

This Is U-47700, Once a Lab Experiment, Now a Killer Opioid

The synthetic drug, born of pharmaceutical research, has been co-opted by overseas laboratories to feed America's addiction—and evade U.S. law enforcement

By Jon Kamp and Arian Campo-Flores

PITTSBURGH—Ray and Christine Henney grew anxious when their 25-year-old son, R.J., didn't respond to text messages late one April night.

Mr. Henney drove to his son's apartment near the University of Pittsburgh, where R.J. studied chemistry, early the next morning. The front door was locked, so he climbed a fire escape and jimmied open R.J.'s third-floor window.

He found R.J.'s lifeless body slumped over a desk, face down on a laptop keyboard. Scattered nearby were several syringes and powdery substances. A toxicology test later found that R.J. died of a drug cocktail that included an obscure synthetic opioid called U-47700, a relic of 1970s pharmaceutical research that was never brought to market.

"It was crushing," the father says. "It was the saddest thing I ever saw."

It was also a legal gray area. The narcotics found in R.J.'s system included compounds so novel that the Drug Enforcement Administration didn't move to ban them until five months after his death.

In a high-stakes game of cat-and-mouse, overseas labs are churning out new synthetic drugs at a furious pace, often staying a step ahead of authorities and helping to fuel America's rampant opioid crisis.



R.J. Henney in family photos. *PHOTO: JEFF SWENSEN FOR THE WALL STREET JOURNAL*

The United Nations Commission on Narcotic Drugs estimates that “new psychoactive substances”—a broad list that includes synthetic opioids—are emerging globally at an average rate of one a week. As with U-47700, rogue chemists sometimes piggyback on research by legitimate scientists that was abandoned before making it to the legal market.

“We’re seeing a whole unknown group of poisons being sold as potent opiate drugs or as heroin substitutes,” says James Hall, an epidemiologist at the Center for Applied Research on Substance Use and Health Disparities in Miami. Most are chemical spinoffs of the powerful painkiller fentanyl.

Synthetic opioids are often more deadly than other kinds of common designer drugs, such as artificial cannabinoids or stimulants known as bath salts. Some opioids have flared up before—fentanyl variants caused problems on the West Coast in the late 1970s and 1980s—and they are roaring back at a perilous time.

“What makes this more dangerous and more concerning is the already widespread abuse of opioids in the United States,” says Jill Head, supervisory chemist at the DEA. “It just adds to an already-saturated market.”

Heroin, painkillers and other opioids killed more than 28,000 people in the U.S. in 2014, the most recent year for which nationwide data is available, according to the

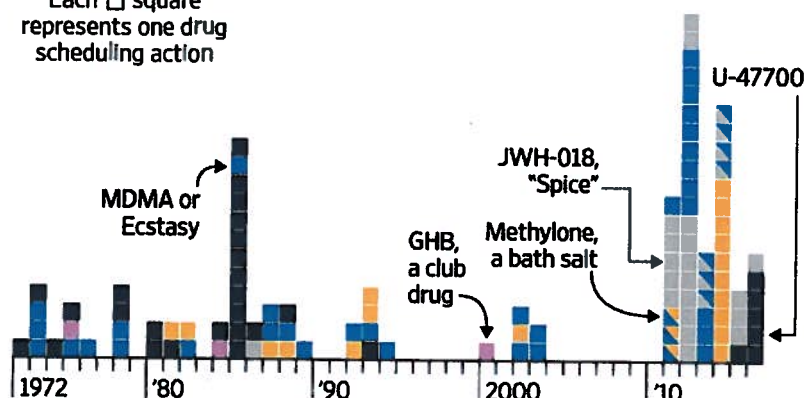
Dangerous Recipes

Drugs added to Schedule I, the most restrictive U.S. category, by the DEA and Congress since passage of the 1970 Controlled Substances Act

Scheduling actions by type of drug

■ Opioid ■ Depressant ■ Stimulant ■ Hallucinogen ■ Cannabinoid

Each □ square represents one drug scheduling action



Note: Drugs can fall under multiple categories; i.e. Methyone is a stimulant and hallucinogen. Actions are in chronological order from top to bottom.

Source: WSJ analysis of Drug Enforcement Administration data and federal legislation
THE WALL STREET JOURNAL.

Centers for Disease Control and Prevention. Data from many hard-hit states show the overdose problem, already at record levels, continues to worsen.

The designer opioids mainly come from Chinese labs, the DEA says, and many labs sell them openly in online drug bazaars. On online drug bazaars, people compare notes on their experiences using the synthetics. The web “really develops the

market for this stuff in the U.S.,” says Gary Tuggle, special agent in charge of the DEA’s Philadelphia division.

