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Revolutionizing Prosthetics, Chaz Holder's Legacy Creates Opportunities for Amputees

This summer, the mine action community lost a man who revolutionized the way prostheses are designed for amputees. Dr. Chaz Holder, president and founder of CZBioMed Enterprises, passed away but left behind encouraging technology to improve the lives of amputees around the world.

by Whitney Tolliver, MAIC

Living with Disabilities Inspired Innovation

Dr. Holder was all too familiar with the difficulties associated with prosthetic devices. In 1970, Holder lost his left arm below the elbow from an industrial accident. Then, 20 years later, he suffered another accident—this time a serious car racing accident, injuring both of his legs. This accident and the slow deterioration from exposure to harmful chemicals during his service in the Vietnam War caused Holder to eventually lose both of his legs. The right leg was amputated above the knee and the left just below the knee.

Frustrations from awkward and difficult-to-use prostheses, high costs, and recurring doctor visits for adjustments prompted Holder to recreate the way artificial limbs are made. Using advanced technology, he designed a universal prosthetic limb that does not require a traditional socket to fit the remaining part of an amputated limb. Instead, his uniquely designed prostheses are made of lightweight metals and polymers and are fitted to the limb with a sling of non-stretch fabric that holds the prosthesis to the body. For arm prostheses, Holder designed a wire to attach to a hook that the amputee can operate by arching back muscles.¹

This new Socketless Prosthetic Technology (SPT) reduces the amount of fitting time required. The fitting of



Dr. Chaz Holder, founder of CZBioMed Enterprises, speaks to a class of young children. c/o Ruth Clark

one of CZBioMed's universal artificial arms can be finished in about 15 minutes, while training of the use of the hook can be accomplished in about 30 minutes.² Traditional prosthetic limbs using socket technology, on the other hand, require extensive individual fittings and regular refittings. Socketless prostheses are adjustable and do not require professional refittings on a regular basis. This is a major advantage for child amputees. Children who are still growing can easily adjust the straps on their own, without frequent visits to a specialist.

Dr. Holder's redesign of SPT and CZBioMed Enterprises' production of the devices has dramatically reduced the costs of artificial limbs. Prostheses using "socket technology" can cost anywhere from \$3,000 to \$15,000 (U.S.) and \$30,000 or more for above-the-knee prostheses, depending on joint and foot fabrication.² Dr. Holder however, obtained several patents for his new technologies, and CZBioMed Enterprises is able to manufacture them for a fraction of the price and in a reduced amount of time.

Hope for Landmine Amputees

While CZBioMed is primarily involved with the manufacturing, research and design of prostheses, Dr. Holder also made it his mission to donate a majority of the manufactured limbs to desperate countries whose citizens have lost limbs due to landmines. These people do not have access to prostheses of any kind. In

February 2000, Holder traveled to Sierra Leone on a mission sponsored by World Hope International with more than 200 of his devices to fit and distribute to amputees, free of charge. The following year, he embarked on a second mission to Vietnam to start a program to distribute free prostheses, sponsored by the non-profit organization Kids First of Seattle.

Another new project was launched in Afghanistan in May 2002. CZBioMed teamed up with the Marshall Legacy Institute, Samaritan's Purse and the Canadian Network for International Surgery to develop a technology transfer model. The intent of the project is to establish an autonomous prosthetic infrastructure in Afghanistan.³ This project is expected to expand to eight more countries in the next three years. Another project called Project Reginald was initiated this summer in Haiti to distribute below-elbow socketless limbs.³

CZBioMed Enterprises is also working to assist the humanitarian demining community. Expected by the end of 2002, the company's protective devices for deminers will be available for use to safely clear mined areas.

Dr. Holder's Legacy

Holder used his disabilities to create a new technology that has improved the lives of many amputees and disabled persons around the world. In 2001, the Tech Museum of Innovation named Holder as one of five individuals awarded for technology benefiting humanity. He also

received \$50,000 to continue his work in improving lives around the world. Holder was named North Carolina's Disabled Citizen of the Year and honored by the Christopher Columbus Fellowship Foundation for his technological innovations at CZBioMed.

Chaz Holder was determined to redesign prosthetic technology. His contributions have improved the lives of a great number of amputees, and made prostheses possible for many desperate landmine victims. As Holder once said in an interview, "Every individual desires the same three things: freedom to pursue quality of life, employment opportunities and free and open access to the community." Holder's dedication to socketless technology has helped make this possible. ■

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