



2022 REPORT

CLINICAL & RESEARCH



Rigshospitalet



ENT - H&N Surgery
and Audiology

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1. INTRODUCTION

In this Clinical & Research Annual Report 2022 from the [Department of Oto-rhino-laryngology, Head and Neck Surgery and Audiology](#) ("ENT"), Rigshospitalet we are pleased to list some of the highlights of the activities in the Department, as well as giving some insight to our daily life.

This year we accelerated our usage of ultrasound and stem cells, and we also proudly accepted the assignment of providing ENT-support to Greenland. Following years of trial, we proved that AVT (Auditory Verbal Therapy) has a profound impact on a child's hearing and language development, consequently it is now a permanent offer to all children with hearing loss in Denmark. Our Head and Neck cancer Nursing and Palliation teams do home visits post-operatively and with their multi-disciplinary setup they identify and implement the best possible rehabilitation. It is a post-pandemic relieve that we again are able to offer this service to our patients.

The accumulated surgical backlogs and workload caused by the pandemic has finally been replaced by genuine ENT activities. Still remaining are the important post-COVID research activities which remain high, where long-term side-effects still need our focus.

With impressive 111 peer-reviewed research publications, we also thank our research leaders, professors, and researchers for this splendid outcome, this also includes an appreciation for organising the education of 400 medical students, 70 nurse students and other pre-graduates and post-graduates. Additionally, we also express our gratitude to our many peers across the hospitals, the nation and abroad, identifying that sharing knowledge and working interdisciplinary can cast new light on diseases and treatments.

No-man-is-an-island and we also express a big gratitude towards our partners, patient organisations, educational institutions, companies, foundations, ngo's, clusters and many more enables us every day to do research for the better of the patient.

It is our finest responsibility to ensure that our patients get optimised treatment based on clinical evidence, which matches the entire team's endless curiosity and need for knowledge in pushing our research forward. We would like to take this opportunity to thank the entire staff for achieving exceptional results in 2022.


A special thanks to the team behind this annual report for bringing this together in a presentable report.

In awe and gratitude,
Tine Bloch Jensen and Mads Klokker
Chief Nurse and Chief Surgeon, ENT Department





2. RESEARCH FOR OPTIMISED TREATMENT

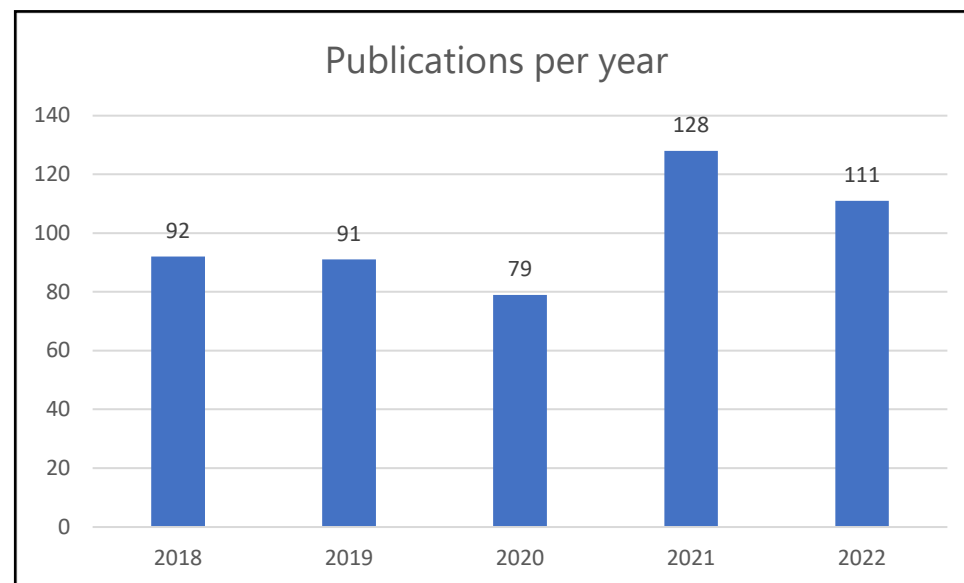
 The [ear-nose-throat research at Rigshospitalet](#) is broad, and encompasses clinical fields such as audiology, language pathology, vestibular disorders, chronic rhinosinusitis and global airways, cystic fibrosis, and Primary Ciliary Dyskinesia (PCD), cancer, sleeping disorder, and COVID-19 treatment and side effects just to mention a few. Next to these research areas we are proudly engaged in our educational responsibility, and through our research we bring new ways of training into life.

Our clinical field has an impact on all ages of our population, which takes us in many research directions. In 2022 our collaborations have increased. We have strengthened our cooperation with educational institutions, domestically and abroad, made private partnerships and engaged across departments within Rigshospitalet. We are continuously proud that DTU has a permanent resident at our Department, enhancing our research in the technical field.

Generally, we experience a centralization of the specialized clinical treatment capacity in our Department but at the same time we investigate incorporating remote care and home care. In the coming years we will further develop our External Clinical Service Teams but also look even further into new digital solutions for home care. Bringing skills and knowhow out of the physical premises of our department closer to the patient.

In 2022 we initiated several research projects using Big Data. We aim that this should enable us to assist us in optimization and creating benefits. This is new grounds, but we vigorously take on this endeavor to not be surpassed by the future.

Our daily work and research have unceasingly the patient in focus.



3. MEASURING OUTPUT

We are pleased to share our measuring point and statistics with you in the below.

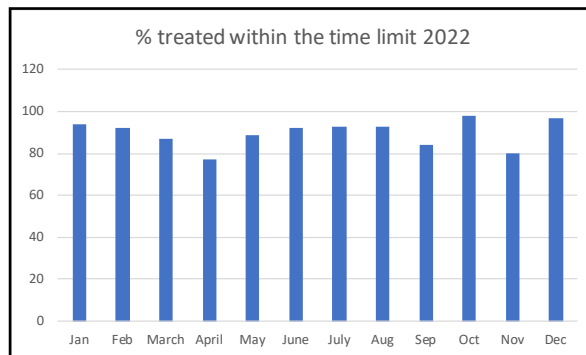
The Department has been significantly challenged in connection with the COVID-19 pandemic. The waiting lists for scheduled ENT surgery are now decreasing in part due to more focus on higher OR capacity. In the upcoming year the capacity is growing from 75% to 125% thanks to hiring and process focus at the Department of Anesthesia and Surgery.

Like previously years, the Head and Neck Division performs highly satisfactory within the head and neck cancer and in accordance to Authority requirements. These cases have had the at most highest priority due to the severeness with the purpose to optimize survival of each patient.



Same day diagnostic/fast track service on suspicion of cancer

The out-patient clinic receives patients with suspicion of cancer and provides same day diagnostics. In 2022 the clinic evaluated 2092 patients. The patients are investigated with a complete ENT evaluation including endoscopic examination with Narrow Band Imaging - microvascular visualization (NBI), ultrasound examination, biopsy and/ or ultrasound guided fine needle aspiration from suspicious areas. Working closely with The Department of Pathology, the analysis of cytology and histology are made within hours, which allows us to confirm or deny the suspicion, establish the correct diagnosis, and make a provisional plan for treatment already at the first visit at the ENT Department.



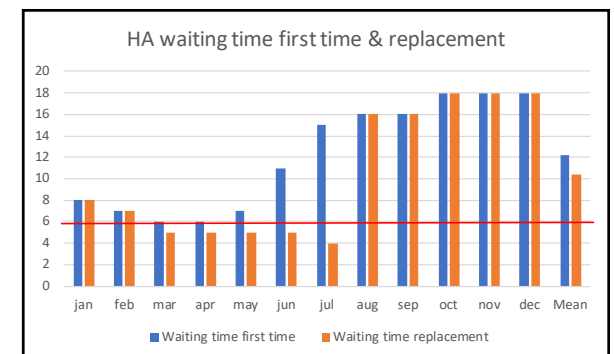
If the suspicion of cancer is confirmed, the patient must be assessed at a multidisciplinary tumour board conference (MDT). The board consist of an ENT surgeon and nurse, a radiologist, and oncologist, alongside the patient and their relatives or a co-sitter of their choice. At the MDT different treatment scenarios are presented, involving the patient in the preferred treatment decision. Doctors and nurses partake in such conferences six times a week. The surgical treatment of head and neck cancer in our center, comprised a total of 828 patients from both the eastern regions of Denmark (670 patients

from The Capital Region and 158 patients from Region Zealand). 84% of these patients underwent surgical treatment within the time limit of 28 days from referral, 76% for Region Zealand and 86% for The Capital Region.

For patients diagnosed and receiving surgical treatment in The Department, the numbers were even better (475 out of 532 patients, or 89%). The results are visualized as follows.

