



GUARDIAN ANGEL

In just over a decade since its commercial release, a UQ vaccine breakthrough has significantly lowered the risk of HPV-related cancers for thousands of women around the world, with 205 million doses distributed in 130 countries to date.

As the world celebrates a decade since the launch of two vaccines for the human papillomavirus (HPV), the widow of one the two UQ researchers responsible says her late husband would have been humbled to have played a role in such a breakthrough.

“To save one life is humbling, but contributing to saving millions is overwhelming,” says Dr Xiao Yi Sun.

But this is exactly what happened when Dr Sun’s husband and research partner Dr Jian Zhou, together with Professor Ian Frazer AC, developed the revolutionary HPV vaccine which prevents cervical cancer and other HPV-related cancers.

Dr Sun holds fond memories of working alongside her husband, who died in 1999, and says that 10 years on from their 2006 release on the market, the vaccines’ positive effects are now becoming clear.

“The development of the vaccines has meant a longer and healthier life for so many women,” she says.

“This is thanks to the huge number of people devoting a large part of their lives to keeping the fight against this terrible disease at the forefront of government thinking all around the world.”

The vaccines were initially made available at a low cost to several developing nations where cervical cancer has the greatest mortality rate. They are now available in more than 130 countries, and more than 205 million doses have been distributed worldwide.

In Australia, free vaccines were first made

available to teenage girls in 2007. Then in 2013, the Australian government announced the extension of the vaccination program to include teenage boys. In boys and young men aged nine to 26, the vaccines help protect against about 90 per cent of genital warts cases.

Four out of five people are believed to have been exposed to HPV, which is proven to cause genital warts and cervical cancer, and is linked to the development of cancers of the anus, penis, mouth and throat. Cervical cancer is one of the leading causes of cancer deaths among women in low-income countries, according to the World Health Organization.

The efficacy of the HPV vaccine is astonishingly high. In girls and young women aged nine to 26, the vaccines have been proven to protect against two types of HPV that cause about 70 per cent of cervical cancer cases, and two more types that cause about 90 per cent of genital warts cases.

It also protects against about 70 per cent of vaginal cancer cases and up to 50 per cent of vulva cancer cases. One of the latest HPV vaccine versions now protects against as many as nine strains of the disease, showing its continued development and progression.

But while young women in the developed world have easy access to these potentially life-saving vaccines, women in poorer countries are less fortunate. Most of the 250,000 cervical cancer deaths each year occur in the developing world, where Pap smear tests to screen for the disease are not widely available.

A momentous step forward for the vaccine was announced this year, when authorities in China (the birthplace of Dr Zhou and Dr Sun) verified the approval to sell one of the HPV vaccines domestically from 2017.

“The recent approval by the Chinese Government is a giant step in improving women’s health in China,” says Dr Sun.

“We have seen the success in other countries that have introduced a vaccination program. To extrapolate those figures to a populace the size of China will see a dramatic difference in the quality of women’s health.”

Dr Sun says her husband would have been pleased with the results now being realised around the world.

“Jian was a very humble man and was happiest when working in his lab. I don’t think Jian would have seen this as his discovery, his vaccine or his achievement. Were he alive today, he would simply be happy to have been part of something that saved lives,” she says.

“I am so proud of Jian’s work, and hold equal amounts of surprise and disappointment that the country of our birth took so long to introduce a vaccination program.

“The benefits have been remarkable and I always had faith in the effectiveness of the vaccine, but the Australian government needs to be applauded. Without that level of commitment and funding, the nation’s cervical cancer reduction rates would look very different.

“I hope other governments will look at these results and realise that the investment in

early prevention ensures significant savings in the long run, and less impact on the overall healthcare budget.”

Dr Sun believes her husband would hope future medical scientists become inspired to innovate and are given the same opportunities he enjoyed. “Jian enjoyed fostering talent and mentoring those eager to learn. Through the Dr Jian Zhou Memorial Scholarship, he continues to identify and develop research talent.” Professor Frazer says the success of the vaccine demonstrates the power of teamwork to make a significant difference to global health through disease prevention.

“Introduction of the vaccines into China would demonstrate the commitment of the largest country on the planet to the eradication of a common preventable disease, and would therefore set an example for other developing economies to follow,” he says.

The 2006 Australian of the Year believes his co-creator Dr Zhou would have seen this as a measure of the influence of scientists educated in China to make a real difference in global health.

“While the figures are encouraging, the real success will be with universal adoption of immunisation,” says Professor Frazer.

Cancer Council NSW Director of Cancer Research Professor Karen Canfell reflected on the impact of the vaccines during the 2016 Jian Zhou Memorial Oration at Brisbane’s Customs House in October this year.

“In the first four to five years, we have observed a 90 per cent decrease in HPV prevalence for the vaccine-included HPV types in 18–24-year-old women,” says Professor Canfell.

The co-principal investigator of Compass, the first ever large-scale clinical trial to assess screening tests in a HPV-vaccinated population, says there is also a marked decline in anogenital warts in women in their early 20s, and a decline in the rates of genital warts in young heterosexual men, even before they were included in the vaccination program.

“The incidence of cervical precancerous abnormalities shows a 36 per cent reduction in 20–24-year-olds, which means they will be at a lower lifetime risk of ever developing cervical cancer,” says Professor Canfell.

“With the HPV vaccine program rolled out in 2007 and offered to all women up to 26 years of age, we have now reached a huge milestone where every woman in Australia aged 35 years and younger is better protected against HPV than ever before – a truly remarkable feat.

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Timeline:

1990: Research begins when molecular virologist Dr Jian Zhou joins Professor Ian Frazer at UQ to tackle the problem of developing a vaccine for HPV

1992: UniQuest submits a complete patent application on the HPV technology

1994: UniQuest licenses the intellectual property to CSL Limited in Melbourne

1996: CSL sub-licenses the HPV technology to Merck & Co. and retains the right to market in Australia and New Zealand

1999: Dr Jian Zhou passes away

2001: The Phase 3 clinical trial involving more than 12,000 women aged 16–26 from 13 countries begins

2005: CSL enters into a cross-licensing and settlement agreement with GlaxoSmith Kline for their cervical cancer vaccine product called Cervarix

2006: Food and Drug Administration (FDA) approves Gardasil 2006: Professor Frazer is named Australian of the Year

2006: Therapeutic Goods Administration approves Gardasil for use in Australia and the vaccine is administered privately

2007: Australia becomes the first country to roll out a national HPV vaccination program

2009: FDA approves Cervarix

2012: Professor Frazer is named a National Living Treasure and receives a Companion of the Order of Australia

2013: Males are included in the National HPV Vaccination Program

2015: Professor Frazer and the late Dr Zhou receive Popular Prize at the European Patent Office’s Annual European Inventor Awards

2016: Findings published in the journal *Clinical Infectious Diseases* suggest Australian women who received the full three courses of Gardasil have experienced an 86 per cent reduction in HPV infection

2017: Prime Minister Malcolm Turnbull announces an improved version of Gardasil that has been shown to prevent 93 per cent of HPV strains, up from 70 per cent

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