



2023 REPORT

CLINICAL & RESEARCH



ENT - H&N Surgery
and Audiology

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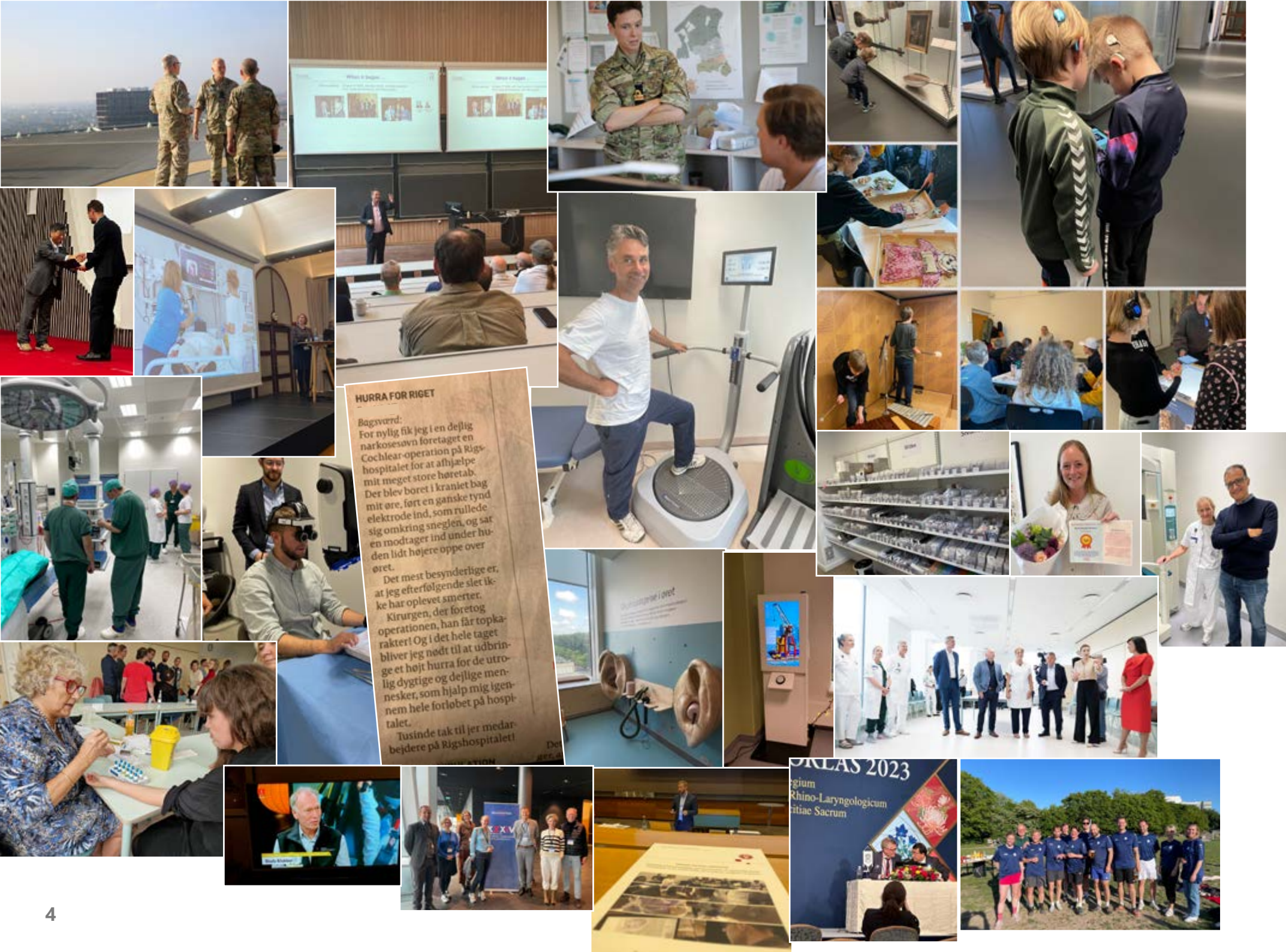


Rigshospitalet

ENT - H&N Surgery
and Audiology

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HURRA FOR RIGET

Bagsværd:
 For nylig fik jeg i en dejlig narkosesøvn foretaget en Cochlear-operation på Rigshospitalet for at afhjælpe mit meget store høretab. Der blev boret i kraniet bag mit øre, ført en ganske rynd elektrode ind, som rullede sig omkring sneglen, og sat en modtager ind under huden lidt højere oppe over øret.

Det mest besynderlige er, at jeg efterfølgende slet ikke har oplevet smerter. Kirurgen, der foretog operationen, han får topkarakter! Og i det hele taget bliver jeg nødt til at udbringe et højt hurra for de utrolig dygtige og dejlige mennesker, som hjalp mig igenem hele forløbet på hospitalet.

Tusinde tak til jer medarbejdere på Rigshospitalet!

1. INTRODUCTION

The [Department of Otolaryngology-Head & Neck Surgery and Audiology](#) at Rigshospitalet has had a remarkable year, as highlighted in this 2023 Clinical & Research Report. The report aims to provide insights into the department's life and information on Key Performance Indicators, emphasizing the pursuit of development opportunities and collaborations within the health sector. It offers an overview of activities that would interest patient groups, medical colleagues, partners, the healthcare community, and politicians for future research and development within the health system.

The department has successfully met its development targets, delivering world-class cancer treatment care in line with the National Cancer Plan 4. This achievement was recognized by Prime Minister Mette Frederiksen during her visit, where she announced the new National Cancer Plan 5.

Significant advancements have been made in surgery volumes through the establishment of a day stay surgery unit, greatly benefiting those requiring routine surgeries. The department's research and development efforts have been productive, contributing more than 100 peer-reviewed research papers to international literature. This reflects the dedication of the department's professionals, who balance patient care with engaging in groundbreaking research, particularly in AI and Translational Research.

Education remains a core commitment, with daily activities involving the training of medical, nursing, and dental students. The Young Scientific Advisory Board continues to support postgraduate studies. The department's collaboration with

Greenland partners aims to enhance otolaryngology, cancer, and audiology care for the Greenlandic people.

In latest survey patient feedback has been overwhelmingly positive, reflecting the department's commitment to delivering the best possible treatment for each individual. The department expresses gratitude to all contributors to its 2023 achievements, including staff, patients, hospital colleagues, education and research institutions, foundations, companies, NGOs, and politicians.

With much appreciation,

Tine Bloch Jensen and Mads Klokker
Directors, ENT Department



2. MEET OUR CHIEF PHYSICIAN - MADS KLOKKER

It is my overall aim to deliver and further develop excellent patient care within our Otolaryngology – Head and Neck and Audiology Department. It is imperative that this care is in alignment with present and future patient needs. Our department will continue to achieve public health system targets, in alignment with the strategy and visions of our representative patient groups and government.



We aim to respect, understand, optimise, and work alongside all those making up our hospital healthcare team. In addition, we need to consider new, innovate and more effective ways to best utilize our hospital staff, health resources, and finances. With fewer health care professionals, we will need to generate more high-quality care, with increased overall care delivery to our patients. Strategic planning and development, along with discussion and collaboration with patient groups and other key health stakeholders, will enable us to set targets to meet the ever-increasing demands placed on us all within the healthcare sector.

We have and will further develop ongoing partnerships with private industry and investors, medical companies, and the Universities ([Copenhagen University](#), [Aarborg University](#) and [The Danish Technical University](#) (DTU)).

We are undergoing a generational concept shift, such that our hospital works in a way that fits more within 21st century developments and demands. An example is

our collaboration with AI industries, using Large Language Models like ChatGBT, to safely deliver to our patients some components of important health care information. We have developed an example of this, the Virtual Assistant for Patients, an AI patient information project developed with a leading Danish AI company [2021.AI](#).

Translational Research is also key focus of our development. This is supported in our department through The Young Scientific Advisory Board (YSAB), the PhD office (a stimulating environment provided a milieu of inspiration, education, and active research) and the ongoing work with colleagues from scientific industries through The [BioMedical Design Fellowship](#). The YSAB is led by junior doctors with significant commitment to research, both in the laboratory and along with Translational research groups (scientists, engineers, AI experts, universities, DTU investors, Private Public Partnerships, and the [BioInnovation Institute](#) etc.) The aim of the YSAB is to organise co-operative projects and events with medical and other technical companies to develop future patient care related technologies and medical interventional treatments. Examples of their activities over the last year included The Summer Research Meeting.

Our research development model starts with considering new needs for patients along with new developments in science. Working alongside Private Public Partnerships (the majority of which are Danish) and in multi skilled teams, allows us to develop new investigation techniques, therapies, and health care solutions. This the essence of translational research. Implementation of these techniques safely with input and feedback from patient groups, allows us to deliver

innovative and effective patient care. An example of this would be research and development from the [Copenhagen Hearing and Balance Centre](#) with develop of investigative goggles used in the assessment of patients with imbalance. This is now being upscaled with input from industry. This is a win win situation, benefiting patients, our hospital and the Danish MedTech industry.

Our goal is to provide holistic and total health care delivery for each one of our patients. In our department, we incorporate excellent care, surgery, training, research, innovation, and development of future therapies. We continue to work in collaboration with key stakeholders in health in the community, alongside government, international health care authorities, and private public partnerships.

We do and will continue to work our hardest for the benefit of our individual patients and the health system at large.



3. MEET OUR CHIEF NURSE - TINE BLOCH JENSEN

2023 was another excellent and progressive year for the ENT department at Rigshospitalet.

The ENT department has nationally the highest number of patients referred for cancer investigations, diagnoses, treatment, and rehabilitation. We receive referrals both regionally and nationally. This demands development of robust, effective, and rapid diagnostic and treatment pathways, not only to support and comply with national cancer treatment targets, but also to deliver world class cancer care comparable with the current survival and morbidity outcomes in Europe and worldwide.



This has been achieved and is being further developed. This has required investment and development of all our diagnostic treatment and management pathways. One result has been the implementation of a rapid one-stop/one-day cancer investigation and diagnostic patient visit. Here we undertake a complete and comprehensive history and investigation of the patient, including a same day tissue biopsy and pathology/diagnostic report. This multifaceted same day service has greatly accelerated the cancer patient treatment pathway with significant reduction of time to delivery of the first definitive cancer treatment, including both surgery and chemoradiotherapy.

Whilst this accelerated investigation and treatment can be very hard for patients and their families, with ongoing support, this cancer pathway optimizes early

delivery of care with the clear goal of overall improvement in survival and quality of life.

The 2019 – 2023 nursing research and development strategy plan

During this 5-year period there was strong focus in our department on professional nursing competence and skills development. An emphasis was given to both informal and formal education, with the support and development of nursing research at the diploma, master's, and PhD level. There have been several avenues of research with a particular attention given to quality-of-life (QOL) studies on several patient groups under our care.

Areas of interest have included:

- QOL and symptom burden in our Head & Neck cancer patients.
- QOL and treatment compliance in Global airways patients
- The Impact of Covid on QOL, with the focus being on the long-term effects of loss of taste and smell and the impact of rehabilitation strategies including smell training.

These nurse lead projects focus on the effects of patients' illness and their symptoms and will allow us to better support our patients, improve rehabilitation and develop better patient self-coping strategies.

Early Rehabilitation and Palliation of Head and Neck Cancer patients

We have now commenced early focused rehabilitation and palliative care for patients our head and neck cancer patients, both during their hospital stay, and following discharge in their family and community environments. Nurse led home visits by our Rehabilitative cancer nurses has and will further improve the quality of life as well as facilitating the overall patient treatment pathway. Patients and their families have clearly benefited from this increased support and continuity in care, and value the focus on working together with our nursing professionals in their treatment and palliative care journey.

The Shared Decision-Making Project

Here in the Ear Nose and Throat department of Rigshospitalet we value the importance of shared decision making. This is not lonely within the Head and Neck Cancer team itself, but importantly between the Cancer team and the patient and their family. It is our norm, that patients have the opportunity for discussion with all the members of the team. This allows better patient understanding of treatment options and facilitates shared decision making prior to the start of definitive treatment. This has developed into our Shared Decision-Making Project. Through this important project we are reviewing the complexity of shared decision making. Our aim is to develop improved strategies to help the patient and the whole team maximize the sharing of information and improve informed decision leading to ideal treatment interventions and better overall patient and family outcomes.



4. OUR PROFESSORS

4.1 PROF. CHRISTIAN VON BUCHWALD PROFESSOR IN RHINOLOGY

[Professor Christian von Buchwald](#) is University of Copenhagen Representing Professor. Christian has a broad research commitment across multiple areas within Head and Neck Surgery, Rhinology and The Global Airway. Furthermore, he represents the academy of The Centre of Head and Orthopedics, (HovedOrtoCentret (HOC)), Rigshospitalet's largest surgical center addressing the initiation, development and oversight of research and education in all these 8 departments.

Prof. Christian von Buchwald works alongside the Medical School in ensuring a high level of teaching is delivered across all the centre and its specialties. He is a lead educator in the ongoing development of medical education as well as carefully monitoring the quality and delivery of this medical student education. He is responsible for the Otolaryngology course of over 400 medical students per year and is a PhD supervisor for several young researchers.

Christian has also established a medical student observership for 4 medical students in their final year of university to visit The Massachusetts Eye and Ear Infirmary at Harvard, Boston. This is of great inspiration for our medical students, many of which have continued their post graduate career within Otolaryngology.



This group of young doctors have contributed significantly to ongoing clinical and scientific research and have also matured into skilled clinicians, demonstrating, and providing excellent evidence-based patient care.

Head and Neck Cancer and the Role of the Human Papilloma Virus (HPV).

