Department of Otorhinolaryngology at the Medical University of Hannover

The world’s largest Centre of Excellence for cochlear implantation

Chairman: Thomas Lenarz, M.D., Ph.D.
Our range of services

The Department of Otorhinolaryngology at the Medical University of Hannover (MHH) is internationally renowned for hosting the world’s largest cochlear implant (CI) programme to treat severely hearing impaired patients. To date, more than 6,000 people have received a CI here.

Other priority areas include hearing-aid fitting (and improving this process), the early identification of hearing loss in children, diagnosis and treatment of inner-ear diseases including tinnitus, skull base surgery including treatment of acoustic neuroma, tumour surgery using modern laser surgical and endoscopic techniques, diseases of the nose and sinuses, covering allergology, environmental medicine and plastic/reconstructive techniques.

At our Outpatients’ Clinic we offer our patients the full range of comprehensive diagnostic techniques and outpatient therapy – to the highest standards.

Our services to patients are organised into various special clinics:

- Otology
- Inner ear diseases and skull base surgery
- Head and Neck diseases
- Plastic surgery
- Rhinology, sleep medicine and allergology
- Trachea

Our Team-Leaders

Prof. Prof.h.c. Dr. Thomas Lenarz
Chairman

Prof. Dr. Burkard Schwab
Team leader Otology

Prof. Dr. Anke Lesinski-Schiedat
German Hearing Centre

PD. Dr. Omid Majdani
Team leader Inner Ear and Skull Base Surgery

Dr. Stefan Stolle
Rhinology

Dr. Martin Durisin
Head and Neck Surgery
Diagnostics

Diagnostics is the starting point for all therapy and all healing. So, as a university department, we are committed to using the full range of modern methods including:

- hearing tests
- balance testing
- rhinomanometry, allergology
- endoscopy
- ultrasound
- Cone Beam CT

Here, specially trained audiometrists conduct hearing tests and balance testing. We provide the full range of clinical and scientific audiological and neuro-otological diagnostic procedures.

- Audiometry in quiet and/or in noise
- Directional hearing
- Objective audiometry including AABR, CERA, ASSA, OAE and EABR testing
- Vestibular testing: caloric, rotation chairs, Equi Test, VEMP

For testing of children, objective and subjective hearing tests are available in an awake situation including video sedation.

Hearing screening – a sound start

In Germany alone, around 15 million people with hearing loss require treatment. A large number of newborn infants are affected – as many as between two and five per 1,000. In risk groups (babies born prematurely or affected by problems during pregnancy or birth), the rate is 10 times as high.

Newborn hearing screening is now part of the first postnatal examination in Germany and involves testing for congenital hearing impairment. Since early 2009, this screening has been paid for by statutory health insurers as standard.

The average age for the detection of congenital hearing impairment was 39 months BEFORE screening and 3 months AFTER screening. This means considerable benefits in terms of maturation potential for the auditory nerve.

Components of newborn hearing screening:

1. Hearing tests (objective, usually OAE) in the first four days of life in the hospital of birth

   If abnormality is detected:

2. Check-up and diagnosis of a potential hearing impairment by an ENT specialist during the following four weeks

   If hearing impairment is confirmed:

3. Therapy is started.
Surgical therapy

We offer the full range of surgical therapy options in otorhinolaryngology, with a particular focus on:

- implantable hearing systems including cochlear implants, partially or fully implantable middle-ear implants, and bone-anchored hearing aids (BAHA)
- surgical therapy for chronic otitis media and surgery to improve hearing for patients with conditions such as otosclerosis
- surgery on the nose and sinuses using the latest endoscopic and navigation-assisted techniques
- surgery for tumours in the head and neck region, acoustic neuroma, skull base
- plastic surgery

Another distinction our Department is proud of: during our annual international conventions 'Otology Update' and 'Rhinology Update', the world's most renowned ENT surgeons operate here.

The Department in figures

Our Department has six wards with a total of 90 beds. Each year we treat around 25,000 outpatients and just under 6,000 inpatients. A highly motivated and specialised team is available, with more than 200 staff – including 30 doctors, 20 nurses, nine education professionals and speech therapists, 20 technical staff and 30 scientists.

Our case numbers: more than 500 cochlear implants, 80 middle-ear implants and 50 acoustic neuromas in 2013.

A nationwide first at MHH's ENT Department: in autumn 2011, for the first time in Germany (and only the fourth time in the world) a patient was successfully implanted with MED-EL's new 'bone bridge' system.
German Hearing Center Hannover (DHZ)

The DHZ is a one-stop provider of the latest diagnostic methods and therapies, all-round technical guidance and support, auditory training provided by education professionals and speech therapists, and fitting with hearing systems at the highest international level.

