

# 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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\*\*\*\*\*Doctors discover man has an aquatic reflex which is useful in slowing a runaway heart.

DALLAS--Consider the duck. When he plunges his beak and head under water, his heart slows down. The maneuver is thought to save oxygen as he rummages for food. It's the same for a seal.

Now consider a human with a runaway heart problem called paroxysmal atrial tachycardia. This is a condition in which the heartbeat increases to 160 or more a minute and it may last minutes, hours or even days.

Now, suppose you took that human and ducked his head in cold water. Yes, it works.

Heart scientists at The University of Texas Health Science Center here are reporting in the British medical journal "Lancet" that the little known "diving reflex" has been used to halt attacks of paroxysmal atrial tachycardia (PAT) in seven patients. Authors are Drs. Kern Wildenthal, James M. Atkins, Stephen Leshin and C. Lynn Skelton.

PAT is the most common heart rhythm irregularity found in young persons, says Dr. Wildenthal. It occurs when the heart's normal rhythm maker, the sino-atrial node, is overridden by electrical impulses from another location in the atria. The heart--reacting to a different "drummer"--speeds up and the victim may feel a fluttering sensation in the chest, weakness or nausea.

"Under certain conditions it can be dangerous," explains Dr. Wildenthal.

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first add diving reflex

Previous treatments all have had problems. One involved massaging the carotid artery in the neck but this ran some danger of producing a complete pacing block and cardiac arrest. Intravenous injections in a hospital setting and problems of either high or low blood pressure, depending on the method, made most of the treatments bothersome or otherwise undesirable.

The Dallas scientists, all faculty members in the Departments of Medicine and Physiology at The UT Southwestern Medical School, report in Lancet:

"Thus far we have treated seven patients (aged 22-66). Four had histories of attacks that had previously required vasopressor therapy and two had been digitalized; three had no history of prior paroxysmal atrial tachycardia or heart disease.

"Each patient was instructed to inhale deeply, hold his breath, and submerge his face in a pan of ice water (two degrees Centigrade) for as long as was comfortably possible while an ECG was recorded.

"In all seven patients, the paroxysmal atrial tachycardia was converted to normal sinus rhythm within 15-35 seconds after facial immersion. One patient with frequent paroxysmal atrial tachycardia has since reported self-termination of attacks with the 'diving reflex' at home in instances when she otherwise would have had to come to the hospital for intravenous therapy."

The reflex should be initiated only under medical supervision, the scientists say.

The diving reflex as applied to animals has been known for some time. "It is especially marked in aquatic animals such as seals and ducks . . . it enables the animals to reduce their rate of oxygen utilization and thereby to remain submerged for longer periods.

"The reflex is less dramatic in man . . . apneic (without breathing) face immersion usually induces a 15-30 per cent decrease in heart rate from normal resting values in human subjects, as compared to more than an 80 per cent decrease in seals and ducks.

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"Nevertheless, the reflex in many remains quite potent in that it is able to override other reflex responses that would appear, superficially at least, to be more vital to the organism's welfare; thus, the 'diving reflex' can completely obliterate the tachycardia that accompanies moderately severe exercise on a bicycle ergometer and result in an abrupt decrease in heart rate from 130-140 beats per minute to 80 or less despite continuation of the exercise."

Work on the reflex in normal subjects was published by Dr. Wildenthal, S.A. Bergman and J.K. Campbell more than two years ago in the Journal of Applied Physiology.

The recent investigation was made possible by the Dallas center's Moss Heart Fund, with additional support from the National Heart and Lung Institute and General Clinical Research Center.

The authors caution against self experimentation:

"We have encountered no complications in our first seven patients nor in dozens of normal subjects but a note of caution should be inserted. Although as a rule the 'diving reflex' should be immune from the dangers of excessive hypertension or hypotension that may beset vasopressor therapy or carotid sinus massage, the response to the reflex can be rather variable in different subjects and prolonged periods of asystole (delayed heart beat) are occasionally precipitated in some. We have observed one normal subject who had sinus arrest for 4.5 seconds before resumption of a regular bradycardia during 'diving' and others have described nodal and ventricular escape beats during apneic maneuvers of various types.

For the time being, the authors say it would seem prudent to avoid the diving reflex in patients with a history of multifocal premature ventricular contractions, a recent myocardial infarction (coronary heart attack) or other evidence to suggest susceptibility to ventricular tachycardia or fibrillation.

"For the same reasons, the presence of defibrillation machines and resuscitation equipment may be indicated for at least the first trial of 'diving' therapy in any given patient," the authors say, adding self treatment at home should be reserved for those who have had previous good responses, and it probably should be avoided in persons with hypoxemia (deficient oxygenation of the blood) or acidosis.