Hearing Aids

Despite the Department's effort to focus on audiology with construction of a specialized center for this purpose (Copenhagen Hearing and Balance Center – CHBC), the Capital Region of Copenhagen changed the conditions for referral of hearing impaired patients mid-2022. Without the financial support the Department has received many more patients for hearing aid treatment. This explains a sudden increase in waiting time for hearing aids in adults. Hopefully this issue will be resolved in 2023.



4. EAR

Otology at the Department is combined by oto-surgery, audiology, vestibular dizziness including physiotherapy and mental rehabilitation, oto-pathology, oto-surgery simulation, and aeronautical otology. In a private public partnership, we opened the doors to the Copenhagen Hearing and Balance Centre (CHBC) late in 2020.

4.1 IMPLANTS

In 2022 CHBC explored new areas of oto-surgical solutions. One such area was bone-anchored hearing aid devices, which are suitable for patients with ear canal diseases or dysfunction of the middle ear post-infection, who cannot wear conventional hearing aids. A novel active magnetic implant design was successfully placed in a series of adults, and based on this success, we plan to offer the same implant to our paediatric/young patients in 2023. Furthermore, CHBC has demonstrated the positive outcomes of cochlear implantation in a wide number of conditions, e.g. genetic hearing loss, vestibular schwannoma, pendred syndrome, and branchiootorenal (BOR) syndrome.

4.2 ENDOSCOPIC SURGICAL TECHNIQUE

CHBC has also consolidated endoscopic ear surgery in addition to the classic microscope surgical technique. In 2018, the first surgical series of endoscopic ear surgery in Denmark were performed at CHBC, supervised by a visiting Japanese surgeon. In 2022, a couple of senior ear surgeons made a return visit to Kyoto to secure continued training. Endoscopes have also been systematically introduced in lateral skull base surgery providing benefits not only in 3D anatomical orientation for the surgeon but also in tumour dissection and wound closure, aiming to preserve hearing in

patients with a tumour on the audio-vestibular nerve. Endoscopic ear surgery is planned to be strengthened in addition to the classic surgical techniques offered today.



4.3 NEURO-MONITORING

Neuro-monitoring of the cochlear nerve function during hearing preservation surgery is well-established in the Department, making it one of the only centers in the world offering this service. After craniectomy, an electrode is placed on the brainstem, allowing for continuous near real-time monitoring by acoustic stimulation in the outer ear canal and recording of evoked potentials at the brain stem level. This allows the surgeon to adapt the surgical tumour dissection to preserve the function of the cochlear nerve. In addition, the continued collaboration with the Mayo Clinic, USA, the global incidence of vestibular schwannomas was explored, showing increasing incidences on a global scale and that the lifetime prevalence appears to exceed 1 per 500 persons.

4.4 VESTIBULOGY

The Department has for several years been privileged with comprehensive vestibular equipment and was the first European clinic with an automated repositioning chair for diagnosis and treatment of benign paroxysmal positional vertigo (BPPV). Another repositioning chair was later added. Some of our BPPV research includes AI in the attempt to improve diagnostic sensitivity and specificity. In 2022 we were grateful to invest in new balance disorder equipment through a private donation enabling us to perform additional vestibular tests and research. In a first-ever human research of neurotransmitters and receptors in the vestibular system, we have demonstrated, that neurotransmitters (e.g. glutamate, serotonin and GABA) are expressed in the neuroepithelium of the saccule, and thus involved in transmission of impulses to the brain upon head tilts and vertical acceleration. These findings provide a basis for pharmacological research and potential drug development. Furthermore, we continuously


partake in educational courses on vestibular disorders with an interdisciplinary qualitative psycho-social approach with the aim of giving guidance to a diversified group of healthcare professionals across Denmark.



4. EAR

4.5 VISIBLE EAR SIMULATOR

Keeping up with technology, enable us to use digital tools to educate and improve skills as part of our clinical work. In a randomized controlled trial, it was shown that some dissection skills can be transferred from Virtual Reality Simulation to cochlear implantation in a cadaver, using a newly developed cochlear implant surgery assessment tool.

 The [Visible Ear Simulator](#) (VES) is developing rapidly and the research group has expanded with a computer scientist. The latest addition to the team, develops metric based automatic and unbiased rating of user skills for the VES. Following clinical validation, this application will enable trainees to monitor their skill level and learning curve. The scientist also develops VES routines for fast, semi-automatic rendering of patient specific surgical models from clinical CT and cone beam CT. This application will enable better preoperative planning and eventually even image guided surgery by 3D mixed reality navigation in a digital surgical microscope. One of the new PhD fellowships is to implement motivation strategies from PC gaming in the VES user interface and test the possible learning benefits. Based on the ratings of trainees and experienced surgeons, the goal is to establish pass/fail levels for a VES based certification of surgical trainees before their first assisted clinical surgery.



4.6 COPENHAGEN HEARING AND BALANCE CENTRE (CHBC)

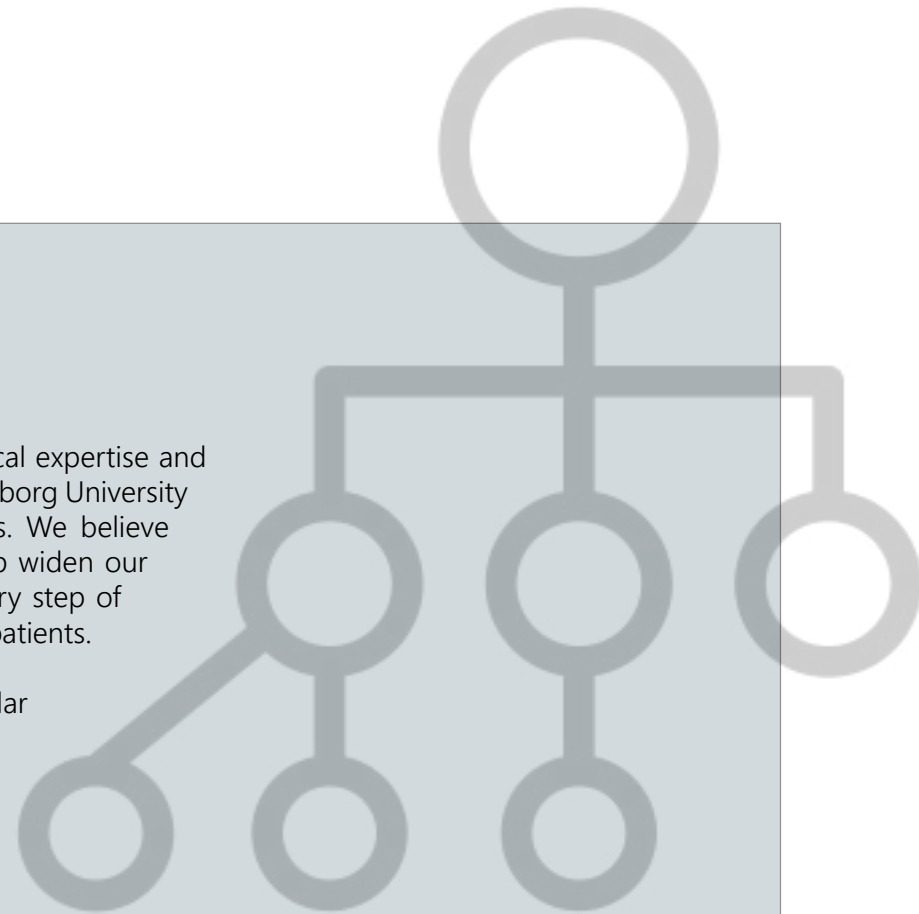
CHBC is a subcenter of the ENT Department which work cross functional bringing clinical expertise and research interests together, therefore both DTU (Technical University of Denmark) and Aalborg University have permanent residence in our center along with part-time industrial competences. We believe that sharing space, ideas and expertise between academic groups is necessary to help widen our understanding and to overcome the growing challenges and possibilities we face. Every step of the way, uncovering new knowledge or solutions, all of which will ultimately benefit our patients.

Our primary area of interest lies within: ear surgery, audiology and speech pathology, vestibular disorders, oto-pathology, and military aviation medicine. Besides aforementioned topics, we are immensely involved in education, bringing knowledge to the next generation of clinicians.

In 2022 we broadened our scope by initiating research projects that combine hearing and balance disorders with other diagnoses, trying to gain proof of the correlation of impairment in these organs and cognitive function and diseases.

AVT (Audio Verbal Therapy) became a permanent offer to children with hearing and subsequent language challenges in Denmark; a health care decision based on profound clinical evidence from our center.

In Denmark we know sound, and the industry contribute to 1.73% of the GNP, accounts for 4.1% of all Danish export and employs 52.000. This creates a very dynamic setting for bringing the best sound experience to the human being, either through improved sound environments, high-tech microphones, or healthcare solutions. Through our membership in the Danish Sound Cluster, we see our center expand with more interesting projects and research, enabling us to help patients best possible. Giving us the opportunity to work closely with the industry, either directly in partnerships or indirectly through foundations and clusters. The Department is also a member of non-profit organizations like, e.g., InterForce, which provides relationship between private or public organizations and military agencies.



