NEWS RELEASE

THE UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL SCHOOL AT DALLAS

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ATLANTIC CITY, N.J. --- Discoveries resulting from experiments with the South American toad's urinary bladder may lead to fuller understanding and improved treatment of such human disorders as congestive heart failure and kidney failure, a Dallas medical scientist and educator said here.

Dr. John C. Vanatta, professor of physiology at The University of Texas Southwestern Medical School at Dallas, described in an interview, two spearate studies which have probed the complicated process whereby the animal bladder regulates vital body salts.

Both studies, he said, showed that the cellular processing mechanism is more complex than previously known--a fact that may shed new light on diseases related to kidney malfunction.

Papers relating results of the two studies were read today (Tues., April 15) at sessions of the Federation of American Societies for Experimental Biology meeting at the Howard Johnson Hotel here.

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Southwestern Medical School research teams used the bladder of the South American toad because its simplified structure and functions are similar to that of the mammalian kidney, Dr. Vanatta explained.

The Dallas scientist said that kidney management of the salts in the system is a controlling factor in maintenance of health.

"Because the mammalian kidney is of such great importance in the regulation of the salt content of the body, and because the kidney fails in this regulation by reabsorbing too much salt in certain disease states, the reabsorption of salt has been of paticular interest to the research biologist," Dr. Vanatta said.

Failure to excrete potassium is a major factor of kidney failure, he said, and excessive reabsorption of sodium occurs in congestive heart failure and other diseases.

Two teams of researchers at Southwestern have been studying the toad bladder's handling of sodium and potassium.

Using radioactive sodium in a tissue-bathing process, Dr. Vanatta and Miss LeEarl tracked the path of the substance--and found that the present simplistic concept of movement through bladder cells was incorrect.

"Previous to these studies it was thought that the sodium entered into the cells which line the inside of the bladder from the urine," Dr. Vanatta explained. "It was thought that the sodium movement was produced by a concentration gradient established across the cell boundary. The sodium inside the cell was thought to be in a single package or compartment."

Instead, the experimenters found there are at least five--and perhaps six--cellular compartments through which the sodium moves in the process of being reabsorbed by the urine.

This was discovered, Dr. Vanatta said, by plotting the rate of the isotope's emergence against time. He explained in this way:

"Had the sodium of the bladder been confined to a single solution in the single compartment of the functioning cells, the rate of disappearance of the radioactive sodium should be plotted as a line known as a single expotential curve. Instead of such a curve, the sodium was washed out as though it came from three different chambers on each side of the bladder."

Another research team made up of Drs. Frank T. Kallus and Robert W. Lackey confirmed a similar complexity in the passage of radioactive potassium across cell boundaries. They found that only three per cent of the total potassium in the bladder exchanged readily with potassium on the mucosal (urine) side--indicating the possibility of another, undetected, barrier.

"Since it has previously been proposed that the mucosal surface of the cell was the barrier to potassium movement, the finding of another possible barrier near this membrane but not limited to it makes it necessary to consider the process of potassium management by the cell a more complex process than hitherto thought," the researchers asserted.

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At stake in these experiments, Dr. Vanatta explained, is a better understanding of the actions of certain hormones, such as the autiuretic hormone, which affect the toad bladder and the mammalian kidney in analagous ways.

"Having discovered the various compartments in the toad bladder," he said, "the next step would be to determine how these hormones effect the exchange between these compartments." It also must be determined if the cells of kidney tubules have a similar compartmentalization.

"If the kidney tubules are similar then it is likely that the effects of hormones on these mechanisms in the toad bladder will give us a better understanding of the functions of mammalian kidneys, including the human kidney."

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