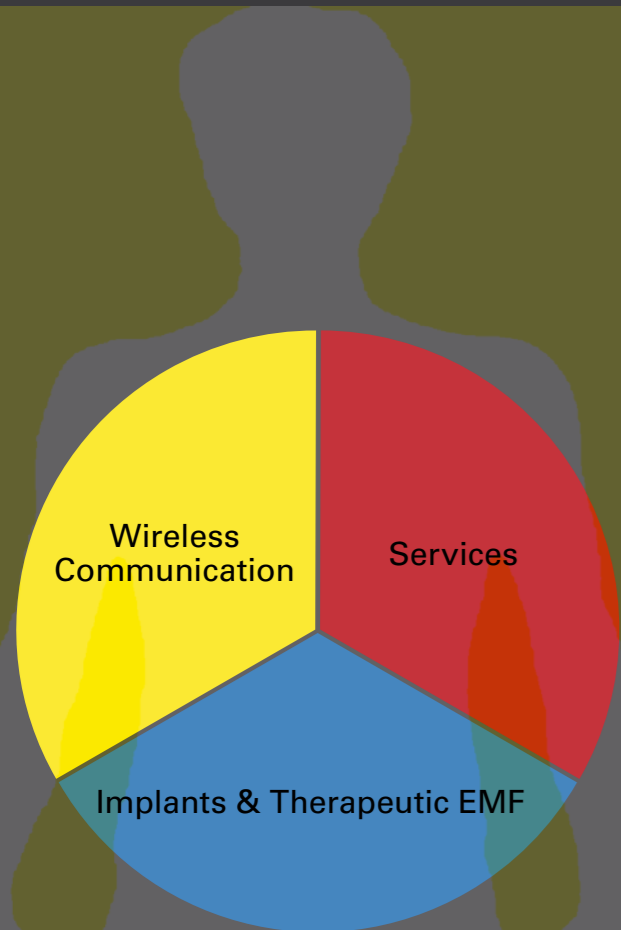


HEALTH SUPPORT SYSTEMS

The R&D partner of choice for advancements in medical technology

Solutions compliant with standards and specific market requirements



Addressing EMF in Medical Technology

The medical device industry is a fast moving high-tech field bringing together the latest technical advances in a great variety of new products. More than half of the present revenue is from devices introduced within the last three years. Today, MRI and ultrasound are applied jointly for improved diagnostic and therapeutic results, and wireless communications play an expanding role in long-term monitoring for in-hospital and outpatient care. Tomorrow, new developments in electromagnetic field (EMF) technology promise to make our lives safer and healthier.

Innovative Solutions from Research to Development

The IT'IS Foundation has been a leader for EMF applications in wireless communication and medical information technology for the past six years. IT'IS is acknowledged worldwide as playing a major role in research on the measurement and computation of EMF energy absorption by biological organisms and in laboratory test systems. We have worked with our customers and research partners on compliance testing, safety white papers, transmitter and immunity optimizations, as well as customized exposure setups.

R&D Collaboration for Improved EMF Outcomes

The IT'IS Foundation Health Support Systems group stands ready to collaborate with medical device manufacturers, regulatory and health agencies, wireless technology companies and researchers in the private, university and government sectors. Several key topics include EMF, energy absorption, device compatibility and extreme technical performance. The Health Support Systems group is prepared to address your issues in wireless communication, medical diagnosis and therapy. We have proven expertise in near-field analysis and exposure assessment for EMF up to 100 GHz.



History

The IT'IS Foundation was established in 1999 through the initiative and support of the Swiss Federal Institute of Technology in Zurich (ETH), the global wireless communications industry and several government agencies. IT'IS stands for Information Technologies in Society.

Legal status

IT'IS is a non-profit tax-exempt research foundation.

Mission

Evaluation of the safety and risks related to current and emerging information technologies. Exploration of information technologies for medical, diagnostic and health support systems. Improvement of the accessibility of information technologies for all members of society including disabled persons.

Commitment

We are committed to the advancement of science for the benefit of society at large while maintaining strict independence from any particular interest groups. We strive for open dissemination of research results and the education and professional growth of young scientists.

Funding

Private and industry sponsorship, public and industry research projects and information services.

