

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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******Cats' weighty workouts giving a lift
to research on heart, other muscles*

DALLAS--The procedure is simple: take the cat, pedigree or alley-type, with a good appetite, a strong curiosity and a fairly intelligent appearance, and you have an excellent candidate for Dr. William Gonyea's rigorous exercise program in weight-lifting.

Dr. Gonyea, an assistant professor of cell biology and a comparative anatomist at UT Health Science Center at Dallas, has developed this unique research project to study muscle hypertrophy and atrophy -- that is, the process by which a muscle increases in size and strengthens when exercised, or weakens and decreases when not exercised. Because of his interest in cat behavior and its relationship to the cat's anatomical structure, Dr. Gonyea felt these animals would be the best models for the study.

"History shows the cat's forelimb was used in hunting 35 million years ago," he noted. "His whole success depended on his ability to grab his prey before biting them. This same trait exists today."

Thus he has taught the felines to do isotonic exercises by grasping and pushing a bar attached to various sizes of weights, as well as isometric exercises (pushing and holding the weighted bar for a certain period of time). As muscle strength increases, the amount of weights is increased.

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first add gonyea's cats

Training begins by placing a cat inside an enclosed box with only a small opening on one side. This hole faces the weight bar.

"His natural curiosity is aroused," Dr. Gonyea said.

This instinctive curiosity and clutching characteristics are then utilized. When he peers out the hole, he thrusts out one paw and is immediately rewarded with a high-protein food.

"It's very important that he's fed immediately each time he performs a correct procedure," Dr. Gonyea commented. "Otherwise he won't learn it properly."

Next the feline is given food for hitting the bar only with his right paw. The final objective is reached when he pushes the bar and lifts a weight with his right paw.

"The average weight lifted is 400 grams in the beginning," Dr. Gonyea pointed out. It generally takes eight weeks for each cat to double this amount. One cat lifted 1000 grams after 11 weeks of exercise, while another, a seven-pound female, has lifted 1350 grams (three pounds), or 46 per cent of her body weight. Of the 17 felines now "in training" at the center, one has reached the 1300-gram mark (or 2.9 pounds).

A side discovery was the animals did not lose their knowledge of the procedure even after long periods of non-training. "Somehow it's a long-term learning process that stays with them," Dr. Gonyea remarked. One cat was not exercised for 11 months, but "when we put him back inside the box after this time, he took up weight-lifting again with no problem," he said.

Another study using the muscular animals determines the effect and adaptation of stress on the cardiovascular system. One cat is doing the isometric exercises, gripping and holding the bar for up to 30 seconds. Blood pressure and heart rate are monitored by an electronic device which records any blood pressure change when pressure is increased, and the amount of blood flow per heart-beat.

second add gonyea's cats

Dr. Jere H. Mitchell, chief of the center's cardiopulmonary laboratories and director of the Moss Heart Center, is collaborator with Dr. Gonyea on the heart-exercise studies -- designed, Gonyea says, "to find out more precisely whether exercise is really good for you.

"We know that jogging, after awhile, has a tendency to lower blood pressure, while weight lifting has a tendency to raise it. The question is, how far these activities can be carried out without inducing harm or death."

Support for the cat-exercise studies comes from two grants by the National Institutes of Health; from the Texas affiliate, American Heart Association, and the Moss Heart Fund.

A primary goal of Dr. Gonyea's work is to determine how the neuromuscular system adapts to various forms of stress. "No one has discovered how adult muscles grow or weaken," he said. "We hope to see how a muscle works and why selected muscles strengthen or weaken as they do."

He has found that in the cats, there is an increase in the total number of muscle fibers after exercise.

By achieving this goal, he hopes a process ultimately can be developed to eliminate such conditions as the muscle weakness associated with muscular dystrophy.

Meanwhile, Round Two is continuing at the center as the 17 cats undergo training in the art of weight-lifting. And one thing is certain -- no pussyfooting around will be tolerated for long.

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