

# His reward is just a heartbeat away



ASISH C. NAG

The middle-aged patient had incurred a heart attack and survived — but with the predictable result — the heart muscle was damaged and scarred.

The surgeon injected a mixture of young heart muscle cells into the damaged area. The regeneration of the cells had begun. The patient was able to resume a normal life.

The laboratory research that could make that scene commonplace has been undertaken by an Oakland University biologist.

Researcher Asish C. Nag of Rochester has shown that adult non-mammalian heart muscle cells can be reverted to a young state and made to actively regenerate, something not previously demonstrated.

Nag's research will be reported for the first time in the forthcoming issue of the prestigious magazine Science. The article is entitled "Evidence for DNA Synthesis and Mitosis in Adult Amphibian Cardiac Muscle Cells in Vitro."

The regeneration thus far has taken place in the laboratory. The experiments on human hearts and live persons may be years away, but the implications for heart attack victims are enormous, Nag says.

In pursuing his research Nag examined a number of basic questions.

"It is fairly well known that after a heart attack or coronary insufficiency, cardiac muscle cells die and they are replaced by scar tissue," Nag says.

Are adult mammalian cardiac muscle cells capable of regeneration? Nag's investigations first involved the intact heart where all experiments proved negative.

The researcher then moved to isolated cardiac muscle cells prepared in a laboratory culture. Here Nag found that the cells, when activated, were capable of two of the three functions needed for regeneration.

There was DNA synthesis and cell division but not contractility (the capability to contract and relax), the third and crucial ingredient for a beating heart.

Stymied temporarily, Nag moved to an investigation of young mammalian heart cells. He reconstructed miniature beating hearts in laboratory culture from isolated single heart cells and found that the cells in the miniature heart differed in action from those isolated single cells in a laboratory culture.

There are still unknown restraints that stop muscle cells in the miniature heart from regeneration, Nag says, but when those cells are isolated and then allowed to grow in culture, they are relieved of that unknown restraint and undergo DNA synthesis, cell division, and the protein synthesis needed for regeneration.

Now Nag is confronting the key question — whether the isolated young heart muscle cells can join with muscle cells from the adult heart and begin regeneration.

Nag is very hopeful about the forthcoming results. There is much work to be done before human experimentation is even feasible, but "hopefully there is now a bright horizon ahead for heart muscle regeneration," he says.

# U-M professor wins West German award

Frederick C. Neidhardt, Ph.D., professor of microbiology and chairman of the department of microbiology and immunology of the University of Michigan Medical School, has been awarded a senior U.S. scientist award by the Alexander von Humboldt Foundation of the Federal Republic of Germany.

The award, granted by the West German government in memory of the aid program initiated by George C. Marshall, honors outstanding American scientists and promotes scientific interchange between German and American researchers and research institutions.

The special awards are administered by the Alexander von Humboldt Foundation of Bonn, West Germany. Nominations for these awards are initiated solely by leading German researchers and research institutions.

Neidhardt will receive his award at the University of Regensburg, West Germany.

Neidhardt, whose work involves bacterial cell growth, came to the University of Michigan to head the microbiology and immunology department in 1970.

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