The Guardian

Australian students recreate Martin Shkreli price-hike drug in school lab

Sydney Grammar students create HIV and malaria drug Daraprim in their school laboratory, putting results online

Sydney students recreate life-saving drug that had 5,000% price hike

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A group of Australian high school students have managed to recreate a life-saving drug that rose from US$13.50 to US$750 a tablet overnight after an unscrupulous price-hike by former hedge fund manager Martin Shkreli.

The Sydney Grammar students reproduced the drug, Daraprim, used to treat a rare but deadly parasitic infection, in their high school laboratory with support from the University of Sydney and global members of the Open Source Malaria consortium.

Dr Alice Williamson, a postdoctoral teaching fellow with the university's school of chemistry, said she could not stop dwelling on the story of Shkreli, who acquired Daraprim last year through his company, Turing Pharmaceuticals, and almost immediately and exorbitantly hiked the price. The drug is used to treat malaria and to prevent toxoplasmosis infection in people with HIV.

The move made him a public villain, a label he embraced as he also became known as "Pharma Bro".

"I couldn't get this story out of my head, it just seemed so unfair especially since the drug is so cheap to make and had been sold so cheaply for so long," Williamson said.

"I said 'Why don't we get students to make Daraprim in the lab', because to me the route looked pretty simple. I thought if we could show that students could make it in the lab with no real training, we could really show how ridiculous this price hike was and that there was no way it could be justified."

Sydney Grammar could afford to pay for the equipment and chemicals, and had the facilities. The group of year 11 students were talented and confident, Williamson said, and decided to give it a go.

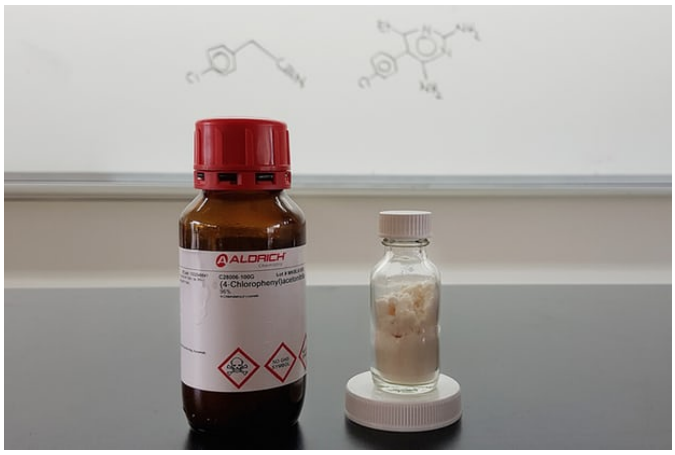
The students made their work open to the internet, and scientists anywhere in the world were able to view all the data generated and mentor the students to accelerate their progress. Williamson and the university's associate professor Matthew Todd also

mentored the students.

Todd told Guardian Australia that what the students had achieved was “a little Breaking Bad”, a television show about a struggling high school chemistry teacher who works with one of his former students to produce and sell crystal meth.

“With the right guidance they could do everything safely,” Todd said.

“There were clues in literature already from patents around these molecules, but they had to change things as some reagents were nasty and dangerous so some invention was needed on their part. The open source platform meant as they posted data in real time, Alice, myself and others could guide them.”



Ingredients for Daraprim with the powdered drug the students created in their school lab. Photograph: Dr Alice Williamson

He said the open nature of the project demystified science and revealed the number of roadblocks the students had faced in coming up with the final product, which involved three complicated chemical steps.

“With science results you can be presented with a polished finished product that hides the false steps along the way,” he said. “The students’ real-time diary highlights their whole process, and is a very transparent way of doing things.”

The students realised they had succeeded two weeks ago when their teacher, Dr Malcolm Binns, brought Todd and Williamson a sample.

“Alice did the analysis and looked at the screen and said ‘Oh my god, they’ve done it’,” he said.

“And not only have they done it, it’s super pure. It’s A-grade. I couldn’t believe my eyes. That was the moment. I realised they had nailed it. The students were over the moon.”

He said unfortunately the students would not be able to sell their drug to the US market. While the drug can be bought in Australia for about A$13 for a packet of 50, there are a number of complicated legal roadblocks in the way of producing and selling it in the US.

“Turing has the exclusive rights to sell it, even though the drug is no longer under patent,” Todd said. “The ridiculousness of this legal loophole means if we wanted to launch it as drug in the US we’d have to go through a whole new clinical trial because we

would have to compare the Sydney Grammar stuff with the officially sanctioned stuff, and Turing would have to give us the drug to allow those comparisons to be made.

“It’s not just a matter of going to the store and buying the Turing drug either, they would have to hand it over directly.”

In response to a question on Twitter about whether the schoolboys were competition, Shkreli simply tweeted: “No”.

Watch Dr Alice Williamson discuss open drug discovery here

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