In 2023 he has been instrumental in establishing a groundbreaking collaborative research project investigating epidemiological trends in Head & Neck Cancer. This collaborative study is ongoing and active and involves 13 centers representing 9 countries including UK, Canada, Sweden, France, Germany, Finland, The Netherlands, Switzerland, and Spain. This is the largest worldwide study of patients with cancer of the throat. Focus has been on the importance, significance, phenotype, and role of the Human Papilloma Virus (HPV) in Head and Neck Cancer. He says "we have clearly shown that different expressed phenotypes significantly impact long-term patient survival. HPV positive patients have a clear survival advantage. With success we have introduced and implemented an alternative treatment to the traditional chemo- radiotherapy i.e., Trans Oral Robotic Surgery (TORS), resulting in less treatment morbidity". As the number of HPV driven oropharyngeal cancers are still increasing, he expects that TORS will, in the coming years, be offered as the primary treatment modality for most of these patients. This exciting innovation has also relied on solid collaboration with our Head & Neck Oncologists, Pathologists and the University of Copenhagen Cluster of Molecular Imaging.

Global Airways Disease

The concept of Global Airways Disease and inflammation was initially based on Professor von Buchwald's research, supervised Ph.D. theses and studies focusing on Cystic Fibrosis (CF), Primary Ciliary Dyskinesia (PCD), Type 2 inflammation, and Chronic Rhinosinusitis with Nasal Polyposis and Asthma. The new biological therapies have significantly improved disease control and quality of life in patients with these afflictions. As Chair of the Danish Medicines Agency, in 2023 he succeeded in gaining the authorization for funding and delivery of biologics treatment for the management of patients with Global airways disease.

A requirement of this authorization was an Audit and Registration Trial to monitor the efficacy of 2 new biologics therapies in the Tornado Trial (Treatment of rhinosinusitis with nasal polyposis with dupilumab and mepolizumab) A randomized multicentre, head to head comparison in real world Danish patients. One of his PhD fellows is working to determine factors such as efficacy and cost effectiveness of this therapy. He says, "this has been a complete game changer for our specialty and the patients under our care."

Post graduate surgical training

The increasing outsourcing of benign procedures from tertiary treatment facilities and the growing emphasis on work-life balance have reduced the time registrars spend in the operating theater. This necessitates a focus on the registrar's surgical training. In collaboration with the European Rhinologic Society, we have developed an evidence-based training curriculum for endoscopic sinus surgery. We are working on a 3D printed model of the nose and paranasal sinuses to facilitate systematic training for registrars.

Dissection courses

The internationally renowned 20th [Copenhagen-Nottingham](#) and 18th [Advanced FESS and Anterior Skull Base](#) dissection courses were conducted in 2023 with great success. The Copenhagen-Nottingham dissection course sold out in less than two minutes, with a waiting list exceeding 400 for the 2024 course



4. OUR PROFESSORS

4.2 PROF. MAD SØLVSTEN PROFESSOR OF OTOLOGY

Professor emeritus Mads Sølvsten Sørensen, is the initiator of the [Visible Ear Simulator \(VES\)](#) and still active in the project group now headed by manager of the CHBC Otopathology Laboratory post doc Steven Andersen.



The VES is a free computer based interactive surgery simulator that is now used worldwide for ear surgery training. The current research activities include developing and testing the effects of interface gamification to increase user motivation and support learning to a higher skills level. In the VES, the level of surgical skill acquisition, traditionally rated manually by the course instructors, is now rated automatically (using the Welling Scale Validation), achieving unbiased, fast, and uniform assessment. This is an invaluable tool, significantly contributing to surgical training. The group is currently testing performances of experienced surgeons to establish reliable pass/fail levels for trainees. PhDs are developing software and testing the automatic rating and testing the gamification interface.



Figure: VES interface with 3D workspace, drilling instruction, and real time progression bars for concurrent feedback.

The research group is also developing 3D print temporal bone models to be used for ear surgical training. Another amazing development of this project is use of patient specific 3D rendering of temporal bones (the part of the skull containing all the hearing), from cone beam CT scans. Patient specific unique 3D models are also being developed. These have great potential, to be used both for preoperative training or for future surgical navigation and robotic surgery.

In the otopathology laboratory professor Sølvsten and his group also works with SDU professor Thomas Levin at OUH mapping the distribution of bone signalling substances in the inner ear in otosclerosis – a pathological inner ear bone remodelling disease, and a major research subject of this lab for generations. Our research group has developed the osteo-dynamic concept of otosclerosis and this has been incorporated into a 3D virtual model (The OTOSIM) in which all the



individual factors involved such as remodelling rate and cellular connectivity etc can be varied to test the osteo-dynamic hypothesis in Virtual Reality. The OTOSIM model showing red dots representing dead bone cells (osteocytes) and a blue spot or cellular void at the stapes footplate – a possible hot spot for otosclerosis.

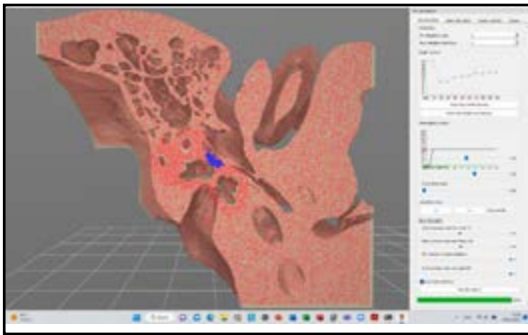


Figure: VES interface with automatic itemized scoring (Welling Scale Validation)



4. OUR PROFESSORS

4.3 PROF. PER CAYÉ-THOMASEN PROFESSOR OF OTOLGY AND NEUROTOLOGY

In 2023 Professor Per Cayé-Thomassen continued his world class research investigation with the first-ever examination of neurotransmitters at play in the human balance system. His research group demonstrated that glutamate, serotonin and GABA are present in the inner ear and work in the transmission of impulses to the brain following head tilts and vertical acceleration of the human body. The findings provide a basis for pharmacological research and potential drug development for the management of patients with balance problems and diseases.



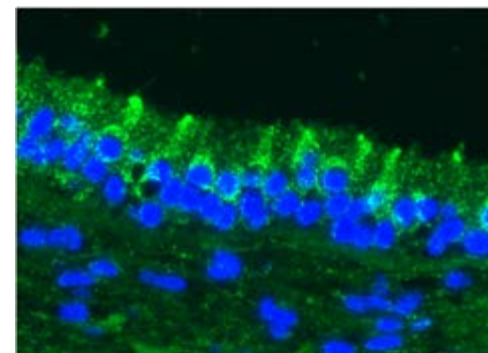
His research group also undertook in depth analysis of Hearing loss following bacterial meningitis. The early identification of hearing loss occurring during meningitis is crucial when considering potential treatments. His group explored the feasibility of measuring oto-acoustic emissions (OAE) for early hearing loss diagnosis. He found that 60% of a patients suffered impaired hearing in the early phase of infection and that the prospect of hearing recovery decreased from day 3 after admission: This strongly indicated that potential early hearing rescue treatment should be given to this patient group.

Other parts of his active research included an extensive metanalysis on the use of steroid injections into the middle ear and whether regeneration of hearing following sudden deafness is attainable. He concluded that intratympanic

steroids may have little or no additional effect compared with systemic steroids (for which an effect in the first place is doubtful).

Professor Per Cayé-Thomassen is active in Collaborative International Research including studies on

1. Facial Nerve Injury Grading Scales. Per lead the Denmark contribution to an international multicentre effort headed by the Mayo Clinic with the aim to identify problems related to contemporary scales used to grade facial nerve injury, e.g., following surgery and resultant facial movement weakness. The international group of clinical researchers is working to develop a more evidence-based system for clinical facial weakness grading.
2. Advanced elastic-net regression and machine learning. Per collaborated in a large international cohort study investigating advanced elastic-net regression and machine learning, to develop a model to predict future hearing loss progression in patients with inner ear abnormalities (enlarged vestibular aqueduct (EVA) and associated inner ear disorders).



(Figure showing the expression of glutamate receptor (green colour) in the neuroepithelium of the human balance part of the inner ear.

CEORL-HNS

In 2023 Professor Per Cayé-Thomasen has as president for the 2024 CEORL-HNS (Confederation of European Otorhinolaryngology - Head and Neck Surgery) been occupied with the 2024 European congress in Dublin, Ireland.

One of the key themes of the congress will be the integration of cutting-edge technology with traditional ENT practices. Sessions covering topics ranging from robotic surgery and artificial intelligence in diagnostics to advancements in minimally invasive techniques and personalized medicine. The inclusion of these topics will underscore the rapid evolution of the field and the importance of staying at the forefront of technological innovations.

In addition to the scientific sessions, the congress also emphasizes the importance of interdisciplinary collaboration and global cooperation. This collaborative spirit is a testament to Professor Cayé-Thomasen's commitment to building a cohesive and inclusive community within the field.



4. OUR PROFESSORS

4.4 ADJ. PROF. LONE PERCY-SMITH ADJ PROFESSOR OF AUDIOLOGY

[Adjunct Professor Lone Percy-Smith](#) at Aalborg University, Senior Researcher at Copenhagen Hearing and Balance Centre (CHBC).

In 2023 the Speech and Language Pathology research unit at CHBC were very pleased to expand our collaboration with [The Multisensory Experience Lab](#) at Aalborg University. This expansion was possible because of funding through many foundations, including AP Møller, Helsefonden and Kurt Sørensen's Fond.

This financial support enabled us to pursue several exciting research avenues, with the purpose of digitalizing and improving ease of access to patient healthcare information. We have created digital apps for children with hearing loss and their parents. They are "Lyt Igen" (Listen Again), "[PreHear](#)" and "[Warble til Høreprøve](#)" ([Warble to the hearing test](#)). These Apps provide an integrated knowledge transfer, hereby reducing the gap between the advances of research and its integration into

"We have succeeded in taking research out of the lab and into the daily life of children with hearing loss and their family."

The "PreHear" App has been developed for parents to be able to learn more about the neurological aspects of hearing loss.



The Hearing test training App: "Warble til Høreprøve"

It can be a very difficult for young children to undergo a hearing test. We have therefore developed a Hearing Test training and orienteering App for children to use before they can come to a hearing test. Following pretest practice with this App, on the day of their actual clinic-based hearing assessment, children can complete a more reliable representative hearing test. This is a follow on from our development of Gamification in Audiology (noted in last year's report).

At CBHC we have also directed research into media technology and Virtual Reality (VR). We have developed a VR hearing world, "Øreverset", to increase awareness of and about hearing loss. This is a VR tour of the ear and hearing, whereby people are guided through the whole of the hearing pathway, from the outer ear, through the middle and inner ear, to the hearing area of the brain, where sound is realized into consciousness.

Other Research

In December 2023 we were awarded funding from the GN Foundation for Speech and Language PhD students to undertake research in two significant areas.

- The Efficacy of Early Hearing Loss Detection and Intervention/Therapy. The first Ph.D. research thesis is to focus on teenagers who grew up with hearing loss. We have followed from birth a cohort of 50 children with hearing loss identified through neonatal screening, of which the majority of whom are fitted with cochlear implants or hearing aids at under one year of age. This was followed by intense language and hearing rehabilitation. It is now of intense interest to see how these young adults are faring both socially and academically.

It is important that we can monitor our hearing interventions, both surgery and rehabilitation therapy from a hearing, language, and social development perspective. Therefore, for each child, this in-depth research and evaluation will not take place in a research lab but in the child's own home, school and social and environments.

We acknowledge it is vital to study their language and hearing competencies within their natural setting. In school, not only will we be assessing the children with hearing loss, but we will also be assessing the other pupils in their class. In this way we will gather study information not only on the children with hearing loss, but also on a comparison cohort of over 500 children.

It is our understanding that this group of children with deafness/hearing loss, detected at birth, and managed with early cochlear implantation and intensive language and hearing rehabilitation, have a significant improvement in quality of life, with many more social, academic, and job-related options, than former generations of deaf children. We expect this to be confirmed with our research.

- Deafness in Children Cancer survivors

The second PhD thesis focuses on children with acquired deafness following treatment for cancer (Children Cancer Survivors (CCS)).

Hearing is an important quality of life measure after the delivery of curative cancer treatment and deafness is a significant complication a sequelae of cancer treatment. This hearing loss has a huge impact, over a lifetime, of poorer quality of life. It is important to study this group of children, to identify and assess their hearing loss and consequences of this loss.

We thereby hope to develop strategies and therapies to minimize the impact of this hearing loss and maximize rehabilitation.



4. OUR PROFESSORS

4.5 PROF. VIBEKE BACKER PROFESSOR IN THE UPPER AND LOWER AIRWAYS (GLOBAL AIRWAYS)

[Professor Vibeke Backer](#) has been instrumental in integrating the new biologics drug therapy for patients with chronic rhinosinusitis with polyps at Rigshospitalet and this treatment is now in daily clinical use. Patients are drawn from local ENT surgeons, local respiratory departments, and the Respiratory and ENT departments at Rigshospitalet.



It has led to a marked improvement in the efficacy of treatment, resolution of symptoms, sense of smell, quality of life and wellbeing in this large group of patients with this crippling chronic disease. This is particularly so, as these patients have previously been treated with the previous standard care of repeated surgeries and frequent use of systemic steroids. Avoidance of systemic steroids avoids associated long term complication such as osteoporosis, diabetes, and obesity. Biologics also halt the need for repeated surgery in the majority of patients.

In 2023 she has developed and implemented the National Danish Register for the biologic treatment of these patients with chronic rhinosinusitis with polyps. Data is collected on the Global Airways Database. This includes all the 9 departments

in Denmark that are treating patients with biologics drug therapy. This database has accrued 260 patients over the last 12 months, and 151 patients of these have commenced treatment with biologics therapy.