4. EAR

4.7 AUDIOLOGY

The area of audiology at CHBC is divided in two separate sites, one at Rigshospitalet and one at Bispebjerg Hospital. At Bispebjerg Hospital the focus is on diagnostics and treatment of adult patients with hearing impairment. At Rigshospitalet all children suspected of or with hearing impairment are assessed, diagnosed, and treated with the latest advancements in both treatment and rehabilitation. In addition, adults with severe hearing impairment are also assessed and treated with implantable hearing devices, e.g., Cochlear implant (CI) and bone anchored hearing devices at CHBC, Rigshospitalet.

The work is organised in multidisciplinary teams to ensure high quality hearing assessments, and ensure our services include the latest technological advancements. Especially regarding hearing measurement in children combining Visual Reinforcement Technology (VRA) with trained professionals, thereby achieving high quality hearing measurements in a playful and child friendly setting. CHBC also offer thorough electrophysiological measurements, e.g., Electrocochleography, Auditory Brainstem Responses (ABR), Auditory Steady State Response (ASSR) and Cortical Auditory Evoked Potentials (CAEP). In combination with genetic counselling and testing, a precise diagnosis and treatment plan can be made.

In treating patients with hearing impairment, CHBC use state of the art hearing technology and verification tools such as Real Ear Measurements (REM), Real Ear to Coupler Difference (RECD) and several discrimination tests. To ensure optimal fitting of the hearing technology perfectly shaped earmolds are

important. CHBC was the first in Denmark to implement 3D scanning, designing, and printing of earmolds for both children and adults. This has resulted in fewer visits to the earmold technicians and more durable earmolds and therefore a noticeable improvement in the overall satisfaction with the hearing technology.

Technology cannot stand alone, which has been proven in several research projects and therefore Auditory Verbal Therapy (AVT) is now an integrated part of the treatment for hearing impairment in children at CHBC and from 2023 onwards in all five regions in Denmark. For more information on AVT and how it has transformed language capabilities in our youngest, look to the chapter "AVT".

It is a privilege for CHBC also to provide audiological services to the Faroe Islands and Greenland to help the local healthcare professionals in handling complicated audiological cases. The support consists of both assessment and treatment at CHBC as well as outpatient visits. For more information, look to the chapter "Greenland".



ONGOING PhD RESEARCH

Gamification in auditory rehabilitation

Signe Wischmann

Electrophysiologically measured frequency discrimination

Mats Daniel Rekswinkel

Rehabilitation of adult CI users

Line Husted

Surgical VR simulation in education, training and surgical certification

Anders Nøhr

Sound-field reproduction methods for assessments of spatial hearing

Janani Fernandez

Clinical assessments of spatial hearing for hearing-aid and cochlear-implant rehabilitation

VibroHear

Francesco Ganes

TeenHear

Nete Rudbeck Kamper

Word learning patterns for children with hearing loss

Julia Chiossi

Audible Contract Threshold (ACT)

Lisbeth Birkelund Simonsen

Auditory Phenotypes in Denmark (postdoc project)

Gerard Encina-Llamas

CBCT in diagnosis and treatment of otosclerosis

Bilal Akram

Advancing virtual reality temporal bone simulation for patient-specific simulation and mixed reality perioperative guidance

Peter Trier Mikkelsen

Vestibular system diagnostics and treatment – the TRV chair in the management of BPPV

Louie Rogalla

Outcomes for children with CI in the Middle East vs children from Denmark

Beauty Hariz

Spatial hearing in realistic environments for bimodal and bilateral listeners Colin Barbier

PRINCIPAL SUPERVISORS: Torsten Dau, Abigail Anne Kressner, Mads Klokker, Lone Percy-Smith, Mads Sølvsten Sørensen, Per Cayé-Thomasen

5. NOSE

Rhinology at the ENT Department is combined by rhino-surgery, sleep medicine, drug induced sedation endoscopy, global airways management, rhinological cancer and cystic fibrosis and primary ciliary dyskinesia.

5.1 RHINOSINUSITIS

With the approval of biological medicine for severe chronic rhinosinusitis with nasal polyps (CRSwNP) in 2022, treatment protocols focusing on clinical effectiveness and patient-reported outcomes have been initiated, as part of our newly founded Global Airway Clinic. In addition, our efforts in 2022 was focused on improving of the diagnostic tests and treatment for the late effects of COVID-19, chronic rhinosinusitis (CRS), and an added emphasis on lung and allergy testing in the treatment of eosinophilic diseases. Based on the newly introduced modulators, we have also reinforced our engagement in the treatment of cystic fibrosis and primary ciliary dyskinesia. Within sleep medicine, drug-induced sedation endoscopy (DISE) and related surgeries have now become standard practices.

The Department has also had a significant impact on the national collaboration with other university departments concerning the future treatment of patients with CRS and CRSwNP. Other collaborations include international expert groups on both the EPOS2020 and the EUFOREA reports and guidelines regarding the treatment of upper and lower airway diseases.

5.2 CYSTIC FIBROSIS AND PRIMARY CILIARY DYSKINESIA

The Department has offered a highly specialized outpatient clinic for several years to patients suffering from the rare genetic diseases such as cystic fibrosis and primary ciliary dyskinesia. In close collaboration with microbiologists and paediatricians, the aim is to relieve patient symptoms and remove infections from the airways. Although the new modulators have significantly improved these patients' quality of life, they still have upper airway symptoms and benefit from the multidisciplinary collaboration taking place at Rigshospitalet.

5.3 RHINOLOGICAL CANCER

In recent years, the Department has been focusing on hematolymphoid tumors and their interaction with other extra-nodal hematological disorders. We have recently published papers on B-cell lymphomas in the nasal cavity and paranasal sinuses. As the first in the world, we have mapped the relapse and dissemination patterns, as well as the treatment prognosis, linking them to CNS and dermatological hematolymphoid diseases.

In addition to B-cell lymphomas, the focus has been on the rare Epstein-Barr-associated extra-nodal NK/T-cell lymphoma (nasal type), which is typically found in the nasal cavity and paranasal sinuses and has a dismal prognosis. As the incidence in Europe is low, we were the first to describe the demographics and prognosis in a European population. Furthermore, the Department is studying plasma cell neoplasms in the nasal cavity and paranasal sinuses, as well as the conversion rate to plasma cell myelomas. We have established a collaboration with the universities of Amsterdam and Leiden to work on the genetic sub-classification of rhinological lymphomas.

5.4 LOSS OF SMELL

Anosmia, hyposmia or phantosmia (loss of smell, reduced sense of smell, or smelling things that is not there) has been increasingly an area of interest worldwide following the pandemic resulting in significant negative effects on quality of life for many, including the ability to enjoy different tastes. In 2022 we continued our highly specialised diagnostic rehabilitation and lively research activity

5.5 DRUG-INDUCED SEDATION ENDOSCOPY (DISE)

Since 2015 we have used drug-induced sedation endoscopy (DISE) as a diagnostic tool before targeted upper airway treatment of patients with obstructive sleep apnea and poor compliance with continuous positive airway pressure (CPAP) treatment. DISE is a fiberoptic examination of the upper airway—from the nostrils to the hypopharynx—conducted while the patient is lightly sedated to mimic natural sleep. The purpose is to locate the soft tissues responsible for the airway obstruction, as a future target for invasive or non-invasive treatment.



