DIGITAL VERSION

2021 REPORT

CLINICAL & RESEARCH

REGION H Rigshospitalet

ENT - H&N Surgery and Audiology

CONTENT

1. INTRODUCTION 5
2. ENT IN FOCUS 7
3. RESEARCH FOR OPTIMISED TREATMENT 8
4. EAR 10
   - 4.1 COCHLEAR IMPLANT 11
   - 4.2 PENDRED SYNDROM 11
   - 4.3 VESTIBULARIS SCHWANNOM 11
   - 4.5 OTO-PATHOLOGY 14
   - 4.6 SURGICAL SIMULATION 14
   - 4.7 DTU 16
5. NOSE 20
   - 5.1 CRONIC RHINOSINUSITIS AND GLOBAL AIRWAYS 21
   - 5.2 CYSTIC FIBROSIS AND PRIMARY CILIARY DYSKINESIA 22
   - 5.3 RHINOLOGICAL CANCER 22
6. DIAGNOSTIC AND PREVENTION OF COVID-19 24
   - 6.1 COVID-19 DIAGNOSIS 24
   - 6.2 COVID-19 AND RHINOLOGY 24
7. HEAD & NECK 26
   - 7.1 STEM CELL RESEARCH 27
   - 7.2 LIQUID BIOPSY 27
   - 7.3 IMAGE GUIDED CANCER SURGERY 27
   - 7.4 TORS - QOLATI 28
   - 7.5 CANCER DATABASE 28
   - 7.6 ULTRASOUND 29
   - 7.7 NURSING PALLIATION 30
8. EDUCATION 32
9. PUBLICATIONS 2021 34
10. ACKNOWLEDGEMENT 42

Summer celebration in HOC - let's play football, and win!

1. INTRODUCTION

This is the first Clinical & Research annual report from the Department of Oto-rhino-laryngology, Head and Neck Surgery and Audiology ("ENT") at Rigshospitalet. We have had aspirations to create such a report for years, though delayed, partly due to moving to new facilities at Nordfløjen, which also included a merge of our older facilities at Rigshospitalet and Gentofte, but foremost due to the increased workload caused by the COVID-19 pandemic. Consequently, we are above and beyond pleased to share our research year of 2021 with you.

The ENT speciality is a clinical field that most Danes are in contact with during their lifetime. In 2021 we experienced a pandemic that influenced our field enormously. Many unknown side effects were identified during a most unusual time for us all. It is most likely not an overstatement that the entire nation had some focus on ENT during 2021.

The clinical team handled all challenges in an exceptional way. Between the merger of three clinics into two, we produced 50% of Denmarks ENT research while navigating through the everyday disruptions and the increased workload due to the pandemic. More so, our department received the highest score in our annual patient's satisfaction poll – LUP – making us glow with pride, since the patients are the driving force in everything we do.

We would like to take this opportunity to thank all our staff for achieving exceptional results the past year and a speciel thanks to our team leaders (Cecilia Fernandez Samar, Jesper B. Yde, Birgitte Charabi, Thomas Hjuler, Mai-Britt Gram, Line Springborg, Lone Toft-Nielsen, Susan D. Jacobsen, Mads Georg Stage, Irene Wessel, Niclas Rubek, Michael Bille, Charlotte D. Hansen and many more) for sublime staff and unit management in a difficult time.

With impressive 128 peer-reviewed research publications, we would also like to thank our research leaders and professors Christian von Buchwald, Mads Sølvsten Sørensen, Per Cayé-Thomasen, Vibeke Backer and Torsten Dau, and their splendid senior researcher staff (Abigail Anne Kressner, Lone Percy-Smith, Annalise Mortensen, Tobias Todsen, Christian Grønhøj, Anders Christensen, Jacob Rasmussen, Steven Andersen, Kathrine Kronberg Jakobsen, and many more). Also organizing 400 medical students, 70 nurse students and other pre-graduates and post-graduates many thanks to Christian Buchwald, Jacob Melchiors, Anne Frandsen and Cathrine Tackmann Eiby. Thanks to our many peers across the hospitals, the nation and abroad, but foremost the entire team for their endlessly curiosity and need for knowledge that pushes our research forward.

A special thanks to the team (Rikke Schriver Nielsen, Abigail Anne Kressner and Louie Rogalla) who took the initiative and brought everything together in a presentable report.

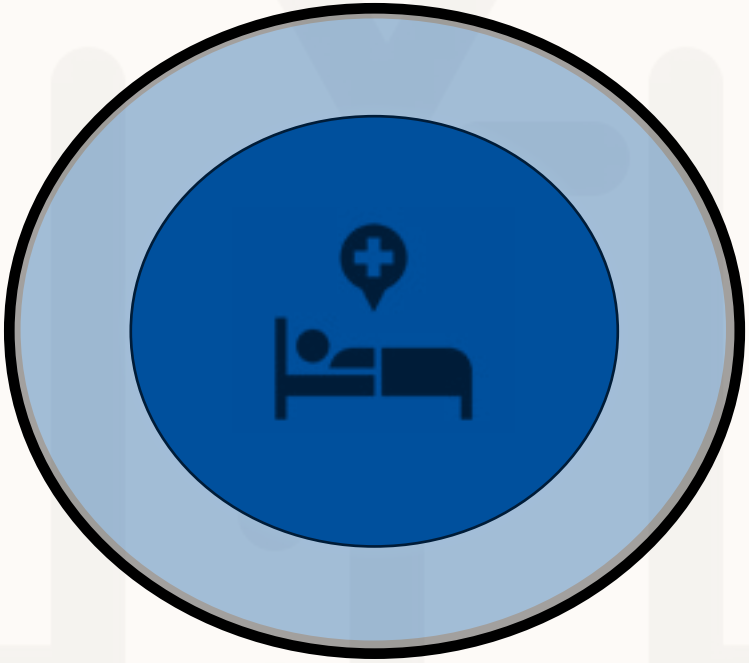
In awe and gratitude,
Tine Bloch and Mads Klokker
Directors, ENT Department


Øre-, Næse- og Halskirurgi
Klinik

2. ENT IN FOCUS

EAR

- Ear diseases
- Hearing disorders
- Vestibular disorder
- Audiological rehabilitation
- Oto-pathology laboratory



EDUCATION

- Evidence based education
- Hands-on traning
- Virtual Reality training

NOSE

- Airway management
- Sinus disorders
- Global Airways
- Smelling rehabilitaion

THROAT

- Head & Neck disorders
- Cancer
- Guided robotic optic surgery
- Ultrasound diagnostics
- Stemcell research
- Palliative rehabilitation

3. RESEARCH FOR OPTIMISED TREATMENT

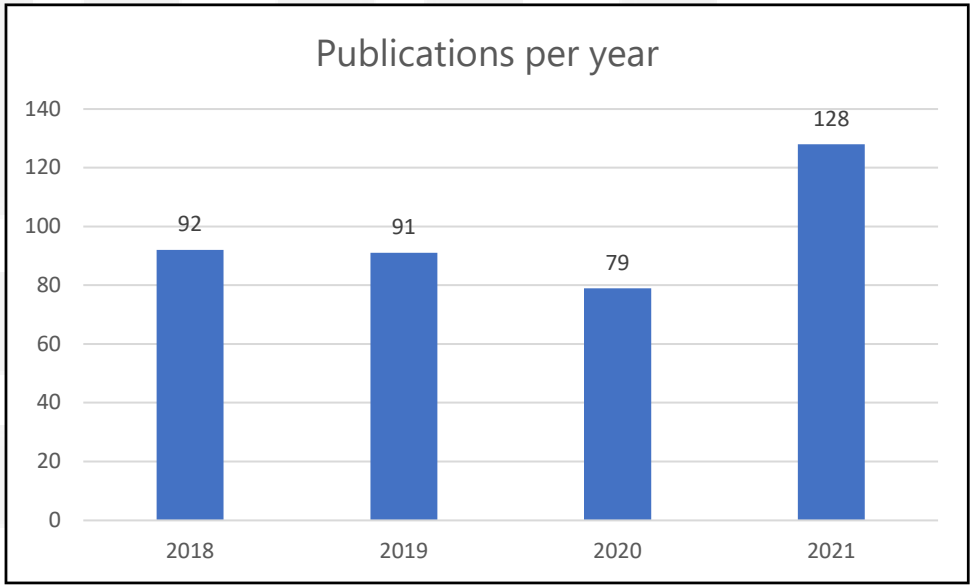
The ear-nose-throat research at Rigshospitalet is broad, and encompass clinical fields such as audiology, language pathology, vestibular disorders, chronic rhinosinusitis and global airways, cystic fibrosis, and Primary Ciliary Dyskinesia (PCD), cancer, sleeping disorder, and COVID-19 treatment and side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

Our clinical field has an impact on all ages of our population, which takes us in many research directions. In 2021 we saw some significant breakthroughs in the fields of Smelling rehabilitation post-COVID-19, global airway management, usage of ultrasound in Head & Neck for cancer, inner ear bone pathology, and the long-term effects on speech intelligibility in children with Cochlear Implants (CI).

"No man is an island" and an interdisciplinary research approach creates increased value and output. The collaboration across departments at Rigshospitalet is evident in our research results for 2021. Additionally, we have strengthened our cooperation with educational institutions domestically and abroad but also made partnerships with the industry. We are proud that DTU has a permanent resident at our Department, aiding us in our basic audiology research.

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

The research future within ENT at Righospitalet holds a ramp up towards the use of image and data AI. We offer almost all clinical ENT treatments thus the variety is broad, yet some patient groups are minute. The usage of Big Data should be able to assist us and hopefully others. This is new grounds, but we vigorously take on this endeavor also to not to be surpassed by the future.



The publication trend in our department is positive, with the team's everlasting curiosity and interest. In a normalised reopened world we expect that our partnerships and collaborations will further strengthen this development.

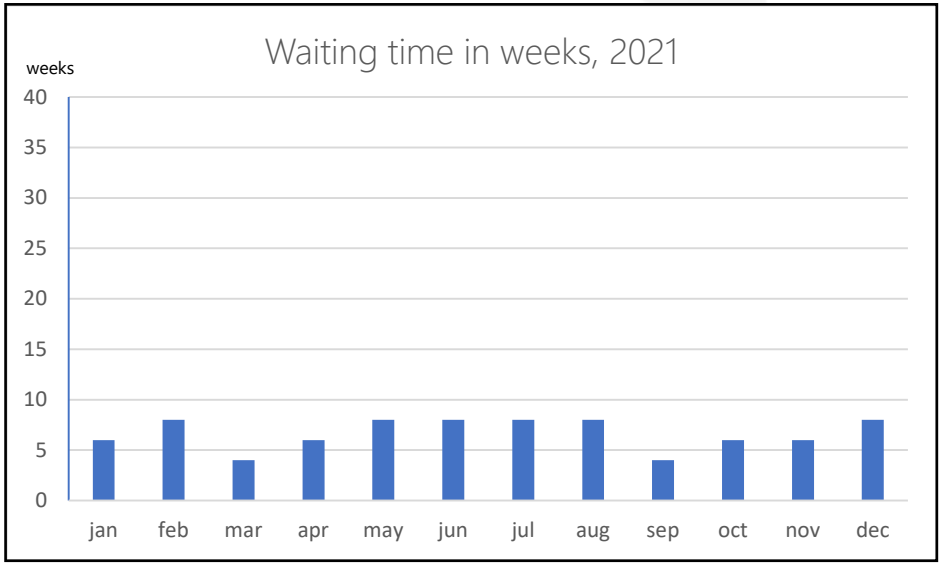
Mads Klokker
Head of Dept., MD, Assoc. Prof., Lt Col

4. EAR

Otology at the Department is combined by oto-surgery, audiology, vestibular dizziness including physiotherapy and mental rehabilitation, oto-pathology, oto-surgery simulation, and aeronautical otology. The Department has a long tradition for high-end research in the field of otology leading to the innovative inventions e.g., tympanometry, postnatal audiological screening using oto-acoustics emissions, clarification of physiology and diseases in the temporal bone and many more. Though, these interdisciplinary audiological research projects partly has led to the fact that Danish hearing med-tech industries today are world leading.