Rigshospitalet is the national leader with respect to patient inclusion and the number of patients treated with biologics therapy. This National Register and the agreed National treatment algorithm assure equal access to therapy for all patients in Denmark. It also demands comprehensive clinical data collection and robust reporting to the Danish Medical Council. This ensures safe and equitable delivery of this treatment to the target patients' group. As of end December 2023, 73 patients have been treated with this therapy for over 6 months.

In addition to the implementation and monitoring of biologics therapy she is also supervising ongoing research into patients with upper and lower airways illnesses. The Global Airways Database greatly facilitates the clinical inclusion of patients in ongoing research into the efficacy of biologic treatments. She has 4 PhD students who actively studying this patient group. Both Professor Backer and her research group are active both nationally and internationally, presenting their work at ENT and pulmonary medicine conferences. Vibeke herself has published over 20 papers in 2023. She is actively reviewing the cost implication of chronic sinusitis, using several patient registers, such as the prescription list, the sick leave registry etc. In Denmark, this is greatly facilitated by the national Central Person Register (CPR) system, allowing retrospective analysis of patients over the last 15 years.

Professor Backer is the chair for the organization that has been developing the worldwide register for chronic sinusitis treated with biologics therapy. This

has gained significant external financial support, and shortly (spring 2024) this organization will be formally inaugurated. The worldwide association will allow collaboration and data collection on the efficacy of treatment as well as looking at differences in inclusion criteria between countries, the outcomes associated with inclusion criteria, improvement of quality of life (especially sense of smell, for a long time overlooked) and disease morbidity. It will be of note to see what differences there are in the nature of the disease, its progression and response in different geographical areas.

At Rigshospitalet, Professor Backer has also developed an outpatient clinic for the assessment and management of patients with smell and taste disorders. Funding has been sort for approved the equipment for the objective assessment of these patients, the Burghardt OG001 taste and smell analyser. She has developed a project to assess taste in relation to both obesity and weight loss following calorie restriction, exercise, and the drug therapy Wegovy (semaglutide). All these three interventions have different and unique effects on taste. This project and research is in collaboration with Professor Thomas Hummel (Department of Otorhinolaryngology, Technical University of Dresden, Germany), Professor Filip Knud (Endocrinology Department, Herlev Hospital, Copenhagen), and Associate Professor Morten Hostlup (August Krogh Institute, Copenhagen University).



4. OUR PROFESSORS

4.6 PROF. MÅNS MAGNUSSON PROFESSOR OF VESTIBULOGY

DTU and Rigshospitalet establish joint clinical professorship. Medio 2023, DTU and Rigshospitalet agreed to increase collaboration and establish a strategic partnership to strengthen the development and utilisation of technological health solutions for future patients. Simultaneously was made a joint clinical professorship shared between [DTU Health Tech](#) and [Copenhagen Hearing and Balance Centre](#) at Rigshospitalet to further this collaboration. Professor Måns Magnusson was invited to our department in this role.



Professor Måns Magnusson is among the world leaders in the field of balance disorders and otoneurology. He has an impressive CV with numerous publications, positions etc. Måns Magnusson has a central position in the world best known vestibular association, the [Barany Society](#). His aim is to combine skills and knowledge to solve problems and implement solutions in healthcare and society.

The collaboration should lead not only to ground-breaking research but also to the development and improvement of patient treatments leading to overall improvement in patient quality of life. Balance problems are the most common cause of patients seeking medical advice in patients over 65. It is also associated

with falls, medical and societal costs, dependence on family and society, and increased isolation. With better balance rehabilitation Måns Magnusson is sure that we could postpone falls and fractures in the elderly and enhance quality of life. Among a great number of younger persons with balance problems and motion sickness, we should be able to ameliorate problems and help with a return to work and normal life. Previously Magnusson and co-researchers have developed expanded balance training techniques demonstrating enhanced everyday balance both in normal subjects as well as “fallers” and patients with chronic balance impairment.

Professor Magnusson believes many medical problems could be better addressed with the help of the research techniques available at DTU. The aim with this translational research is to enhance research and develop new examination techniques and treatments for patients with balance disorders and dizziness - including motion sickness.

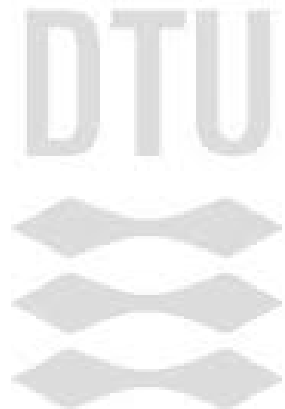
The primary cause of the clinical DTU-Rigshospitalet professorship is focus motion sickness. While achieving the professorship, CHBC and DTU got Novo Grant aiming research of 3 phd students on the physiology behind motion sickness. Motion sickness seems to play a more pronounced role in the future as more vehicles become automated and locomotion becomes even more common. Moreover, space flights will result in more frequent motion sickness. Prevention is warranted and is likely to include medical interventions, rehabilitation, as well as behaviour modification technique.



4.7 OTHER PROFESSORS IN THE DEPARTMENT

An important ambition of [Copenhagen Hearing and Balance Center](#) (CHBC) is a close collaboration between clinicians and engineers. Both [The Technical University of Denmark Health Tech](#) and the [Multisensory Experience Lab at Aalborg University](#) are important to our research. 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

Over several years, and recently in connection with the establishment of CHBC, the ENT department has had close collaboration with [Professor Torsten Dau at DTU Health](#). Torsten Dau's research area has primarily been within signal processing in hearing research. Just as Torsten Dau works several days a week at CHBC,



[Stefania Serafin](#) is a Professor from Aalborg University in Copenhagen, where she amongst others leads the Multisensory Experience Lab. She research and teach on sonic interaction design, sound for virtual and augmented reality, multimodal interaction and applications in health and culture.

At the ENT department she is connected to projects with applied pedagogical hearing research.

Additionally she is President of [the Sound and Music Computing](#) association, Project Leader of the [Nordic Sound and Music Computing network](#) supported by Nordforsk and leader of the Sound and music computing Master at Aalborg University.



5. NEW HEAD & NECK THERAPIES INCL CANCER

5.1 MEASURING OUTPUT

Patients who may have cancer receive same-day diagnostic services at the outpatient clinic.

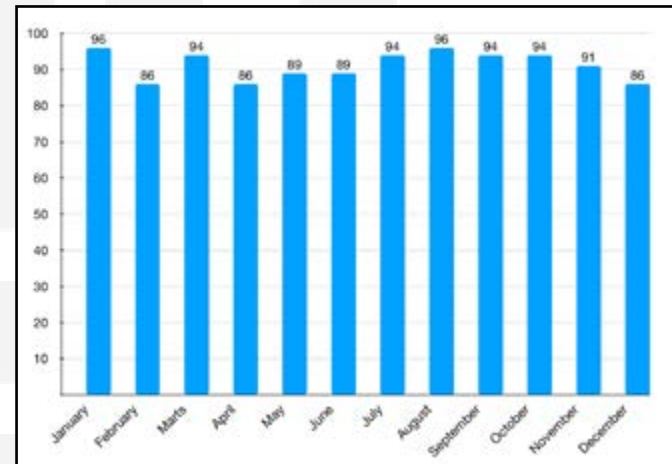
In 2023, the clinic saw 2144 patients. They undergo a thorough ENT evaluation, which includes endoscopic exams with Narrow Band Imaging (NBI) for microvascular visualization, ultrasounds, biopsies, and/or fine needle aspirations of questionable areas.

With prompt collaboration from The Department of Pathology, cytological and histological analyses are performed quickly, enabling confirmation or rejection of cancer suspicions, accurate diagnosis, and initial treatment planning during their first visit to the ENT Department.

When cancer suspicions are confirmed, patients are discussed at a multidisciplinary tumor board meeting (MDT). This team includes an ENT surgeon and nurse, a radiologist, an oncologist, and allows participation of the patient with their family or a companion of their choice. During the MDT, various treatment options are reviewed, incorporating the patient's preferences into the decision-making process. These conferences take place six times per week with doctor and nurse involvement.

In our department, surgical management for head and neck cancer involved 859 patients across eastern Denmark regions, with most from The Capital Region and some from Region Zealand. A significant portion of these patients received surgery within 28 days of referral, this proportion was higher in The Capital Region compared to Region Zealand. For cases diagnosed and surgically treated within The Department, the statistics were even more favorable; almost 91% of such patients began treatment promptly. These outcomes are graphically represented below.

% Patients treated within time limits, 2023



5.2 PET/CT FOLLOW-UP IN HEAD AND NECK Squamous Cell Carcinoma (PET Follow)

Assoc. Prof. [Jacob Høygaard Rasmussen](#) will study the assessment management and clinical course of patients with Head and Neck Cancer after primary curative radiotherapy. Currently many patients proceed on to neck surgery after their primary radiation treatment. This is to prevent the development of cancer spreading to the neck. However not all patients develop recurrence. The aim is through this study to more accurately identify those patients who are either very unlikely or very likely to develop cancer in their neck after radiotherapy.



In those patients who are very unlikely to develop cancer in the neck, we hope to be able to avoid neck surgery, as it will not have any impact on cancer recurrence or long-term survival. Unnecessary surgery would only add to increased morbidity in this group.

In the PET Follow project, all patients with Head and Neck Cancer treated by primary radiotherapy in Eastern Denmark will undergo a standardised PET CT body scan 3 months after completion of radiotherapy. There is currently no standardised recommended post radiotherapy scanning protocol between regions in Denmark or internationally. Therefore, through this project we will provide equitable follow up access to all the patients drawn from 2 adjacent health regions. The 3 month follow up scan will be used to identify three patient groups.

1. Patients with complete response after radiotherapy. These patients will be monitored in clinic without undergoing a post radiotherapy neck dissection.
2. Patients with equivocal response or partial response after radiotherapy. The patients in this group will proceed on to neck surgery (a neck dissection to remove the remaining cancer in the neck)
3. Patients with incomplete response. This group will also undergo post radiotherapy neck surgery.

The surgical specimen histology will then be correlated with the individual follow up PET scan. We hope to develop better understanding of the PET scan results, such that we define the patients in this group more effectively, and thereby only treat those patients who need this treatment.

The PET Follow study will benefit future patients by sparing those with a low risk of neck disease from unnecessary operations while ensuring that high-risk patients receive timely surgery instead of prolonged surveillance, which would delay salvage treatment. In short, the PET Follow project aims to establish a uniform follow-up protocol for all patients treated in eastern Denmark, facilitating the decision-making process regarding when and whom to operate and when and whom to observe. If successful, the prospective study will ensure uniform follow-up procedures for all patients in Denmark, irrespective of their place of residence or socio-economic status.

5. NEW HEAD & NECK THERAPIES INCL CANCER

5.3 RECONSTRUCTION TECHNIQUES

[Christoffer Holst Hahn](#) is a highly qualified senior surgeon at Rigshospital managing patients with secondary and tertiary care needs in the areas Head and Neck cancer, Thyroid and Parathyroid diseases. During 2023 he has started to use local neck muscle rotation flaps (infrahyoid neck muscle) for reconstruction in surgery for patients with Head & Neck cancers. This has resulted in much shorter operative and post operative stay and provides more reconstruction options for patients who have previously been treated with Radiotherapy.

5.4 PARATHYROID GLAND ASSESSMENT

Christopher Holst Hahn has introduced new and innovative pre-operative imaging for parathyroid adenomas (cholinPET scanning: also used in identification of prostate cancer). This allows quicker, more accurate and easier location of the abnormal parathyroid gland. Along with these PhD colleagues he has shown this to be an effective and a valuable clinical tool in the preoperative evaluation and localization of disease in patients with benign parathyroid tumours.

5.5 THROAT PROBLEMS: CRICOPHARYNGEAL DYSFUNCTION

Consultant [Kristine Grubbe Gregersen](#) has introduced a new treatment option for patients who are unable to burp (retrograde cricopharyngeal dysfunction). Whilst sounding amusing, this previously chronic untreated condition has been a very uncomfortable problem for many patients. She and her colleagues have introduced the use Botulinum toxin injection treatment into the muscles at the bottom of the throat (cricopharyngeus) to allow normal relaxation of this muscle. This is performed under general anesthesia as a day case procedure and the results have been excellent after just a single treatment.

5.6 SMALL LARYNX CANCERS: IMPROVEMENT IN SURVIVAL AND TREATMENT OPTIONS

Associate Professor and consultant surgeon [Jesper Filtenborg Tvedskov](#) has together with colleagues implemented and audited safe and effective laser surgery for small (T1a) laryngeal cancers. This project was implemented as a nation-wide strict study protocol and included around 100 patients. Through his research he has established that this safe, single episode, day surgical, evidence-based laser treatment, is equally or more effective than traditional management with radiotherapy. This has resulted in a marked reduction in the number of patients suffering both short and long-term postradiotherapy treatment complications. Additionally, with laser treatment compared to radiotherapy, more patients avoid the need for eventual surgical removal of the voice box. Initial laser surgery also maintains radiotherapy as an option for treatment for those patients with recurrent cancer that is not amenable to further local surgery. There is also a significant cost benefit in comparison with radiotherapy treatment.



5.7 OUTPATIENT SURGICAL TREATMENT OF BENIGN THYROID NODULES AND CYSTS

Consultant Surgeon [Mikkel Kaltoft](#) and his colleagues were the first in the Nordic Countries to establish outpatient treatment of thyroid with ultrasound guided radiofrequency ablation. This started in 2020, just before Covid-lockdown, and there has been an exponential rise in the number of patients who are managed with this treatment modality.



This has proven to be a safe, and established patient centered treatment. His group has now completed over 100 patient treatments with significant volume reduction in thyroid nodules and resolution of pressure and cosmetic symptoms. The big plus is the marked reduction in treatment morbidity and the rapid return to normal quality of life and work. There is also a marked cost benefit compared with open surgical treatment.