5. NOSE

5.6 THE DANISH CENTER FOR SLEEP SURGERY

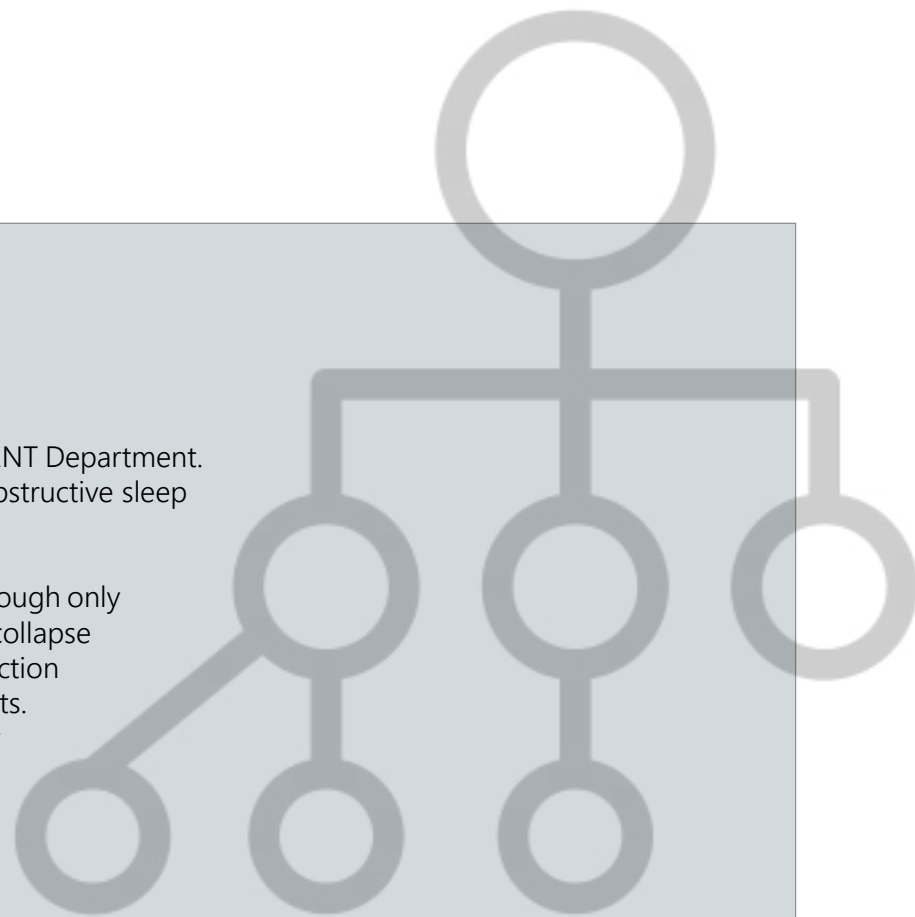
The Danish Center for Sleep Surgery (Dansk Center for Søvnikirurgi) is a center within the ENT Department. The center was founded in 2018, with the main purpose of improving the treatment of obstructive sleep apnea (OSA).

OSA can be a serious disease affecting up to 34% of adult men and 17% of adult women though only around 25% of patients are symptomatic. The disease is characterized by upper airway collapse during sleep, inducing poor sleep quality, daytime sleepiness, disturbances in memory function and concentration, and a 3 to 6-fold increased risk of being involved in traffic accidents. In addition, there is an increased risk of type 2 diabetes, hypertension, cardiovascular disease—and an up to 3-fold increased risk of sudden death.

Our center was the first in Scandinavia to introduce DISE back in 2015 and the first in the world to combine DISE with an enhanced sedation method, Nurse Administrated Propofol Sedation (NAPS). By this method, sedative is administered by a staff nurse according to the nurse-administered guidelines — without the presence of an anesthesiologist. Our team of ENT nurses and doctors have all completed their formal NAPS training at CAMES (Copenhagen Academy for Medical Education and Simulation), and it has been proven safe and beneficial in a large study conducted in our Department.

As a result, our Department is now the national referral center —and while most patients come from the Capitol Region of Denmark, we receive patients from all parts of the Kingdom including Greenland and the Faroe Islands. We offer a large variety of DISE-directed interventions with the main focus on targeted upper airway surgery. Soft palate laser surgery, palatine tonsillectomy, and trans-oral robotic surgery are some of the procedures performed. If surgical intervention is not deemed favorable, we collaborate with the Danish Center for Sleep Disorders who specializes in non-invasive treatment.

In addition, we have research collaborations with the Danish Center for Sleep Disorder, The Technical University of Denmark (DTU), and Stanford University. We also host national courses on DISE and upper airway surgery. The ongoing research projects in our center engage both nurses and doctors devoted to the continued improvement of treatments and outcomes for patients with OSA.





ONGOING PhD RESEARCH

Sinonasal lymphomas - epidemiology, genetic mapping and homing of B lymphocytes

Patrick Eriksen

Which patients with chronic rhinosinusitis will benefit the most from biologic treatment - how to optimize treatment?

Christian Korsgaard Petersen

FESSnonFESS

Anne-Sophie Homøe

Quality of life in patients with olfactory and gustatory dysfunction following COVID-19

Ditte Gertz Mogensen

Mastering endoscopic sinus surgery

Mads Guldager

PRINCIPAL SUPERVISORS: Christian von Buchwald and Vibeke Backer

6. HEAD & NECK

The Head and Neck Division of the ENT Department at Rigshospitalet is the largest in Denmark and provides all aspects of head and neck services from ENT emergencies, minor procedures to major complex head and neck surgery for cancer patients. Beside servicing major part of the capital region as a tertiary hospital, we also serve the Eastern part of Denmark - Zealand's 2.8M inhabitants as tertiary highly specialized Head and Neck surgical oncological center.

The team of clinicians offer a broad variety of highly specialised treatments of head and neck cancers, thyroid and parathyroid disorders, sarcomas, vascular malformations, and phoniatic lesions. The Department offers surgical procedures with minimally invasive approaches such as laser surgery, robotic surgery, and sentinel node biopsy procedures with a weekly capacity of 23 top-equipped surgery theatres. The Department has a long tradition for research in cancer, stemcells, image guided surgery, liquid biopsy, ultrasound, and more.

6.1 MULTIDICPLINARY COLLABORATION

The ENT Department at Rigshospitalet has close collaboration with other diagnostic departments, attending daily radiology conferences and bi-weekly PET-CT conferences. The Department has established a close collaboration with surgical partners from plastic surgery and maxillofacial departments when major cancer surgery requires microvascular reconstructive procedures. As a consequence these clinical partners established the East-Danish Center of Head and Neck Cancer (OCHH) funded late summer 2021 and the intention with the Center is to research in better, more effective, and safer cancer treatment.

Some of the patients may experience functional deficit post cancer surgery, for example when eating, speaking, breathing, or how it might have altered their physical appearance. In recognition of the this, we have a weekly multidisciplinary rehabilitation conference with occupational therapists, physiotherapists, nutritionists, nurses, and ENT specialists focusing on diagnostics of the potential side-effects of the treatment, and proper rehabilitation, either in house or in general rehabilitation in the municipality.

6.2 NURSE-LED REHABILITATION

The Department have a strong tradition for nurse-led rehabilitation, an effort which is initiated at the first visit in our patient clinic, followed by interviews during hospitalization for surgery and after discharge with systematic phone calls and home visits by a nurse with specialization in rehabilitation. These visits have been established to ensure that patients throughout their course of treatment are optimized in terms of pain management, nutrition, support for tobacco and alcohol abstinence and with a focus on psychosocial wellbeing, which can be challenging to reveal in the clinical setting at the hospital. The strategy is to prevent readmissions and accommodate our most vulnerable patients. After successful treatment all patients are offered the opportunity to attend a four-hour patient seminar, with the focus on living with a cancer diagnosis. Moreover, the Department has a collaboration with the Head and Neck Cancer Patient Association.

6.3 LIQUID BIOPSY

We are investigating the potential of detecting head and neck cancers with a blood test. We have initiated a prospective, observational study investigating circulating tumor DNA (ctDNA) and HPV DNA in blood samples from head and neck cancer patients with references to healthy controls. The aim is to use it as a diagnostic tool to diagnose recurrence of head and neck cancer.

6.4 IMAGE GUIDED CANCER SURGERY

Intraoperative imaging guidance in cancer surgery based on injection of imaging agents is a novel research field with a significant potential to improve the quality and outcome of cancer treatment, based on a precise surgery leading to improved radicality.

Recently, the use of an optical imaging agent to detect lymph nodes in oral cancer surgery has been clinically implemented. Next is specific cancer targeted optically guided oral cancer surgery based on uPAR, an imaging agent that specifically lights up the cancer during surgery.



6. HEAD & NECK

6.5 TORS - QoLaTi

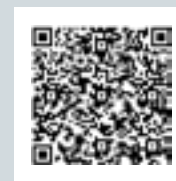
The Department is currently running two national randomized clinical trials concerning TransOral Robotic Surgery (TORS). One trial is investigating TORS vs. primary radiotherapy as the primary treatment for oropharyngeal cancer and the effect on quality of life and subsequent swallowing function. The other trial focus on an optimization of the perioperative course, including an investigation of an improved pain management. Both trials are run with participation of all the Danish head and neck cancer centers in Denmark.



6.6 EAST-DANISH CENTER OF HEAD AND NECK CANCER (OCHH)

The OCHH is a subcenter at the ENT Department. The purpose of the newly established brickless center is to optimize chances of survival and improve quality of life after treatment

for head and neck cancer. The vision for the center is for the existing organization with many individual actors inside and outside Rigshospitalet to engage in closer collaboration in order to achieve optimized, evidence-based and consistent treatment for head and neck cancer patients in Eastern Denmark. Furthermore, the center should facilitate similar improvements in other cancer areas with regards to scaling and inspiring education. The center has already had initial meetings with actors and is working on the organization and first research projects.





ONGOING PhD RESEARCH

An investigation of postoperative pain, why still in hospital and days alive and out of hospital following transoral robotic surgery (TORS).