Copenhagen Hearing and Balance Centre

In a private public partnership, we opened the doors to the Copenhagen Hearing and Balance Centre (CHBC) late in 2020 with the support of the Region and the Demant foundation. Due to the Covid-19 pandemic, we had a postponed initiation of specific CHBC-funded PhD projects. CHBC is a subcenter to the ENT Department and includes multiple specialists within clinical and research activities, and in 2021 the Center got certificated as BAT CAG (Brain and Technology Clinical Academic Group) in collaboration with others. This enabled us to offer a holistic treatment to our patients, bringing surgery and rehabilitation into the same building. We surgically restore hearing and provide the important speech and language training. To hear is often a precondition for a successful education and social and cognitive development in society. Danish researchers are very active in the field of sound, and Rigshospitalet partakes in many studies together with DTU, Aalborg University and private partners such as hearing aid and implant companies. Last but not least we also have a very strong alliance with patient organizations



In In the year 2021 the Department managed to fulfill political and patient organization's demand of 6 weeks waiting time for renewing hearing aids while most other clinics had considerable longer waiting time. In addition, the staff at the audiological outpost at Bispebjerg Hospital voluntary helped another extra 800 patients from the area of ENT Department of Hillerød without influences our 6 weeks goal. This achievement has only possible due to impressive engagement among the staff in the new fast track setup.

4.1 COCHLEAR IMPLANT

It is now well-documented, through work at CHBC and elsewhere, that improvements in assessment, operative treatment and postoperative, targeted language training have meant that hearing-impaired children in the vast majority of cases can achieve age-appropriate—or even in some cases above average—language development when compared to normally hearing children.
With cochlear implantation, there is a certain risk of reduced or completely abolished balance function after the operative opening of the inner ear. Based on the latest studies of vestibular function before and after cochlear implantation, it has become clear that objective examination of the balance function before surgery can be crucial for the consideration of implantation, and in particular, for the choice of implantation ear, to ensure that patients maintain their balance function postoperatively.

4.2 PENDRED SYNDROM

Pendred syndrome causes abnormal development of the inner ear, which for patients leads to hearing loss and altered balance function. The latter has now been documented using the latest high-tech equipment in the CHBC, making it clear that the balancing function has increased sensitivity to external stimuli but retained capacity during rapid head movements
Lack of bone cover over a part of the balance system can cause, among other things, severe sound hypersensitivity and challenges with balance. This condition is called "superior canal dehiscence syndrome". A PhD thesis on this is underway in CHBC and has been initiated with a state-of-the-art review.

4.3 VESTIBULARIS SCHWANNOM

CHBC has the world's largest database of patients diagnosed with a tumor on the auditory balance nerve (vestibularis schwannom). Data from across the country have been collected prospectively for over 40 years, and the natural progression of tumor growth has now been mapped on the basis of several thousand patients. The results, which were recently published in the acclaimed journal Neuro Oncology, suggest that only a fraction (20-40%) of the tumors show growth after diagnosis. These findings on the progression of tumor growth were further confirmed in an international, multicenter collaboration with the Mayo Clinic (Minnesota, United States).

Furthermore, it has been shown for the first time that the risk of further tumor growth once growth has taken place is significantly greater than previously thought, with 70-80% of the tumors growing further, which highlights the importance of early intervention once growth has taken place.

A vestibular schwannoma may be located exclusively in the inner ear (i.e., in the cochlea and/or balance organ), which is known specifically as a intralabyrinthian schwannoma. Patients with such tumors are typically deaf and suffer from severe tinnitus and impaired balance function on that side. The treatment has so far been primarily conservative, but now in an international collaboration between CHBC and the University of Halle (Germany), it has been shown that surgical removal of the tumor and simultaneous cochlear implantation in most cases results in surprisingly good hearing and reduction of tinnitus. Moreover, it has even been shown that the balance function on the ear in question can in some cases be maintained, even after surgical opening and subsequent tumor removal from the cochlear.

4. EAR

4.4 VESTIBULOGY

The vestibular part of CHBC includes pilot assessments in aviation medicine, pre-operative evaluation of patients with vestibular schwannoma and cochlear implant candidates in addition to a major part of patients with single symptom dizziness. The Department has for several years been privileged with comprehensive vestibular equipment and was the first European clinic with an Epley OMNIAX repositioning chair for diagnosis and treatment of benign paroxysmal positional vertigo (BPPV).

Being a beta-test site for the Danish med-tech industry, a TRV repositioning chair was later added. Several research projects have been made and are continually ongoing within this field, partly in collaboration with Danish med-tech industry. The BPPV projects include objective and subjective assessment of chair repositioning and the use of AI in an effort to improve diagnostic sensitivity and specificity.

Furthermore, CHBC have focus on other vestibular topics (Ménière disease, superior canal dehiscence syndrome, disequilibrium in vestibulopathies etc.). Additionally, we continuously partake in educational courses on vestibular disorders with an interdisciplinary qualitative psycho-social approach with the aim of giving guidance to a diversified group of healthcare professionals across Denmark.


Sygeplejerske

4. EAR

4.5 OTO-PATHOLOGY

The Oto-pathology Laboratory at the CHBC established 1955 takes a special interest in the capsular bone tissue protecting the inner ear and its major disease – otosclerosis. Since 1988 we extended the collection of celloidin embedded decalcified temporal bones with a similar library of un-decalcified and bulk-stained human temporal bones for studies of tissue remodeling and degeneration of the cellular signaling network. A large sequence of studies with a wide variety of methods revealed a unique inner ear mechanism in control of local bone behavior and gave rise to the osteo-dynamic concept of otosclerosis. This concept is the first to embrace all the clinical, histological and genetic characteristics of otosclerosis, to identify local OPG signaling as a natural protection against sensorineural hearing loss by remodeling, and to recognize otosclerosis as the price some of us pay for OPG protection of the ear. Present activities focus on VR probabilistic modeling of human inner ear bone cell apoptosis, and on temporal bone studies of inner ear signaling with RNA- and immune labeling techniques.

Lars Juul Hansen MD defended the PhD thesis "Cellular Patterns and Irregularities in Human Perilabyrinthine Bone" at the University of Copenhagen, 8/10/21.
Lars studied the amount and distribution of degenerating bone matrix and cells and found characteristic irregularities with occasional formation of cellular voids, in which all bone cells are dead and the signaling network is defunct. A coincidence of voids and otosclerosis was documented in the distributional patterns and in every individual focus of disease in support of the osteo-dynamic concept"

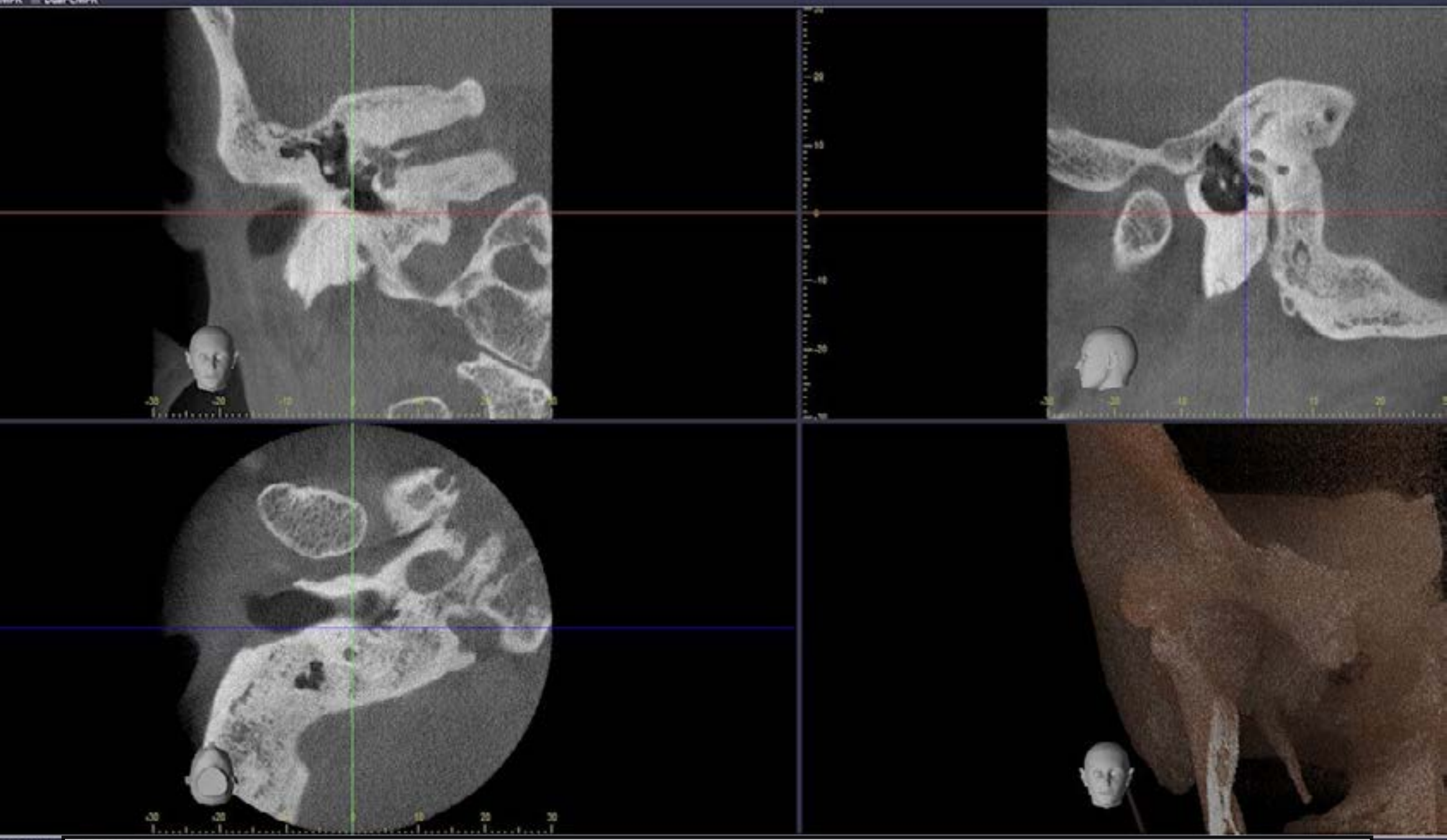
4.6 SURGICAL SIMULATION

Since 2009 the Visible Ear Simulator VES offers high fidelity virtual surgery simulation to trainees in ear surgery at any skills level. Users around the world can install the VES academic freeware on their own gaming type PC and enjoy realistic drilling of a selection of temporal bone anatomies and surgeries with force feedback from a Geomagic Touch® haptic device. The VES team at CHBC cooperate with computer scientist at the Alexandra Institute, Aarhus to constantly develop simulator functions and learning strategies to increase the training benefits of the VES. The present activities focus on distributed and directed self-regulated learning, automatic rating, metric based certification, and user motivation by gamification.

In 2021 Martin Frendø MD defended his PhD thesis "Virtual Reality simulation-based training of cochlear implant surgery: perspectives of performance, assessment, and transfer". Martin developed and validated a Cochlear Implant Surgery Assessment Tool (CISAT) to study the benefit of simulation training of CI procedures. The project data on skills acquisition and transfer instructed important changes in the VES simulator haptics and user interface, and in training schedule recommendations for CI surgery.