Mikkel Kaltoft has also treated over 100 patients with thyroid cysts, with a single ethanol injection. This takes around 20 minutes and is undertaken in an outpatient setting. This has huge advantages over traditional surgery, again with respect to complications of surgery, and time to return to pre-treatment quality of life.

6. SLEEP SURGERY

The [Danish Center for Sleep Surgery](#) (DACESS) at Rigshospitalet was developed and founded in 2018 by [Eva Kirkegaard Kiær](#) with the aim to improve both surgical and non-invasive non-CPAP treatment options for patients with obstructive sleep apnea (OSA). The center is a national referral center, and while most patients come from the Capital Region of Denmark, patient referrals come from all parts of the country including Greenland and the Faroe Islands.

OSA is a serious disease affecting up to 34% of adult men and 17% of adult women. The disease is characterized by upper airway collapse during sleep, inducing poor sleep quality, daytime sleepiness, disturbances in memory function and concentration, and an up to 6-fold increased risk of traffic and other 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.

In 2015 we introduced drug-induced sedation endoscopy (DISE) as a diagnostic tool before targeted upper airway treatment of patients with OSA and poor compliance with CPAP treatment. We also introduced nurse-administered propofol sedation (NAPS). The team of ENT nurses and doctors have completed formal NAPS training and in a large study conducted in our department, the method has been proven both safe and feasible. We were the first in the world to apply this method of sedation for DISE. At DACESS we offer a large variety of DISE-directed treatment interventions with the focus on targeted upper airway surgery.



In 2023 we established, as the first hospital in Denmark and the only current hospital in Scandinavia, a study of hypoglossal nerve stimulation treatment for selected Obstructive Sleep Apnea patients. With the addition of this treatment to our current surgical procedures (soft palate surgery, palatine tonsillectomy, and trans-oral robotic surgery) we will be able to surgically target most upper airway sleep obstruction patterns. Under the leadership of Eva Kirkegaard Kiær, doctors, and nurses at Rigshospitalet are engaged in high quality and broad research collaborations both nationally and internationally. Eva and her team also host both national and international courses on DISE and upper airway surgery.



For advanced sleep studies and non-invasive treatment of OSA patients we collaborate with the Danish Center for Sleep Disorders (Dansk Center for Søvnssygdomme, Rigshospitalet). Eva Kirkegaard Kiær established and is the chairman of the Danish Association of Sleep Surgeons. The inaugural meeting was in October 2023. Through this association, there will be opportunities for collaboration and discussion between the different centers in Denmark offering sleep apnea surgery solutions. She also, in October 2023, co-lead an international sleep apnea symposium, along with a colleague from Sjællands Universitetshospital. Several world leaders in sleep apnea surgery presented at this meeting.

She says "Bringing sleep surgery more forward for the patients in Denmark in 2023 has been exciting and a big achievement for us at Rigshospitalet. We look forward to our ongoing work and research in this important disease".



7. DAY SURGERY

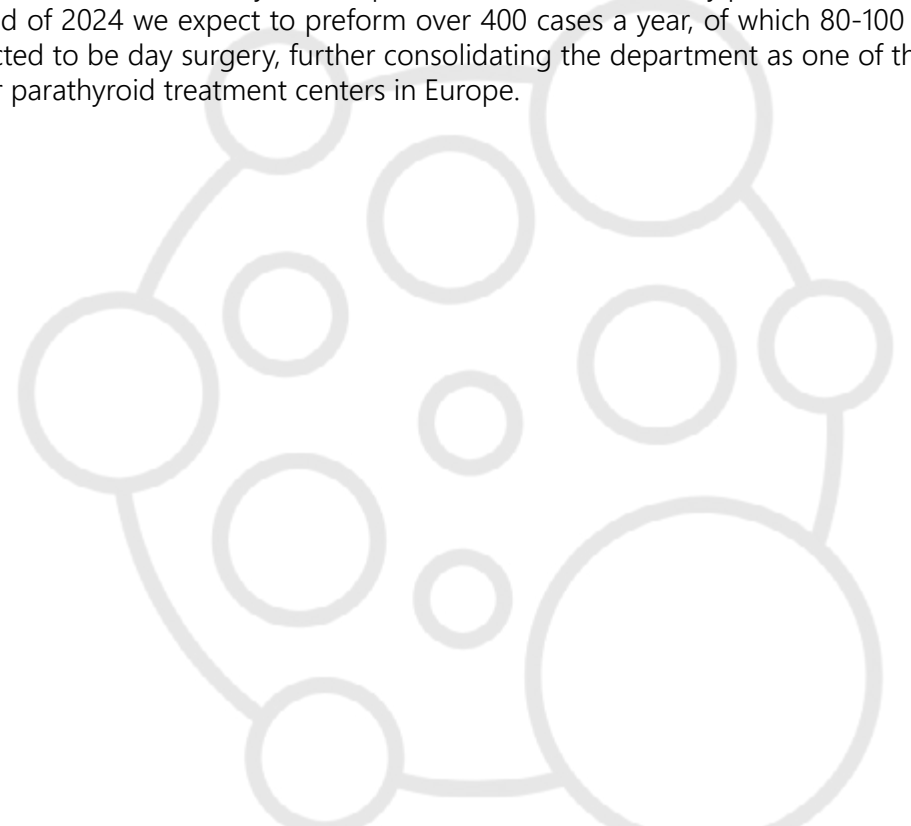
May 2023 saw the opening of a dedicated day stay surgical unit at Rigshospitalet. The ENT department, was the first to start offering patients operations in this unit, running two daily operating theatres on the 6th floor of the at Rigshospital. [Eva Kirkegaard Klær](#) was the prime mover in this initiative from the consultant surgical perspective and worked alongside her Anaesthetic department to bring this day operating unit into active productive service. The unit now runs 5 daily day surgery operation lists across many surgical specialties.

The purpose of the unit is to offer more quality streamlined effective day surgery for our patients, significantly reducing the wait times for operations with fewer cancelled operations. It also allows us to provide more fast track surgical treatment outside the context of acute and cancer operations. This is very useful due to increase in the surgical waiting lists due to the Covid-19 pandemic.

At the first outpatient visit, many patients are offered prompt dates for their operations in the day unit. Less patients need to be referred to private hospitals for their treatment. Additionally, as a direct consequence of this increased activity, we can provide more surgical training opportunities for our junior colleagues. This unit is running very well, allowing more routine quality care to be offered expediently at Rigshospital.

Parathyroid Gland Surgery and Day Stay Development: A New Day Stay Initiative

In March 2023, [Christoffer Holst Hahn](#) and [Mads Georg Stage](#) in conjunction with NBCL introduced the rapid intra operative Parathyroid hormone measurement tool (NBCL Connect). This allows fast and safe surgery for parathyroidectomy patients. This has allowed the introduction of Day Surgery for these patients and over 30 of the 300 annually treated patients were treated as day patients in 2023. By end of 2024 we expect to perform over 400 cases a year, of which 80-100 is expected to be day surgery, further consolidating the department as one of the larger parathyroid treatment centers in Europe.





8. UPCOMING AND EMERGING

8.1 YOUNG SCIENTIFIC ADVISORY BOARD (YSAB)

The Young Scientific Advisory Board is comprised of a select group of clinicians chosen by the Directors of the ENT department, with the mission to cultivate innovation among young researchers as well as collaboration and networking and funding opportunities within the clinic. Established in 2023, the board encourages cross-disciplinary cooperation and seeks to integrate scientific research into clinical practice. They aim to foster Young Researchers' Innovation, collabs, and network in the clinic. It provides a valuable conduit for emerging researchers to connect with established senior researchers and professors. The YSAB has been instrumental in organising the clinic's yearly Research Day and coordinating PhD gatherings.

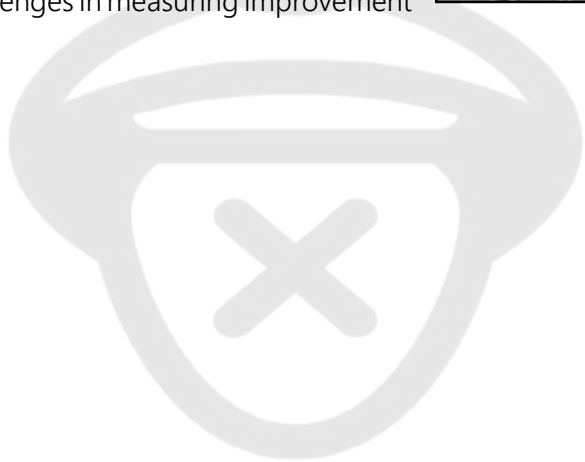
The rationale for creating the board was rooted in the convergence of clinical expertise with innovation. By merging clinical insights with innovation, nurturing up-and-coming talent, and creating a robust cross-functional network, our department is better primed to stay ahead, now and in the future. This strategic approach not only improves patient outcomes and operational efficiency but also positions the organization as a leader in the dynamically changing healthcare environment.



8.2 INSIGHTS TO ACTIVE RESEARCH PROJECTS

Smell and Taste Disturbance, the Impact on Quality of Life and the Utility of Rehabilitation

[Ditte Gertz Mogensen](#), a Clinical Nurse Specialist and PhD student in our department, is addressing the emerging issue of Taste and Smell disorders, particularly after viral infections. These conditions severely impact patients' lives and can cause depression, anxiety, and weight changes. Ditte's research evaluates the effect on quality of life and explores rehabilitation methods at the Ear Nose and Throat outpatient clinic, where thorough examinations and patient questionnaires are used to understand these disorders better. She is conducting a placebo-controlled study on olfactory training and its benefits for well-being, despite the challenges in measuring improvement objectively.



Cone Beam CT: an effective rapid diagnostic tool

[Steven Andersen](#) is a Senior Researcher and PhD Supervisor. He is responsible for clinical cone-beam CT and heads the "[Temporal Bone Imaging and Simulation](#)" research group at the Copenhagen Hearing and Balance Center. One of many of Stevens research projects has been the integration and expansion of Cone Beam CT applications in clinical practice and research. This is particularly useful in patients with ear conditions such as cholesteatoma and is also showing relevance in the evaluation of people sinus conditions. Cone Beam CT is significantly cheaper than conventional CT, with less radiation dose to the patient. It is also able to be provided in a one stop point of care setting.

Steven has also been active in research in the areas of simulation-based training in temporal bone surgery. His current research focuses on using clinical cone-beam CT for patient-specific simulation and navigation, 3D-printing, and automated image analysis in otorhinolaryngology applications.



8. UPCOMING AND EMERGING

8.2 INSIGHTS TO ACTIVE RESEARCH PROJECTS

3D visualization of cancer to improve surgical treatment

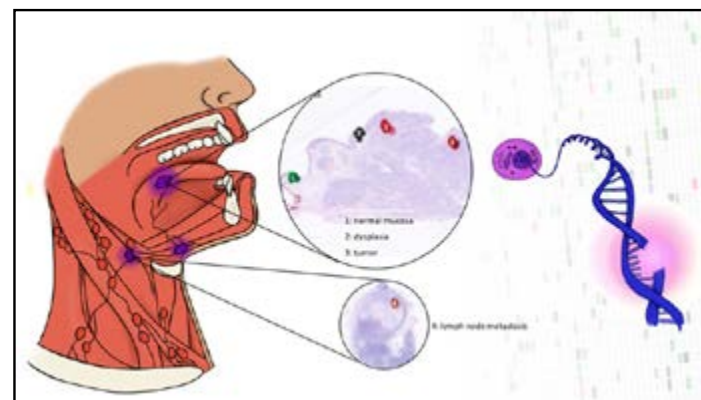
Asst. Professor [Fateme Makouei](#) (pictured alongside Associate Professor [Tobias Todsén](#)) is a biomedical engineer and technical lead of the [Surgical Ultrasound Research Group](#) in Copenhagen (SURGiC). She is working with advanced 3D ultrasound technologies to improve cancer treatment. Fateme is investigating the use of intraoperative ultrasound to improve the certainty of complete cancer tumour resection during operations on patients with Head and Neck Cancer. She has collaborated with, and supervised, several engineer students from The Technical University of Denmark, DTU. Along with Tobias Todsén, she has developed and patented the 3Sonic – a medical device that uses new 3D ultrasound technology to improve perioperative visualization of cancers. The hope is that 3Sonic can improve future surgical cancer treatment and increase the number of patients who are cured of cancer with a single operation. If successful, this will improve survival, lower healthcare costs, and reduce waiting times for cancer treatment.



The progression of normal mouth (oral) mucosa to cancer with regional to the lymph nodes in the neck

A research project investigating gene mutations as possible targets for therapy. [Jakob Myllerup Jensen](#), a junior doctor at the department has led this project.

Results to date have revealed a significant amount of gene cancer mutations associated with oral cancer in normal mouth mucosa. This is in keeping with known “field change” in oral mucosa, meaning there is a higher risk of developing cancers in mucosa that has been exposed to long term carcinogens such as smoking and alcohol. However, as yet no specific local gene mutations have been found that could be target for gene therapy in the future. Research is ongoing.



Progress in Cancer Diagnostics: The Integration of Liquid Biopsy into Clinical Practice

Over the past three years, an in-depth investigation into the diagnostic utility of HPV-DNA measurements in blood samples has been conducted as part of the PhD by [Kathrine Kronberg Jakobsen](#), under the guidance of supervisors, Professor [Christian von Buchwald](#), and Associate Professor [Christian Grønhøj](#). Katherine has published recently in the journal "Cancer Research". This work has shown significant promise as a diagnostic tool for HPV-positive oropharyngeal cancer patients, particularly for detecting recurrent disease. It is highly clinically relevant that is poised to have an impact on survival, quality of life, and patient care.

