

# ‘Modest’ Until It Comes to Donations

## PHILANTHROPY: Riggs gifts \$310M to City of Hope

By **HOWARD FINE** Staff Reporter

He was a pioneer of the modern biotech industry and was lead researcher on the team that developed artificial insulin, which tens of millions of people around the globe now use to treat diabetes.

In recent years, he has turned to philanthropy, becoming the largest single donor to City of Hope's research programs in its 100-plus year history.

But few people had heard of **Arthur Riggs** until he came forward last month with a \$100 million gift to Duarte-based **City of Hope**.

“City of Hope convinced me that if my donations were made public, I could encourage others to follow suit,” Riggs told the Business Journal in a rare interview.

That gift followed roughly \$210 million worth of previous donations by the modest Riggs to City of Hope, which last month renamed its Diabetes and Metabolism Research Institute in his honor.

Riggs, 81, has spent almost his entire career at City of Hope, joining in 1969 and retiring only in October as director of the institute.

Besides the landmark research that led to commercialization of the first artificial insulin, Riggs also developed tools to produce recombinant monoclonal antibodies in host cells. If that sounds familiar, that's because monoclonal antibodies are now being used to treat Covid-19 patients.

In addition, Riggs' collaboration with a scientist at a then-fledgling South San Francisco company called Genentech Inc., helped catapult that company to the forefront of the West Coast biotech industry in the 1980s.

“He was right there, at one of the starting points of the modern biotech industry — his team at the City of Hope was the first to make a gene that worked to treat a disease,” said **Peter Dervan**, Bren professor of chemistry at **Caltech**, who recently wrote a forward to a book compiling Riggs' research notes. “Yet even though his work has improved the lives of millions of diabetics worldwide, he is relatively undiscovered and certainly underappreciated.”

### Early work

Riggs grew up in post-war San Bernardino, attended **San Bernardino High School** and

then **UC Riverside**.

“I found I had a real talent for chemistry. I loved performing chemistry experiments, and I was good at it,” Riggs said. “I decided to combine my talent in chemistry and use that to improve treatments for disease.”

His graduate work at Caltech and post-doctoral work at the **Salk Institute for Biological Studies** in La Jolla focused on the mechanisms that turn genes on and off.

When he then joined City of Hope at age 29, research in this field had reached a critical early phase. The structure of DNA had been

laid out just 20 years earlier by several researchers — including famed scientists **James Watson** and **Francis Crick**.

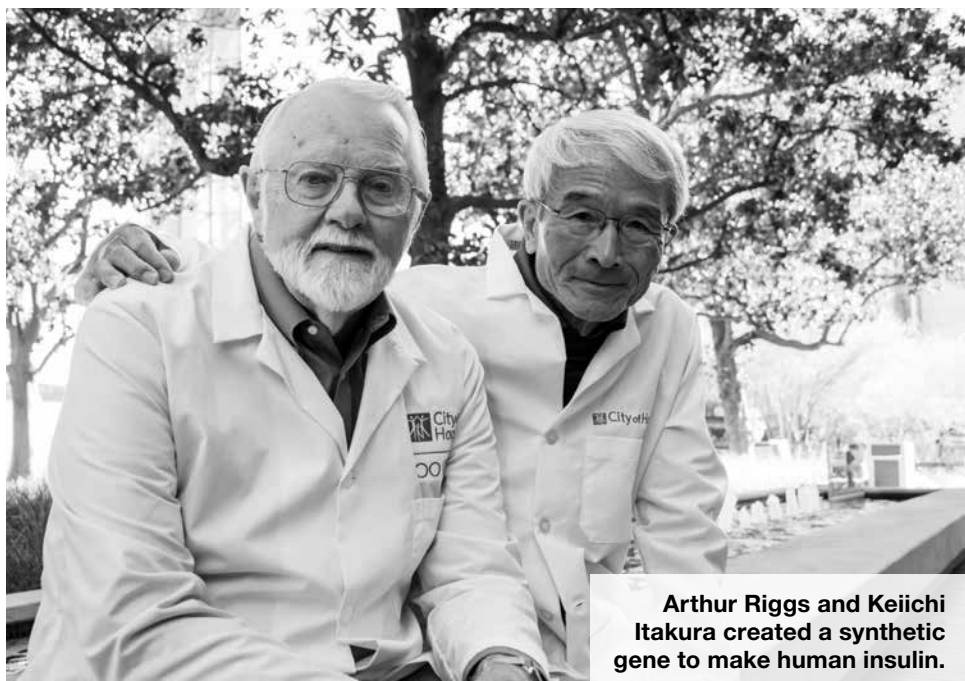
Throughout the 1960s, techniques were developed to analyze and snip DNA segments. In the early 1970s, Riggs and his research team at City of Hope started working on the next step: using DNA fragments to make genes that could then be applied as therapies to treat diseases.

“We were trying to develop technology to chemically synthesize genes,” Riggs said.

To help in that effort, Riggs recruited **Keiichi Itakura**, who, as a researcher in Canada,



**Long Career: Riggs joined City of Hope in 1969.**



**Arthur Riggs and Keiichi Itakura created a synthetic gene to make human insulin.**

had developed a technique to make DNA using chemical synthesis.