Daniel Sieber MSc, Diplom Engineer completed his PhD Thesis "Modeling of the human temporal bone for virtual reality surgical training" at the Mediziniche Hochschule Hannover 2021 and developed new virtual anatomies from cone beam CT, published all data as medical freeware in Nature Scientific Data and validated the files in the Visible Ear Simulator. The addition of new high fidelity VR scenarios to the VES is of great benefit for all users and moreover, a valuable resource for researchers in 3D modeling of the ear, surgical training, navigation, and robotics.

Ongoing PhD-research (Andreas Frithioff) supported by DTU took a giant step for 3D printing of patient specific temporal bones in affordable materials available for plug-and-play manufacturing by the user and well suited for surgical preparation and training.



The use of a cone beam scanner is the newest modality in visualization of the detailed ear structures. Research projects are in progress for the purpose of achieving per operative augmented reality view of the scan in the surgeon's microscope.

4. EAR

4.7 DTU

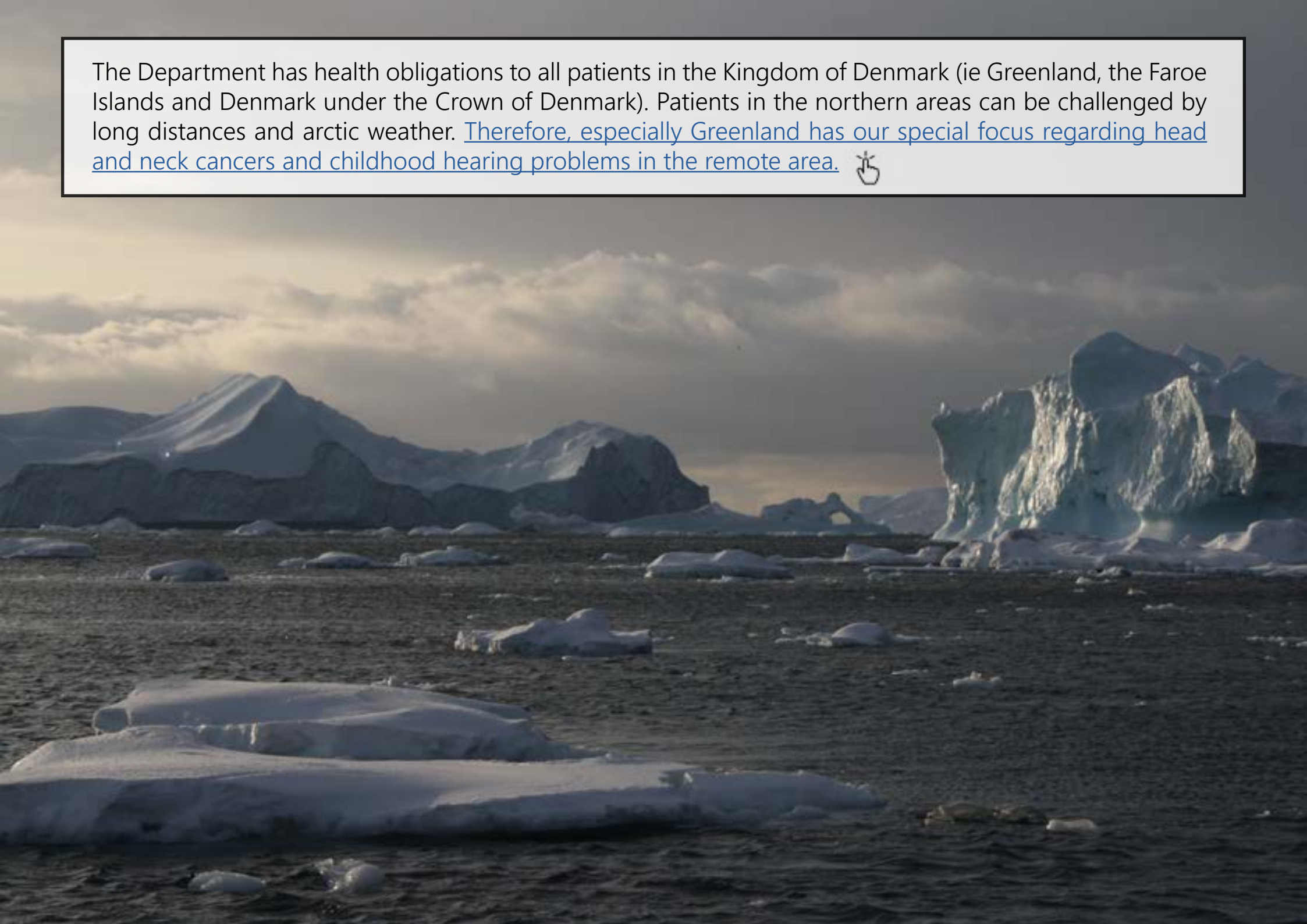
One of the core elements of the CHBC is the close collaboration between the clinicians at the ENT Department at Rigshospitalet and the engineers at DTU Health Tech. This collaboration is facilitated by a DTU research unit within CHBC that consists of jointly employed faculty and researchers together in our brand new and state-of-the-art research facilities.

In 2021, we established our research facilities at CHBC consisting of a fully equipped sound booth and a clinically oriented spatial hearing lab. The setup enables the recording of peripheral, subcortical and cortical processes using (non-invasive) electrocochleography (ECochG), electroencephalography (EEG), and functional near-infrared spectroscopy (fNIRS) as well as various behavioral measures of auditory function to characterize the consequences of individual hearing loss ('auditory profiling'). One particular focus area was the study of neural correlates of cochlear synaptopathy using frequency following responses (FFR) obtained with ECochG using tympanic membrane electrodes. We demonstrated that age-related neural degeneration was already reflected by a reduced auditory nerve neurophonic response, which in turn causes a reduced auditory brainstem response. The results challenge the 'central desynchronization' hypothesis that argues that the brainstem is the source of the reduced FFR in older listeners.

Our spatial hearing lab contains a loudspeaker array consisting of 41 individual loudspeakers that have been embedded within the walls and ceiling of an otherwise ordinary clinical room that has been acoustically enhanced. The lab enables us to design, develop, and test novel ways of bringing realism and ecological validity to the clinic. We anticipate this lab will help us revolutionize spatial hearing and listener behavior diagnostics, and accelerate the optimization of fitting procedures for hearing aid and cochlear implants, while catalyzing rehabilitation that is more transferrable to daily life.

Another focus area at CHBC has been the development of a new, large-scale corpus of Danish speech material, in collaboration with our partners from the hearing aid industry. Many research and development projects in the fields of speech and hearing sciences rely heavily on speech corpuses. For example, in the evaluation of new algorithms in hearing aids and cochlear implants, like dynamic range compression and noise reduction, a large number of sentences is required to test the efficiency of, e.g., different noise types or different amounts of reverberation on speech intelligibility and to investigate the test/re-test reliability and generalizability of the results.

The Department has health obligations to all patients in the Kingdom of Denmark (ie Greenland, the Faroe Islands and Denmark under the Crown of Denmark). Patients in the northern areas can be challenged by long distances and arctic weather. Therefore, especially Greenland has our special focus regarding head and neck cancers and childhood hearing problems in the remote area.



4. EAR

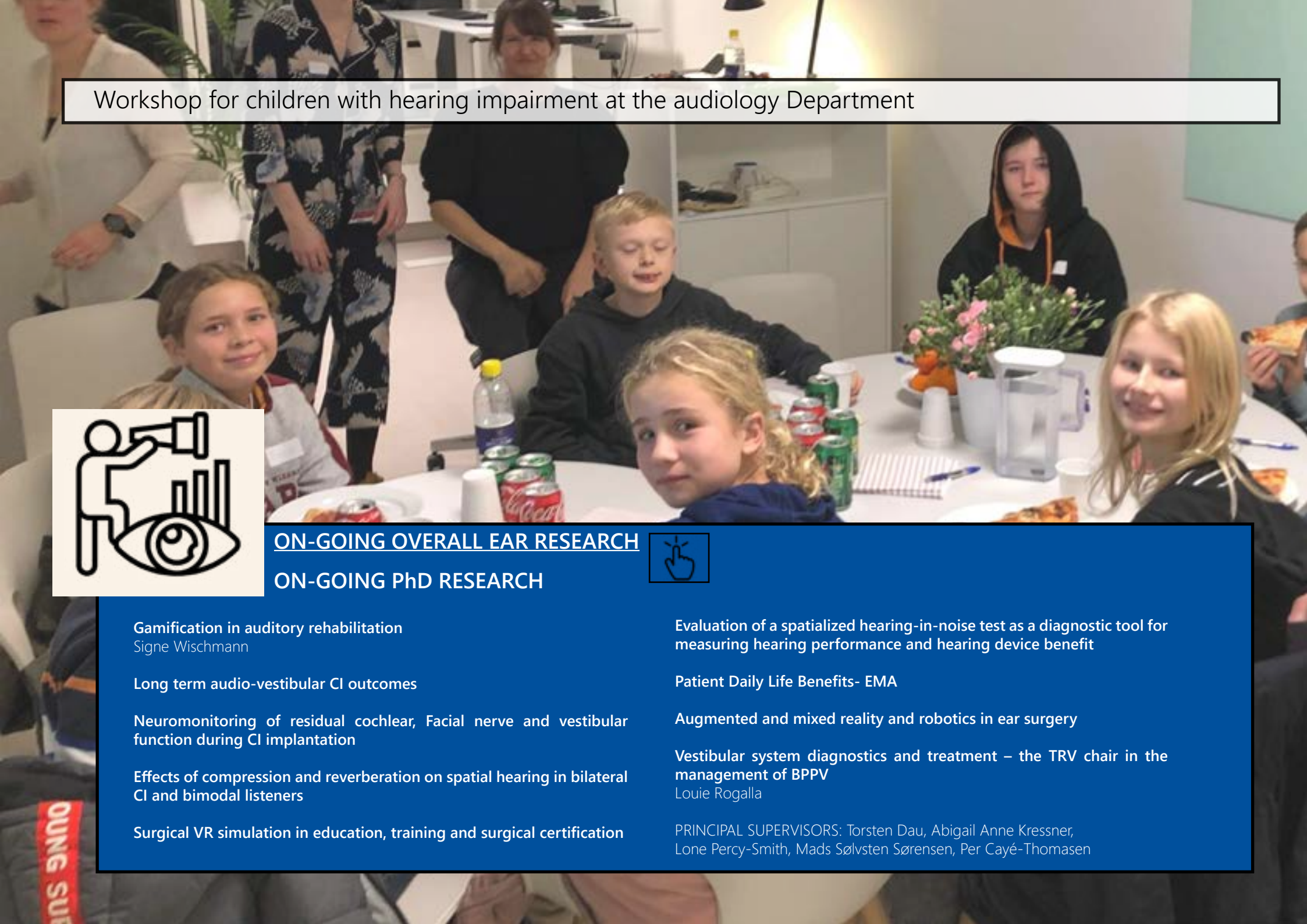
4.8 AUDIOLOGY

Throughout the past 25 years the Department has carried out studies on paediatric populations with hearing loss, which have documented new opportunities in treatment making language development and social well-being comparable to peers with normal hearing. These new opportunities for children are based on the introduction of neonatal hearing screening, advances in medical-surgical and technical interventions combined with specific auditory and verbal training at CHBC.

In 2021 a large partnership project, IHEAR, involving CHBC, the patient organisation Decibel, the hearing aid manufacturer Oticon AS, and Aarhus University hospital documented that children with Hearing Loss (HL) with early technical and educational intervention can attend regular schools and follow educational paths according to each child's individual potential. Children with HL now have the opportunity to become equal members of their local hearing community. This study involved children using both hearing aids and cochlear implants. Furthermore, children showed levels of speech discrimination in noise, which has never previously been documented.

In addition, the CHBC also conducted studies on children with HL and additional disabilities. In a longitudinal study design, it was documented that these children could acquire a language understanding within normal range though at a slower rate compared to children with HL without additional disability. The mission of this four-year study was "no child with HL left behind" and mission was accomplished. At CHBC we now regard children with HL receiving early intervention as belonging to a new paediatric generation with HL and we argue that history has been re-written for children with HL.