President

Prof. Dr. Ralf Hütter
huetter@itis.ethz.ch
+41 44 245 9696

Health Support Systems

Dr. Michael Oberle
+41 44 245 9689
oberle@itis.ethz.ch

Director

Prof. Dr. Niels Kuster
+41 44 245 9690
kuster@itis.ethz.ch

Services

Sven Kühn
+41 44 245 9694
kuehn@itis.ethz.ch

Sensing Techniques & SCIENCE

Dr. Andreas Christ
+41 44 245 9685
christ@itis.ethz.ch

EMF Health Risk Assessment

Dr. Urs Lott
+41 44 245 9692
lott@itis.ethz.ch

Computational Techniques

Dr. Nicolas Chavannes
+41 44 245 9740
chavanne@itis.ethz.ch

Sponsoring

Prof. Dr. Niels Kuster
+41 44 245 9690
kuster@itis.ethz.ch

Main Office Address

IT'IS Foundation
ETH Zentrum ETZ
CH-8092 Zurich
Switzerland

Mailing Address and Labs

IT'IS Foundation
Zeughausstrasse 43
CH-8004 Zurich
Switzerland

Phone +41 44 245 9696
Fax +41 44 245 9699

info@itis.ethz.ch

www.itis.ethz.ch



R&D Services for Electromagnetics in Medical Technology

WIRELESS COMMUNICATION

We optimize your on-body and in-body communications

Reliable Operation in Difficult Environments

Wireless communication in the medical device industry faces challenges from device miniaturization with limited battery power budgets, complex propagation environments and differing international standards.

The IT'IS Foundation offers a complete range of services across the electromagnetic fields (EMF) spectrum from low frequency (LF) to extremely high frequency (EHF) for the manufacturing of implantable and on-body devices. Our expertise extends from antenna design by our team of experienced engineers to the detailed evaluation of RF safety compliance and immunity to EMI. A typical project begins with feasibility studies, followed by a detailed wireless transmission design during which performance is evaluated and modified by a process of structure optimization that relies on sophisticated in-house numerical simulation platforms. A project typically concludes with hardware measurements and standardized EMI interference tests using customized solid and liquid human equivalent phantoms.

IT'IS identifies applicable regulatory standards for health and safety in specific markets and is able to customize antenna and device designs to meet necessary requirements. We remain current with regulatory developments and the global RF standard harmonization.

The trend towards miniaturized sensor systems for medical health surveillance is further enhanced by research into alternative means of low-power wireless communication beyond traditional RF telemetry.

In recent years, the human body itself has been identified as a promising transmission medium, serving as a uniquely tailored communication platform in the health care environment. To further understand the potential of such technologies, the IT'IS Health Support Systems group is developing comprehensive electrical models of the human body and phantoms for measurements. Applications include galvanic, capacitive and inductive coupling from low to medium frequencies.



IMPLANTS & THERAPEUTIC EMF

We offer advanced testing and optimization for implant compatibility with MRI

Adapting Devices to EM Imaging Systems

The electronic implant market is led by cardiovascular devices for cardiac rhythm management. Advances in multi-functional pacemakers and cardiac resynchronization devices now enable persons afflicted with cardiac rhythm disorders and heart failure to live a practically normal life with reduced dependence on complex drug regimens. The common use of MRI among patients with active and inactive implants illustrates the need for compatibility assessments for both existing and emerging imaging techniques.

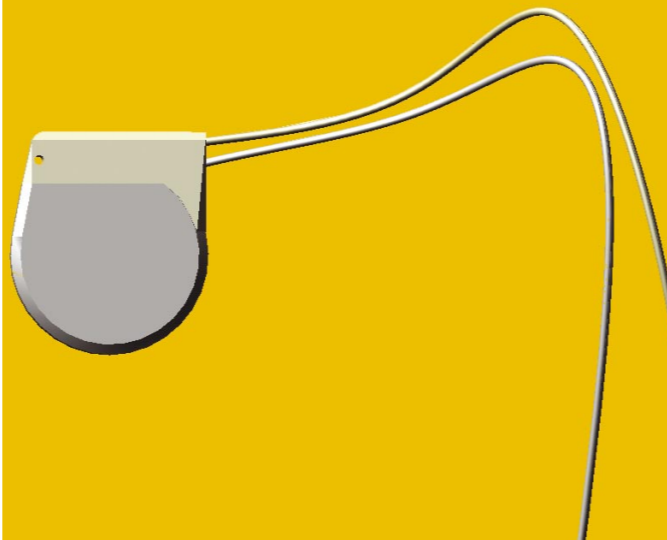
All types of implant devices should be free of potentially harmful effects from electromagnetic fields and heat during patient imaging and likewise, the implant should continue to operate without adverse effects on the patient. The Health Support Systems group has identified the need for test procedures featuring adapted simulation and novel measurement tools as part of a general risk assessment. Specifically, the effectiveness of shielding must be determined, and heat generation in the implant and surrounding tissues must be measured. For devices that use electrodes, EMF induction in the leads is an important consideration. The integrity of MR images must also be evaluated for artifacts due to the implant.

