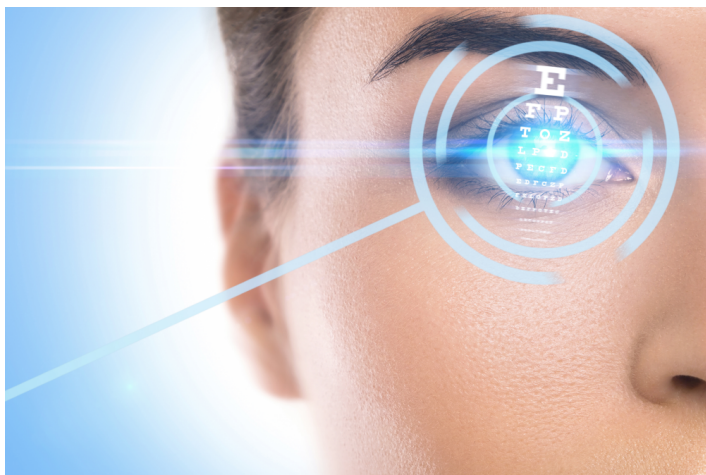


# Laser-Accident-Turned-Surgery-Breakthrough Wins Golden Goose

A team of physicists and clinicians will today be honored for their development of the bladeless eye surgery technique known as LASIK, an advance partly aided by a lab mishap involving an eye and a laser.

By **Katherine Wright**

Five years after they were awarded a Nobel Prize for developing techniques for generating high-intensity laser pulses (see [Focus: Nobel Prize—Lasers as Tools](#)), Gérard Mourou of École Polytechnique, France, and Donna Strickland of the University of Waterloo, Canada, are back in the laser spotlight. Today they are among a team of five being awarded a Golden Goose Award for their approach to corrective eye surgery that uses a laser rather than a blade.



A serendipitous lab accident led to the development of femtosecond-laser-based eye surgery techniques; procedures now undergone by around 25 million people in the US alone. Credit: [blackday/stock.adobe.com](#)

The Golden Goose Awards—originally conceived by US Representative Jim Cooper as a counterpoint to criticisms that funding basic research is a wasteful way to spend taxpayer dollars—are given out each year to researchers whose seemingly obscure idea led to an unforeseen breakthrough that has significantly impacted society. Past winners of the awards, which are conferred by the American Association for the Advancement of Science (AAAS), include David Sachar, whose experiments with frog skin led to a treatment for cholera, and Lotfi Zadeh, whose “fuzzy” logic appears in the control of everything from vacuum cleaners to antilock brakes.

“It has been an honor to watch the Golden Goose Award grow over the past decade,” Cooper said in a statement. “Remarkable scientific discoveries—and the people behind them—are as important as ever.” Sudip Parikh, chief executive officer at AAAS, added: “The Golden Goose Award reminds us that potential discoveries could be hidden in every corner.”

The hidden corner for corrective eye surgery was a lab accident. Thirty years ago, while carrying out experiments at the University of Michigan, one of Mourou’s graduate students accidentally hit his eye with the beam of a femtosecond laser. He was taken to the hospital where the ophthalmologist on duty—Ron Kurtz—observed that the damage was “perfect.” The beam had burned out a precise circular silhouette in the student’s retina, a feat not possible with other lasers in clinical use at the time. “Immediately we realized that we had something,” Mourou recounted in [an interview](#) with a French

radio station.

“It was an accident but also a very important step,” says Tibor Juhasz, who was working in Mourou’s lab at the time. The chance meeting brought together physicists and clinicians who would eventually help make laser-based eye surgery a safe and reliable procedure. Juhasz studied ophthalmic applications of femtosecond lasers and is currently the CEO of ViaLase, while Kurtz—the hospital ophthalmologist—built a career developing lasers for eye surgery and is now the CEO at RxSight. Along with Detao Du at Rayz Technologies, they share the Golden Goose with Mourou and Strickland.

It’s worth noting what eye surgery was like before the serendipitous lab accident. For those undergoing nearsightedness correction, for example, a surgeon would first cut open a flap in the cornea, then reshape the underlying cornea, and finally replace the flap. The cutting was usually done with a vibrating razor, but preliminary research at the time was beginning to explore using picosecond lasers. However, Juhasz notes that those lasers—and the blade—caused significant collateral damage to the surrounding eye tissue.

Laser-surgery researchers solved the damage issue by switching to femtosecond laser pulses, which have a significantly shorter duration and thus produce a more precise cut. The improvement was such that “collateral damage into the adjacent tissue practically disappeared,” Juhasz says.

The damage reduction also meant that despite the technique’s

newness and its hefty price tag, people were quick to opt in for laser-assisted eye surgery, or bladeless LASIK as it is now known. “Everybody liked the high-precision laser idea,” Juhasz says. He notes that his son has since undergone the procedure and now has “perfect” eyesight.

Strickland was surprised to learn that she was one of the awardees, as she helped in the development of femtosecond lasers but not in the subsequent jump from physics into the medical world. That said, she sees benefits for awards such as the Golden Goose as they highlight the unexpected payoff from investing in “esoteric research.” She gives the example of early theoretical work by Albert Einstein that set the stage for the invention of the laser. “I don’t think when Einstein came up with those equations he was thinking ‘yes, some day they’re going to make a laser out of these.’”

Also receiving Golden Goose Awards today are Manu Prakash of Stanford University and Jim Cybulski of Foldscope Instruments for their paper-based microscope, which costs less than a dollar to manufacture; and Lourdes Cruz of the University of the Philippines and J. Michael McIntosh and Baldomero Marquez Olivera from the University of Utah, who discovered a nonopioid pain medicine while studying snail venom. Craig Clark is posthumously celebrated for his work on that study.

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