Mikkel Hjordt Holm Larsen

Tumor-specific imaging in oral cavity and oropharyngeal squamous cell carcinoma

Mads Lawaetz

Translational trials with mesenchymal stem/stromal cell therapy for the regeneration of radiation-induced salivary gland hypofunction and xerostomia

Charlotte Lynggaard

Optically imaging-assisted head and neck surgery

Eva Lykke

Adherence in global airways

Christiane Haase

Mesenchymal stem cells for the treatment of radiation-induced dry mouth and HPV-related oropharyngeal cancer

Amanda-Louise Fenger Carlander

Development of peptide-based tracers/imaging agents targeting the calcium-sensing receptor (CaSR) for radionuclide- (pre-operative e.g. PET or SPECT) and optical-imaging (intraoperative) of the parathyroid glands

Amanda Øster Andersen

Surgeon-performed transoral ultrasound to improve detection and staging of oropharyngeal cancer

Martin Garset-Zamani

Circulating tumor DNA and HPV DNA in head and neck cancer patients and Mesenchymal stem cell therapy for patients with previous head and neck cancer

Kathrine Kronberg Jakobsen

Evaluation of a prognostic HPV Biomarker assay for risk stratification of HPV16+ OPSCC patients

Simone Klock Bendtsen

Biological treatment of CRSwNP in Denmark

Christian Korsgaard Petersen

Lymph node and margin assessment by 3D Ultrasound Imaging of surgical specimen

Fatemeh Makouei

Development of peptide-based tracers for preoperative scanning and intraoperative visualization of the parathyroid

Amanda Øster Andersen

Design, synthesis and characterization of novel peptide-based fluorescent probes for optical imaging during cancer surgery

Tuule Treiberg

PRINCIPAL SUPERVISORS: Christian von Buchwald, Vibeke Backer and Tobias Todsén

7. EDUCATION

The ENT department partake in education of 400 medical students, 70 nurse students and other pre-graduates and post-graduates on a yearly basis. An very important task of any organisation is skill development and training. Realising this, the ENT Department has a firm focus on providing evidence-based knowledge on medical training. Here is a small sample , of such activities with a special focus on education.

[In-house 3D printing and Virtual Reality being investigated as a training platform for surgeons in training](#)

In collaboration with The Additive Manufacturing Group at the Technical University of Denmark (DTU), The ENT Department has developed a low-cost, 3D-printed temporal bone model suitable for mastoidectomy training. The model can be used as an adjunct to virtual reality (VR) simulation training to train physical aspects of temporal bone surgery. The model is created using an inexpensive, consumer-grade 3D-printer, enabling in-house production and providing a low-cost alternative to commercially available physical models. The research project aims to establish the effect of the 3D-printed model for training mastoidectomy and collect evidence on its validity in the temporal bone training curriculum for residents and future oto-surgeons as well as how best to implement this new training modality. In 2022, the Temporal Bone Imaging and Simulation Group at The CHBC introduced the model successfully at the international Geneva Temporal Bone Beginner Course after debuting the model at the Danish National Temporal Bone Course in 2021. At the Geneva course, the ENT Department contributed not only the new 3D-printed models but also high-fidelity, VR simulation training of the mastoidectomy procedure with our Visible Ear Simulator.



[Mastering Endoscopic Sinus Surgery](#)

Functional Endoscopic Sinus Surgery, FESS was introduced in the 1970s, the procedure is now common worldwide, and performed more than 250.000 times a year in the US. No international consensus exists for endoscopic sinus surgery. The ENT Department launched a Delphi study aiming to identify essential technical elements of endoscopic sinus surgery. In the forthcoming studies, we aim to test this "stepwise approach" and clarify whether it can contribute to a framework for a systematic learning of endoscopic sinus surgery, for better and faster skill acquisition.

[Ultrasound](#)

The ENT Department has a long tradition of integrating ultrasound as a part of the diagnostic workup in the head and neck cancer outpatient clinic. The Department arranges a yearly [International Head & Neck Ultrasound Course](#) with a multinational faculty including, Stanford University, The Imperial College of London, Emory University, and The Regensburg University. In 2022 our international two-day course on how to integrate ultrasound into a clinical setting, hosted in Copenhagen, had participants from 19 different countries. The Department has also been involved in the development of the European recommendations for head and neck [ultrasound training published](#) this year.





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8. IN THE SPOTLIGHT

8.1 NURSING REHABILITATION, EDUCATION, AND RESEARCH

Postgraduate Education, Research, and Development in Nursing Practice

During the last decade, the focus has been directed towards strengthening research and development in the field of nursing. This has included enhancing the competencies of nurses in clinical practice, as well as enabling several nurses to complete postgraduate education at diploma, master's, and Ph.D. levels. In line with the strategy for nursing rehabilitation and palliative care, significant attention has been given to the rehabilitation team and "Multidisciplinary Rehabilitation Conferences."

Nursing Rehabilitation and Palliation

The nursing rehabilitation team's focus in 2022, has been on home visits shortly after discharge and approximately two weeks postoperatively. Here a needs assessment will be performed to identify rehabilitation and symptom management in relation to physical, functional, emotional, social, and existential needs. Furthermore, early detection of patients in need of palliation have been implemented. If palliation efforts are deemed favourable, the patients will be referred to the Department's multidisciplinary palliative team. In order to improve adequate detection of these patients a digital needs assessment instrument is being implemented. These consists of of two parts: a PRO questionnaire (the University of Washington Quality of Life Questionnaire) and a Concerns list (the Patient Concerns Inventory).



The Department hosts patient seminars which are multidisciplinary including surgeons, dieticians, speech-language pathologists, physiotherapists, and nurses. These address concerns, symptoms, and needs related to returning to a "new normal" after surgery, such as speech, nutrition, fear of cancer, and symptoms of recurrence. The seminars take place two months postoperatively. During the COVID-19 lockdown, an online version of the patient seminar was rapidly implemented, but with the easing of the pandemic-restrictions in 2022, they are now back in their original form. The online version can still be accessed on the Department's homepage.



Also, the previously implemented Multidisciplinary Rehabilitation Conferences are now functioning at full capacity. The purpose of the conferences and consultations is to see patients with complex needs after head and neck cancer surgery, such as dysphagia, nutritional or other problems. The multidisciplinary teams consist of surgeons, speech-language pathologists, dieticians, physiotherapists, and nurses.



8. IN THE SPOTLIGHT

8.2 NASAL POLYPS AND UPPER AIRWAY MANAGEMENT

Global airways management

CRSwNP is a disease that often leads to a significant disease burden with symptoms like nasal blockage, nasal discharge, facial pain or pressure, and loss of smell. Eosinophil cells are the major immune competent cell in action and disease burden among patients with Type-2 chronic rhino-sinusitis with nasal polyps (CRSwNP) and well as other inflammatory diseases of the airways, such as asthma. Research has shown that patients with CRSwNP often present with inflammation of the entire airway system—not only the nose and sinuses. Our department has found asthma in more than half of the patients referred to the hospital for surgical removal of nasal polyps, with a quarter of them not knowing they had it. Treatment with the novel biological antibodies, not only reduce the size of the nasal polyps, improve smell deficient and quality of life, but also reduce asthma exacerbations and increase lung function.

The airway team is an interdisciplinary workforce that includes ENT specialists, pulmonologists, and specialised nurses. The collaboration between ENT specialists and pulmonologists has led to the development of the global airway concept in the Department. Patients suffering from global airway diseases, with the potential involvement of both upper and lower airways, are now examined by both type of specialists within the same consultation in our outpatient clinic. The aim is a systematic assessment of the entire airway, and the concept has been developed with a holistic approach in mind—minimizing the number of consultations for patients with global airway diseases. The collaboration has resulted in the development of the STARR-15 questionnaire - a screening tool for asthma, CRS, and allergic rhinitis.

In the field of Global Airways, The Department has initiated four Ph.D studies and one master in nursing concerning adherence to standard treatment of CRSwN. The Ph.D studies include one staff MD ENT specialist in a head-to-head RCT study of two different biologic drugs, another MD in training in ENT in a RCT study of FESS versus non-FESS in patients whom all are treated with the same biologic drug in both arms plus FESS surgery and biologic drug alone in the other treatment arm, and one upcoming MD pulmonologist in airway inflammation in upper and lower airways when treated in a FESS versus non-FESS study.

Post-COVID clinic

In the Post-Covid clinic patients with smell and taste deficiency are managed. Initially at the COVID epidemic loss of the sense of taste and smell occurred in 75% of infected patients. In contrast to other post-viral olfactory loss, in coronavirus it is often younger patients with milder courses of COVID-19, who experience the combined olfactory and gustatory loss. The duration of the impairment ranges from a few days to weeks after the end of the infection, whereas 25% of the patients suffer of persistent impairment of taste and smell. The Department has initiated an out-patients clinic which is taking care of these patients. They are offered systematic assessment for smell and olfactory dysfunction, and medical evaluation to ensure not have other diseases as the course of the deficiency. All data is included in a REDcap smell database. One PhD student has been initiated studying whether olfactory training twice daily (versus placebo), will improve QoL.