New Technologies through EMF Tools

EMF promises to have an expanding role in new technologies for the diagnosis and treatment of cancer and other diseases that goes beyond current applications such as EM hyperthermia and localized tissue ablation. With advances in technology, novel applicators will be able to deliver electromagnetic energy to diseased tissues precisely and efficiently. However, because field and temperature distributions in the human body can only be measured with invasive techniques, appropriate new software tools are needed to improve and control the performance of EMF devices.

The IT'IS Foundation and its industry partners have created an advanced platform for the computer-aided design of EM radiators in lossy dielectrics, the complex environment that characterizes biological tissue. Recently, IT'IS achieved a major breakthrough with the introduction of novel algorithms and the implementation of coupled EM/thermal solvers for bioheat thermal equations.

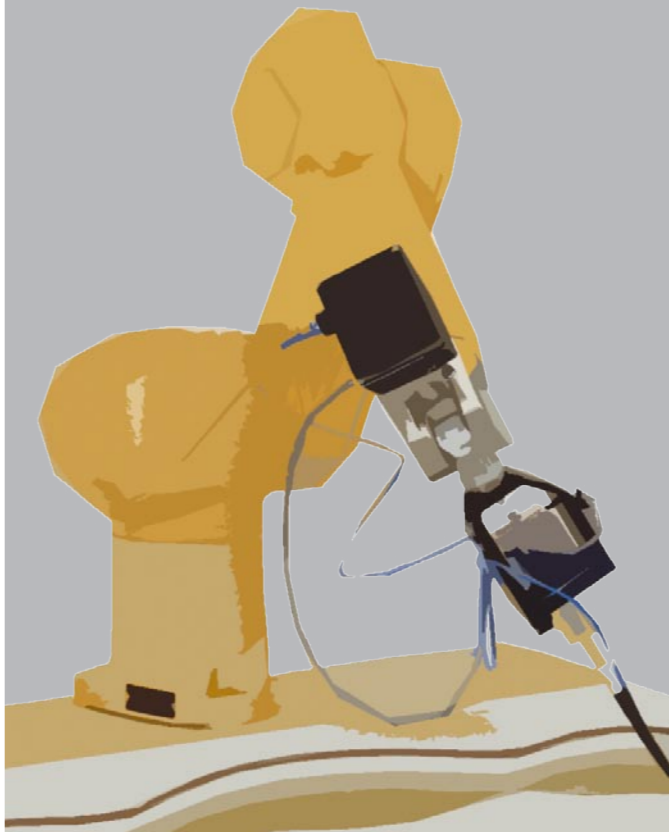
Your partner in EMF based therapeutic applications



SERVICES

Trust us for a complete range of assessment and testing services

First hand transfer of key knowledge



Safety White Papers

IT'IS plays a leading role in the worldwide research effort of health risk assessment and participates in commissions developing EMF safety guidelines. This recognition has led international organizations, industry and governments to request that we draft safety white papers for existing and emerging technologies and specific novel applications. Risk evaluations may, for example, include EMF risk analysis, prediction of worst-case exposure and worst-case temperature increase.

EMF Workshops

The Health Support Systems group organizes specific workshops on EMF related issues such as wireless communication in the medical field or treatment with EMF energy. All workshops are conducted in cooperation with national and international partners, providing a platform of discussion for stakeholders representing research, industry, government and health services.

Compliance Testing

The Foundation conducts compliance testing for RF applications such as implanted devices according to all national and international EMF safety guidelines. IT'IS is regarded by many as the leading, independent institute for dosimetric evaluations. We are a pacesetter for near-field analysis tools and remain at the forefront of developing the most accurate and suitable compliance testing procedures.