The U.S. surveillance system for these chemicals is a largely informal network of crime labs, medical examiners and law-enforcement authorities who share clues and alert each other when they find something new. It can be a laborious task, slowed in part by the challenge of finding something they didn’t know they were looking for.

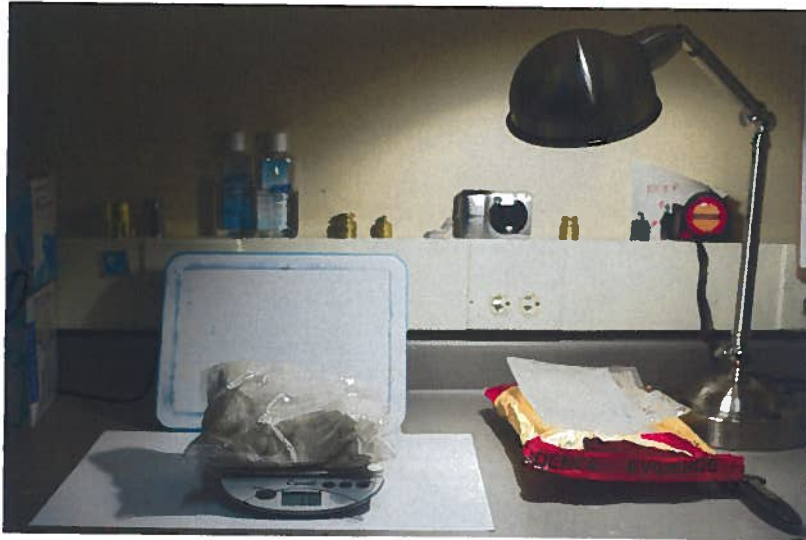
The U.S. government—including Congress and the DEA—has added more than 100 drugs to Schedule I, the category for chemicals the DEA says don’t have a medical purpose and pose a significant abuse risk, since passing the Controlled Substances Act in 1970. This has long been largely reactive, fueled by drug producers intent on evading the law.

“That’s the challenge here for the DEA,” says Larry Cote, a former associate chief counsel in the DEA’s Diversion and Regulatory Litigation Section, who is now a

partner with law firm Quarles & Brady LLP. “The bad guys, I hate to say it, are smart. They always seem to be a step ahead of the regulators.”

The Opioid Crisis

Continuing coverage of how synthetic painkillers became a global menace



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- ♦ The Chinese Connection Fueling America's Fentanyl Crisis
- ♦ For Small-Town Cops, Opioid Scourge Hits Close to Home
- ♦ The Pill Makers Next Door: How America's Opioid Crisis Is Spreading
- ♦ Tramadol: The Opioid Crisis for the Rest of the World
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- ♦ Fentanyl Billionaire Comes Under Fire as Death Toll Mounts From Prescription Opioids
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- ♦ Vermont's Radical Experiment to Break the Addiction Cycle
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At least six states specifically banned U-47700 before the DEA announced plans in September to make the drug illegal. DEA spokesman Rusty Payne said the agency's scheduling actions are subject to “exhaustive reviews,” which take time.

So far this year through September, NMS Labs, a major

private lab outside Philadelphia that works with states around the U.S., has tallied 105 overdose deaths related to U-47700 and 265 fatalities related to furanyl fentanyl—an analog, or chemical compound that is closely related to fentanyl—which also was detected in R.J. Henney’s blood. Axis Forensic Toxicology, a private lab firm in Indianapolis, has seen another 20 deaths linked to U-47700.

“It’s hard to keep track of what’s killing people,” says Karl Williams, chief medical examiner in Allegheny County, which includes Pittsburgh.

The DEA on Sept. 27 announced plans to put furanyl fentanyl on a list of controlled substances in coming weeks.

The U-47700-related fatalities span at least 31 states from Alaska to Utah to Florida. At least four users, including Mr. Henney, have died in the Pittsburgh area.

Christopher DeKleva was discovered dead in his Pittsburgh home in January by his mother. A toxicology test found the 28-year-old had ingested substances including U-47700 and 4-methoxy-butyryl fentanyl, a fentanyl analog that hasn’t been placed on the controlled-substances list.



Denny DeKleva goes through an album of photos of his son Christopher, who died in January. *PHOTO: JEFF SWENSEN FOR THE WALL STREET JOURNAL*

His mother, Karen DeKleva Rebottini, a psychologist who was staying with him out of concern for his well-being, knew he was ordering drugs online. On the day he overdosed, she intercepted a package with markings suggesting it came from overseas. She tossed it out but fears he retrieved it.

“He would try to find the things that could get you high but were ‘legal,’ ” says his stepfather, Rick Rebottini. “When one became listed, he gave it up and went to another one.”

A U.S. and Chinese crackdown last year on a fentanyl variant known as acetyl fentanyl may have primed the market for other synthetic opioids, including U-47700. The DEA issued an order scheduling acetyl fentanyl in July 2015, and China added that drug and 115 other chemicals to a controlled-substances list three months later.