Stem cell treatment for xerostomia

Research group: [Kathrine Kronberg Jakobsen](#), [Amanda-Louise Fenger Carlander](#), [Charlotte Duch Lynggaard](#), [Christian Grønhøj](#) and Professor [Christian von Buchwald](#).

From 2014, we have been investigating the use of stem cell therapy in the salivary glands as a new treatment approach to relieve dry mouth in former head and neck cancer patients treated with radiotherapy. We completed the phase 2 part of this study in 2023 which showed that with this therapy, select patients are very likely to have improvement in their dry mouth.

These encouraging results have motivated us to continue our stem cell therapy

research in 2024. Further studies will involve:

- 1) the use of repeated stem cell treatment for previous stem cell patients
- 2) a randomized, placebo-controlled, phase 3, multicenter study
- 3) a randomized, placebo-controlled, phase 2 study on stem cell therapy in patients with Sjögren's syndrome and dry mouth.



Comprehensive Databases for Head and Neck, Thyroid and Sinonasal Cancers

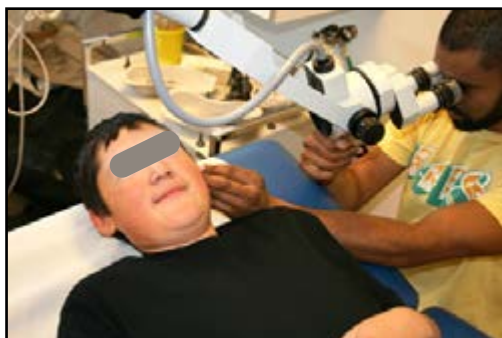
Prof [Christian von Buchwald](#), [Christian Grønhøj](#) and [Kathrine Kronberg Jakobsen](#) have also set up retrospective databases of the above cancers, to be completed by end 2024. This will aid further research into disease progression, treatment efficacy, and patient outcomes.



9. SUPPORT TO THE ENT CARE IN GREENLAND

Greenland and its population have access to specialist ENT health via a collaboration with the ENT Department of Rigshospitalet and other ENT Specialists in Denmark. The ENT care is provided via a rotation of ENT specialists from Denmark, each undertaking a 2-week rotation. Naturally there is a wide range of ENT conditions amongst the Greenland population. Whilst the population is small, it is very spread out over a vast geographical space. Most of the inhabitants do not have direct access to ENT care. Ear disease is more prevalent than anywhere in the world. Pictured: Ramon Gordon Jensen caring for a patient with ear disease.

2023 was the first year of collaboration between Nuuk and Rigshospitalet with respect to Audiology Services in Greenland ([Dronning Ingrid's Health centre](#) and [The Copenhagen Hearing and Balance Centre](#), Rigshospitalet). Because of this new organisational structure, we were able to deliver a more robust rehabilitation care program for those children with hearing, the majority of which is



secondary to middle ear infection. Through audit of this new directed activity, there has clearly been shown an improvement of the standard of over several ear conditions. This has a direct effect on overall quality of life, as well as having a positive effect on education in children with hearing loss.

The provision of Head and Neck care is also challenging in Greenland. There is a higher level of Head and Neck cancers amongst the Greenland population than most other countries, and once again patients are very spread out throughout

the country. Following return from treatment in Denmark, ease of access to specialised healthcare and rehabilitation remains a big problem.



2023 also saw the development of a new collaboration and work group, between the Oncology Department at Rigshospitalet, the ENT Department at Rigshospitalet, and then Surgical Department of Dronning Ingrid's Hospital. The first meeting of this development group was in November of 2023. The program aimed to improve delivery of Head and Neck cancer care. A very large focus of this group

will be to develop robust rehabilitation patient pathways. It is very important that the Healthcare team and especially the nurses at Dronning Ingrid's Hospital are integral in the delivery of this Head and Neck Cancer program.

Spearheading this, in the ENT department is our consultant surgeon [Ramon Gordon Jensen](#). He says "It is a passion of mine to improve the overall delivery of ENT care to the Greenland population in along with our Greenland healthcare partners. This year I have focused on ear disease and cancer. I remain committed to this ongoing development of care, in collaboration with my colleagues both in Greenland and Denmark.



10. EDUCATION, FELLOWSHIPS AND OBSERVERSHIPS

10.1 BEST NATIONAL EAR NOSE AND THROAT SURGERY EDUCATOR

In April 2023, at the annual meeting of the Danish Society for Otorhinolaryngology, Senior Consultant Surgeon [Irene Wessel](#) was awarded the best educator trophy. This was in recognition of her excellence in the interdisciplinary training of doctors, nurses, occupational therapists, and dentists within ENT surgery.



She said, "Thank you to my colleagues for nominating me, but also a big thank you to Rigshospitalet's Department of Ear, Nose and Throat Surgery and Audiology for prioritizing education and training and that together we always strive for high-quality treatment and professionalism."

10.2 OBSERVERSHIP AT THE MEMORIAL SLOAN KETTERING CANCER CENTER, N.Y. USA

Senior Consultant [Anne Fog Lomholt](#) visited Prof. Jatin Shah and colleagues at the [Memorial Sloan Kettering Head and Neck Cancer Surgery Service](#), New York City in June 2023. The department was founded 100 years ago and is still a leader in the treatment of all head and neck related cancers. The Head and Neck Surgeons work in close collaboration with oncologists and other supporting specialties. The focus of the stay was to gain inspiration for optimizing treatment planning, and patient selection for major surgical interventions.

It was inspiring to observe the way tumor board groups and multi-disciplinary conferences were held, and to witness the high quality of care delivered in the day-to-day functions of outpatient clinics, surgery and education.



10.3 OBSERVERSHIP MASSACHUSETTS EYE AND EAR INFIRMARY, BOSTON, USA

Consultant [Tina Toft Kristensen](#) spent four weeks in an observership at the Thyroid/[Parathyroid Endocrine Surgical Division at the Massachusetts Eye and Ear Infirmary](#), Boston USA. Here she worked with, observed, and learned from Professor Gregory W. Randolph about world class treatments of thyroid cancer.



Tina Toft Kristensen in the black suit with the team

Recent Danish Guidelines have recommended a less aggressive interventional approach to selected thyroid cancers without compromising patient and health or life expectancy. Tina joined a team in the USA that has integrated

this gentler and organ-preserving (de-escalation) treatment. This observership has given her colleagues at Rigshospitalet inspiration and validated experience to implement this same level of improved yet less aggressive care here at Rigshospitalet.

10.4 MEDICAL STUDENT FELLOWSHIPS AT THE MASSACHUSETTS EYE AND EAR (MEE), HARVARD MEDICAL SCHOOL IN BOSTON, USA

Professor [Christian von Buchwald](#) has for many years supported this twice a year opportunity for our medical students to spend a month at MEE. In 2023 [Benedicte Bitsch Lauritzen](#), [Oliver Abrahamsen](#), and Klara Bay Rask had the pleasure of this unique experience. They observed both outpatient and operating theatre activity, covering a wide spectrum of sub-specialties within ENT. They say "We were three medical students who participated in a four-week observership at the Massachusetts Eye and Ear (MEE), Boston. We were the first group of international observers since COVID-related challenges. We gained invaluable insights into various ENT surgeries and outpatient clinic procedures. Shadowing renowned senior surgeons provided rich learning experiences and offered glimpses into different subspecialties. Witnessing up to 50 patients seen per day per doctor underscored the hospital's high level of expertise and work ethic.



Benedicte, Oliver and Klara (from left to right)

The staff's kindness made the otherwise demanding schedule manageable, fostering a conducive learning environment. Our short stay broadened our understanding of most ENT practices and laid a significant foundation for potential future collaborations and professional growth."

10.5 THE BIOMEDICAL DESIGN FELLOWSHIP – INNOVATION OPPORTUNITIES

In the autumn of 2023 a team of 8 experts from The [BioMedical Design fellowship](#), spent 2 months observing all aspects of work, interventions and treatments taking place in our department. The department's clinical nursing specialist and PhD student, [Ditte Gertz Mogensen](#), worked closely with this team, alongside Associate Professor [Christian Grønhøj](#) and strategy and innovation officer Rikke Schriver Nielsen.



The Biomedical Design fellowship is a one-year study program, for 8 colleagues working in the world of medical technology and development. The aim of the fellowship is to study and seeks solutions to unmet patient healthcare needs and to consider development opportunities and innovations from both operational and technological perspectives. The fellowship program is funded by the [Novo Nordisk Foundation Fellowship Programme](#). During the 2 months visit at Rigshospitalet, the fellows spent considerable time talking with the nursing and medical colleagues in our department. There was much shared of about opportunities for development.

11. V.I.P VISITS

11.1 NATIONAL UNIFORM DAY - INTERFORCE

The ENT Department has a close association with the Ministry of Defence. In this current time of increased European and Global insecurity there is a clear need for more active partnership with the military and their specific healthcare processes.

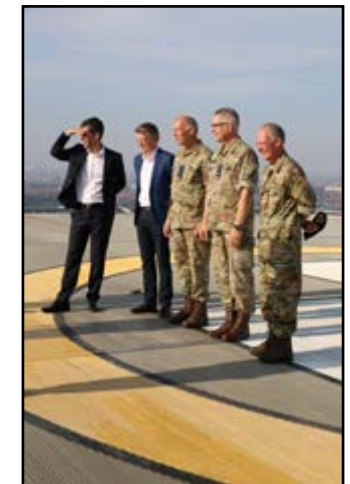
In keeping with this, on the 27th of September the ENT department at Rigshospitalet hosted a visit by the Ministry of Defence. Appropriately this was arranged on the first "National Uniform at Work Day"; a day when all staff who are also Danish reservists or volunteers in the Home Guard, Emergency Management Agency, and Coastal Rescue Service (Interforce) are encouraged to wear their uniform to work.

Attending was the Chief of Defence Flemming Lentfer, the CEO of the Capital Region of Denmark [Jens Gordon Clausen](#), the Director for the HovedOrtoCentre at Rigshospitalet [Martin Magelund Rasmussen](#), and the ENT Head of Department [Mads Klokke](#). Mads Klokke is Lieutenant Colonel in the Royal Danish Airforce and the Military Health Services and has been in the armed forces for 40 years.



The meeting focused on support, military partnership, development, and cooperation and included a tour of the Aviation department in the ENT department and the Acute Heli-transport Service.

Out of the meeting came a consensus for the need for further cooperation between the two departments to establish a more robust partnership service for the provision of the overall medical care within the national emergency services. Mads said "We need cultural changes so that preparedness/civil defence/military community service becomes natural for everyone in Denmark (a tradition our Nordic neighbours are better at). In my civilian leadership role, I will do my best to create this".





11. V.I.P VISITS

11.2. VISIT BY THE PRIME MINISTER, MINISTER OF HEALTH, AND FOREIGN MINISTER

Visit by Prime Minister Mette Frederiksen, The Minister of Health Sophie Løhde and the Foreign Minister Lars Løkke Rasmussen with a focus on National Cancer Management.

National Cancer Management is a focus for ongoing attention in our healthcare service. With more than 2,500 referred cancer patients annually, the ENT department is one of the largest in the country. We have no waiting list for cancer surgery, even though patients come from all over Region Zealand and the Capital Region.

This level of care demands investment and development of robust, effective, and rapid diagnostic and treatment pathways, not only to support and comply with national cancer treatment targets, but also to deliver world class cancer care comparable with current survival and morbidity outcomes in Europe and worldwide.

We have established a rapid one-day cancer investigation and diagnostic outpatient patient visit pathway, where complete comprehensive history taking, and investigation is performed, including some day tissue biopsy and pathology reporting. This has greatly accelerated the cancer patient treatment pathway with significant reduction of time to delivery of the first definitive cancer treatment, including both surgery and chemoradiotherapy.

However, there remain challenges in the provision of this care that can only be realized with the support and shared vision of our politicians. It was with great pleasure that we therefore welcomed Mette Frederiksen, Lars Løkke Rasmussen



and Sophie Løhde to visit our department. The purpose of visit of the visit was to review and discuss the delivery of cancer care within our department. Our chief physician [Mads Klokke](#), chief nurse [Tine Bloch Jensen](#), hospital director [Rasmus Møgelvang](#) and regional chairman [Lars Gaardhøj](#) guided our political leaders around the department's new premises in the North Wing at Rigshospitalet, where the ministers spoke to employees and visited inpatients who were actively being treated within their individual cancer treatment pathway.

The politicians were very receptive to our thoughts and concerns regarding opportunities for improvement in the treatment packages and pathways for our patients with cancer of the Head and Neck.

After the review of our department and our cancer care pathways during the morning in the morning of their visit, there followed a press conference, which included the announcement of a larger budget injection of, among other things, the upcoming Cancer Package 5. We were delighted to be present and involved at the public announcement of this plan. This plan will provide increased political and financial support for our aspirations of developing the quality and effectiveness of treatments of patients with cancer within our department, at Rigshospitalet, and nationally with the expected and required improvement in care and overall patient cancer survival.



12. AWARD-WINNING AI PROJECT: VIRTUAL ASSISTANT FOR PATIENTS



In June 2023, the ENT Department together with The Rigshospitalet Innovation Centre partnered with the Danish firm, [2021.AI](#), Neil Oschlag-Michael and Clara Foged Andersen from 2021.AI spearheaded the project in collaboration with [Rikke Schriver Nielsen](#) and the team at the ENT Department.

The goal was to design an AI Virtual Assistant powered by LLM (Large Language Model) technology that would enable patients to obtain information regarding their health issues and care, aiming to promote equity in healthcare information access. '

We aimed to mitigate the risk of cancelled operations, stress and feeling of insecurity with increased access to information, also outside our normal opening hours. Patients and their families may not always fully comprehend details or ask questions about medical conditions and surgeries during the consultations leading to inadequate pre-surgery preparation.