8. IN THE SPOTLIGHT

8.3 ULTRA SOUND IN HEAD & NECK

The use of ultrasound in head and neck evaluation has now become an integrated part of the clinical ENT examination. Housing more than 20 ultrasound machines, The Department is a world-leading center in surgeon-performed head and neck ultrasound. To strengthen research in high-resolution and minimally invasive ultrasound diagnostics and ultrasound-guided interventions, The Department has established the Surgical Ultrasound Research Group in Copenhagen (SURGiC). The group consists of clinical researchers, biomedical engineers, and data scientists to ensure an environment for translational collaboration between basic and clinical research. We focus on testing new ultrasound methods and conduct prospective and multicenter clinical trials.

SURGiC is currently developing a technique to perform trans-oral ultrasound with small high-frequency transducers to improve the diagnostic imaging of oral- and oropharynx cancer. Transoral ultrasound can be a cost-effective imaging technique to improve cancer detection and avoid diagnostic surgery in general anesthesia. The Department conducted a promising clinical pilot project of the diagnostic workup of oropharynx cancer with other departments. SURGiC is also leading another multicenter randomized clinical trial to compare a new type of sSpinal needle versus a conventional fine needle for ultrasound-guided fine needle aspiration biopsy – the SPINAB trial. Having included more than 150 patients and aim to complete the study in 2023, hopefully leading to an improvement Thyroid cancer's diagnostic workup. Furthermore, the Department has also been the first in Denmark to implement a new minimally invasive treatment for thyroid nodules with ultrasound-guided

radiofrequency ablation (RFA). A prospective clinical study is ongoing to evaluate RFA of benign thyroid nodules with Patient Reported Outcome measures.

SURGiC is working with new 3D ultrasound imaging technologies to improve some of the limitations of conventional 2D ultrasound imaging. Two ultrasound machines funded for research in collaboration with various partners to test new emerging technologies.





8.4 STEMCELL TREATMENT FOR XEROSTOMIA AND HYPOSALIVATION

Salivary gland hypofunction and xerostomia (sensation of dry mouth) are among the most common patient reported adverse side effect following head and neck radiotherapy – whether given in combination with chemotherapy or not. It can result in debilitating oral disorders and a significant impairment inequality of life (QoL).

In 2022 The Department conducted two pilot studies, on the use of intraglandular mesenchymal stem cells as a potential treatment for xerostomia. The studies were promising, indicating that the treatment was safe with no treatment-related serious adverse events. Following our discovery, the Department has since expanded the research on stem cells and recently finished the inclusion of 120 patients in a randomized, double-blinded, placebo-controlled trial investigating the effectiveness and safety of allogeneic stem cells for the treatment of radiation-induced xerostomia. The study aims to investigate the effect of stem cells on the unstimulated saliva flow rate, the stimulated saliva flow rate, impact on QoL, safety of the treatment, and investigate the impact on the quality of the saliva. The long-term goal being a clinically relevant treatment to amend patients with xerostomia, a severely hampering condition.

Our progress on stem cell research, includes two PhD-projects and one post doc. The next protocol is finished as we start investigating the effect of stem cells on xerostomia because of Sjogren's disease but also its application in other areas such as scar tissue on the vocal cords. In addition, we will investigate the effect of repeated treatments on xerostomia in head and neck cancer patients with the MESRIX-more trial.



8. IN THE SPOTLIGHT



8.5 GREENLAND

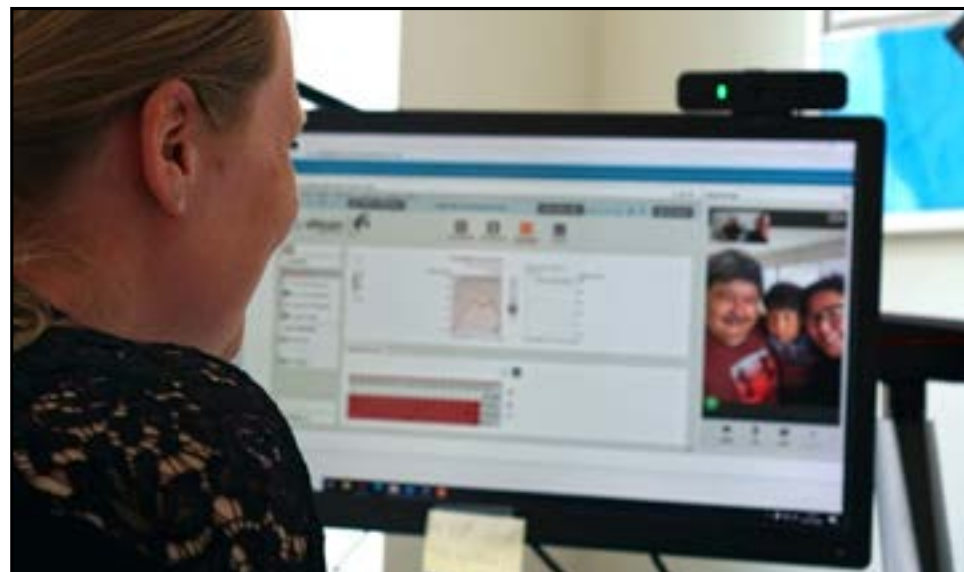
It is our ambition that every person in the Kingdom of Denmark have equal access and opportunity for treatment, in case of sickness or health impairment. The 1st of January 2023 marked a strengthening in our ties to Greenland, since the increased collaboration in 2022 has led to the Department taking over audiology support from Odense University Hospital. In the coming years, the Department will aid Queen Ingrid's Health Center in expanding local capacity and bring new technology in both diagnostics and hearing rehabilitation. But no partnership is one-sided, as we commit to learn and upscale our resources in remote caregiving, an area where Greenland is considered vastly superior. More importantly, also committing to learn of the Greenlandic values, and a holistic approach of both health and nature.

The joint effort has multiple goals, one of them is bringing treatment and care to the high incidence of children and young people with ear diseases and hearing loss in both cities and settlements in Greenland. In May 2022, the first tele-audiological follow-up was carried out in a pilot project, where an audiologist at Copenhagen Hearing and balance Centre (CHBC), adjusted the hearing aid on a boy in South Greenland, via the mother's smartphone, controlled remotely from Copenhagen, over 3500 km away. The project succeeded in delivering a highly specialized service into the safety and comfort of the family's living room. Over the next few years, several comparable technological solutions will be tested to equalize the otherwise unequal access to specialists.

Another focus of our collaboration is in regard to patients with head and neck cancer, where studies have shown a continued improvement in survival rates over the past 25 years. However, the delay from symptom identification to treatment initiation, is in dire shape. Recent data discloses that treatment of

suspected head and neck cancer in Greenlanders start with an inappropriate delay. Furthermore, the patient follow-up on return to Greenland from Rigshospitalet, has not yet been fully systematized. The goal is that organization of rehabilitation and follow-up are anchored at the surgical outpatient clinic at Queen Ingrid's hospital in Nuuk. Here, specialized nurses will conduct follow-up and have the opportunity for sparring with the Cancer Rehabilitation Team of the ENT Department at Rigshospitalet.

We are looking forward to this important cooperation and the improvement in treatment and knowledge, it will bring to The Department and to the people of Greenland.





8. IN THE SPOTLIGHT

8.6 AVT - AUDITORY VERBAL THERAPY

Auditory Verbal Therapy (AVT) is an established and well documented method for helping children with hearing impairment and their families to develop age equivalent language levels prior to starting school. AVT coaches and guides the parents on how to stimulate the auditory centers in the brain, providing the child with the optimal benefit of their hearing technology. During in-house sessions, the parents are shown auditory techniques and strategies in a playful and natural manner enabling them to easily integrate them into their daily life, as the primary language models they are.

Prior to the introduction of AVT, only 30% of children with hearing impairment reached age equivalent language levels when starting school, whereas after 3 years of AVT it is now 83%. This significant improvement has a putative positive impact on the individual child, their family and improves their adoption in society.

Copenhagen Hearing Balance Center at Rigshospitalet has played a major part in achieving this, together with our excellent colleagues at Århus University Hospital, Odense University Hospital and the patient organization Decibel. Our collective results have shown how important proper rehabilitation is in the children's outcome scores and in the general treatment. That said, of course always combined with timely intervention and state of the art and well-fitted technology, though underlined that technology cannot stand alone.

Therefore, from 2023 and onwards AVT will be offered in all five regions in Denmark as a permanent offer in treatment of children with hearing impairment. Making Denmark the undisputed world leader, as the first country to implement AVT on matter the degree of hearing loss or type of hearing technology they use, and with no additional costs for the families.

