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Samuel Achilefu: *The Visionary Behind Infrared Goggles Revolutionizing Cancer Surgery*

By Chuka Odike

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FEATURE
IMAGE

**Samuel Achilefu - Washington
University, USA.**

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SAMUEL ACHILEFU

Samuel Achilefu: The Visionary Behind Infrared Goggles Revolutionizing Cancer Surgery

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A surgeon in the operating room, peering through a pair of high-tech goggles that light up cancer cells in a glowing blue hue, making the invisible visible. This isn't science fiction—it's the groundbreaking work of Samuel Achilefu, a Nigerian-born scientist whose invention of infrared goggles has transformed cancer surgery. Born in northern Nigeria in 1963, Achilefu's journey from a war-torn childhood to a global innovator is a story of resilience, brilliance, and a relentless drive to make a difference. His cancer-visualizing goggles, developed through years of research, are helping surgeons worldwide remove tumors with precision, offering hope to countless patients. Let's dive into the life of this remarkable man and the invention that's changing the fight against cancer.

01

A Childhood Shaped by War and Determination

Samuel Achilefu's story begins in northern Nigeria, where he was born just after the country gained independence. Life was comfortable—his father worked in hospitals and clinics—but everything changed in 1967 when the Nigerian Civil War, also known as the Biafran War, broke out. Achilefu was just five years old when his family fled to the southeast for safety, leaving behind their possessions but holding onto what his father called “a good name.” An inscription on their wall read, “When wealth is lost, nothing is lost.

But when name is lost, everything is lost,” a lesson that would guide Achilefu’s life.

Growing up in the Eastern Nigeria during the war, Achilefu attended village schools, where he saw brilliant children with big dreams but little opportunity. Despite the chaos, his own intelligence shone through. He developed a love for French, which earned him a French government scholarship—one of only five awarded—to study in France. There, at the University of Nancy, he earned a PhD in molecular and materials chemistry, writing his thesis in French. He then pursued postdoctoral studies at Oxford University, focusing on oxygen transport mechanisms and blood substitutes, setting the stage for a career that would blend science, medicine, and innovation.

02

A Career Built on Curiosity and Collaboration

In 1993, Achilefu moved to St. Louis, Missouri, joining the Discovery Research Department at Mallinckrodt Medical Inc. as its first full-time staff member. By 2001, he was at Washington University’s Mallinckrodt Institute of Radiology, where he founded the Optical Radiology Program—a hub for over 80 researchers working on medical imaging, cancer diagnosis, and therapy. Achilefu’s curiosity drove him to ask, “What if?” What if surgeons could see cancer cells that are invisible to the naked eye? This question, sparked by watching surgeons struggle to remove tumors completely, led to his most famous invention: the cancer-visualizing goggles.

Achilefu’s career wasn’t just about one breakthrough. He holds 59 U.S. patents and has published over 300 scientific papers, exploring everything from light-sensitive drugs to new cancer therapies. He’s served as a professor of radiology, biomedical engineering, biochemistry, and molecular biophysics, and held roles like Director of

the Washington University Molecular Imaging Center. Later, he moved to the University of Texas Southwestern Medical Center, where he now chairs the Department of Biomedical Engineering, holding the Lyda Hill Distinguished University Chair.

03

The Invention That Changed Cancer Surgery

The idea for the infrared goggles—often called “cancer goggles”—came from a simple but powerful need: surgeons couldn’t always tell where a tumor ended and healthy tissue began. Even with high-tech imaging like CT scans or MRIs, the operating room was like “walking in the dark,” as Achilefu put it. Tumors don’t have clean edges, and missing even a few cancer cells could mean a second surgery—or worse, the cancer coming back. Achilefu wanted to change that.

After years of research, starting with a \$2.8 million grant from the National Institutes of Health in 2012, Achilefu and his team developed the goggles. The technology works in two steps. First, a patient is injected with a special infrared fluorescent marker—a peptide dye—that seeks out cancer cells and attaches to them. About an hour later, during surgery, the surgeon wears the goggles, which use near-infrared light to make the cancer cells glow blue. This real-time, image-guided system creates an augmented reality, overlaying the glowing cancer cells onto the surgeon’s view of the operation site.

The impact is huge. Surgeons can now remove tumors with precision, ensuring no stray cancer cells are left behind. The goggles have been tested on patients with breast, skin, and liver cancer, with 27 successful surgeries reported by 2015. In one study, surgeons found additional liver tumors not detected by MRI or CT scans, proving the goggles’ ability to spot microscopic cancer. The technology reduces

the need for follow-up surgeries, cutting stress, time, and costs for patients. Achilefu hopes to make the goggles a routine tool in hospitals worldwide, especially in low-resource areas where advanced imaging isn't available.

04

A Legacy of Innovation and Inspiration

Achilefu's work has earned him global recognition. In 2014, he received the prestigious St. Louis Award for his contributions to cancer treatment, becoming the 87th recipient since the award began in 1931. He's also won the Technical Innovation Award from Mallinckrodt Medical in 1995, the St. Louis Innovator Award in 2011, and the Breast Cancer Research Programme Distinguished Investigator Award in 2016. He's a fellow of the Royal Society of Chemistry, the Optical Society of America, and the National Academy of Inventors, and serves on editorial boards like the Journal of Biomedical Optics.

But Achilefu isn't done. He's working on light-based cancer therapies, like photodynamic therapy, to kill cancer cells in deep tissues—something traditional methods struggle with. He also wants to inspire the next generation, especially children in developing countries. Reflecting on his village school days, he often wonders what the world would look like if those bright kids had the chances he did. He's committed to creating opportunities, serving on advisory boards like the National Cancer Institute's Molecular Imaging Program and as a former trustee of Loma Linda University.

05

A Personal Touch to a Global Impact

Achilefu's life isn't all labs and awards. He's been married to his wife, Nnnena, for over 21 years, and they have two children—Chisara, who studies at Washington University, and Kelechi, a teenager with big dreams of his own. Achilefu speaks three languages fluently—Igbo, English, and French—and his journey from a war-torn childhood to a world-changing scientist is a testament to resilience. He's a proud Nigerian, often celebrated on platforms like X for his contributions to medicine, with posts calling him a “pride to the Nigerian diaspora.”

06

A Vision for the Future

As of today, March 28, 2025, Samuel Achilefu's infrared goggles are still making waves. They're awaiting full FDA approval, but the technology has already shown promise in clinical trials, with newer designs improving sensitivity to near-infrared fluorescence. Achilefu dreams of a world where cancer is manageable, if not eradicated, and his goggles are a big step toward that goal. For surgeons, patients, and families, his invention is a beacon of hope—a tool that turns the invisible into something they can fight. If you ever hear of a surgeon seeing cancer cells glow blue, you'll know Samuel Achilefu's vision is at work, lighting the way to a healthier future.

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ABOUT THE AUTHOR

Chuka Odiike

I'm a dedicated civil engineer with a passion for infrastructure development and community empowerment. With a strong background in engineering, my work focuses on creating sustainable solutions for urban and rural development projects. Outside of my professional career, I'm deeply interested in Igbo history and culture. I actively explores ways to impact society by using historical lessons to inspire and educate others about the rich cultural heritage of the Igbo people, aiming to bridge tradition and modern development.



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