A new study, LYT IGEN "Listen Again", investigates how to train spatial awareness in a playful and engaging way for children with HL. CHBC has the lead in this study and partners with multisensory experience lab at Aalborg University and the patient organisation Decibel. In a participatory design involving stakeholders and end-users (children with HL and their families, as well as local speech and language therapists) an application with aspects of gamification was developed to train spatial awareness by use of virtual reality at home. Evaluation of the effect of using the application involves observation in schools before and after training, focus group meetings with the children and on-line questionnaires on social well-being aspects. The study derives data about everyday life for the new generation of children with HL, as it documents the true needs of the children by involving them from start to finish.



Workshop for children with hearing impairment at the audiology Department

ON-GOING OVERALL EAR RESEARCH

ON-GOING PhD RESEARCH

Gamification in auditory rehabilitation
Signe Wischmann

Long term audio-vestibular CI outcomes

Neuromonitoring of residual cochlear, Facial nerve and vestibular function during CI implantation

Effects of compression and reverberation on spatial hearing in bilateral CI and bimodal listeners

Surgical VR simulation in education, training and surgical certification

Evaluation of a spatialized hearing-in-noise test as a diagnostic tool for measuring hearing performance and hearing device benefit

Patient Daily Life Benefits- EMA

Augmented and mixed reality and robotics in ear surgery

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

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

5. NOSE

The year 2021 was a game changer for rhinology. Development was expected on many fields such as COVID-19, Chronic rhinosinusitis (CRS) and the concept of global airways adding lung and allergy testing focusing on treatment of eosinophilic disease. Based on the newly introduced modulators we also reinforced our engagement in Cystic Fibrosis and Primary Ciliary Dyskinesia. Within sleep medicine DISE (Drug Induced Sleep Endoscopy) with related surgery have now become standard.

Furthermore, we have had large impact on the national collaboration with the other university departments in Denmark concerning the future treatment of patients with CRS also comprising polyps, as well as large impact on the International collaboration in both EPOS2020 and EUFOREA, both of which is international expert groups within the upper airways, as well as upper and lower airways.

The Department has an interdisciplinary environment (ENT and pulmonologist consultants, nurses etc.) where specialist nurses hand out standard questionnaires for both upper and lower airways and perform spirometry with forced expiratory volume in first sec (FEV1), forced vital capacity (FVC) and measurement of airway forced expiratory nitric oxide (FeNO).

The Department has developed a Global Airway concept based on many years of collaboration between ENT and pulmonology, where patients suffering of both potential upper and lower airway illness will meet a rhinologist and a pulmonologist in our outpatient clinic. We work for systematic assessment of the entire airway, with the aim of treatment of both upper and lower airways. This concept has been developed based on holistic ideas, where the whole patients is taken into of the focus when they are assessed. This has finalist in developing a screening tool for asthma, CRS and allergic rhinitis (the STARR-15 questionnaire).

5.1 CRONIC RHINOSINUSITIS AND GLOBAL AIRWAYS

Another previously under-recognized disease often leading to a significant disease burden with nasal blockage, nasal discharge, facial pain or pressure and loss of smell, is chronic rhinosinusitis with nasal polyps (CRSwNP). The Department has made substantial contributions to a better understanding of this disease as a "Global Airways" phenomenon. This research has contributed to show that CRSwNP is the result of inflammation of the entire airway system, and not only the nose and sinuses.

Research from the Department has shown that more than half of patients referred to hospital for polyp surgery had asthma, a quarter of them without knowing it, and similarly, nearly a quarter of patients with Chronic Obstructive Pulmonary Disease were shown to have CRSwNP, most of them without knowing it. For this reason, the Department has started one of the world's first "Global Airways" outpatient clinics, attended by both pulmonologists and rhinologists working together to ensure world class treatment of all aspects of global airway disease in order to ensure systematic assessment on international level of both upper and lower airways. The Department is Chair of Nordic and European boards and has developed a Nationwide quality control database to ensure national equal accesses to treatment.

Furthermore, evaluation of adherence to local treatment of CRSwNP has never been studied systematically, which is even more important in patients with global airway disease using treatment one, two or three times daily. A nursing PhD fellowship is planned on the patient perspective of having Chronic Rhinosinusitis (CRS) treated many years with local and systemic steroid. In addition, the Department is in the process of initiating several research PhD projects with the aim of investigating the effects of biologic treatment improving the assessment of Which patients will benefit from biologic treatment by looking at patient-specific levels of biologic markers of inflammation.

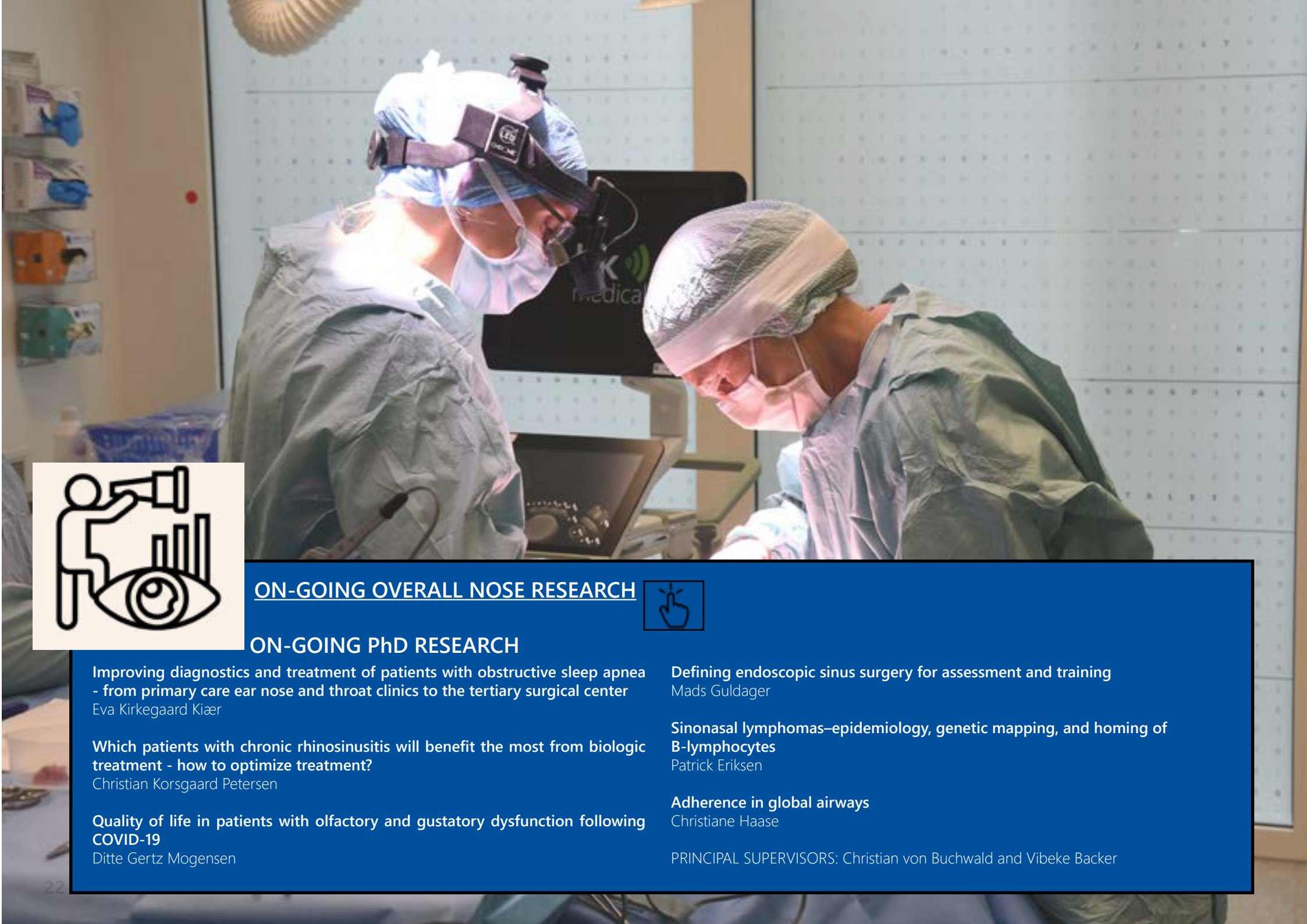
5. NOSE

5.2 CYSTIC FIBROSIS AND PRIMARY CILIARY DYSKINESIA

The Department has over several years offered a highly specialized outpatient clinic for patients suffering from the rare genetic diseases Cystic Fibrosis and Primary Ciliary Dyskenesia in close collaboration with the microbiologists and the pediatricians in attempt to relieve patient symptoms and infection from the airways. Though the new modulators significantly have improved these patients' quality of life, the patients still have upper airway symptoms and the patients still need to benefit from the multidisciplinary collaboration taking place at Rigshospitalet. In 2021, we have published an article The Department continuously researches in helping these patients with focus on eradicating bacteria using autologous fibrin with antibiotics, with promising results of PhDs from the Department.

5.3 RHINOLOGICAL CANCER

In recent years, the Department's focus in rhinology cancers has been on hemato-lymphoid tumors and their interaction with other extranodal hematological disorders. As the first in the world, published on B-cell lymphomas in the nasal cavity and paranasal sinuses, we have mapped the disease's relapse/dissemination pattern and treatment prognosis and linking this to CNS and dermatological hemato-lymphoid diseases. In addition to B-cell lymphoma, the focus has been on the rare Epstein-Barr-associated extra-nodal NK/T-cell lymphoma (nasal type), which is prototypically found in the nasal cavity and paranasal sinuses and has a dismal prognosis. As the incidence in Europe is low, we were the first to describe the demographics and prognosis in a European population. In addition, the Department is in the process of studying plasma cell neoplasms in the nasal cavity and paranasal sinuses and the conversion rate to plasma cell myeloma. We have established a collaboration with the Universities of Amsterdam and Leiden, working on genetic sub-classification of rhinological lymphomas.



ON-GOING OVERALL NOSE RESEARCH

ON-GOING PhD RESEARCH

Improving diagnostics and treatment of patients with obstructive sleep apnea - from primary care ear nose and throat clinics to the tertiary surgical center
Eva Kirkegaard Kiær

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

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

Defining endoscopic sinus surgery for assessment and training
Mads Guldager

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

Adherence in global airways
Christiane Haase

PRINCIPAL SUPERVISORS: Christian von Buchwald and Vibeke Backer

6. DIAGNOSTIC AND PREVENTION OF COVID-19

The SARS-CoV-2 virus pandemic caused a sudden and colossal global interest in symptoms, diagnostic, prevention, vaccination and treatment. The Department were exceptionally active in several of these topics. Furthermore, research in particularly diagnostic tools were in focus in the Department in addition to nasal symptoms.

A major part of the staff on Rigshospitalet got their COVID-19 vaccination by ENT team.

6.1 COVID-19 DIAGNOSIS

Testing is essential for controlling and limiting the spread of COVID-19, and billions of tests have been performed during the pandemic. Proper upper respiratory specimen collection is the most crucial step in the initial diagnosis of COVID-19 and a suboptimal collected specimen may lead to false or inconclusive test results. The Department has therefore worked together with the World Health Organization (WHO) in developing guidelines for upper respiratory specimen collection. Further the department have been leading in clinical research to explore optimal techniques for upper respiratory specimen collection and validation of rapid antigen testing as well self-sample swabs and saliva specimens. The department received 5.7 million funding from Novo Nordisk Foundation to conduct research within diagnostic work-up of SARS-CoV-2 infection in public setting.