We are very proud of our AVT-adventure and happy to see so many children and families reaching their full potential, from this specialized rehabilitation. To maintain high quality, we ensure adequate AVT-education for all professionals, by continuously onboarding new professionals in the AVT-field. An AVT education takes 3-5 years as a postgraduate, and therefore a continuing educational plan is mandatory and professional sustainability needs to be planned.





8. IN THE SPOTLIGHT



8.7 INTERDISCIPLINARY AUDIOLOGY RESEARCH

An important ambition of Copenhagen Hearing and Balance Center (CHBC) is a close collaboration between the clinicians at The ENT Department and the engineers at [The Technical University of Denmark \(DTU\) Health Tech](#). This collaboration is facilitated by a research unit within CHBC that consists of jointly employed faculty and researchers together with dedicated, state-of-the-art research facilities. Additionally, a close collaboration with researchers from Aalborg University has been established. Some research is being conducted in collaboration with MedTech companies.

One particular focus area has been the study of neural correlates of cochlear synaptopathy, often referred to as “hidden hearing loss,” which is not reflected in a traditional hearing test. At CHBC, we obtained frequency following responses (FFR) to high-intensity low-frequency tones, using electrophysiological tests (ECochG and BRA). Age-related neural degeneration in the brainstem has been demonstrated to be caused by a reduced neurophonic response already at the level of the auditory nerve. FFRs to low-frequency tones might thus be a sensitive marker of peripheral neural degeneration.

With DTU’s Audio Visual Immersion Lab (AVIL) and CHBC’s Spatial Hearing Lab, we are testing novel ways to bring realism and ecological validity to the clinic for diagnostics and clinical assessments. For example, we have been able to demonstrate that patients diagnosed with vestibular schwannoma (i.e., a tumor on the auditory balance nerve) who are implanted with a cochlear implant (CI) achieve improvements in their spatial hearing.

Another focus area at CHBC has been the development of a new Danish-language speech-in-noise test designed to measure speech intelligibility in

noise, both with and without a hearing aid or cochlear implant. Sentence-level speech-in-noise tests are suggested to give a better representation of functional hearing ability than word-level tests (which are currently used in clinical practice) and can therefore aid in achieving more accurate validations of prescribed treatment. However, access to a Danish-language speech-in-noise test that is clinically feasible to administer remains limited. The development of the corpus to create such a clinical test was completed this year, and the design and validation of the associated tests are underway.

Furthermore, CHBC have started two new research streams: one on tinnitus and one on psychosocial function. Regarding the tinnitus stream, our aim is to improve the methods for tinnitus management by means of personalized hearing-aid fittings. Here, we subdivide tinnitus patients into subgroups reflecting different perceptual (supra-threshold) auditory deficits. These subgroups are used to investigate whether more complex hearing-aid settings can provide long-term tinnitus improvements to patients who otherwise do not benefit from the treatment. Regarding the psychosocial function stream, we have translated and evaluated standard international scales that quantify hearing handicap and social participation restriction into Danish and investigated whether such patient-reported outcomes are sensitive enough to characterize the experience of patients following first-time hearing-aid fittings.

In the “Lyt Igen” (listen again) project, CHBC and [Aalborg University and their Multisensory Experience Lab](#) are investigating how to help children with hearing loss train their spatial awareness using virtual reality (VR) and gamification. This is achieved by asking children to borrow a VR display and play the developed gamified simulations of visiting the Danish Music Museum and a school

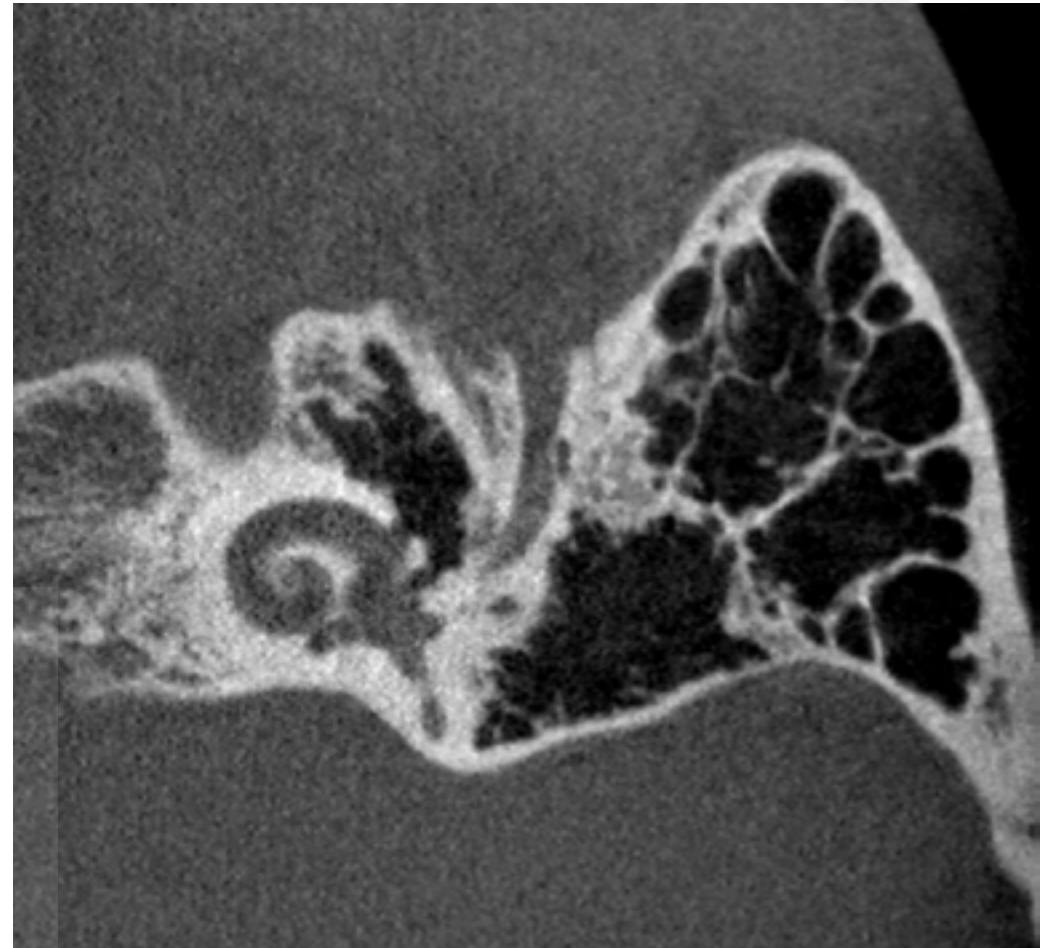
playground twice a week for three months.

In GameHear, CHBC is collaborating with Aalborg University to investigate how to reduce the boredom of hearing tests performed in the clinic. This goal is achieved by creating a body-based game where children need to detect where and when a sound is appearing and reach for it.

In the PreHear project we aim to educate parents about the neurological consequences of not using hearing aids through the use of interactive applications. Another goal is to prepare children for the unpleasant action of having their hearing tested with insert phones.

The VibroHear project, a collaboration between CHBC and Aalborg University, investigates how to use vibrotactile feedback to augment and complement auditory feedback.

CHBC and DTU Health Tech are currently expanding their neuroscience activities in connection with their recently established "Centre for Auditory Neuroscience" (CAN). One of the goals here is to develop new imaging methods to study the microstructure of the inner ear at the cellular level and its pathologies.



8. IN THE SPOTLIGHT

8.8 CAG - CLINICAL ACADEMIC GROUP

Image Guided Cancer Surgery – Clinical Academic Group

Optical imaging is a technology that allows direct real-time visualization of cancer tissue during operation. The technology may function as a surgical tool to aid detection or delineation of cancer and to secure complete removal of cancer tissue following a tumor resection, while sparing healthy tissue, thereby improving the functional outcome for the patient. By use of optical labeling of targeted tracers, other tissues and structures of interest can also be visualized during surgery. Optical imaging of nerves or endocrine organs, to avoid them during surgery, thereby improving outcome.

The research collaboration on optical imaging with Technical University of Denmark (DTU) Health Technology, the Department of Chemistry at University of Copenhagen (KU) and Region Zealand has been commenced and earned the status as Clinical Academic Group in Imaging Guided Cancer Surgery (IGCS-CAG).

For the clinical translation of research, the group uses an organized network of clinical departments at Rigshospitalet. Currently IGCS-CAG has initiated three PhD projects with the overall purpose of developing novel optical imaging agents. Two of the PhD projects are based on KU and Rigshospitalet with a focus on the laboratory development and preclinical validation of optical probes while the third PhD project, based at DTU, investigates advanced optical imaging technology and microscopy.