Collaboration within a close-knit interdisciplinary team – including ENT specialists, medical engineers, education professionals and speech therapists, hearing-aid audiologists, manufacturers of hearing systems and scientists – culminates in the development of medical devices in direct interaction with patients. This process of ongoing optimisation continues beyond implantation and the subsequent basic therapy: the HZH provides its patients with support that lasts a lifetime.

A special, recently developed priority area involves establishing specific, highly qualified remote-care partners in Germany. Close networking at local level enables patient service to be enhanced – while maintaining consistently excellent quality.

Our partners

At the German Hearing Center Hannover (DHZ), all partners with leading-edge expertise in the hearing-system industry are present in consultation and service lounges:

- KIND Hörgeräte and auric Hörsysteme, experts in the field of conventional hearing aids
- Advanced Bionics, Cochlear, MED-EL and Neurelec, manufacturers of cochlear implants

The intense collaboration between research, medicine and industry partners for the benefit of patients represents a world-leading, unique approach to hearing-aid fitting. In close consultation with patients, all these players are working on optimizing hearing systems and developing state-of-the-art products.

The DHZ also works hand-in-hand with the Cochlear Implant Centrum (CIC) ‘Wilhelm Hirte’ in Hannover. The educational team and the engineers who fit the devices are present at both sites, because a main focus of the approach to CI at Hannover is early implantation of severely hearing-impaired and deaf children who receive implants in their first year of life.
Research profile

With the Laboratories of Experimental Otology (LEO), the Institute of Audioneurotechnology (VIANNA) and the German Hearing Center Hannover (DHZ) – the facility for clinically related research and clinical studies in collaboration with industry – the Department of Otorhinolaryngology covers the entire innovation chain from basic research to translational and clinical research as well as product development.

In collaboration with leading international manufacturers, this enables the findings of fundamental research to be implemented and utilised in novel methods. New types of cochlear implant electrode designed to preserve hearing in the partially deaf, the auditory midbrain implant and physiologically based speech-processing algorithms are worth to be mentioned here. In clinical studies, products can then be directly tested as to their clinical value, including potential improvement. The basis for this is the world’s largest programme for implantable hearing devices (cochlear implants and implantable hearing aids) with a large number of patients.

These activities have given rise to in-house innovations including modern speech-processing algorithms, non-invasive and invasive methods of audiometry.
Research

The Department of Otolaryngology is among the international leaders in hearing research. The range of activities covers the causes, diagnosis and therapy of all kinds of hearing impairment.

One particularly important field is the functional restoration of hearing using auditory implants. These include cochlear implants which replace the inner ear, central auditory implants in the midbrain and brainstem region (to treat neural deafness) and implantable hearing aids to correct conductive and sensorineural hearing loss. Research here includes work on new electrodes to regenerate the inner ear, local pharmacotherapy for hearing impairment, development of new ossicular prostheses, and signal processing.

Foundational to this work are physiological studies on the impact of hearing impairment on the development and function of the auditory system, including its plasticity.

At the forefront

The Department is also on the cutting edge of advances in modern surgical techniques.

Computer- and robot-assisted surgery will make it possible to carry out atraumatic insertion of stimulating electrodes and mechanical actuators in the region of the inner ear and the central auditory system.

In tumour research, the Department is among the leading centres in the field of in vivo differentiation of tissue and cells, as well as laser-assisted targeted tissue removal.

Within the field of paranasal sinus surgery, degradable stents are being developed allowing the sinus passages to be continuously aerated.

For the most part, this research takes place in national and international collaborative research networks in conjunction with other universities and industrial partners, such as:

- The Hearing4all Cluster of Excellence
- Collaborative research centre SFB 599 ‘Sustainable biodegradable and permanent implants of metallic and ceramic materials’
- Collaborative research centre SFB Transregio 37 ‘Micro- and nanosystems in medicine – reconstruction of biological functions’
- The Audiologie-Initiative Niedersachsen (AIN)
- The BMBF project REMEDIS: ‘Higher quality of living through new types of microimplants’
- Numerous transfer projects with companies
New approaches

In conjunction with the Institute of Mechatronic Systems (IMES) at the Leibniz University of Hannover, a work group at the Medical University of Hannover’s ENT Department is currently designing a mechatronically guided procedure for minimally invasive cochlear implantation. The aim: risk minimisation (e.g. protection of the taste and facial nerve), reduction of surgical trauma and hence reduction of surgical duration and costs.