We made studies on different testing techniques incl a large experiment with 28,000 participants, using saliva. This was discussed in the national Danish News broadcast "21 Søndag"

6.2 COVID-19 AND RHINOLOGY

The SARS-CoV-2 virus pandemic brought with it a sudden and colossal global interest for nasal symptoms, especially loss of smell (LoS), but also distortions of smell. LoS is a dominant symptom of COVID-19 affecting the majority of patients - both young and old. In some cases, the LoS is long-lasting, indicating a post-COVID-19 condition, resulting in significant negative effects on quality of life due to inability to enjoy different tastes/inability to detect spoiled food, smoke or gas leaks/fear of smelling unpleasantly etc. The increased focus on LoS has led to the opening of an entire new unit dedicated to smell and taste disorders with highly specialized diagnostics, rehabilitation and lively research activity. Upcoming nursing PhD project is planned.

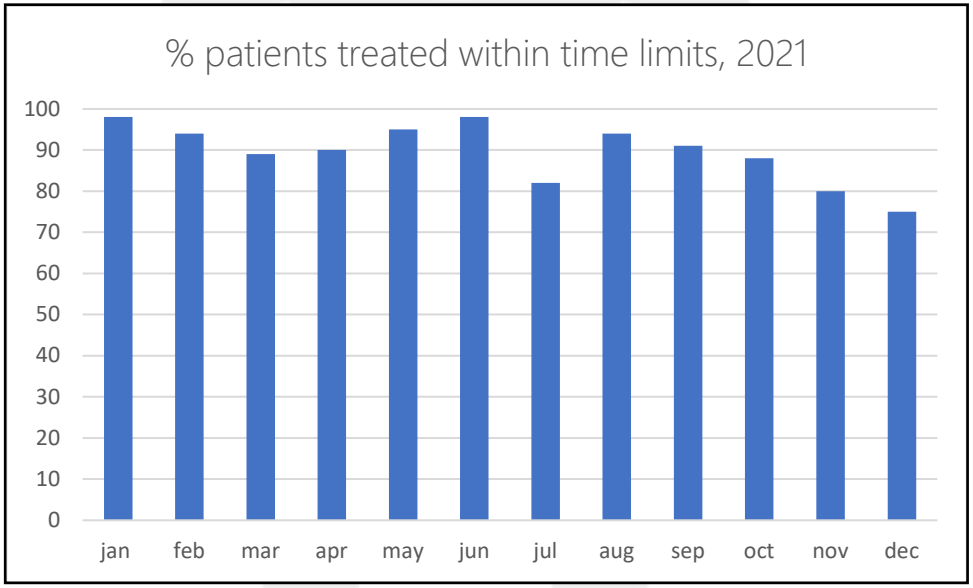
7. HEAD & NECK

Yearly the Department evaluate 2000-2500 patients suspected of head and neck cancer referred from outpatient services and hospitals in the eastern part of Denmark. The referred patients are evaluated in parallel organized fast tracks, which includes scans, frozen sections for pathology, HPV-classification on fine needle material, dental and ENT examinations etc. All cancer patients are evaluated at a multidisciplinary conference with attendance of the patient in person in order to ensure optimal cancer treatment (may it be conventional or robotic cancer surgery, chemotherapy, electro chemo-therapy, immune-therapy, irradiation or palliative treatment).

In 2021 the Department performed surgical treatment of head and neck cancer on 843 patients. Eighty three percent of these patients underwent surgical treatment within the time limit of 28 days from the initial referral. For patients who are locally referred, and both diagnosed and treated in the Department, the percentage of patients treated within the time limit was even higher in periods of 2021.

The Department has initiated a brand-new comprehensive head and neck cancer center ("Østdansk Center for Hoved- Halskræft") including all departments in Region Hovedstaden and Zealand active in diagnostic, treatment and rehabilitation of head and neck cancer. The center was funded late summer 2021 and the intention with the Center is to research in better, more effective, and safer cancer treatment.

For patients local referred and both diagnosed and treated by surgery in the Department, the score is in periods of 2021 even better



7.1 STEM CELL RESEARCH

We have currently initiated a phase II randomized-controlled trial investigating the efficacy and safety of mesenchymal stem cells injected into the salivary glands as a possible treatment for hyposalivation and xerostomia. We expect to include 120 patients and have included 90 patients so far. Within the next year, we will initiate a randomized-controlled trial investigating the safety and efficacy of repeated treatments with stem cells on radiation-induced salivary gland hypofunction and xerostomia.

7.2 LIQUID BIOPSY

We are investigating the potential of detecting head and neck cancers with a blood test. We have initiated a prospective, observational study investigating circulating tumor DNA (ctDNA) and HPV DNA in blood samples from head and neck cancer patients with references to healthy controls. The aim is to use it as a diagnostic tool to diagnose recurrence of head and neck cancer. We have currently collected blood samples on approximately 1800 patients referred to our department on suspicion of head and neck cancer. Of these approximately 600 patients have been diagnosed with head and neck cancer. We are planning to initiate a study investigating the correlation between ctDNA and PET/CT before and after treatment.

7.3 IMAGE GUIDED CANCER SURGERY

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

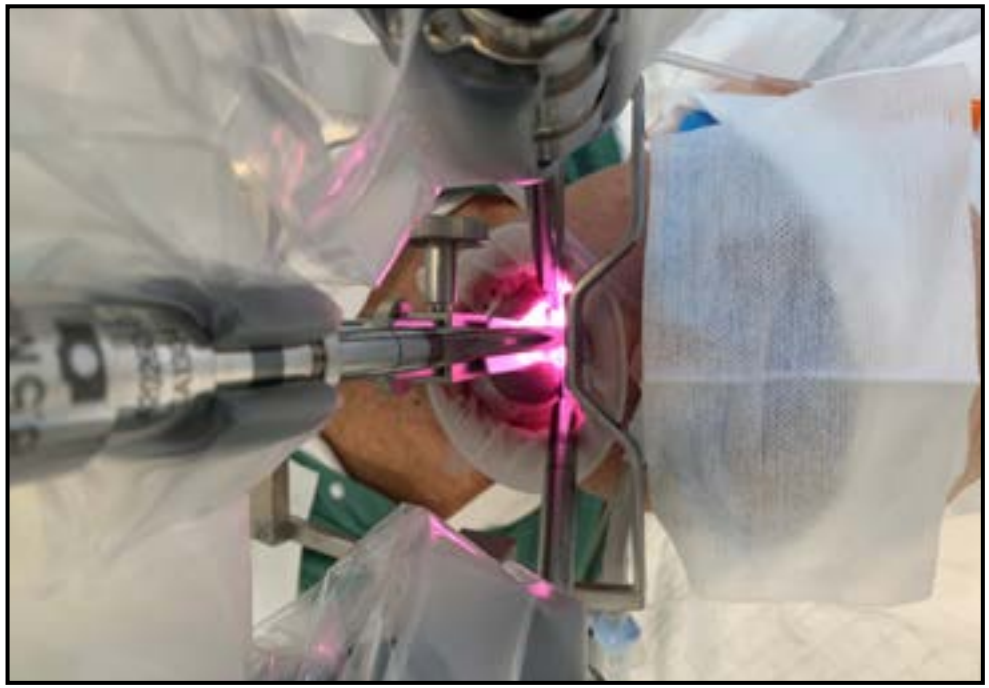
In collaboration with the Department of Clinical Physiology, Nuclear Medicine & PET and Cluster for Molecular Imaging at KU, our Department has since 2013 engaged in the development and clinical translation of optical imaging agents. In 2021, research collaboration with DTU, the Department of Chemistry at KU and Region Zealand was commenced and earned the status as Clinical Academic Group (GAG – Imaging Guided Cancer Surgery) within Greater Copenhagen Health Science Partners (GCHSP).

Recently, the use of an optical imaging agent to detect lymph nodes in oral cancer surgery has been clinically implemented. Next is specific cancer targeted optically guided oral cancer surgery based on uPAR, an imaging agent that specifically lights up the cancer during surgery, which is scheduled for clinical testing in head and neck cancer in 2022. This is the first surgical CAG (Imaging-Guided Surgery - IGCS).

7. HEAD & NECK

7.4 TORS - QoLaTi

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



7.5 CANCER DATABASE

We have established large comprehensive databases of patients with oral cavity cancer or oropharyngeal cancer to enable surveillance and research of the diseases.

The databases include all patients diagnosed with and/or treated for an oral cavity cancer (the COrCa database) or an oropharyngeal cancer (the COHOC database) at Rigshospitalet, University of Copenhagen from 2000 to 2020. The databases are continually being updated. The databases will provide data for numerous retrospective studies and expand our knowledge of this patient group thus hopefully improving the understanding, survival, and treatment.
We are collaborating with several international institutions here amongst MD Anderson, Texas, to validate a predictive-mutational signature in OPSCC patients. Moreover, we have pooled data with other large institutions from e.g. Germany, UK, Sweden, Spain.

7.6 ULTRASOUND

Surgeon-performed trans-oral ultrasound to improve detection and staging of tongue and tonsils cancer

Incidence rates for head and neck cancer have increased due to HPV-related squamous cell carcinoma developed by younger and non-smoking patients. Especially patients suspected of having tonsils cancer are a diagnostic challenge because many are asymptomatic, and the primary tumor may be difficult to stage with the traditional imaging. The diagnostic workup is currently cost and time-consuming and often involves diagnostic procedures in general anesthesia. Furthermore, some patients undergo multimodality treatment due to lack of precision of the diagnostic workup. As an alternative, ultrasound is a low-cost, dynamic image modality that can obtain the highest image resolution of superficial soft-tissue tumors.

The Department is therefore working on new techniques to perform trans-oral ultrasound with small high-frequency transducers placed directly on the tongue and tonsils for improved image resolution. The hypothesis is that trans-oral ultrasound can be a cost-effective form of imaging to improve cancer detection and staging compared to standard of care with MRI and biopsies in general anesthesia. The research project is supported by the Novo Nordisk Foundation and includes cost for one post.doc and two PhD students.

3D ultrasound to assess tumor volume and surgical margins

Tumor-free margins of the removed specimen during cancer surgery have an important influence on survival. Adjuvant treatments, along with prognostic complications and significant financial costs, are usually required when positive surgical margins are observed by the pathologist. To address this, we have initiated a 3D ultrasound imaging research project, since it is versatile, cost-effective and provides the highest image resolution of superficial soft tissue compared to other image modalities. The overall ambition of the research idea is to improve surgical cancer treatment. The goal is to investigate if it is possible to reduce the rate of non-radical tumor resections during the surgery. A patent for the novel 3D technique has been filed, as it has competitive advantages.

7. HEAD & NECK

7.7 NURSING PALLIATION

A strategy for nursing rehabilitation and palliation was published in 2021. The purpose of the strategy is to describe how nursing in the Department will focus on rehabilitation and palliation for surgically treated patients with head and neck cancer. In 2015 a rehabilitation team consisting of experienced head and neck cancer nurses was established, who both performed more personalized assessments of rehabilitation needs and provided at-home, postoperative visits patients for patients treated for head and neck cancer. And from 2017 – 2019 a PhD study was conducted focusing on nursing rehabilitation for surgically treated head and neck cancer patients. The findings and experiences of these projects have given rise to several recent improvements to the rehabilitation and palliation offered by nurses in the Department.

The first steps to be implemented was an expansion of the visits to patients' homes post-surgery, so that patients are visited by a specialist nurse from the rehabilitation team at three time-points post-surgery: after discharge; after approximately 7 – 10 days post-operatively and 2 months post-operatively. The nurses will during the home-visit perform a needs assessment towards needs for rehabilitation and symptom management. Further steps will be the implementation of two needs assessment instruments, tested during the PhD study – a PRO-questionnaire (the University of Washington Quality of Life Questionnaire) and a concerns list (the Patient Concerns Inventory).

