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## Deadly mushrooms: Santa Cruz protocol is becoming known internationally

**‘Santa Cruz protocol’ to save lives is becoming known internationally**

*By Jondi Gumz, Santa Cruz Sentinel*

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SANTA CRUZ >> Three hours after Dr. Todd Mitchell’s Dec. 3 flight from Beijing landed in San Francisco, a call demanded his immediate attention.

Mitchell, 59, had spent two-and-a-half weeks in China, which has the most mushroom poisoning deaths in the world, sharing the treatment method he developed at Dominican Hospital.

The call concerned a Santa Rosa hospital patient believed to have eaten deadly mushrooms.

[Principal investigator](#) of an [amatoxin mushroom poisoning clinical trial](#) that has treated nearly 100 patients across North America in the past 10 years, Mitchell arranged for the patient’s overnight transfer to Dominican Hospital.

This patient was the first of seven from outside Santa Cruz County to be treated at Dominican Hospital over the next three days — a cluster of death cap cases.

On Dec. 4, the call came from closer to home.

A Mexican-Indian family of five at Natividad Medical Center in Salinas had eaten soup made with wild mushrooms that looked similar to edibles they foraged in Mexico. They had no idea their mistake could be deadly.

Four members of the family ate them for dinner and a fifth ate the leftovers for breakfast.

Unfortunately, death caps are tasty, and cooking does nothing to reduce the toxic effects.

Dominican Hospital agreed to treat the entire family — a last chance to save their lives.

“The sickest cohort I have ever seen,” Mitchell said.

**GRIM ODDS**

One was a 19 month old. For the youngest, the odds of survival after ingesting amatoxin — the poison in the mushrooms — are grim.

After six hours on the “Santa Cruz protocol,” the toddler’s condition improved but remained critical. She was flown to UC San Francisco Medical Center, ultimately undergoing a liver transplant five days later. Her aunt recovered after undergoing a liver transplant at Stanford.

Treating six patients with amatoxin poisoning, a life-or-death situation, strained Dominican Hospital’s resources.

“It was like a bus accident occurring right in front of the hospital,” Mitchell said, reporting most of the family members returned home after five days at Dominican.

Later that week, Oakland hospitals used the Santa Cruz protocol for two patients with amatoxin mushroom poisoning. Both recovered.

Around the world, rapid recovery is not the usual outcome.

“These mushrooms continue to wipe out entire families each and every year in Nepal, South Africa, Russia, Ukraine, Vietnam and India as well as China,” Mitchell said. “Amatoxin mushroom poisoning is an unrecognized worldwide public health crisis. Literally, hundreds die every single year.”

The [Santa Cruz Fungus Fair](#) at the Louden Nelson Community Center aims to help people figure out the difference between deadly and delightful mushrooms, with Henry Young and Debbie Viess speaking on that topic this weekend.

## STEPPING UP

Dominican Hospital provides the home of this clinical trial, with the Dignity Health Institutional Review Board providing oversight required by the U.S. Food and Drug Administration.

Hospital pharmacy staff volunteered to stock and ship silibinin, purified from the common milk thistle and which must be given intravenously as soon as possible.

After hours, at night, on weekends — the pharmacy staff receives urgent calls for the medication, which is kept in locked storage bins.

“It’s always an emergency,” said Mitchell. “But Dominican always finds a way to get the antidote delivered within 24 hours of the initial hot line call.”

Since July, the pharmacy had shipped the antidote to liver transplant centers affiliated with Indiana University, Duke University in North Carolina, Thomas Jefferson University in Philadelphia, University of Rochester, UC San Francisco and the Cleveland Clinic.

Mitchell said all seven of those severely poisoned patients enrolled in the clinical trial made complete and rapid recoveries.

Dominican pharmacists calculate how much to send, package the drug, add mixing instructions and

consent forms and negotiate shipping arrangements for FedEx SameDay.

“We get it to San Francisco and they fly it out,” said clinical consulting pharmacist Glenn Robbins. “Calls, texts, we get it there.”