With an initial focus on information for thyroid cancer surgery patients, we engineered a Virtual Assistant application. It is secured through "Governance guardrails" and provide responses to inquiries on thyroid health, drawing from internal verified sources from the ENT department.

This Virtual Assistant does not offer prognosis or survival outcomes and refrains from speculating answers, directing patients to medical staff when confronted with unknown queries instead. It's designed not to collect or use personal data, ensuring compliance with the upcoming "EU AI Act." Its safety and efficacy were validated in objective evaluations conducted with physicians and nurses at department.

Completed in August, within an exceptional timeframe, the project marked the debut utilisation of LLM for patient information at Rigshospitalet. Due to

its adaptable framework, the AI Virtual Assistant can be expanded to serve additional patient demographics. We intend to broaden its scope within ENT Surgery and explore applications in other medical fields.

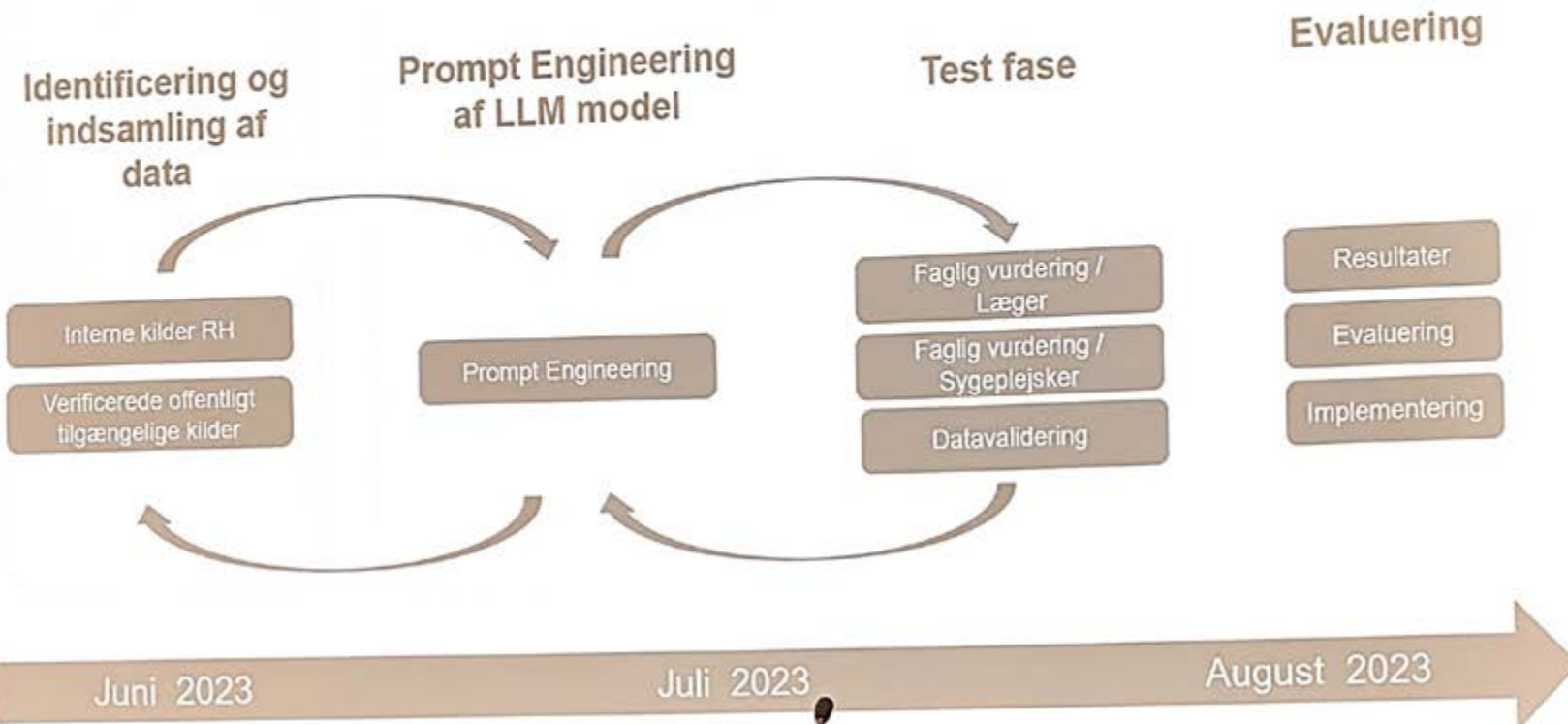


Our initiative, the Virtual Assistant for Patients, not only claimed the AI Journal's "Best Use of AI in the Public Sector Award: 2023" but is also nominated for the Danish Digital Award 2024; honoring projects delivered in 2023.

Surely, we are only taking the first steps of using this type of digital intelligence in the public healthcare, yet evidently, we must make use of the tools we are offered to be best prepared for the future with limited resources and a growing elderly population. 2024 will bring more innovation in this area, Rikke Schriver Nielsen concludes.



Forløb



13. SOUND AND COGNITIVE LOAD

13.1. DANISH SOUND DAY

We were proud to host the Danish Sound Day 2023 at the [Copenhagen Hearing and Balance Centre](#) (CHBC) at Rigshospitalet on November 7, 2023. The Danish sound day is an annual Danish Audio industry networking event held by [Danish Sound Cluster](#), the nationwide cluster organization for Denmark's sound industry. This is one of Denmark's strongest tech areas. The focus of the day was on sound and audio technology and its connection to health and well-being.



The day was opened by [Martin Magelund Rasmussen](#), Director the Centre of Head and Orthopedics, (HOC) and the conference moderator Paul Tyler. There were many exciting speakers from the fields of research, business, tech, performance arts, mental health, wireless and hearing technologies.

There were also presentations from our researchers and clinicians from the CHBC. Topics included Creativity in research, How sound effects our brains, Sound and schizophrenia treatment, Sound and sleep, The future of hearing aids and audio use, and Deep Vibrations and well-being.

It was an excellent day, with opportunities for knowledge sharing and making contacts with other "sound people". It was also a great opportunity to visit the exhibitor stands to see what is being developed in the MedTech industry here



in Denmark. We were also proud to showcase the CHBC to the participants of the sound day with the help of our talented PhD students as guides.

The winner of Danish Sound Day - Research Pitch Battle Winner was Prithvi Ravi Kantan, an electronics and telecommunication engineer and a full-time PhD fellow at Aarhus university. He is developing a novel technology that converts human movement into musical feedback in real-time for rehabilitation applications for Balance and Gait Rehabilitation in Hemiparetic Stroke Patients.

The event was funded by the Danish Business Promotion Board and the Danish Ministry of Higher Education and Science in association with many companies from the related MedTech industries.

We look forward to the next Sound Day in 2024.



13.2. HEARING AND DEMENTIA

The LINK Project – Understanding the link between hearing impairment with cognitive decline and dementia – [Rebecca Hendel](#), post doc Neuropsychologist at Rigshospitalet.

Rebecca Hendel is working in the [Danish Dementia Research Centre](#) (DDRC) and the [Copenhagen Hearing and Balance Centre](#) (CHBC) at Rigshospitalet. She is part of the Link Project group including the principal investigators [Abigail Anne Kressner](#) and [Asmus Vogel](#), also from the DDRC. The team also include support from our audiology team, incl. Amal Abdulqadir Ali, Sagal Rådberg Nagbøl and Sofie Kobberø Bundgaard, pictured next to Rebecca Hendel here.



In large epidemiological and population-based studies, hearing loss has been identified as one of the biggest risk factors for dementia in midlife. In 2023 a new joint research project began between the DDRC and the CHBC at Rigshospitalet: The Link Project. This collaboration allows a more holistic approach to this research, drawing from the expertise across neurology and audiology. The project is funded by the [GN Store Nord Foundation](#). The Link project is examining the link between hearing loss and cognitive impairment in the population over age 55. The first phase of the study includes people from the general population as well as patients referred from the Memory Clinic at Rigshospitalet (part of DDRC). The second phase will include patients from the Department of Audiology at Bispebjerg Hospital. To the best of our knowledge this is the only clinical study in Denmark currently being undertaken in this patient group.

While previous studies have established rather convincingly that there is an

association between hearing loss and cognition, they have done so primarily using epidemiological and population-based study designs. We want to find out how many of the patients who attend the DDRC with memory loss also have a hearing loss. We are examining the patients with more detailed investigations, including both subjective and objective measures of both hearing and cognition. Objective measures of hearing include pure-tone audiometry and two speech-in-noise tests, and the cognitive assessments includes assessment of several cognitive domains.

It is important to identify this patient group for several reasons. We want to raise awareness of the need of hearing rehabilitation (hearing aids), especially in patients with additional problems such as memory loss. We know hearing loss has significant consequences. It often leads to significant social isolation and consequent depression which are further risk factors for dementia that may contribute to the rising number of dementia cases among individuals with hearing loss. Screening for hearing loss in the older population, and especially in those with memory loss is vital, such that patients can be fitted with effective hearing aids. This would significantly improve the quality of life of our patients as well as reducing social isolation and depression.

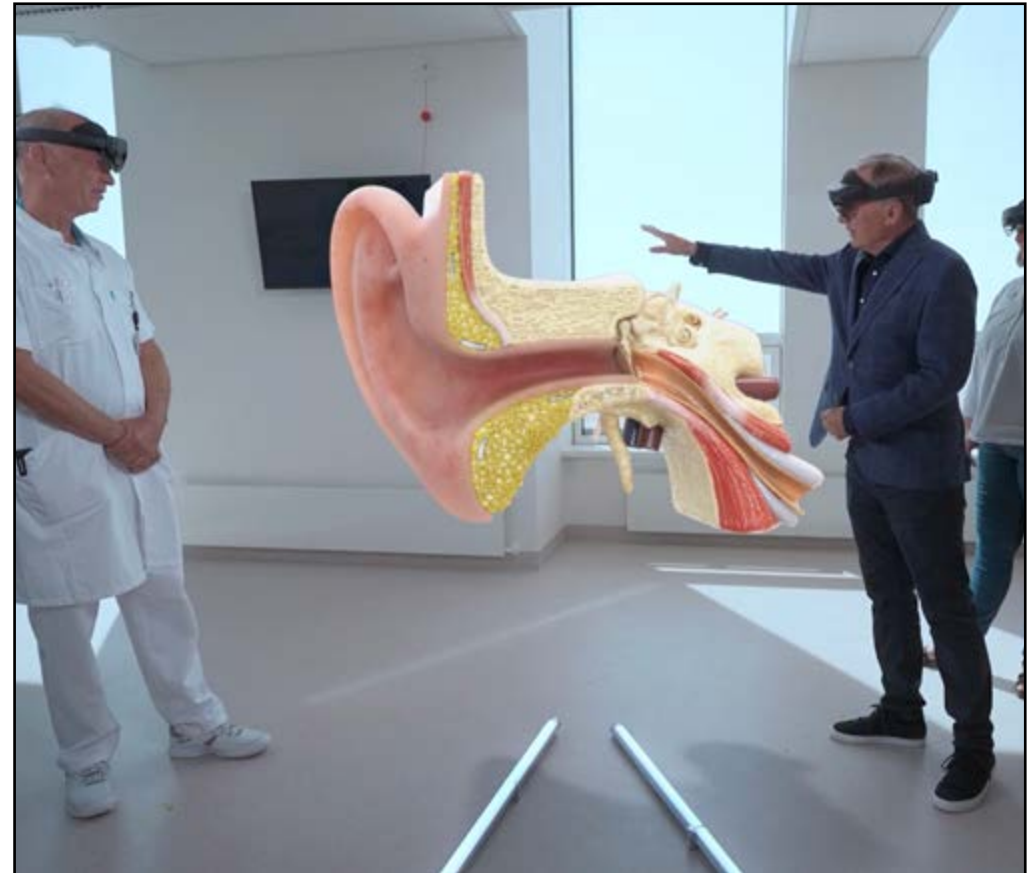
Ultimately, we hope that this research project into hearing loss and cognitive decline will enable us to provide more comprehensive care across departments for our patients with hearing loss and dementia. It will also lead to increased community awareness of the hearing problems in our older population, stressing the importance of early and active hearing rehabilitation.

14. COMMUNICATION

In recent years, the importance of knowledge sharing with both experts and the general public has become increasingly evident. Traditionally, the latest knowledge has been shared with professionals through specialty-relevant journals and scientific meetings, while we have previously not been good at translating and disseminating this broadly.

Therefore, in recent years, the department has actively worked on also communicating messages broadly for the purpose of both general health information and to make the department known and attractive to future collaborating partners - both private and public. This is done on serious media platforms such as LinkedIn, radio and TV as well as in podcasts.

Examples of public media engagement have been the DR broadcast "[Kroppen indefra](#)" ("The Body from Within") with TV host Dr. Peter Qvortrup Geisling and the department's chief physician [Mads Klokke](#), where innovative holographic 3D technology was used for the first time on Danish TV to explain what the disease ear stones are and how to treat this dizziness condition.



Other examples of media participation have been regarding physical impacts during space travel when the Danish astronaut was to be launched to and stay for an extended period on the International Space Station, and increased incidence of nasal septum perforation due to drug abuse and misuse of nasal spray, the overlooked socially disabling effects of tinnitus, etc.

Through the department's three official LinkedIn platforms, there has also been announced news of AI in healthcare, public-private collaboration, new research projects and academic defenses, collaboration with the Greenlandic healthcare system, visit from the Military Defense, visit from ministers to the department, etc.

We are proud of the department's many engagements and are happy to share this with the general public. The department's active communication strategy should be seen as a supplement to Rigshospitalet's and the Capital Region's overall strategy in the area, where the department has targeted communication to topics within the department's areas of interest.