ON-GOING OVERALL H&N RESEARCH

ON-GOING PhD RESEARCH

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

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

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

Mesenkymale stamceller til behandling af stråleinduceret mundtørhed og HPV-relateret oropharynxcance
Amanda-Louise Fenger Carlander

Optically imaging-assisted head and neck surgery
Eva Lykke

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

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

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

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

8. EDUCATION

Our contribution for the future of ENT health care is a core part of our daily work with the training of about 500 medical students, nurses, and speech and language pathologists each year. Our research pushes our training efforts forward adapting to the latest techniques and knowledge. This includes transoral robotic surgery and optic guided surgery, fiberoptic endoscopic evaluation of swallowing (FEES), ultrasound of head and neck, biological treatment of nasal polyps, drug induced sedation endoscopy (DISE) and the use of virtual reality and simulation.

We proudly house a substantial amount of temporal bone specimen, which allows us to let the past contribute to the future via scans that we render. An example of this is the online freeware Virtual Ear Simulator (VES), with more than 3000 users globally and still being translated into new languages.

Ultrasound within the field of cancer diagnostics also holds a key position within our department, the latest addition being trans-oral ultrasound of oral cancer, something we have already included in our educational offer at the Department.

Many junior doctors do not feel sufficiently prepared to handle acute patients in a stressful environment where rapid clinical assessment and treatment is needed for successful outcomes. Simulation-based training in H&N is an effective learning intervention but also has high costs. Virtual reality (VR) technology can provide a highly realistic and low-cost teaching alternative by using a VR head-mounted displays. Five interactive 360-degree VR scenarios with different examples of critical ill patients have been developed. The trainees can thereby improve their clinical skills by an interactive format which will provide feedback of correct and suboptimal decision during an emergency scenario. The project is conducted in collaboration with CAMES and Department of Computer Science at Copenhagen University.

We have recently formed a new comprehensive H&N Center ("Østdansk Center for Hoved- Halskræft") which aims to bring multidisciplinary aligned regional care to the patients. An offer that requires collaboration of specialists such as physicists, surgeons, nurses, psychology in the spirit of learning and knowledge-sharing. This holistic approach is also influencing and optimizing our external clinical service teams, also called SMART-care. The aim of SMART-care is to bring the care from Rigshospitalet to patients that are either not able to visit us or if their illness do not require hospitalization. Thereby we bring balance to the cost and benefit in our caregiving, without removing the patient from the center of our focus.

Inviting foreign students and doctors from around the world is in the DNA of the Department. However, year 2021 challenged these traditions and affected our international course offer. Unfortunately, only a few dozen came during the summer and autumn due to the COVID-19 pandemic. In 2022 we will reopen and look forward to welcoming international peers to our renowned courses: "The International Copenhagen-Nottingham ENT Dissection Course" (300 young ENT doctors on the waiting list) and the"International Advanced FESS and Anterior Skull Base Course".

Training the new otologists in drilling vertually, using the VES. This program is invented at Rigshospitalet

ON-GOING EVIDENCE BASED EDUCATIONAL RESEARCH

Virtual ear surgery

Ultrasound H&N and video aided surgical educational material

Upper Airway simulation training

9. PUBLICATIONS 2021

Follow our on-going Research output 

PhD THESIS

Rigshospitalet
University of Copenhagen, Faculty of Health and Medical Sciences

Quality of Life and functional outcomes after treatment for oropharyngeal squamous cell carcinoma (OPSCC)
Scott, S. I., 26 Mar. 2021.

Virtual Reality simulation-based training of cochlear implant surgery: perspectives of performance, assessment, and transfer
Frendø, M., 28 Apr. 2021.

Global airway disease in patients with primary ciliary dyskinesia and chronic obstructive pulmonary disease - paranasal sinuses meet lungs
Arndal, E., 28 Oct.. 2021.

Needs assessment and symptom management in patients surgically treated for head and neck cancer
Mortensen, A., 22 Sep. 2021.

Cellular Patterns and Irregularities in human Perilabyrinthine Bone
Hansen, L. J., 8 Oct. 2021.

EAR

Papers in peer-reviewed journals - Ear

A meta-analysis uncovers the first sequence variant conferring risk of Bell's palsy
Skuladottir, A. T., Bjornsdottir, G., Thorleifsson, G., Walters, G. B., Nawaz, M. S., Moore, K. H. S., Olason, P. I., Thorgeirsson, T. E., Sigurpalsdottir, B., Sveinbjornsson, G., Eggertsson, H. P., Magnusson, S. H., Oddsson, A., Bjornsdottir, A., Vikingsson, A., Sveinsson, O. A., Hrafnsdottir, M. G., Sigurdardottir, G. R., Halldorsson, B. V., Hansen, T. F., Paarup, H., Erikstrup, C., Nielsen, K., Klokker, M., Bruun, M. T., Sorensen, E., Banasik, K., Burgdorf, K. S., Pedersen, O. B., Ullum, H., Jonsdottir, I., Stefansson, H. & Stefansson, K., 18 feb. 2021, I: Scientific Reports. 11, 1, s. 4188 4188.

Atlas-based segmentation of cochlear microstructures in cone beam CT
Powell, K. A., Wiet, G. J., Hittle, B., Oswald, G. I., Keith, J. P., Stredney, D. & Andersen, S. A. W., mar. 2021, I: International journal of computer assisted radiology and surgery. 16, 3, s. 363-373 11 s.

Cochlear Implantation After Radiotherapy of Vestibular Schwannomas
Tian, L., West, N. & Cayé-Thomasen, P., sep. 2021, I: The Journal of International Advanced Otology. 17, 5, s. 452-460 9 s.

Cochlear implant surgery: Learning curve in virtual reality simulation training and transfer of skills to a 3D-printed temporal bone - A prospective trial
Frendø, M., Frithioff, A., Konge, L., Sørensen, M. S. & Andersen, S. A. W., nov. 2021, I: Cochlear Implants International. 22, 6, s. 330-337 8 s.

Content validity evidence for a simulation-based test of handheld otoscopy skills
von Buchwald, J. H., Frendø, M., Guldager, M. J., Melchiors, J. & Andersen, S. A. W., jul. 2021, 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. 278, 7, s. 2313-2320 8 s.

Distribution of microcrack surface density in the human otic capsule
Hansen, L. J., Bloch, S. L., Frisch, T. & Sørensen, M. S., jun. 2021, I: Acta Oto-Laryngologica. 141, 6, s. 567-571 5 s.

Effect of 3D-Printed Models on Cadaveric Dissection in Temporal Bone Training
Frithioff, A., Frendø, M., Weiss, K., Foghsgaard, S., Pedersen, D. B., Sørensen, M. S. & Wuyts Andersen, S. A., 1 okt. 2021, I: OTO open. 5, 4, s. 2473974X211065012

Effects on hearing and tinnitus following Dupilumab treatment of severe asthma with chronic rhinosinusitis - a case report*
Thorsberger, M., Porsbjerg, C., Aanæs, K. & Yde, J. B., 30 mar. 2021, I: Rhinology. 4, s. 73-76 4 s.

Examination of hearing loss among school-aged children in Greenland
Jensen, J. S., Schnohr, C., Skovsen, C. F., Homøe, P. & Jensen, R. G., okt. 2021, I: International Journal of Pediatric Otorhinolaryngology. 149, s. 110865 110865.

Intracochlear Vestibular Schwannoma Presenting with Mixed Hearing Loss
Reda, J. D., West, N. & Cayé-Thomasen, P., maj 2021, I: The Journal of International Advanced Otology. 17, 3, s. 265-268 4 s.

Language Development for the New Generation of Children with Hearing Impairment
Percy-Smith, L., Wischmann, S., Josvassen, J. L., Schiøth, C. & Cayé-Thomasen, P., jun. 2021, I: Journal of Clinical Medicine. 10, 11, 2350.

Long-Term Vestibular Outcomes in Cochlear Implant Recipients
Rasmussen, K. M. B., West, N., Tian, L. & Cayé-Thomasen, P., 11 aug. 2021, I: Frontiers in Neurology. 12, s. 686681 686681.

Lower thriving among females with hearing impairment than males - a cross-sectional study of 185 primary and secondary students in Greenland
Friis Skovsen, C., Jensen, J. S., Jensen, R. G. & Schnohr, C., dec. 2021, I: International Journal of Circumpolar Health. 80, 1, s. 1921995 1921995.

Microcrack surface density in the human otic capsule: An unbiased stereological quantification
Hansen, L. J., Bloch, S. L., Frisch, T. & Sørensen, M. S., maj 2021, I: Anatomical record (Hoboken, N.J. : 2007). 304, 5, s. 961-967 7 s.

Follow our on-going Research output

EAR

Natural History of Growing Sporadic Vestibular Schwannomas During Observation: An International Multi-Institutional Study
Marinelli, J. P., Carlson, M. L., Hunter, J. B., Nassiri, A. M., Haynes, D. S., Link, M. J., Lohse, C. M., Reznitsky, M., Stangerup, S-E. & Caye-Thomasen, P., 1 sep. 2021, I: Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology. 42, 8, s. e1118-e1124

Objective Vestibular Test Battery and Patient Reported Outcomes in Cochlear Implant Recipients
West, N., Tian, L., Vang Petersen, L. K., Bille, M., Klokker, M. & Cayé-Thomasen, P., 1 apr. 2021, I: Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology. 42, 4, s. e416-e424

OpenEar Image Data Enables Case Variation in High Fidelity Virtual Reality Ear Surgery
Sieber, D. M., Andersen, S. A. W., Sørensen, M. S. & Mikkelsen, P. T., sep. 2021, I: Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology. 42, 8, s. 1245-1252 8 s.

Patient-specific Virtual Temporal Bone Simulation Based on Clinical Cone-beam Computed Tomography
Andersen, S. A. W., Varadarajan, V. V., Moberly, A. C., Hittle, B., Powell, K. A. & Wiet, G. J., aug. 2021, I: The Laryngoscope. 131, 8, s. 1855-1862 8 s.

Segmentation of Temporal Bone Anatomy for Patient-Specific Virtual Reality Simulation
Andersen, S. A. W., Bergman, M., Keith, J. P., Powell, K. A., Hittle, B., Malhotra, P. & Wiet, G. J., jul. 2021, I: Annals of Otology, Rhinology and Laryngology. 130, 7, s. 724-730 7 s.

The natural history of Vestibular Schwannoma growth - prospective 40-year data from an unselected national cohort
Reznitsky, M., Petersen, M. M. B. S., West, N., Stangerup, S-E. & Caye-Thomasen, P., 5 maj 2021, I: Neuro-Oncology. 23, 5, s. 827-836 10 s.

The use of ecological momentary assessment to evaluate real-world aided outcomes with children
Glista, D., O'Hagan, R., Van Eeckhoutte, M., Lai, Y. & Scollie, S., apr. 2021, I: International Journal of Audiology. 60, sup1, s. S68-S78 11 s.

Vestibular Function in Pendred Syndrome: Intact High Frequency VOR and Saccular Hypersensitivity
West, N. C., Ryberg, A. C. & Cayé-Thomasen, P., 1 okt. 2021, I: Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology. 42, 9, s. e1327-e1332

Vestibular Screening Before Cochlear Implantation: Clinical Implications and Challenges in 409 Cochlear Implant Recipients
West, N., Klokker, M. & Cayé-Thomasen, P., 1 feb. 2021, I: Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology. 42, 2, s. e137-e144

Video head impulse test saccades and loss of cervical vestibular evoked myogenic potentials are late vestibular footprints of cochlear implantation
West, N., Klokker, M. & Cayé-Thomasen, P., 2021, I: Journal of vestibular research : equilibrium & orientation. 31, 1, s. 61-67 7 s.

Review - Ear Research

3D-Printed Models for Temporal Bone Surgical Training: A Systematic Review
Frithioff, A., Frendø, M., Pedersen, D. B., Sørensen, M. S. & Wuyts Andersen, S. A., nov. 2021, I: Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery. 165, 5, s. 617-625 9 s.

