

## Social Innovation with Innovative Cybernic Systems: Challenges to Shape the Future “Society 5.0”

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### **Yoshiyuki Sankai, Ph.D.**

CEO and President, CYBERDYNE Inc.

Yoshiyuki Sankai, president and CEO of CYBERDYNE, Inc., shared his vision for social innovation given his experience developing and marketing Cybernic Systems at the 18<sup>th</sup> Annual Mitsui USA Symposium. His vision consists of Cybernic interface devices including the world’s first cyborg-type robot, “HAL.” Hugh Patrick, director of CJEB, introduced Dr. Sankai and moderated the discussion.

Dr. Sankai began his presentation discussing the challenges of developing Cybernic Systems for social innovation. He recalled that as a child, he read American literature, specifically Isaac Asimov’s iRobot. After reading this book, he decided to become a scientist and researcher in this field. Now, in addition to his position at CYBERDYNE, Dr. Sankai holds a professorship at the University of Tsukuba, where he is also the Director for the University’s Center for Cybernics Research (CCR).

Dr. Sankai specifically noted that international collaboration has been essential to the development and dissemination of Cybernic Systems – hybrid technological systems that

improve, support, expand, and regenerate humans' brain-neuro-physical functions. Dr. Sankai frequently meets with government officials from Europe, the United States, and Asia, including German Chancellor Angela Merkel and Japanese Prime Minister Shinzo Abe. When he meets with these leaders, he explains how social innovation transcends many fields; in the case of Cybernic Systems, the public, business, and technology sectors work together to create and commercialize innovation.

Dr. Sankai has created some innovative technologies to collect humans' neural and physiological signals. For example, HAL, as a Cybernic System, can utilize neural signals derived from the brain, modify them, and feed them back to the brain in order to establish a functional recovery cycle where synaptic connections are strengthened or adjusted. Patients who have lost physical functions due to a variety of ailments – strokes, polio, traumatic injuries – engage in functional improvement / regeneration treatment, the so-called “Cybernic Treatment,” by using these systems. With these systems, patients' physical functions dramatically change, along with brain activity. These systems treat the nervous systems directly and non-invasively. HAL is attached to the patient's body; the robot detects the patient's motion intentions in order to control the wearer's movement and establish functional recovery cycles. Many patients who have used these devices have regained physical functions.

Dr. Sankai emphasized that there are business challenges to develop these technologies; normal production companies can build and market ordinary devices. However, for innovative research, there is no real market. If there were a market for social innovation, the solution would be easy. A goal of Dr. Sankai's company is to solve social problems such as aging by creating innovative devices and systems, and also to make them more financially accessible. In order to achieve this, Dr. Sankai and his colleagues promote international clinical trials and push for regulatory approvals. Importantly, they have succeeded in participating in the development of social rules by the International Standards Organization (ISO) for these devices and systems, which eventually helped them obtain medical approvals that are covered by insurance.



*Yoshiyuki Sankai*



*Hugh Patrick*



*Hugh Patrick, Yoshiyuki Sankai, interpreter*

medical insurance to cover the cost of treatment with these Medical HAL devices. Dr. Sankai also made progress in marketing the devices in Germany, where patients can use their public workers' compensation insurance for the use of these devices. The company also started the application procedure for general insurance coverage for treatments using these devices. They reduce hospital stays, which reduces public costs for the hospitals. Furthermore, the insurance industry in the United States is approaching the final stages of approving insurance coverage for these devices.

Before demonstrating the device, Dr. Sankai spoke about a few cases of patient success. One of these patients had suffered from stroke twice and her medical doctor had advised that she would never walk again. The patient's family contacted Dr. Sankai and two months later, the patient could not only walk, but jog, and had returned to her home without any devices after functional improvement treatment using HAL. Another patient who had polio since infancy used Dr. Sankai's devices; several days later, he began to be able to control his legs.

Following his remarks, Dr. Sankai did a live demonstration with the Cybernic System, Medical HAL, for the audience. They were impressed with its abilities.



*Hugh Patrick, Yoshiyuki Sankai, Medical HAL*