For more news check our LinkedIn via the QR codes on the back cover



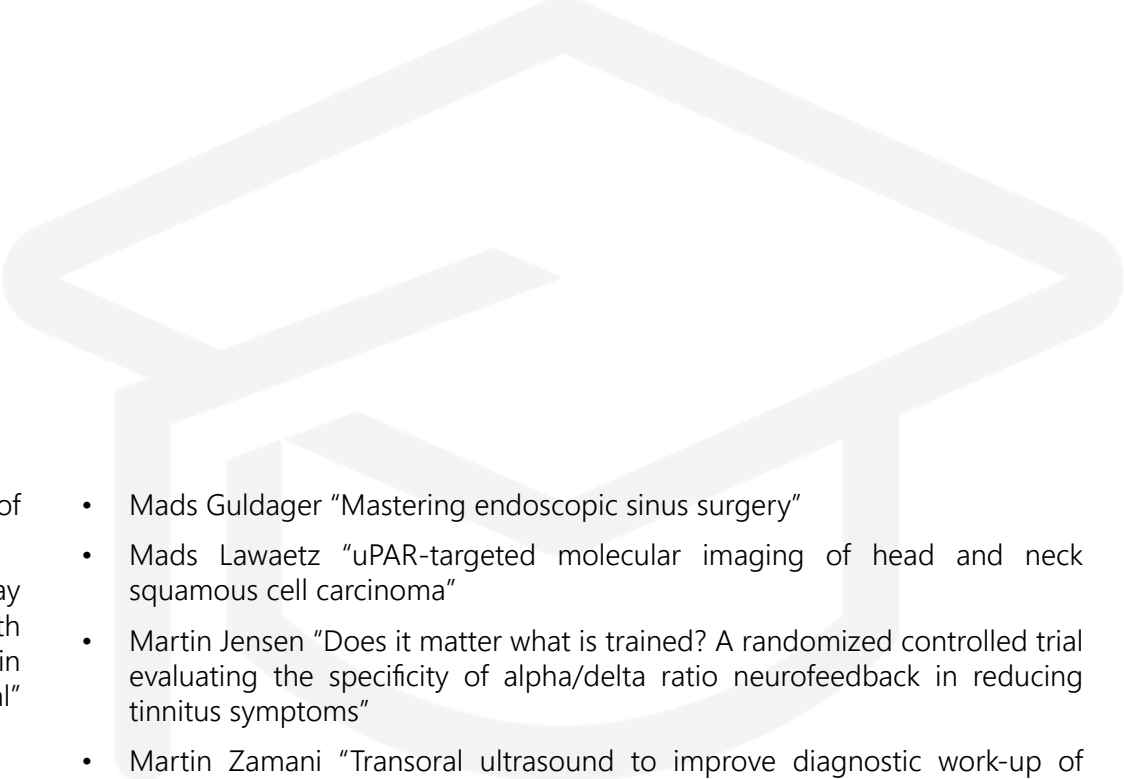
The Journal of Danish Medical Association (Ugeskrift for læger) interviews our chief physician about the increased usage of cocaine

15. RESEARCH EDUCATION PROGRAMME

The department boasts an impressive cadre of 40 PhD students, a number that is particularly noteworthy given that the majority of these doctoral positions are externally funded. This external funding not only reflects the department's strong reputation in the academic community but also speaks volumes about the quality of its research and educational programs. Securing such funding often requires rigorous peer review and competition, indicating that the department's work is highly regarded by funding agencies, industry partners, and academic institutions. This achievement underscores the department's ability to attract and nurture top-tier talent, further cementing its standing as a leader in its field.

On-going PhD Fellows, 2023

- Adam Omari "Patient-specific 3D-printed models for improving temporal bone and middle ear surgery"
- Amanda Louise Fenger Carlander "Mesenchymal stem cells for radiation induced hyposalivation and xerostomia in previous head and neck cancer patients (MESRIX-III)"
- Amanda Øster Andersen "Optical molecular imaging in head and neck surgery"
- Anders Nøhr "Gamification and certification in the Visible Ear Simulator"
- Andreas Frithioff "3D-printed models for Training temporal bone surgery"
- Anne-Sophie Homøe "Effect of mepolizumab and FESS surgery compared with mepolizumab alone in patients with CRSwNP and signs of Type-2 inflammation – 6 months follow-up of a randomized controlled trial"
- Beauty Hariz "Outcome of Children who are deaf and hard of hearing with cochlear implant in the Middle East"
- Bilal Akram "Clinical cone-beam CT in the diagnosis and surgical treatment of otosclerosis"
- Camelia Nabi Saber "Multicenter Study for Enhancing Auditory Brainstem Implant Performance in Neurofibromatosis type 2 Patients"
- Carl Frederik Haugaard "Wireless electroporation in HNSCC"
- Christian Korsgaard Pedersen "Biological treatment of severe nasal polyposis in Denmark"
- Christiane Holbæk Haase "Adherence to local steroid in Global Airways – importance of double disease and the relationship between steroid intake and the impact on the endocrine axis, bone density, and bone structure"
- Colin Barbier "Characterising the effect of compression and reverberation on spatial hearing"
- Ditte Gertz Mogensen "Living with an invisible disability and the Effect of Olfactory Training in Patients with Post-Covid-19 Olfactory Dysfunction, - A Randomized Placebo-controlled Clinical Trial"
- Elisa Skovgaard Jensen "Audio-vestibular function in neuroinfections"
- Eva Kirkegaard Kiær "Improving diagnostics and treatment of patients with obstructive sleep apnea – from private ENT-practice to the tertiary surgical center"
- Eva Lykke "Optical-assisted head and neck surgery"

- 
- Francesco Ganis "Localisation and emotional detection in speech signals of children with CI"
 - Jens Even Tidemandsen "Change in physical activity, lung function, airway inflammation and airway hyperresponsiveness after treatment with mepolizumab and FESS surgery compared with mepolizumab alone in patients with CRSwNP– 6 months follow-up of a randomized controlled trial"
 - Julia Chiossi "Word learning for children with HL"
 - Kasper Daugaard Larsen "Improving the diagnostic work up of thyroid nodules: Exploring new biopsy techniques and Proteome profiling"
 - Kasper Rasmussen "Advances in Cochlear Implantation in Denmark: Investigating Speech Recognition, Tinnitus, Patient-Reported Outcomes, Hearing Preservation, and Spatial Hearing"
 - Kasper Søndergaard "Specific Training According to Balance Evaluation (STABLE)"
 - Kathrine Kronberg Jakobsen "Head and Neck Cancer – From Diagnosis to Rehabilitation: Advancing Patient Care"
 - Kristine Eberhard "Middle and inner ear mechanical pathologies"
 - Line Husted Baungaard "Aural rehabilitation with Cochlear Implants in Adults; CI Candidacy and Auditory Verbal rehabilitation"
 - Lisbeth Birkelund Simonsen "New applications and test modalities for the Audible Contrast Threshold (ACT) test"
 - Lone Jantzen "Auditory late effect in CCS"
 - Mads Guldager "Mastering endoscopic sinus surgery"
 - Mads Lawaetz "uPAR-targeted molecular imaging of head and neck squamous cell carcinoma"
 - Martin Jensen "Does it matter what is trained? A randomized controlled trial evaluating the specificity of alpha/delta ratio neurofeedback in reducing tinnitus symptoms"
 - Martin Zamani "Transoral ultrasound to improve diagnostic work-up of oropharyngeal cancer"
 - Mats Daniel Rekswinkel "Investigating an objective and clinically oriented measurement paradigm based on cortical responses to assess speech discrimination"
 - Mikkel Hjordt Holm Larsen "Postoperative pain and recovery Following transoral robotic surgery (TORS)"
 - Nete Rudbeck Kamper "TeenHear - timely and relevant audiology for adolescents with hearing loss"
 - Patrick Eriksen "Sinonasal Lymphomas – From Genotype to Phenotype on a Nationwide Scale : Genetic Patterns, Disease Behavior, and Patient Prognosis"
 - Peter Trier Mikkelsen "Advancing virtual reality temporal bone simulation for patient-specific simulation and mixed reality perioperative guidance"
 - Signe Buhl Gram "Heterogeneity in Head and Neck Squamous Cell Carcinoma – impact on treatment and follow-up"
 - Signe Wischmann "Gamification in auditory rehabilitation"

16. PUBLICATIONS 2023



THESIS

Rigshospitalet
University of Copenhagen, Faculty of
Health and Medical Sciences

DOCTORAL THESIS

Simulation-based training and assessment of mastoidectomy—perspectives on the outside, inside, and in-between conditions of practice
Steven Andersen, Nov 2023.

PHD THESIS

3D-printed models for Training temporal bone surgery
Andreas Frithioff

Improving diagnostics and treatment of patients with obstructive sleep apnea – from private ENT-practice to the tertiary surgical center
Eva Kirkegaard Kiær

Does it matter what is trained? A randomized controlled trial evaluating the specificity of alpha/delta ratio neurofeedback in reducing tinnitus symptoms
Martin Jensen

Postoperative pain and recovery Following transoral robotic surgery (TORS)
Mikkel Hjordt Holm Larsen

Middle and inner ear mechanical pathologies
Kristine Eberhard

EAR

Papers in peer-reviewed journals

Gamification and serious games in dermatology education : A systematic review and quality assessment
Kristensen, S I P; Frithioff, A; Ternov, N K et al. I: Journal of the European Academy of Dermatology and Venereology : JEADV. 2023.

Simulation-based training and assessment of mastoidectomy—perspectives on the outside, inside, and in-between conditions of practice
Andersen, Steven Anders Wuyts. / . 2023.

Cochleaimplantation for children.
Percy-Smith, Lone; Jantzen, Lone; Cayé-Thomasen, Per. / I: Ugeskrift for Laeger. 2023 ; Bind 185, Nr. 49.

Pipeline for Automated Processing of Clinical Cone-Beam Computed Tomography for Patient-Specific Temporal Bone Simulation : Validation and Clinical Feasibility
Andersen, Steven Arild Wuyt; Hittle, Brad; Keith, Jason P et al.. I: Otology & neurotology: official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology. 2023; Bind 44, Nr. 2. s. e88-e94.

Rationale for the Development of a Novel Clinical Grading Scale for Postoperative Facial Nerve Function : Results of a Multidisciplinary International Working Group
Carlson, Matthew L ; Lohse, Christine M; Agazzi, Siviero et al. / . I: Otology & neurotology: official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology. 2023 ; Bind 44, Nr. 10. s. e747-e754.

Gathering validity evidence for a 3D-printed simulator for training of myringotomy and ventilation tube insertion
Lüscher, Michael; Konge, Lars; Tingsgaard, Peter et al. I: Laryngoscope Investigative Otolaryngology. 2023 ; Bind 8, Nr. 5. s. 1357-1364.

Life Expectancy After Diagnosis of a Vestibular Schwannoma in Patients 70 Years and Older
Mistarz, Nicole; Reznitsky, Marti; Høstmark, Karianne et al. / . I: JAMA otolaryngology -head & neck surgery. 2023.

Tinnitus forårsaget af essentiel palatal tremor
Nikoghosyan-Bossen, Gohar; Bork, Kristian Hveysel; Bloch, Sune Land. / I: Ugeskrift for Laeger. 2023 ; Bind 185, Nr. 36.

Effect of sound therapy on whole scalp oscillatory brain activity and distress in chronic tinnitus patients
Jørgensen, Mie Lærkegård; Hyvärinen, Petteri ; Caporali, Sueli et al. / . I: Frontiers in Neuroscience. 2023 ; Bind 17. s. 1212558.

Does it matter what is trained? A randomized controlled trial evaluating the specificity of alpha/delta ratio neurofeedback in reducing tinnitus symptoms
Jensen, Martin; Alanis, Jose Carlos Garcia; Hüttenrauch, Eva et al. / . I: Brain communications. 2023 ; Bind 5, Nr. 4. s. fcad185.

Further Validity Evidence for Patient-Specific Virtual Reality Temporal Bone Surgical Simulation
Andersen, Steven Arild Wuyts ; Hittle, Brad ; Värendh, Maria et al. / . I: The Laryngoscope. 2023

3-D-Printed Models for Temporal Bone Training : A Validity Study
Frithioff, Andreas ; Frendø, Martin; Weiss, Kenneth et al. / . I: Otology & neurotology: official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology. 2023 ; Bind 44, Nr. 7. s. e497-e503.

Transient Facial Nerve Palsy in Aviation.
Bloch, Sune Land ; Hertz, Jonas; Klokker, Mads. / I: Aerospace medicine and human performance. 2023 ; Bind 94, Nr. 5. s. 404-408.

Correction : Systematic cascade screening in the Danish Fabry Disease Centre: 20 years of a national single-centre experience
Effraimidis, Grigoris ; Rasmussen, Åse Krogh ; Dunoe, Morten et al. / . 2023. (PLoS One).

Endovascular occlusion of a persistent stapedia artery prior to stapedotomy : a novel approach
Bloch, Sune Land; Dahl, Rasmus Holmboe ; Hansen, Klaus et al. / . I: European archives of oto-rhino-laryngology : official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS) : affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery. 2023 ; Bind 280, Nr. 10. s. 4701-4707.

A Review of Virtual Reality for Individuals with Hearing Impairments
Serafin, Stefania ; Adjorlu, Ali; Percy-Smith, Lone Marianne. / . I: Multimodal Technologies and Interaction. 2023; Bind 7, Nr. 4.

EAR

Tinnitus suppression in a prospective cohort of 45 cochlear implant recipients : occurrence, degree and correlates.

Rasmussen, Kasper Dyre; West, Niels Cramer; Bille, Michael et al. / I: European archives of oto-rhino-laryngology : official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS):affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery. 2023 ; Bind 280, Nr. 9. s. 4073-4082.

3D-printing a cost-effective model for mastoidectomy training.

