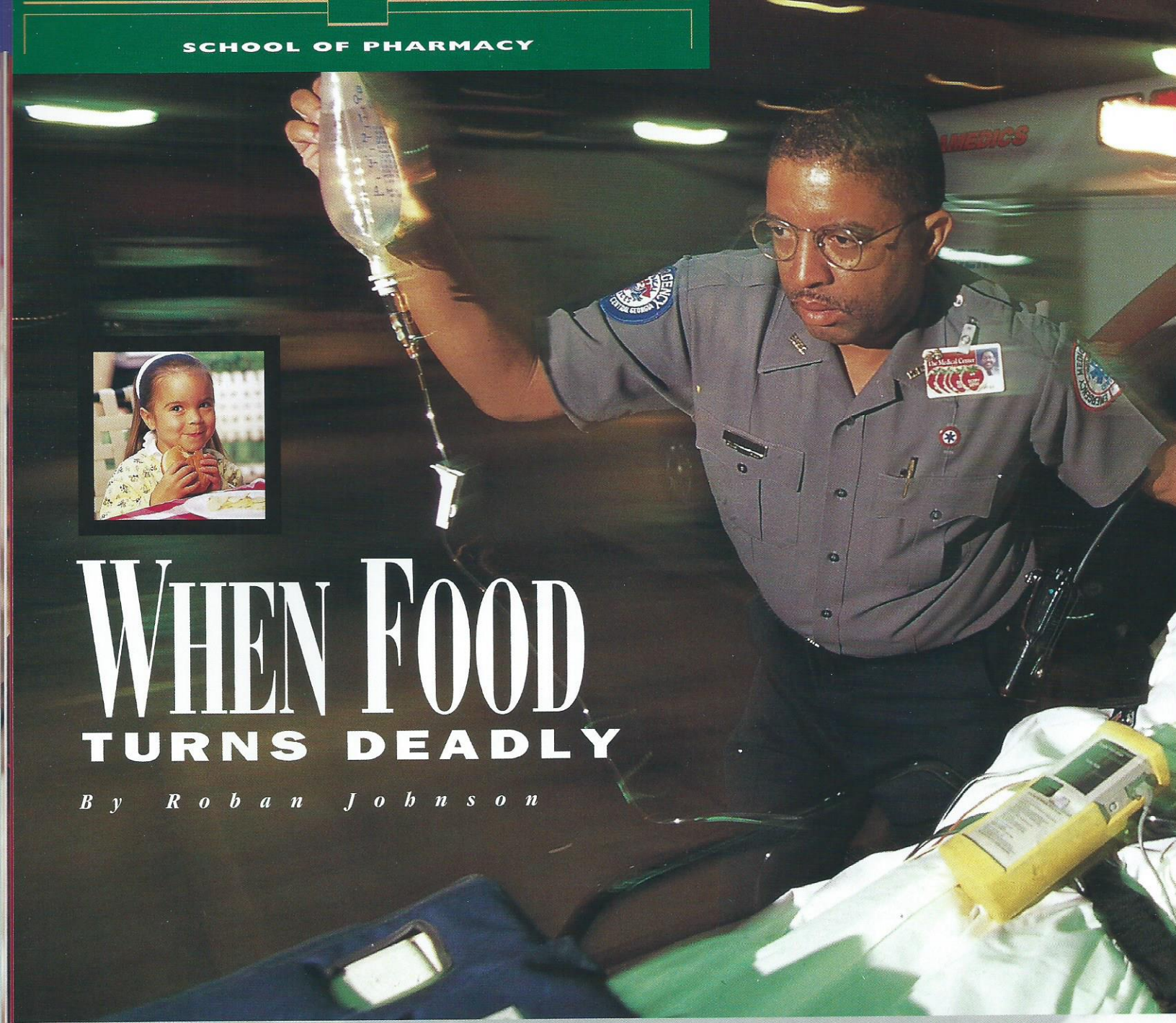




# WHEN FOOD TURNS DEADLY

*By Roban Johnson*

We have seen the headlines alerting us to E-coli bacteria. We have read or heard news accounts of people falling ill and dying from contaminated food. Picnics in the park, restaurants and even our own homes are now suspect in how some food-borne illnesses are spread.