At City of Hope, the pair worked with about 10 other researchers to develop a small synthetic gene with 14 amino acid components, known as somatostatin. But, according to Itakura, a problem cropped up.

“The artificial somatostatin was proving not to be very stable when injected inside a bacterium,” Itakura said. “Dr. Riggs had the idea of combining the small somatostatin gene with a larger protein to give it more stability. That was a critical development. Without it, the artificial gene would not have been of much use.”

### Artificial insulin

With that problem solved, the researchers moved on to their real goal: making a bacterial gene that commanded bacteria to create human insulin.

“We chose insulin because it looked doable, and there was a need,” Riggs said. “At the time, diabetics were being treated with cow insulin because there was no source of human insulin. And cow insulin resulted in a high rate of allergic reactions.”

Around this time, the team added another key researcher, **Herb Boyer**, who was working for Genentech.

In 1979, the team applied for a patent for its synthetic gene used to make human insulin. Meanwhile, Genentech was using its private lab to begin scaling up the process to make enough insulin to be commercially viable.

Five years later, the Food and Drug Administration approved the synthetic insulin, which Genentech began marketing as Humulin. It was the first instance of a synthetic gene being used to create a drug that could treat a disease.

After Genentech inked a deal with Indianapolis-based pharma giant **Eli Lilly and Co.**, the synthetic insulin drug Riggs helped develop put Genentech on the map.

“Genentech was the first rock star of the biotech industry on the West Coast,” Caltech’s Dervan said.

By 1986, Riggs had started receiving royalties from the sale of Humulin. As of 2019, according to Eli Lilly’s annual report, sales of Humulin were \$1.3 billion; global sales of the drug have topped \$1 billion a year for at least the last decade.

### Antibody research

Riggs could have left City of Hope for more lucrative and high-profile positions at Genentech, now part of Basel, Switzerland-based pharma giant **Hoffmann-La Roche**, or another pharmaceutical company. Instead, he chose to remain as a researcher at City of Hope.

“It turned out to be a very good place to do research,” he said. “I was mostly focused on basic research, trying to understand how things work. And City of Hope is also a hospital, so I could see both the need and that practical applications of the research in curing or treating very serious diseases.”

Riggs next turned his attention to improving antibodies, which are at the center of the body’s immune response to diseases. His team’s work in synthesizing antibodies by converting mouse antibodies into human antibodies led to more patents and ultimately to treatments for cancer and various autoimmune diseases.

Riggs said several companies, including Genentech, negotiated licensing deals with City of Hope for this new technology. Genentech in turn, licensed the technology out to other biotech and pharmaceutical companies.

According to Dervan, the monoclonal antibody technology developed by Riggs and his research team has formed the basis for at least 70 drugs to treat a diverse range of diseases, from the popular breast cancer treatment Herceptin to rheumatoid arthritis drug Humira.

After that work, Riggs was chosen to lead City of Hope’s Diabetes and Metabolism Research Institute. He has spent much of the last 20 years in an administrative role, developing City of Hope’s diabetes research program.

### Quiet philanthropy

At around the same time, Riggs quietly began giving back some of his rapidly accumulating royalty payments in a series of anonymous donations to City of Hope, supporting the research efforts he was leading.

“I wanted to continue working as a scientist and wanted to be treated as other scientists, not as someone in the limelight who made major gifts,” he said of his decision to keep his philanthropic gifts anonymous.

Dervan and colleague Itakura, though, cited another reason: Riggs’ modest character.

“He has always been very soft-spoken, very modest — even kind of shy,” Itakura said.

Eventually, though, it became an open secret that he was gifting tens of millions of dollars at a time to City of Hope.

Then, at the end of last year, when Riggs finally retired at age 80 from his research administrative post, he decided to make his biggest gift to date.

“Dr. Riggs’ \$100 million donation is the largest single gift from a donor to City of Hope,” said **Kristin Bertell**, City of Hope’s chief philanthropy officer. “His latest gift makes Dr. Riggs the most generous donor to City of Hope research to date, giving more than \$310 million cumulatively.”

That’s when Riggs and City of Hope leadership both agreed that he would go public and that the research institute he led for more than 20 years would be renamed in his honor.

As for the future, Riggs said that, although he has retired from his administrative post, he is continuing with his diabetes research, helping to lead a team of 10 researchers at City of Hope in this effort.

“I could have retired into a South Pacific mansion and enjoyed myself on the beach, but I would have been bored within a week,” he said. “I’m going to keep going as long as I can. There is such a need for diabetes research and treatment; diabetes is an epidemic, and it is becoming a huge problem for world health. My goal remains to cure diabetes in my lifetime.”

### City of Hope

**HEADQUARTERS:** Duarte

**BUSINESS:** Comprehensive cancer center and biomedical research institution

**CEO:** Robert Stone

**EMPLOYEES:** 6,800

**TOTAL RESEARCH GRANT REVENUE:** \$170.5 million (2020)

**NOTABLE:** City of Hope is one of only 51 comprehensive cancer centers in the nation. Its research has led to four of the most widely used cancer treatments — Herceptin, Erbitux, Rituxan and Avastin.