates. Working with him on the "electrical birefringence" apparatus are electrical engineer Millard Judy and physicist Peter Schaar.

The equipment delivers electrical pulses to the target solution of only a billionth of a second. After a large number of pulses and readouts of how the laser light was polarized, the records are delivered to a computer for sorting.

What the workers hope to do is accomplish a hookup directly to the computer so things could be done to the protein molecules at the same time the computer is analyzing what's happening.

The electrical birefringence method, first worked out about 1950 by scientists at Berkely, Calif., promises to be a good tool for looking at complex proteins so tiny they are just out of reach of the most powerful electron microscopes.

Dowben, who has been on faculties at Brown University, Massachusetts Institute of Technology, Harvard Medical School, and Northwestern University, among others, was given a birefringence apparatus built at Brown a few years ago with National Science Foundation funds. The American Heart Association has provided additional funding toward reconstruction of the machine.

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