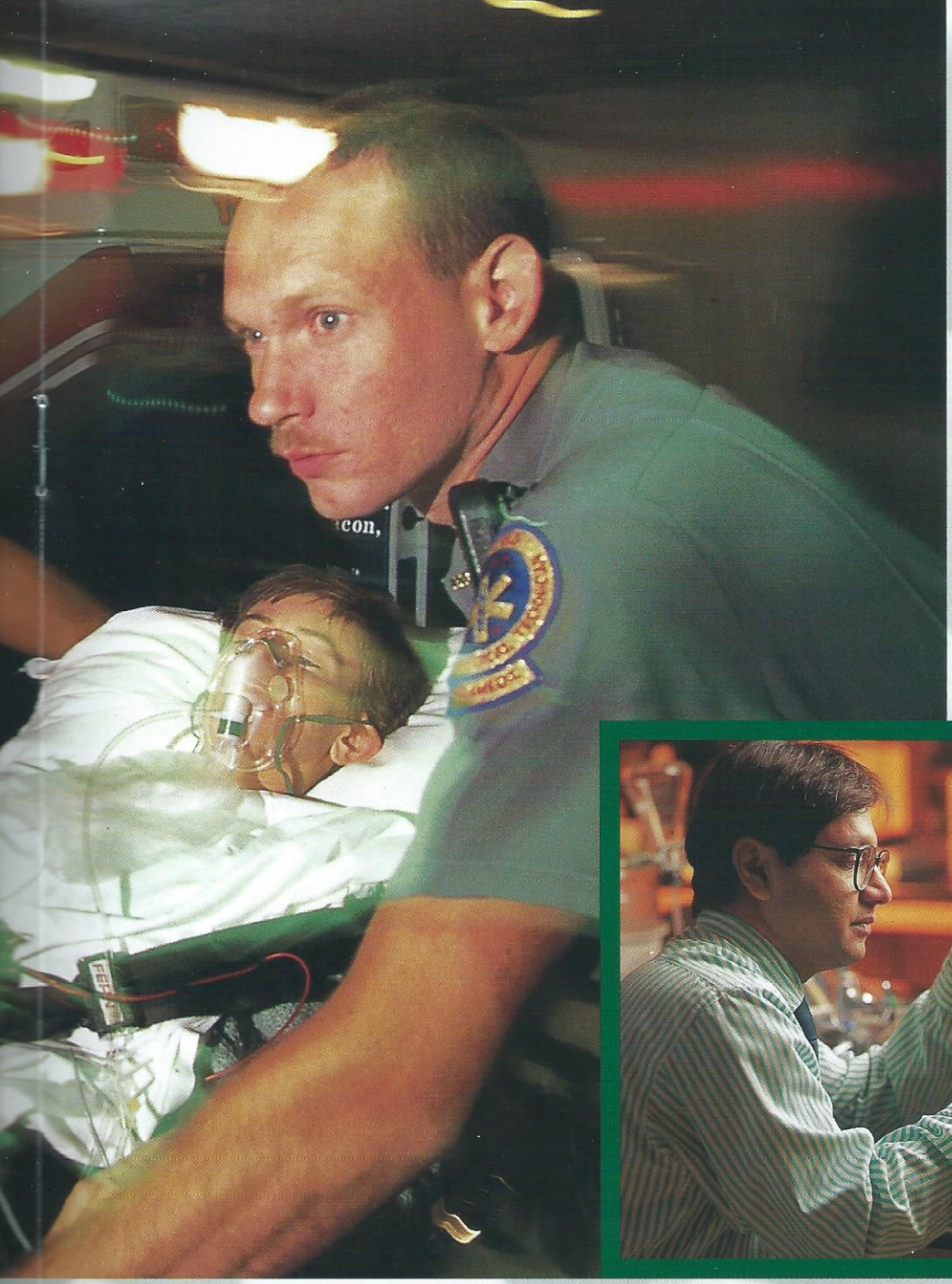
But what happens when a person consumes E-coli tainted food? Why do some people die? And, if we can't control the food chain, can we at least defend ourselves against the disease and possible death?

"When bacteria like E-coli invade your body, your white blood cells and macrophages engulf the bacteria and secrete cytokines — like tumor necrosis factor-alpha and interleukin 1 beta — that kill the bacteria," said Dr. Martin D'Souza, associate professor of pharmaceutical sciences at Mercer's Southern School of Pharmacy. "Once the cytokines are released, the macrophages are unable to regulate or stop them. Even if all the bacteria are killed, cytokines continue to be released into your body, which results in circulatory shock and organ failure. That is what kills you."

With a mortality rate of about 60 percent, septic shock remains the major killer in hospital intensive care units worldwide, with children and the elderly more susceptible to dying. Food poisoning is not the only culprit when it comes to septic shock. Wounds to the body can also bring on an onslaught of white blood cells to battle infection.

The only way to treat septic shock is with antibiotics. "If a patient survives for about a week after developing septic shock, there are several common antibiotics that can be used for treatment. The trick," Dr. D'Souza said, "is getting them past the first few days."

Currently, there is nothing that can be done for patients to ensure they survive those first few days. And although promising new antibodies have been developed to fight cytokines and the onset of septic shock, they must be cultured in a





*"Here at Mercer we're not trying to do what everyone else is doing. Instead we are changing the concept of how it is done."*

*— Dr. Martin D'Souza*

lab in such massive quantities that they are cost prohibitive to use.

"So what the future holds is a slightly different way of treating septic shock," Dr. D'Souza said.

For the past 10 years, Dr. D'Souza has been developing and perfecting a unique method of drug delivery called microencapsulation, a process that appears to be the answer to septic shock. "We take cytokine-neutralizing antibodies and create a microcapsule — a tiny, beadlike structure, less than one micron in size," Dr. D'Souza said. "The microspheres are then injected into the blood stream, where they are taken up by macrophages. This releases the antibodies inside the macrophages."

By microencapsulating the medicine, Dr. D'Souza can reduce the dosage and toxicity of the antibodies, making treatment more affordable and beneficial.

He has seen amazing results in rodent and primate models. "When we treated the animals with microencapsulated neutralizing antibodies, we increased survival by 90-100 percent. The animals that received the antibody in the traditional solution form had only a 10-20 percent survival rate."

Dr. D'Souza and his graduate research students also have tested microspheres of new drugs currently under research or review. In their study, these drugs, CNI-1493 and clondronate, brought excellent results. Before testing the medication in humans, Dr. D'Souza must have approval from the Food and Drug Administration.

With funding from Dialysis Clinic Inc. of Atlanta, Dr. D'Souza's research has expanded beyond septic shock to include treatment of rheumatoid arthritis. He is also studying its effect in delivering anti-tumor vaccines and antibodies used to prevent organ rejection following transplantation.

"Here at Mercer we're not trying to do what everyone else is doing. Instead we are changing the concept of how it is done," said Dr. D'Souza, whose pioneering research may indeed be the key to improved treatment for generations to come. D