By means of minimally invasive cochleostomy, the cochlea can be opened in a ‘well-targeted’ manner via a single drill canal that bypasses all the at-risk structures. This is made possible only by the parallel use of CT-based frameless navigation and robotic assistance systems. The insertion of the CI electrode is endoscopically monitored: the video data are used to control the mechatronic assistance system.

To insert cochlear implant electrodes using a minimally invasive approach – especially a narrow drill canal from the skull surface to the cochlea – an automatic insertion tool has been developed and created. The automation of this tool allows precisely planned, carefully controlled and optimised insertion of the electrode into the cochlea. It is to be expected that this will enable fine internal intracochlear structures such as membranes to be protected and preserved, thus remaining functional after surgery. This will mean the patient can potentially be helped in two ways: by exploiting the existing residual hearing and through electrical excitation of the auditory nerve to specifically stimulate the different frequency ranges.

Winning technology

As part of the BMBF-organised ‘Innovations in Medical Technology Competition 2007’ we impressed the jury with the following idea: the curvature of the CI electrode is to be adapted to the tortuous course of the inner ear in such a way that the electrode carrier will avoid contact with the surrounding tissue to the maximum extent possible, thereby avoiding the creation of intracochlear forces that can result in complete loss of hearing to the patient as a result of the operation itself.

The main focuses of the research group are:
• Use of medical imaging, especially the role of /f_l at-panel detector technology in volume tomographic imaging
• Imaging of cochlear implants, including limitations of MRI imaging

Projects:

a. DFG priority programme in Medical Navigation and Robotics (SPP 1124), project: Robot-assisted and visually insertion of a cochlear implant electrode

b. BMBF Innovation Competition 2007, project: Cochlear implantation – minimally traumatic cochlear implantation to preserve residual hearing through controllable shape memory electrodes

c. DFG funding – material allowance, project: use of OCT imaging for medical near-field navigation

d. DAAD PPP programme to promote international collaboration between this group and the Computer Assisted Oto-Surgery (CAOS) work group at Vanderbilt University, Nashville, TN, USA.
Since its foundation in 2008, researchers at the Institute of Audioneurotechnology (VIANNA), which forms part of the ENT Department, have been investigating how the brain develops in deaf individuals, what changes it shows, and how it adapts to stimulation by neuroprostheses. VIANNA's range of activities encompasses basic research into deafness and the artificial stimulation of nerve tissue, as well as the development, design and initial in vivo testing of auditory and neuro-implants, nanobiomaterials and both diagnostic and therapeutic laser techniques. This takes place in collaboration with high-profile industry partners based within the Institute in Hannover's Medical Park, the cochlear implant manufacturers Advanced Bionics, Cochlear and MED-EL, as well as HZH GmbH.

This work is expected to result in new, improved diagnostic and therapeutic methods for patients with hearing loss, other sensory impairments and neurological conditions. Its societal importance should not be underestimated, as people of all ages are affected by hearing loss. In Germany alone, there are around 15 million people with hearing loss requiring treatment. And providing therapy to children at an early age, in particular, means educational opportunities.

The Institute brings together scientists from the natural and engineering sciences, as well as medical professionals from the fields of otolaryngology, neurophysiology, neurosurgery and neurology. The spectrum of research methods ranges from quantum optics, biomechanics, electrotechnology, electrophysiology, neurophysiology and neurobionics, to imaging and image processing, histology, molecular biology, in vitro and in vivo techniques and signal processing. This trans-disciplinary collaboration under one roof creates the conditions that are necessary to facilitate further developments in VIANNA's targeted field: medical technology at the highest international level.
Training

As an internationally renowned university hospital, the conferences and other events we hold every year set standards in the training and education not only of students and doctors but also of patients and the lay public.

At our prestigious annual convention called ‘Otology Update,’ international specialists in the field of otology spend four days in Hannover demonstrating the latest surgical skills and familiarising themselves with the latest industrial developments in medical engineering. We cover rhinology in the same way, with renowned specialists coming to Hannover for two days to provide instruction.

At our initiative, an international group of surgeons has merged to form the Live International Otolaryngology Network (LION). This Internet-based training event is held twice a year and links up surgeons in operating theatres on five continents via simultaneous transmission. These live simulcasts enable quality standards to be raised and aligned internationally, and the best joint solutions to be found for recurring issues.

Our annual CI conference, which is unrivalled nationwide, brings together education professionals, physicians and patients to share information and experience. The three-day event features lectures, discussion forums, live surgery and trade show exhibits.