Recently, the use of a novel optical imaging agent for sentinel node biopsy in oral cancer surgery has been developed within the IGCS-GAG research collaboration and clinically implemented in our Department. In 2022 the

Department initiated the first cancer targeted clinical prospective phase 2 study in patients treated with surgery (including with TransOral Robotic Surgery - TORS) for oral and oropharyngeal cancers i. e. investigating an uPAR-targeted optical agent that specifically lights up the cancer cells during surgery. Ahead is further development and translation of receptor-targeted optical imaging agents to guide cancer surgery for the benefit of cancer patients.

Brain and Technology – Clinical Academic Group

CHBC became a part of Brain and Technology – Clinical Academic Group (BAT-CAG) in 2021. The BAT-CAG aims to improve diagnostics, monitoring, and treatment of patients suffering from neurological or sensory disorders using digital technologies close to the patient (eDevices), BIG DATA, and artificial intelligence (AI). The BAT-CAG also aims to strengthen research across medical specialties and social and technical sciences. Our main focus is on hearing and balance, as well as the interpretation of sensory and cognitive abilities. Currently, major interdisciplinary projects are underway, and updated information will be provided in the coming years.





8.9 INTER-SECTIONAL COLLABORATION

The Department benefits of intensive collaboration with several other clinical departments at our hospital, and in 2022 we saw an increased level of teamwork.

One of the very strong and important collaborations is together with the Department of Anesthesia and Surgery. Together we have optimized the processes and thereby increased speed and effectiveness, enabling more surgery to take place. Other important alliances for ENT Department are with the oncologist, radiologist, dentist, plastic surgeons, pediatrician, and the neurologist. Particularly, our cancer patients benefit from our teamwork to facilitate the easiest possible treatment in a time vulnerability, a good example of such collab is found in the previous mentioned Nurse Rehabilitation Teams.

The Department of Occupational and Physiotherapy team up with our Department to perform training in fiberoptic endoscopic evaluation of swallowing function (FEES), being one of many significant training alliances. Furthermore, several non-clinical departments have been of importance. In 2022 we also enjoyed teaming up with new Department of Innovation. Strategies, funding, and partnership have been some of the topics we have partnered on.

Obviously, there are many other connections made across the borders of clinics every day, a must in a busy and well-established organization.



9. PARTNERSHIPS

9. RELATIONS MATTER

We continually seek new and exciting partnerships with the aim of improving patient treatment. Despite Denmark's modest geographical size, the Danish ENT field is world leading in many aspects. The nation's high level of treatment quality and availability combined with research environment and tradition is optimal. Rigshospitalet ranked 9th in 2022 by the SCImago Institutions Rankings (SIR)* measured by research performance, innovation output and societal impact. Our reputation combined with our contacts in national and international organisations, private and public sectors sets our Department up for long-term cooperations and partnerships. This, to the gain of all parties involved, but always to the benefit of the Danish society and foremost the patient.

In addition to formal partnerships, we are proud to have relationships and memberships with clusters and patients' organizations. Furthermore, we are in full appreciation of the various foundations and organisations supporting our clinical developments and research. A selected part of our collaborations and partnerships are listed in the Acknowledgement Section.

We are always appreciative to expand and cordially invite new relations, collaborators and partners into our Department. Together we can work for new and valuable know-how and treatments for our patients in the years to come.

[*https://www.scimagoir.com/rankings.php?sector=Health&ranking=Research&country=Western%20Europe](https://www.scimagoir.com/rankings.php?sector=Health&ranking=Research&country=Western%20Europe)



10. PUBLICATIONS 2022



[See Online](#)



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The effect of phoneme-based auditory training on speech intelligibility in hearing-aid users

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NOSE & GLOBAL AIRWAYS

Peer-reviewed paper - Nose and Global Airways

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HEAD & NECK

Peer-reviewed papers - Head & Neck

Assessment of the prognostic significance of anemia in patients with oropharyngeal squamous cell carcinoma (OPSCC) in Eastern Denmark 2000-2017: a systematic review: Master thesis
Mordhorst, C., 2022

Hovedhalskræft i Grønland: Master thesis
Vårdal, M., 2022

Impact of tumor subsite location in patients with OSCC: a systematic review: Master thesis
Kristensen, M. M., 2022

Knude på halsen hos børn: Master thesis
Hansen, C. S., 2022

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Nasir, M. S. A., 2022

3D Ultrasound versus Computed Tomography for Tumor Volume Measurement Compared to Gross Pathology-A Pilot Study on an Animal Model
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Witting, N., Daugaard, D., Prytz, S., Biernat, H., Diederichsen, L. P. & Vissing, J., aug. 2022, I: Journal of Neurology. 269, 8, s. 4154-4160 7 s.

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Scott, S. I., Madsen, A. K. Ø., Rubek, N., Charabi, B. W., Wessel, I., Jensen, C. V., Friberg, J. & von Buchwald, C., 14 okt. 2022, (E-pub ahead of print) I: The Laryngoscope. s. epub

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HEAD & NECK

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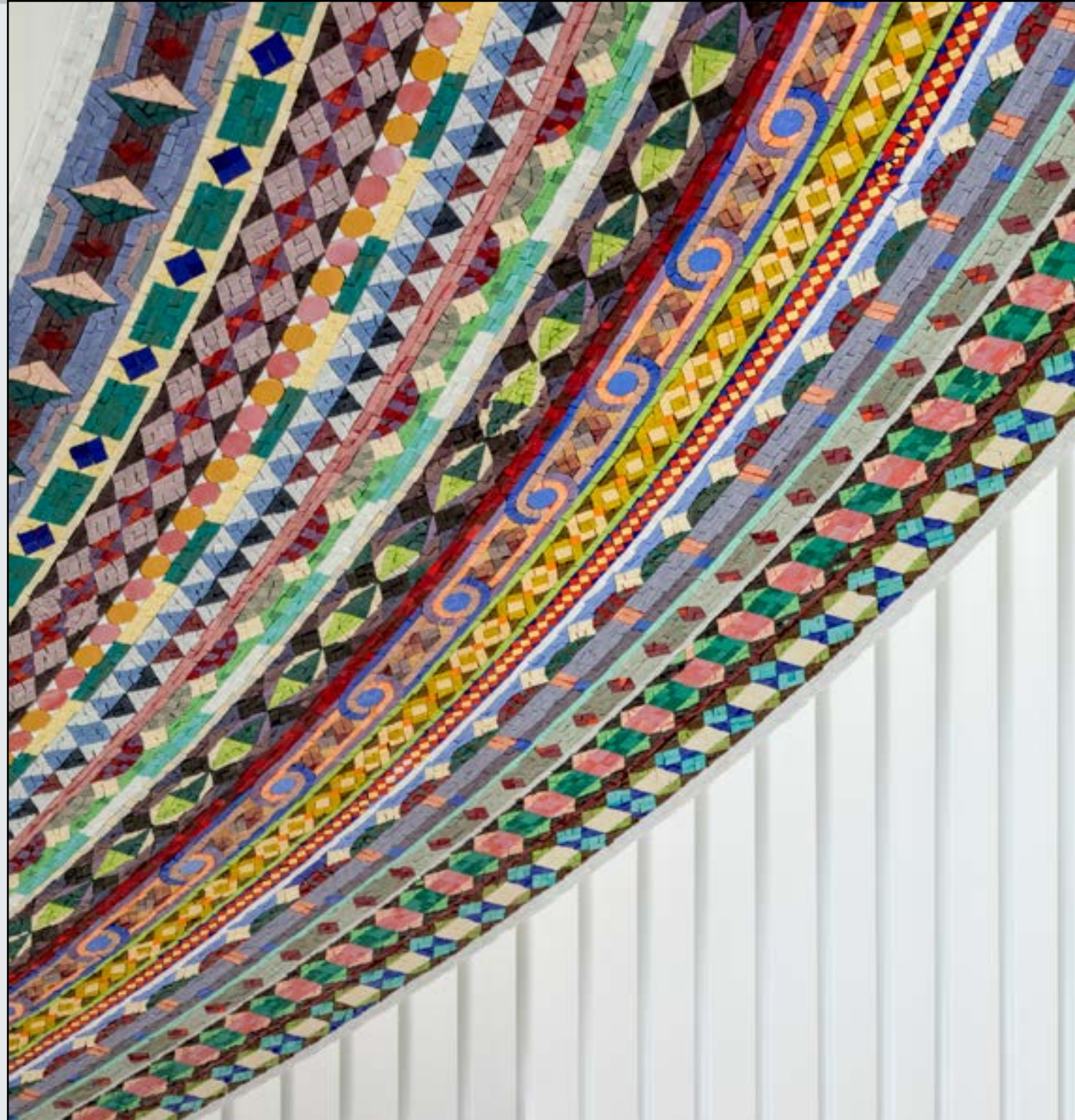
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