Angel Hao of Wuhan, China-based synthetics vendor Dharmachems said in an email to The Wall Street Journal that these moves boosted the popularity of both U-47700 and furanyl fentanyl.

The origins of U-47700 date to 1973, when Upjohn Co. asked its scientist Jacob Szmuszkovicz to create a drug with the pain-relieving power of morphine, but without the risk, according to a chapter he wrote for a 1999 book on drug research. Researchers wanted to find the Holy Grail that is elusive to this day: potent pain relievers that don't have dangerous side effects, such as addiction and a potentially fatal slowdown in breathing.

By about 1974, Dr. Szmuszkovicz created a chemical Upjohn dubbed U-47700 at a company lab in Kalamazoo, Mich. Researchers knew it was a morphine-like drug when it triggered erect tails in mice, a reaction known as a Straub tail, says Phil von Voigtlander, a retired Upjohn research director who worked on the project. Dr. Szmuszkovicz died in mid-October at age 92.

Another test, which involved shining a hot light on mice's tails to judge how long it took them to move, helped measure U-47700's potency, says Dr. von Voigtlander. He learned the compound worked on the same receptor as morphine with roughly 7.5 times the strength.



A 1984 Upjohn Co. annual report photo shows Phil von Voigtlander, far right, who worked on U-47700, and Jacob Szmuszkovicz, far left, who invented the chemical. *PHOTO: PFIZER*

Further rodent testing also revealed a downside. “Once we saw that it just caused tolerance and dependence like opioids and had opioid side effects, we thought, well, that’s just another morphine and that’s not what we’re looking for,” Dr. von Voigtlander says.

He calls U-47700 an important research steppingstone, and Upjohn patented the chemical. The company never tested U-47700 on people.

These kinds of pharmaceutical research efforts leave behind copious patents and scientific papers, which can serve as recipes for today’s enterprising chemists. Some researchers, such as Mr. Hall, the Miami epidemiologist, believe Chinese labs are scouring patent literature for new synthetic compounds to produce, before selling them.

“That’s the scary thing,” says Dr. von Voigtlander, who lamented that a company’s quest to develop a less-addictive painkiller instead created ammunition for abuse. “We tried vitally to produce alternatives.”

Foreign labs began making U-47700 and offering it for sale online by late 2014, according to a forum on the social-media website Reddit devoted to discussion of chemical vendors and frequented by drug users. Buyers can choose from an array of online vendors selling synthetic drugs, including opioids, dubbed “research chemicals.”

The websites typically carry warnings that the chemicals they sell are “not for human consumption”—an attempt to gain legal cover, authorities say—and that buyers are responsible for complying with their home countries’ laws.

Mr. Hao, from the China-based U-47700 vendor, wrote, “I don’t sell illegal products to U.S.” and “I sell for lab research only.” The DEA spokesman said the term “research chemical” “only exists to evade law-enforcement scrutiny.”

LS Research Chem Lab, a five-year-old company registered in Jiangsu province in China, recently offered U-47700 online for \$120 a gram, or \$290 for 10 grams. It promised fast shipment and offered various payment options, including PayPal. The company, as well as six others that list synthetic drugs for sale, didn’t respond to emails seeking comment.

Several people who claim they used U-47700 told The Wall Street Journal they were drawn to the drug because it was cheap, readily available and allowed them to avoid interacting with street dealers. One user estimated he would have to spend 15 times as much to get the same high from oxycodone, the narcotic prescription pill.

On message boards, users described snorting, injecting or “plugging” the drug in their anus. They lauded U-47700’s euphoric high, but complained it wears off fast and fuels near-obsessive cravings. Many recounted suffering nasal or rectal bleeding.

U-47700 began claiming lives in the U.S. by May 2015, when a 28-year-old man overdosed in Knox County, Tenn. The medical examiner there initially pegged his death to oxycodone, which was in his system. It took many more months to discover U-47700 was also there.

First, labs had to figure out what the drug was. NMS Labs detected U-47700 in November 2015 while testing blood samples from four different states at its facility outside Philadelphia.

“We actually found it by accident,” says Barry Logan, chief scientist there. U-47700 closely resembles a synthetic opioid called AH-7921—another research relic—which NMS had started watching for last year.

NMS, which is now rushing to create new tests to screen for 21 different designer opioids, eventually linked U-47700 to the Knox County case.

The Society of Forensic Toxicologists’ newsletter for March and April cited two 2015 deaths in Texas linked to the drug. Axis, the private lab in Indianapolis, saw its first case this spring, according to Kevin Shanks, a forensic toxicologist there. Growing worries triggered actions to outlaw the drug in states like Georgia and Idaho.

