SOUTHWESTERN NEWS

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COCAINE ACTS ON CENTRAL NERVOUS SYSTEM, CAUSING VESSEL CONSTRICTION, RAPID HEARTBEAT

DALLAS – October 20, 1999 – UT Southwestern Medical Center at Dallas researchers are a step closer to understanding how cocaine triggers heart attacks and other cardiovascular emergencies.

Knowledge of the mechanisms involved in the sympathetic nervous system's reaction to cocaine may lead to development of a life-saving antidote for the drug, which is involved in nearly 10 out of every 1,000 deaths in U.S. emergency rooms.

Dr. Wanpen Vongpatanasin, assistant professor of internal medicine; Dr. Ronald Victor, chief of hypertension; and their colleagues wanted to test whether cocaine directly affects the central nervous system. The UT Southwestern researchers reported their findings in a recent issue of *Circulation.*

"We are taught in medical school that cocaine stimulates the cardiovascular system by blocking nonadrenaline uptake in the nerve endings; however, there is increasing evidence that this may not be totally accurate," said Vongpatanasin. "Therefore we wanted to determine if cocaine acts on sites other than nerve endings that release adrenaline.

"We hypothesized that the drug stimulates the cardiovascular system at the central nervous system level in humans, causing constriction of blood vessels, rapid heartbeat and subsequent heart attacks."

Such studies had previously been done in rats, but the rats had been anesthetized when the cocaine was administered. UT Southwestern researchers suspected that the results would be different in humans.

"In animals whose central nervous system is already affected by anesthesia it's difficult to access the effects of cocaine," said Vongpatanasin, lead author of the paper.

Investigators administered lidocaine, used here as a placebo, to seven patients and cocaine to seven patients in a small, medically approved, nonharmful dose. The lidocaine, like

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the cocaine, has a bitter taste and numbs the nose but has no other physiological manifestations.

Microelectrodes, which are similar to acupuncture needles, recorded sympathetic nerve activity of the patients before, during and after they received nose drops of cocaine. The readings showed a two- to threefold increase in sympathetic nerve firing, demonstrating that cocaine acts in the central nervous system to increase heart rate and blood pressure. Another group of 11 patients was similarly tested.

Vongpatanasin and her colleagues found that by blocking the sympathetic nervous system, they blocked the effects of cocaine on the heart. This debunked the previous belief that cocaine only impacts adrenaline-releasing nerve endings. The results in both groups were opposite those found in the tests on anesthetized rats.

This gives scientists another pathway to use in searching for treatments of cocaine overdoses.

Approximately 30 million Americans have tried cocaine, and about 5 million to 6 million are habitual users.

Other researchers who contributed to the study were Dr. Yasser Mansour, an internal medicine postdoctoral fellow; and Debbie Arbique, a research nurse.

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