



TDK and Tokyo Medical and Dental University measure cardiac activity using high sensitivity MR sensor array outside a magnetically shielded room

- Using TDK's high sensitivity MR sensor array, Tokyo Medical and Dental University (TMDU) is the first in the world* to realize successful magneto-cardiometry under regular conditions (outside a magnetically shielded room)

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TDK Corporation (TSE:6762) and the Division of Systemic Organ Regulation, Graduate School of Medical and Dental Sciences, TMDU (Professor: Tetsuo Sasano) have become the first in the world to successfully measure cardiac activity (magneto-cardiometry) using highly sensitive MR sensors under conditions without a magnetic shield room.

TDK has prototyped a chair that can measure cardiac activity without direct skin contact with the patient (as with an electrocardiogram (ECG)). With this, the TMDU conducted magneto-cardiometry in a regular testing room without a magnetic shield at its internal medicine outpatient ward. The university successfully measured magneto-cardiographic waveforms associated with atrial and ventricular excitation at roughly as well as an ECG, even without a magnetic shield room. This is achieved by reducing environmental noise. This magneto-cardiometer does not require the use of a magnetically shielded room or liquid helium (superconducting coil coolant), both necessary for conventional superconducting quantum interferometric devices (SQUIDs). This consequently removes the need to build a large system inside the hospital, allowing magneto-cardiometry to be performed simply by installing this magneto-cardiometer in a regular testing room.

With the success of this demonstration experiment, it is expected that the Tokyo Medical and Dental University not only will be able to diagnose heart disease through more accessible magneto-cardiometry but will use this technology to diagnose prenatal cardiac diseases by recording fetal magneto-cardiograms and to predict the onset of cardiac diseases, which has been difficult to do in the past.

In 2016, as a result of joint research, TDK and the Joint Research Department of Advanced Technology in Medicine, TMDU (Joint Research Professor: Shigenori Kawabata) succeeded in visualizing the distribution of the cardiac magnetic field, which is a biomagnetic field, using a room-temperature MR sensor array in a magnetic shield room for the first time in the world. In another world first, in 2019, they succeeded in measuring the distribution of the cardiac magnetic field in real-time using an MR device. TDK will continue to accelerate research and development to further improve the performance of the magnetic sensors and reduce environmental noise, thus contributing to social transformation.

* As of August 2024, according to TDK



Glossary

- MR (magneto-resistive): The resistance value changes depending on the strength of the magnetic field.
- Magneto-cardiometry: A method of magnetically measuring cardiac activity by detecting the biomagnetic field emitted from the heart with high-sensitivity magnetic sensors.
- Magnetically shielded room: A room that blocks geomagnetic and other external environmental magnetic fields from equipment sensitive to magnetic fields in semiconductor fabrication plants and medical facilities.
- Superconducting quantum interferometric device (SQUID): An ultra-sensitive magnetic sensor used to detect extremely weak magnetic fields using Josephson junctions.

About Tokyo Medical and Dental University

Tokyo Medical and Dental University (TMDU) was established as a national educational institution for dentistry on October 12, 1928, and currently located in the Yushima/Shoheizaka area of Tokyo, which is considered sacred ground for scholarship and learning in Japan. Since then, as Japan's only comprehensive medical university and graduate school, TMDU has provided advanced medical treatment through a fusion of the medical and dental fields and worked to cultivate "professionals with knowledge and humanity," thereby contributing to human health and the well-being of society.

Institute of Science Tokyo (Science Tokyo) will be established on October 1, 2024, following the merger between TMDU and Tokyo Institute of Technology (Tokyo Tech), with the mission of "Advancing science and human wellbeing to create value for and with society."

(<https://www.tmd.ac.jp/english/>)

About TDK Corporation

TDK Corporation is a world leader in electronic solutions for the smart society based in Tokyo, Japan. Built on a foundation of material sciences mastery, TDK welcomes societal transformation by resolutely remaining at the forefront of technological evolution and deliberately "Attracting Tomorrow." It was established in 1935 to commercialize ferrite, a key material in electronic and magnetic products. TDK's comprehensive, innovation-driven portfolio features passive components such as ceramic, aluminum electrolytic and film capacitors, as well as magnetics, high-frequency, and piezo and protection devices. The product spectrum also includes sensors and sensor systems such as temperature and pressure, magnetic, and MEMS sensors. In addition, TDK provides power supplies and energy devices, magnetic heads and more. These products are marketed under the product brands TDK, EPCOS, InvenSense, Micronas, Tronics and TDK-Lambda. TDK focuses on demanding markets in automotive, industrial and consumer electronics, and information and communication technology. The company has a network of design and manufacturing locations and sales offices in Asia, Europe, and in North and South America. In fiscal 2024, TDK posted total sales of USD 14.6 billion and employed about 101,000 people worldwide.

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