Current Evidence for Simulation-Based Training and Assessment of Myringotomy and Ventilation Tube Insertion: A Systematic Review
Hovgaard, L. H., Al-Shahrestani, F. & Andersen, S. A. W., 1 okt. 2021, I: Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology. 42, 9, s. e1188-e1196

Current Status of Handheld Otoscopy Training: A Systematic Review
Frithioff, A., Guldager, M. J. & Andersen, S. A. W., okt. 2021, I: Annals of Otology, Rhinology and Laryngology. 130, 10, s. 1190-1197 8 s.

Current Trends, Controversies, and Future Directions in the Evaluation and Management of Superior Canal Dehiscence Syndrome
Eberhard, K. E., Chari, D. A., Nakajima, H. H., Klokker, M., Cayé-Thomasen, P. & Lee, D. J., 6 apr. 2021, I: Frontiers in Neurology. 12, s. 638574 638574.

Hjernestammeimplantation ved høretab
Hansen, J. O., West, N., Bille, M. & Cayé-Thomasen, P., 18 jan. 2021, I: Ugeskrift for Laeger. 183, 3, s. V08200602

Repositioning Chairs in the Diagnosis and Treatment of Benign Paroxysmal Positional Vertigo - A Systematic Review
Abdulovski, S. & Klokker, M., jul. 2021, I: The Journal of International Advanced Otology. 17, 4, s. 353-360 8 s.

9. PUBLICATIONS 2021

Follow our on-going Research output

NOSE

Papers in peer-reviewed journals - Nose

Airway hyperresponsiveness to inhaled mannitol identifies a cluster of non-eosinophilic asthma patients with high symptom burden
Sverrild, A., Andreasen, A. H., Westergaard, C. G., von Bülow, A., Udesen, P. B., Thomsen, S. F., Allin, K. H., Backer, V. & Porsbjerg, C., nov. 2021, I: The journal of allergy and clinical immunology. In practice. 9, 11, s. 4029-4036.e2 8 s., e2.

Association of Variants Near the Bradykinin Receptor B2 Gene With Angioedema in Patients Taking ACE Inhibitors
Ghouse, J., Ahlberg, G., Andreasen, L., Banasik, K., Brunak, S., Schwinn, M., Larsen, I. H., Petersen, O., Sørensen, E., Ullum, H., Rasmussen, E. R., Eriksson, N., Hallberg, P., Wadelius, M., Bundgaard, H. & Olesen, M. S., 17 aug. 2021, I: Journal of the American College of Cardiology. 78, 7, s. 696-709 14 s.

Autologous fibrin sealant co-delivered with antibiotics is a robust method for topical antibiotic treatment after sinus surgery
Aanaes, K., Nielsen, K. G., Arndal, E., von Buchwald, C., Pressler, T. & Høiby, N., feb. 2021, I: Acta Oto-Laryngologica. 141, 2, s. 181-186 6 s.

Food-Specific IgE and IgG Antibodies in Patients With Chronic Rhinosinusitis With Nasal Polyps: A Case-Control Study
Veloso-Teles, R., Cerejeira, R., Rodrigues, D., Roque-Farinha, R. & von Buchwald, C., mar. 2021, I: Ear, nose, & throat journal. 100, 3, s. 177-184 8 s.

Eosinophilic and non-eosinophilic asthma: an expert consensus framework to characterize phenotypes in a global real-life severe asthma cohort
Heaney, L. G., Perez de Llano, L., Al-Ahmad, M., Backer, V., Busby, J., Canonica, G. W., Christoff, G. C., Cosio, B. G., FitzGerald, J. M., Heffler, E., Iwanaga, T., Jackson, D. J., Menzies-Gow, A. N., Papadopoulos, N. G., Papaioannou, A. I., Pfeffer, P. E., Popov, T. A., Porsbjerg, C. M., Rhee, C. K., Sadatsafavi, M., Tohda, Y., Wang, E., Wechsler, M. E., Alacqua, M., Altraja, A., Bjermer, L., Björnsdóttir, U. S., Bourdin, A., Brusselle, G. G., Buhl, R., Costello, R. W., Hew, M., Siyue, M. K., Lehmann, S., Lehtimäki, L., Peters, M., Taillé, C., Taube, C., Tran, T. N., Zangrilli, J., Bulathsinhala, L., Carter, V. A., Chaudhry, I., Eleangovan, N., Hosseini, N., Kerkhof, M., Murray, R. B., Price, C. A. & Price, D. B., sep. 2021, I: Chest. 160, 3, s. 814-830 17 s.

Hormone Replacement Therapy and Development of New Asthma
Hansen, E. S. H., Aasbjerg, K., Moeller, A. L., Gade, E. J., Torp-Pedersen, C. & Backer, V., jul. 2021, I: Chest. 160, 1, s. 45-52 8 s.

Optimal Insertion Depth for Nasal Mid-Turbinate and Nasopharyngeal Swabs
Callesen, R. E., Kiel, C. M., Hovgaard, L. H., Jakobsen, K. K., Papesch, M., von Buchwald, C. & Todsen, T., 14 jul. 2021, I: Diagnostics. 11, 7, 1257.

Potential Severe Asthma Hidden in UK Primary Care
Ryan, D., Heatley, H., Heaney, L. G., Jackson, D. J., Pfeffer, P. E., Busby, J., Menzies-Gow, A. N., Jones, R., Tran, T. N., Al-Ahmad, M., Backer, V., Belhassen, M., Bosnic-Anticevich, S., Bourdin, A., Bulathsinhala, L., Carter, V., Chaudhry, I., Eleangovan, N., FitzGerald, J. M., Gibson, P. G., Hosseini, N., Kaplan, A., Murray, R. B., Rhee, C. K., Van Ganse, E. & Price, D. B., apr. 2021, I: The journal of allergy and clinical immunology. In practice. 9, 4, s. 1612-1623.e9

Socioeconomic biases in asthma control and specialist referral of possible severe asthma
Håkansson, K. E. J., Backer, V. & Suppli Ulrik, C., dec. 2021, I: The European respiratory journal. 58, 6, 00741-2021.

Surgical management of rhinocerebral mucormycosis: A case series
Wolthers, M. S., Schmidt, G., Gjørup, C. A., Helweg-Larsen, J., Rubek, N. & Jensen, L. T., dec. 2021, I: JPRAS Open. 30, s. 33-37 5 s.

Systemic Immune Profile in Patients With CRSwNP
Veloso-Teles, R., Cerejeira, R., Roque-Farinha, R. & Buchwald, C. V., sep. 2021, I: Ear, nose, & throat journal. 100, 5_suppl, s. 554S-561S

The potential role of biological treatment of chronic rhinosinusitis with nasal polyps: a nationwide cohort study
Eriksen, P. R. G., Jakobsen, K. K., Aanæs, K., Backer, V. & von Buchwald, C., 1 aug. 2021, I: Rhinology. 59, 4, s. 374-379 6 s.

Upper airway symptoms associate with the eosinophilic phenotype of COPD
Obling, N., Backer, V., Hurst, J. R. & Bodtger, U., jul. 2021, I: ERJ Open Research. 7, 3, s. 00184-2021 10 s., 00184-2021.

β2-Adrenergic agonist salbutamol augments hypertrophy in MHCIIa fibers and sprint mean power output but not muscle force during 11 weeks of resistance training in young men.
Jessen, S., Reitelseder, S., Kalsen, A., Kreiberg, M., Onslev, J., Gad, A., Ørtenblad, N., Backer, V., Holm, L., Bangsbo, J. & Hostrup, M., 1 mar. 2021, I: Journal of Applied Physiology. 130, 3, s. 617-626 10 s.

Follow our on-going Research output

HEAD & NECK

Papers in peer-reviewed journals – Head & Neck

Clinicopathologic characteristics of Burkitt lymphoma of the head and neck in a non-endemic region-a Danish nationwide study
Dupont Harwood, C., Eriksen, P. R. G., Clasen-Linde, E., Jensen, J. S., Asdahl, P., Rasmussen, M., Hjalgrim, L. L., Heegaard, S. & von Buchwald, C., aug. 2021, I: Acta Oto-Laryngologica. 141, 8, s. 812-819 8 s.

Conjunctival intraepithelial neoplasia and carcinoma: distinct clinical and histological features in relation to human papilloma virus status
Ramberg, I., Toft, P. B., Georgsen, J. B., Siersma, V. D., Funding, M., Jensen, D. H., von Buchwald, C. & Heegaard, S., jun. 2021, I: The British journal of ophthalmology. 105, 6, s. 878-883 6 s., 315011.

Danish translation of the Neck Dissection Impairment Index
Scott, S. I., Wessman, M., Lunderskov, E., von Buchwald, C. & Wessel, I., jun. 2021, I: Acta Oto-Laryngologica. 141, 6, s. 646-648 3 s.

Days alive and out of hospital after treatment for oropharyngeal squamous cell carcinoma with primary transoral robotic surgery or radiotherapy - a prospective cohort study
Scott, S. I., Madsen, A. K. Ø., Rubek, N., Kehlet, H. & von Buchwald, C., feb. 2021, I: Acta Oto-Laryngologica. 141, 2, s. 193-196 4 s.

Days alive and out of hospital a validated patient-centred outcome to be used for patients undergoing transoral robotic surgery: protocol and perspectives
Larsen, M. H. H., Scott, S. I., Kehlet, H. & von Buchwald, C., 2 jan. 2021, I: Acta Oto-Laryngologica. 141, 1, s. 95-98 4 s.

Days alive and out of hospital following transoral robotic surgery: Cohort study of 262 patients with head and neck cancer
Larsen, M. H. H., Scott, S. I., Channir, H. I., Madsen, A. K. Ø., Charabi, B. W., Rubek, N., Tvedskov, J. F., Kehlet, H. & von Buchwald, C., 2021, I: Head and Neck. 43, 12, s. 3866–3874 9 s.

European white paper: oropharyngeal dysphagia in head and neck cancer
Baijens, L. W. J., Walshe, M., Aaltonen, L-M., Arens, C., Cordier, R., Cras, P., Crevier-Buchman, L., Curtis, C., Golusinski, W., Govender, R., Eriksen, J. G., Hansen, K., Heathcote, K., Hess, M. M., Hosal, S., Klussmann, J. P., Leemans, C. R., MacCarthy, D., Manduchi, B., Marie, J-P., Nouraei, R., Parkes, C., Pflug, C., Pilz, W., Regan, J., Rommel, N., Schindler, A., Schols, A. M. W. J., Speyer, R., Succo, G., Wessel, I., Willemsen, A. C. H., Yilmaz, T. & Clavé, P., feb. 2021, 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. 278, 2, s. 577-616 40 s.

Focal Epithelial Hyperplasia
Bendtsen, S. K., Jakobsen, K. K., Carlander, A-L. F., Grønhøj, C. & von Buchwald, C., 2 aug. 2021, I: Viruses. 13, 8

Genomic Alterations in Human Papillomavirus-Positive and -Negative Conjunctival Squamous Cell Carcinomas
Ramberg, I., Vieira, F. G., Toft, P. B., von Buchwald, C., Funding, M., Nielsen, F. C. & Heegaard, S., 1 nov. 2021, I: Investigative ophthalmology & visual science. 62, 14, s. 11 11.

Human subcutaneous dirofilariasis: the 'migrating' skin tumor
Mistry, M. A., Hoejvig, J., Helleberg, M., Stensvold, C. R., Jokelainen, P., Noehr, A. & Bonde, C., 2021, I: Case Reports in Plastic Surgery and Hand Surgery. 8, 1, s. 181-185 5 s
.

Impact of time to treatment initiation for patients with oral cavity squamous cell carcinoma: a population-based, retrospective study
Jensen, J. S., Jakobsen, K. K., Mirian, C., Ghanizada, M., Håkansson, K., Wessel, I., Grønhøj, C., Rasmussen, J. H. & von Buchwald, C., apr. 2021, I: Acta Oncologica. 60, 4, s. 491-496 6 s.