We also organise numerous events on special topics: in-service training for doctors in areas including ultrasound, allergology, vestibular disorders, DVT and audiology, as well as training for speech therapists and talks open to the public. Our physicians and staff are sought-after speakers at events in other universities or institutions throughout the country.

Networking

Teaching and learning are closely intertwined. So we’re always in close dialogue with other universities and institutions. For all of us, this involves attending globally prestigious conferences and symposia, as well as active involvement in committees and membership of networks.

The ENT Department is, with its Chairman, Professor Thomas Lenarz, represented on the following societies:

- German Research Foundation (DFG)
- Advisory Council of the Federal Ministry of Education and Research (Member)
- German Society of Otology and Neuro-Laryngology, Head and Neck Surgery
- German Audiological Society (DGA; Presidency/Board)
- German Society of Skull Base Surgery (DGSS; Vice-President)
- German Society of Computer and Robot-Assisted Surgery
- German Society of Stem Cell Research
- Politzer Society, Inc.
- German Society of Biomaterials (DGBM)
- German Tinnitus League
- European Academy of Otology and Neuro-Otology (Regional Secretary)
- European Academy of Otology & Neurotechnology (EAONO)
- European Federation of Audiological Societies (EFAS; Past President)
- European Skull Base Society (ESBS; Council Member)
Department of Otolaryngology
Senior Physician: Prof. Dr. B. Schwab

VIANNA
• Electrical stimulation of the nerve tissue
• Central neuroprostheses
• Deafness and its consequences
• Adaptive plasticity of the brain
• Sensitive development phases for therapy with cochlear implants
• Middle-ear implants
• Laser-based prostheses
• translational research including manufacturing applications
• product development
• spin-offs
• new business setups

LEO
• inner ear biology
• - molecular biology
• - basic research
• - drug delivery
• - regeneration of the auditory system

CIC Wilhelm Hirte
(Cochlear Implant Center for children)
Rehabilitation of children with cochlear-implants
Head: Dr. B. Eßer-Leyding

Department of Otorhinolaryngology– Outpatients' Clinic
• patient care
  - diagnostics
  - surgical therapy
• clinical research

Otology/Trachea/Larynx:
Team leader Prof. Dr. Schwab, Chief Physician

Inner Ear/CI/Skull Base Surgery:
Team leader PD Dr. Majdani, Senior Physician

Head and Neck: Team leader Dr. Durisin, Senior Physician

Rhinology: Team leader Dr. Stolle, Senior Physician

Plastic Surgery: Team leader Dr. Stolle, Senior Physician

Audiology and Rehabilitation:
Team leader Prof. Dr. Lesinski-Schiedat, Senior Physician

DHZ
• patient care
  - integrated diagnostics
  - therapy of hearing loss
• clinical and audiological research

LEO
• Electrical stimulation of the nerve tissue
• Central neuroprostheses
• Deafness and its consequences
• Adaptive plasticity of the brain
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• translational research including manufacturing applications
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• spin-offs
• new business setups
Contact data

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scan this qr-code
with your smartphone and explore
our website:

How to get here

by train (DB)

Line R3/S3 (going to ‘Celle’) from Hannover Central Station, change at stop ‘Karl-Wiechert-Allee’, go upstairs to tram U 4 (going to ‘Roderbruch’), get off at ‘Medizinische Hochschule’

Line R9 (going to ‘Hildesheim’) from Hannover Central Station, change at stop ‘Karl-Wiechert-Allee’, go upstairs to tram U 4 (going to ‘Roderbruch’), get off at ‘Medizinische Hochschule’

by tram (üstra)

Line U 4 via ‘Köpcke’ (going to ‘Roderbruch’), get off at ‘Medizinische Hochschule’

by bus (üstra)

Line 123, 124, 127, 137: bus stop ‘Medizinische Hochschule’

by car

Coming from the south (Kassel) on A7 motorway, exit at ‘Hannover-Süd’ to A37 in the direction of Hannover.

Coming from the north (Hamburg) on A7 motorway, exit at ‘Hannover-Kirchhorst’ to A37 in the direction of Hannover.

Coming from Dortmund or Berlin on A2 motorway, exit at ‘Hannover-Buchholz’ to A37 in the direction of Hannover.

On A37 (‘Messeschnellweg’), exit at ‘Weidetorkreisel’ roundabout and turn onto ‘Karl-Wiechert-Allee’. Go straight on and in a few minutes you will arrive at MHH.

Photos: MHH, Cochlear® (p. 6)