Robbins, 61, began working at Dominican Hospital’s pharmacy in 1986 and saw it become a 24/7 operation 12 years ago.

He answers telephone questions about mixing the drug, maintains the inventory and keeps up with the FDA paperwork.

The pharmacy has 18 pharmacists and 18 technicians, all of whom had to be trained to know what to do.

“They’ve done a yeoman’s job,” Robbins said.

Mitchell, a UC Santa Cruz alum who has practiced medicine in Santa Cruz for 28 years, is amazed at the [support provided](#) by a community hospital that has no medical school affiliations with Stanford University or UC San Francisco.

## IMPROVING ODDS

Mitchell’s dive into amatoxin poisoning treatment began [in January 2007](#) when a local Mexican immigrant family of six ate tacos made with death cap mushrooms foraged at Wilder Ranch State Park.

Searching online for an alternative to a liver transplant, he asked Madaus, a German drug company, to ship its European-licensed antidote, silibinin, brand name Legalon SIL, via air courier to Santa Cruz.

Ownership of the drug has changed hands several times since. In mid-2007, Madaus was [acquired by Rottapharm](#) of Italy, which was [acquired in 2014 by Meda](#) of Sweden, which was [acquired by Mylan](#) in August.

Mylan made [headlines](#) last year after the company headed by Heather Bresch raised the price of the lifesaving allergy treatment EpiPen by 400 percent as her own compensation grew 600 percent.

Currently, because Legalon SIL is part of a clinical trial, Mylan provides the drug to patients at no charge.

Silibinin had never been tested in a well-designed clinical trial, according to Mitchell, noting the drug had developed a reputation for being unreliable.

Of nine people in Australia treated with the drug between 2000 and 2013, four died; one needed a liver transplant.

In 2015, dozens of amatoxin mushroom poisonings occurred [in Germany](#) among Syrian refugees foraging for food. Of 40 given the drug, at least 10 died or needed a liver transplant.

Mitchell discovered that silibinin fails when the patient's kidneys, gallbladder and biliary tract are not given appropriate attention during treatment.

Feeding patients, he said, allows bile to recirculate back to the gut, allowing the amatoxin poison to re-attack the liver again. Kidney function and a brisk urine output must be maintained for silibinin to work successfully, he added.

If the patient gets plentiful intravenous hydration, the kidneys can move amatoxin into urine to exit the body; however, insufficient intravenous fluids lead to kidney injury and treatment failures.

Patients who recover on the Santa Cruz protocol "are virtually good as new," Mitchell said.

## GLOBAL INVITES

In late November, Mitchell presented in Singapore at the [15th Annual Asia Pacific Medical Association of Medical Toxicology](#).

Invited for the first time to China, Mitchell set up two demonstration projects to begin this summer. He presented at an acute liver failure symposium in Kunming, capital of Yunnan Province, where up to 100 deaths occur each year from amatoxin mushroom poisoning.

He was invited to Shenyang, a city the size of Chicago near the North Korean border, where 17 people died in University Hospital from amatoxin poisoning last summer.

In Beijing, he participated in a daylong meeting with the head of the national Chinese Centers for Disease Control and Prevention Poison Control.

Treating the cluster of Bay Area cases slowed Mitchell's progress on publishing the clinical trial results, which could be midyear, but the experience provided a wealth of data that backed up his suppositions.

"We can't recover every single poisoning, but fortunately it's quite rare when the protocol does not successfully do so," he said.

The amatoxin hot line: 866-520-4412 or 412-563-1400.

## Fungus Fair

What: 43rd Annual Santa Cruz Fungus Fair, speakers, cooking demonstrations, kids' room, panel to identify mushrooms; books, wild mushroom delicacies for sale.

When: 10 a.m. to 5 p.m. Saturday and Sunday.

Where: Louden Nelson Community Center, 301 Center St., Santa Cruz.

Details: Fungus Federation Santa Cruz, [ffsc.us](http://ffsc.us).

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