Frithioff, Andreas ; Weiss, Kenneth; Frendø, Martin et al. / I: 3D printing in medicine. 2023 ; Bind 9, Nr. 1. s. 12.

Learning Curves in Directed Self-Regulated Virtual Reality Training of Mastoidectomy and the Role of Repetition and Motivation.

Fartoussi, Hagar Al; Sørensen, Mads Sølvsten ; Andersen, Steven Arild Wuyts. / I: The Journal of International Advanced Otolaryngology. 2023; Bind 19, Nr. 2. s. 99-104.

Hearing Loss in Bacterial Meningitis Revisited- Evolution and Recovery

Jensen, Elisa Skovgaard; Cayé-Thomasen, Per; Bodilsen, Jacob et al. / I: Open Forum Infectious Diseases. 2023 ; Bind 10, Nr. 3. s. ofad056.

Cellular voids in the pathogenesis of otosclerosis

Hansen, Lars Juul; Bloch, Sune Land; Sørensen, Mads Sølvsten. / I: Acta Oto-Laryngologica. 2023; Bind 143, Nr. 3. s. 250-253.

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

Koprowska, Aleksandra; Marozeau, Jeremy ; Dau, Torsten et al. / I: International Journal of Audiology. 2023 ; Bind 62, Nr. 11. s. 1048-1058.

Are Video Recordings Reliable for Assessing Surgical Performance? A Prospective Reliability Study Using Generalizability Theory

Frithioff, Andreas; Frendø, Martin; Foghsgaard, Søren et al. / I: Simulation in healthcare: journal of the Society for Simulation in Healthcare. 2023 ; Bind 18, Nr. 4. s. 219-225.

The reliability and agreement of scores in a novel balance measure for older adults : Specific Training According to BaLance Evaluation (STABLE)

Søndergaard, Kasper; Curtis, Derek John; Cayé-Thomasen, Per et al. / I: Disability and Rehabilitation. 2023 ; Bind 45, Nr. 21. s. 3582-3594.

Self-reported listening effort in adults with and without hearing loss : the Danish version of the Effort Assessment Scale (D-EAS).

Cañete, Oscar M ; Nielsen, Silje G; Fuentes-López, Eduardo. / I: Disability and Rehabilitation. 2023 ; Bind 45, Nr. 1. s. 98-105.

Am I doing this right? Structured self-assessment during simulation training of mastoidectomy improves cadaver dissection performance: a prospective educational study

Andersen, Steven Arild Wuyts; Frithioff, Andreas ; von Buchwald, Josefine Hastrup et al. / I: European archives of oto-rhino-laryngology : official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS) : affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery. 2023 ; Bind 280, Nr. 1. s. 97-103.

Prevalence of bilateral vestibulopathy among older adults above 65 years on the indication of vestibular impairment and the association with Dynamic Gait Index and Dizziness Handicap Inventory Piper,

Katrine Storm ; Juhl, Carsten Bøgh ; Andersen, Hanne Elkjaer et al. / I: Disability and Rehabilitation. 2023 ; Bind 45, Nr. 7. s. 1220-1228.

Enlarged Vestibular Aqueduct and Associated Inner Ear Malformations: Hearing Loss Prognostic Factors and Data Modeling from an International Cohort.

Saeed HS, Fergie M, Mey K, West N, Cayé-Thomasen P, Nash R, Saeed SR, Stivaros SM, Black G, Bruce IA. J Int Adv Otol. 2023 Nov;19(6):454-460. doi: 10.5152/iao.2023.231044. PMID: 38088316; PMCID: PMC10765208.

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

Koprowska A, Marozeau J, Dau T, Serman M. Int J Audiol. 2023 Nov;62(11):1048-1058. doi: 10.1080/14992027.2022.2135032. Epub 2022 Oct 27. PMID: 36301675.

Self-reported listening effort in adults with and without hearing loss: the Danish version of the Effort

Assessment Scale (D-EAS)
Cañete OM, Nielsen SG, Fuentes-López E. Disabil Rehabil. 2023 Jan;45(1):98-105. doi:10.1080/09638288.2021.2022781.

Explaining neurological factors of hearing loss through digital technologies.

Wischmann S, Kamper NR, Jantzen L, Hammer L, Reipur DB, Serafin S, Percy-Smith L. Int J Pediatr Otorhinolaryngol. 2024 Jan;176:111825. doi: 10.1016/j.ijporl.2023.111825. Epub 2023 Dec 14. PMID: 38128354.



16. PUBLICATIONS 2023



NOSE

Papers in peer-reviewed journals

The effect of aerobic exercise training on asthma control in postmenopausal women (ATOM) : a randomized controlled pilot study.

Hansen, Erik Sören Halvard ; Rasmusen, Hanne Kruuse ; Hostrup, Morten et al. . I: European Clinical Respiratory Journal. 2023 ; Bind 10, Nr. 1. s. 2251256.

Inhaled beta2 -agonist, formoterol, enhances intense exercise performance, and sprint ability in elite cyclists.

Jeppesen, Jan S ; Jessen, Søren ; Thomassen, Martin et al.: Scandinavian journal of medicine & science in sports. 2023.

Skader i næse og mellemansigt ved kokainmisbrug

Hansen, Frederik Vestergaard ; Kiehn, Oliver Thstrup ; Lomholte, Anne Fog et al. I: Ugeskrift for Laeger. 2023 ; Bind 185, Nr. 40.

Severe asthma trajectories in adults : findings from the NORDSTAR cohort.

von Bülow, Anna; Hansen, Susanne ; Sandin, Patrik et al. I: The European respiratory journal. 2023 ; Bind 62, Nr. 3.

Anxiety and depression in women with asthma prior to fertility treatment.

Yifei Huang, Emilia; Hansen, Anne Vejen; Tidemandsen, Casper et al. I: European Clinical Respiratory Journal. 2023 ; Bind 10, Nr. 1.

EUFOREA summit in Brussels 2023: inspiring the future of allergy & respiratory care.

Hellings, P W ; Lau, S ; Scadding, G et al. I: Frontiers in allergy. 2023 ; Bind 4. s. 1236977.

Childhood Asthma and Parental Antidepressant Use in a Nationwide Danish Cohort.

Cabrera Guerrero, Silvia; Håkansson, Kjell Erik Julius; Backer, Vibeke et al. I: Journal of Asthma and Allergy. 2023 ; Bind 16. s. 821-831.

EUSICA/COST IMMUNO-model workshop fostering collaboration to advance sinonasal cancer research : A meeting report.

Hermsen, Mario A; Lechner, Matt; Oliveira Ferrer, Leticia et al. I: Oral Oncology. 2023 ; Bind 146. s. 106543.

Systemic corticosteroids in treatment of chronic rhinosinusitis - A systematic review.

Tamene, Sarah ; Dalhoff, Kim ; Schwarz, Peter et al. I: European Clinical Respiratory Journal. 2023 ; Bind 10, Nr. 1. s. 2240511.

EUFOREA pocket guide on the diagnosis and management of asthma: An educational and practical tool for general practitioners, non-respiratory physicians, paramedics and patients

Diamant, Zuzana ; Jesenak, Milos ; Hanania, Nicola A et al. I: Respiratory medicine. 2023; Bind 218. s. 107361.

Diagnostic approach to lower airway dysfunction in athletes: a systematic review and meta-analysis by a subgroup of the IOC consensus on 'acute respiratory illness in the athlete

Reier-Nielsen, Tonje ; Sewry, Nicola; Chenuel, Bruno et al. I: British Journal of Sports Medicine. 2023 ; Bind 57, Nr. 8. s. 481-489.

Unusual cases of sinonasal malignancies : a letter to the editor on HPV-positive sinonasal squamous cell carcinomas.

Lauritzen, Benedicte Bitsch; Sjøstedt, Sannia; Jensen, Jakob Myllerup et al. I: Acta Oncologica. 2023 ; Bind 62, Nr. 6. s. 608-613.

A EUFOREA comment on a lost comorbidity of asthma.

Conti, Diego M; Hellings, Peter W ; Diamant, Zuzana et al. I: Allergy, Asthma and Clinical Immunology. 2023 ; Bind 19, Nr. 1.

Burden and unmet need for specialist care in poorly controlled and severe childhood asthma in a Danish nationwide cohort.

Håkansson, Kjell Erik Julius; Guerrero, Silvia Cabrera; Backer, Vibeke et al. I: Respiratory Research. 2023 ; Bind 24, Nr. 1.

Effect of High-Intensity Interval Training on Inhaled Corticosteroid Dose in Asthma Patients : A Randomized Controlled Trial.

Pitzner-Fabricius, Anders; Dall, Christian H; Henriksen, Marius et al. I: The journal of allergy and clinical immunology. In practice. 2023; Bind 11, Nr. 7. s. 2133-2143.e8.

Hormonal contraceptives are associated with an increase in incidence of asthma in women.

Hansen, Erik Soeren Halvard; Aasbjerg, Kristian; Moeller, Amalie Lykkemark et al. I: The journal of allergy and clinical immunology. In practice. 2023 ; Bind 11, Nr. 8. s. 2484-2490.e3.

Beyond direct costs : individual and societal financial burden of asthma in young adults in a Danish nationwide study.

Håkansson, Kjell Erik Julius; Løkke, Anders; Ibsen, Rikke et al. I: BMJ Open Respiratory Research. 2023 ; Bind 10, Nr. 1.

Inhaled formoterol impairs aerobic exercise capacity in endurance-trained individual: a randomised controlled trial.

Jessen, Søren; Lemming, Anders; Backer, Vibeke et al I: ERJ Open Research. 2023 ; Bind 9, Nr. 2.

Prevalence and management of severe asthma in the Nordic countries: findings from the NORDSTAR cohort.

Hansen, Susanne; von Bülow, Anna; Sandin, Patrik et al. I: ERJ Open Research. 2023 ; Bind 9, Nr. 2.

EPOS/EUFOREA update on indication and evaluation of Biologics in Chronic Rhinosinusitis with Nasal Polyps 2023. F

okkens, W J ; Viskens, A-S ; Backer, V et al. I: Rhinology. 2023 ; Bind 61, Nr. 3. s. 194-202.

Asthma and Exercise-Induced Bronchoconstriction in Athletes : Diagnosis, treatment, and anti-doping challenges.

Hostrup, Morten; Hansen, Erik S; Rasmussen, Søren M et al. I: Scandinavian journal of medicine & science in sports. 2023.

Sex, anxiety and the interplay with physiological variables of stress : a clinical study of patients about to undergo bronchoscopy.

Jeppesen, Elisabeth; Backer, Vibeke; Jespersen, Kira Vibe et al. I: Psychology, health & medicine. 2023 ; Bind 28, Nr. 9. s. 2548-2561.



NOSE

Multidisciplinary approaches to identifying and managing global airways disease: Expert recommendations based on qualitative discussions.

Backer, Vibeke; Cardell, Lars Olaf; Lehtimäki, Lauri et al. I: *Frontiers in allergy*. 2023; Bind 4. s. 1052386

The Asthmas: A Precision Medicine Approach to Treatable Traits, Diagnosis and Management.

Backer, Vibeke; Gibson, Peter G; Pavord, Ian D. Routledge, 2023. 142 s.

Urine concentrations of vilanterol and its metabolites, GSK932009 and GW630200, after inhalation of therapeutic and supratherapeutic doses.

Østergaard, Martin; Jessen, Søren; Hansen, Erik Søren Halvard et al. I: *Drug Testing and Analysis*. 2023; Bind 15, Nr. 5. s. 516-528.

Automatic scoring of drug-induced sleep endoscopy for obstructive sleep apnea using deep learning.

Hanif, Umaer; Kiaer, Eva Kirkegaard; Capasso, Robson et al.. I: *Sleep Medicine*. 2023; Bind 102. s. 19-29.

Assay validation for vilanterol and its metabolites in human urine with application for doping control analysis.

Panchal, Tina; Baldwin, Sandra; Østergaard, Martin et al I: *Drug Testing and Analysis*. 2023; Bind 15, Nr. 5. s. 495-505.

Clinical Presentation and Outcome of Sinonasal Extrasosseous Plasmacytoma in Denmark : A Nationwide Cohort From 1980 to 2017.

Eriksen, Patrick René Gerhard; Khakbaz, Elham; Clasen-Linde, Erik et al. I: *Annals of Otolaryngology and Laryngology*. 2023; Bind 132, Nr. 10. s. 1186-1193.

An update on patient reported outcomes in type 2 inflammation airway disease.

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17. ACKNOWLEDGEMENT

The research from the ENT Department is primarily funded by external resources.

In cooperation with strong patient associations, foundations, and companies we proudly produce this substantial amount of clinical evidence.

- Advokat Annelise Skjoldager
- Alfred Benzon Fonden - Program for Klinisk Forskning
- A.P. Møller Fonden
- BetaHealth
- Candys Foundation
- Danish Life Science Cluster
- Den Grønlandske Fond
- GN Store Nord Fonden
- GN Hearing
- Helsefonden
- Ingeborg og Emmanuel Jensens Legat
- Innovationsfonden
- Interfond
- Karen Elise Jensens Fond
- Kurt Sørensen Fond
- Købmand Niels Erik Munk Pedersen Fonden
- Mauritzen La Fontaine Familiefond
- Nordforsk
- Novo Nordisk Fonden
- Nunafonden
- Olympus
- Undervisningskvalitetspuljen (KU)
- Velux foundation
- William Demant Fonden
- WS Audiology
- Aalborg University



Department of ENT, H&N and Audiology
Clinical and Research Report, 2023
© Department of ENT, H&N and Audiology,
Rigshospitalet, Denmark

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Department of ENT, H&N and Audiology

Printed in Denmark 2024



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Inge Lehmanns vej 8, 2100 Copenhagen East
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