Ohio, a hotbed for opioid abuse and fatal overdoses, was among the first states to take action by placing U-47700 on its controlled-substances list in May. The move came a month after Douglas Rohde, a toxicologist in Lake County, confirmed that an overdose death from January involved U-47700, and a local news program aired a report about it. Authorities in nearby Lorain County also blamed a spate of springtime overdoses on the drug.

The DEA on April 18 told the secretary of the Department of Health and Human Services it planned to make U-47700 a Schedule I drug on an emergency basis. A bulletin in May from the agency’s Philadelphia division cited R.J. Henney’s overdose, without naming him, while warning that deaths linked to the drug were on the rise. The bulletin included a picture of Mr. Henney’s head on his drug-strewn desk.

This spring, R.J. Henney showed his mother how he could access the darknet, a restricted part of the internet and a known drug market, she said. A drug shipment his parents later discovered arrived in what looked like a greeting card, with

calligraphy on the envelope. Another came in a cellophane-wrapped DVD case for “Lord of the Dance,” an Irish musical.



Ray, Christine and Megan Henney listen to a recording of R.J. Henney talking about helping an addict he met at a gas station. *PHOTO: JEFF SWENSEN FOR THE WALL STREET JOURNAL*

His parents, Ray, a civil engineer, and Christine, a bank director, say he had been a bright child and insatiable reader, though he later struggled with clinical depression and borderline personality disorder. As a teen, he tried a raft of drugs, some illegal. By 2013, he was using heroin. They enrolled their son in treatment programs.

R.J. hated being an addict, and the impact his addiction had on his family, his parents say. A fluid writer, he was open about his struggles.

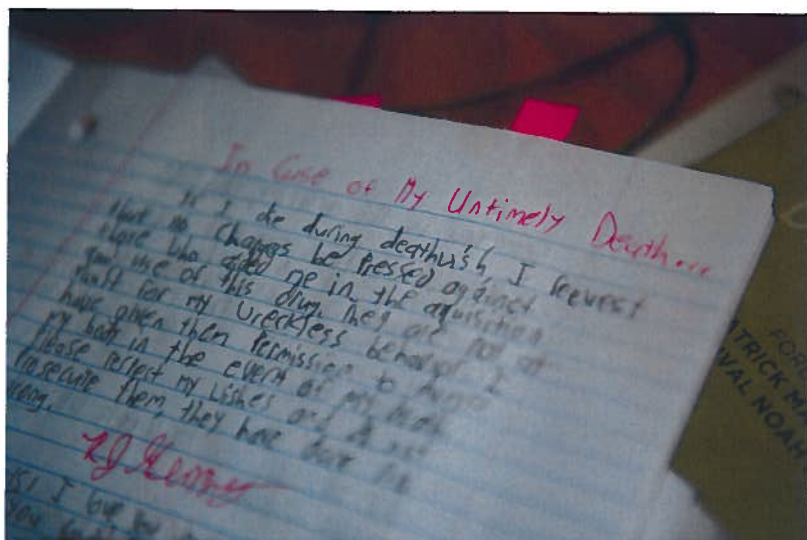
“Those you love begin to fall away, Replaced by a synthetic narcotic bouquet,” he wrote in one poem about addiction posted on Facebook.

On April 10, R.J. posted on the message board drugs-forum.com about his desire to inject fentanyl, which the medical examiner also found in his blood. Some members sought to dissuade him. “Worried about you,” one wrote. “These chems are more powerful. Seriously, don’t f—ing die.”

In an April 11 post, the day before his parents believe he overdosed, R.J. wrote, “I can’t get the needle out of my mind.” Later that night, he sent a text message to a

friend in Germany that his parents still have on his phone. "I made some really bad decisions man and just scared the f— out of myself," he wrote.

A week later, his father introduced himself on drugs-forum.com. "I found his posts looking at his computer after I found his body...dead from an accidental overdose," he wrote. "Such a tragic waste of a brilliant mind...I encourage anyone with addictions to get the help they need."



A will in R.J. Henney's notebook, found after his death. PHOTO: JEFF SWENSEN FOR THE WALL STREET JOURNAL

On Sept. 7, the DEA moved to add U-47700 to Schedule I. The agency spokesman noted that U-47700 is an analog of AH-7921, which the DEA scheduled in the spring. The DEA has the authority to treat analogs of controlled substances as illegal drugs.

Some people scrambled to stock up on the drug after the DEA's scheduling announcement, according to interviews with users and comments some users posted online. Others discussed potential alternatives, including more castoffs from Upjohn's research with similar "U" names.

Chinese labs "have a backup list a mile long," a 26-year-old former U-47700 user said in an interview, adding: "If [the DEA doesn't] think there are entire communities analyzing and making and testing new chemical structures every day, then they have no idea how our world works."

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