Incidence and survival of head and neck cancer in the Faroe Islands
Olsen, S. H., Friborg, J., Ellefsen, B., Jakobsen, K. K. & Aanæs, K., 1 jan. 2021, I: International Journal of Circumpolar Health. 80, 1, s. 1894697 1894697.

Incidence and survival of salivary gland cancer in children and young adults in Denmark: A nation-wide study for the period 1990-2015
Jensen, J. S., Grønhøj, C., Garset-Zamani, M., Westergaard-Nielsen, M., Bjørndal, K., Kiss, K., Charabi, B., von Buchwald, C. & Hjuler, T., apr. 2021, I: International Journal of Pediatric Otorhinolaryngology. 143, 110637.

Intratumor heterogeneity is biomarker specific and challenges the association with heterogeneity in multimodal functional imaging in head and neck squamous cell carcinoma
Rasmussen, J. H., Olin, A. B., Lelkaitis, G., Hansen, A. E., Andersen, F. L., Johannesen, H. H., Kjaer, A., Fischer, B. M., Specht, L., Bentzen, S. M., von Buchwald, C., Wessel, I. & Vogelius, I. R., jun. 2021, I: European Journal of Radiology. 139, s. 109668 109668.

IRDye800CW labeled uPAR-targeting peptide for fluorescence-guided glioblastoma surgery: Preclinical studies in orthotopic xenografts
Kurbegovic, S., Juhl, K., Sørensen, K. K., Leth, J., Willemoe, G. L., Christensen, A., Adams, Y., Jensen, A. R., von Buchwald, C., Skjøth-Rasmussen, J., Ploug, M., Jensen, K. J. & Kjaer, A., 2021, I: Theranostics. 11, 15, s. 7159-7174 16 s.

Late migration of silicon as a complication to breast transplant rupture: Case report and literature review
Khakbaz, E., Lang, C., Lelkaitis, G. & Grønhøj, C., aug. 2021, I: International Journal of Surgery Case Reports. 85, s. 106241 106241.

Livstruende ødem efter inhalation af lattergas
Thorsberger, M. & Aanæs, K., 10 maj 2021, I: Ugeskrift for Laeger. 183, 19

Locating hyperfunctioning parathyroid glands using 11C-Choline PET/CT: an inter- and intra-observer variation study
Christensen, J. W., Jensen, L. T., Søndergaard, S. B., Broholm, R., Haarmark, C., Krakauer, M., Bennedbæk, F. N., Zerahn, B., Trolle, W., Hahn, C. H. & Kristensen, B., 6 jul. 2021, I: European journal of hybrid imaging. 5, 1, s. 13 13.

9. PUBLICATIONS 2021

Follow our on-going Research output

HEAD & NECK

Long-term quality of life & functional outcomes after treatment of oropharyngeal cancer
Scott, S. I., Kathrine Ø Madsen, A., Rubek, N., Charabi, B. W., Wessel, I., Fredslund Hadjú, S., Jensen, C. V., Stephen, S., Patterson, J. M., Friborg, J., Hutcheson, K. A., Kehlet, H. & von Buchwald, C., 2021, I: Cancer Medicine. 10, 2, s. 483-495 13 s.

Long-term survival outcomes after primary transoral robotic surgery (TORS) with concurrent neck dissection for early-stage oropharyngeal squamous cell carcinoma
Frederiksen, J. G., Channir, H. I., Larsen, M. H. H., Christensen, A., Friborg, J., Charabi, B. W., Rubek, N. & von Buchwald, C., jul. 2021, I: Acta Oto-Laryngologica. 141, 7, s. 714-718 5 s.

Low-dose aspirin use and risk of head and neck cancer-A Danish nationwide case-control study
de la Cour, C. D., Verdoodt, F., Aalborg, G. L., von Buchwald, C., Friis, S., Dehlendorff, C. & Kjaer, S. K., mar. 2021, I: British Journal of Clinical Pharmacology. 87, 3, s. 1561-1567 7 s.

Lymphoma of the Uvula: Clinical, Morphological, Histopathological, and Genetic Characterization. A Nationwide Danish Study From 1980 to 2019
Iversen, L., Eriksen, P. R. G., Andreasen, S., Clasen-Linde, E., Homøe, P., Wessel, I., von Buchwald, C. & Heegaard, S., 30 apr. 2021, I: Frontiers in Surgery. 8, 6 s., 675279.

Major driver mutations are shared between sinonasal intestinal-type adenocarcinoma and the morphologically identical colorectal adenocarcinoma
Sjöstedt, S., Schmidt, A. Y., Vieira, F. G., Willemoe, G. L., Agander, T. K., Olsen, C., Nielsen, F. C. & von Buchwald, C., apr. 2021, I: Journal of Cancer Research and Clinical Oncology. 147, 4, s. 1019-1027 9 s.

The maxillary swing approach - the first Scandinavian experience
Channir, H. I., Avnstorp, M. B., Wessel, I., Rostgaard, J., Rubek, N., Kiss, K., von Buchwald, C., Chan, J. Y. W. & Charabi, B. W., maj 2021, I: Acta Oto-Laryngologica. 141, 5, s. 519-530 12 s.

Nasopharyngeal malignancies in Denmark diagnosed from 1980 to 2014
Grønlund, M. P., Jakobsen, K. K., Mirian, C., Grønhøj, C., Juul Nielsen, K., Charabi, B., Lelkaitis, G., Bentzen, J. & von Bucwald, C., nov. 2021, I: Oral Oncology. 122, s. 105583 105583.

Photothermal Therapy as Adjuvant to Surgery in an Orthotopic Mouse Model of Human Fibrosarcoma
Simón, M., Jørgensen, J. T., Melander, F., Andresen, T. L., Christensen, A. & Kjaer, A., 20 nov. 2021, I: Cancers. 13, 22, 5820.

Prognostic scoring models in parotid gland carcinoma
Westergaard-Nielsen, M., Möller, S., Godballe, C., Grau Eriksen, J., Larsen, S. R., Kiss, K., Agander, T., Parm Ulhøi, B., Charabi, B., Ehlers Klug, T., Jacobsen, H., Johansen, J., Kristensen, C. A., Andersen, E., Andersen, M. & Bjørndal, K., jul. 2021, I: Head and Neck. 43, 7, s. 2081-2090 10 s.

Reliable and valid assessment of procedural skills in resuscitative endovascular balloon occlusion of the aorta (REBOA)
Engberg, M., Lönn, L., Konge, L., Mikkelsen, S., Hörer, T., Lindgren, H., Søvik, E., Svendsen, M. B., Frendø, M., Taudorf, M. & Russell, L., 1 okt. 2021, I: The journal of trauma and acute care surgery. 91, 4, s. 663-671 9 s.

Robustness and Generalizability of Deep Learning Synthetic Computed Tomography for Positron Emission Tomography/Magnetic Resonance Imaging-Based Radiation Therapy Planning of Patients With Head and Neck Cancer
Olin, A. B., Thomas, C., Hansen, A. E., Rasmussen, J. H., Krokos, G., Urbano, T. G., Michaelidou, A., Jakoby, B., Ladefoged, C. N., Berthelsen, A. K., Håkansson, K., Vogelius, I. R., Specht, L., Barrington, S. F., Andersen, F. L. & Fischer, B. M., 30 sep. 2021, I: Advances in radiation oncology. 6, 6, s. 100762 100762.

Safety and feasibility of mesenchymal stem cell therapy in patients with aqueous deficient dry eye disease
Møller-Hansen, M., Larsen, A-C., Toft, P. B., Lynggaard, C. D., Schwartz, C., Bruunsgaard, H., Haack-Sørensen, M., Ekblond, A., Kastrup, J. & Heegaard, S., jan. 2021, I: The ocular surface. 19, s. 43-52 10 s.

Salivary gland carcinoma in Denmark: a national update and follow-up on incidence, histology, and outcome
Westergaard-Nielsen, M., Godballe, C., Eriksen, J. G., Larsen, S. R., Kiss, K., Agander, T., Ulhøi, B. P., Charabi, B., Klug, T. E., Jacobsen, H., Johansen, J., Kristensen, C. A., Andersen, E., Andersen, M., Andreasen, S. & Bjørndal, K., apr. 2021, 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. 278, 4, s. 1179-1188 10 s.

Sequelae of Major Trauma Patients with Maxillofacial Fractures
Petersen, L. Ø., Ipsen, E. Ø., Felding, U. A., von Buchwald, C. & Steinmetz, J., maj 2021, I: Annals of Otology, Rhinology and Laryngology. 130, 5, s. 475-482 8 s.

Sinonasal cancer in Denmark 2008-2015: a population-based phase-4 cohort study from DAHANCA
Filtenborg, M. V., Lilja-Fischer, J. K., Sharma, M. B., Primdahl, H., Kjems, J., Plaschke, C. C., Wessel, I., Kristensen, C. A., Andersen, M., Andersen, E., Godballe, C., Johansen, J., Overgaard, J. & Petersen, K. B., mar. 2021, I: Acta Oncologica. 60, 3, s. 333-342 10 s.

Submandibular ectopic thyroid tissue and concurrent thyroid hemiagenesis
Hansen, M-L. U., Vedtofte, T., Wessel, I. & Kaltoft, M., 4 nov. 2021, I: Acta Oto-Laryngologica. 6, s. 91-95 5 s.
Surgeon-performed Transoral Ultrasound-Guided Aspiration of Peritonsillar Abscess
Todsen, T., Stage, M. G. & Hahn, C. H., okt. 2021, I: The Laryngoscope. 131, 10, s. 2241-2245 5 s.

Surgical Preservation of Parathyroid Function During Total Thyroidectomy Can Be Improved by Intraoperative Imaging
Feldt-Rasmussen, U., Lykke, E., Christensen, A. & Buchwald, C. V., 2021, I: Clinical Thyroidology. 33, 10, s. 456-58

Follow our on-going Research output

HEAD & NECK

Surgical treatment of the neck in patients with salivary gland carcinoma
Westergaard-Nielsen, M., Godballe, C., Grau Eriksen, J., Larsen, S. R., Kiss, K., Agander, T., Parm Ulhøi, B., Wittenborg Charabi, B., Ehlers Klug, T., Jacobsen, H., Johansen, J., Kristensen, C. A., Andersen, E., Andersen, M. & Bjørndal, K., jun. 2021, I: Head and Neck. 43, 6, s. 1898-1911 14 s.

The impact of comorbidities on survival in oral cancer patients: a population-based, case-control study
Ghanizada, M., Jakobsen, K. K., Jensen, J. S., Wessel, I., Filtenborg Tvedskov, J., Grønhøj, C. & von Buchwald, C., feb. 2021, I: Acta Oncologica. 60, 2, s. 173-179 7 s
.

The Impact of Comorbidity on Survival in Patients With Head and Neck Squamous Cell Carcinoma: A Nationwide Case-Control Study Spanning 35 Years
Ruud Kjær, E. K., Jensen, J. S., Jakobsen, K. K., Lelkaitis, G., Wessel, I., von Buchwald, C. & Grønhøj, C., 17 feb. 2021, I: Frontiers in Oncology. 10, s. 617184 617184.

The nurse-patient interaction during rehabilitation consultations in patients surgically treated for head and neck cancer- a qualitative study
Mortensen, A., Thorne, S., Wessel, I., Rogers, S. N. & Jarden, M., aug. 2021, I: European journal of oncology nursing : the official journal of European Oncology Nursing Society. 53, s. 101985 101985.

The Voice-Related Quality of Life (V-RQOL) Instrument: Cross-Cultural Translation and Test of Validity and Reliability of the Danish Version
Wulff, N. B., Møller, P. R., Christensen, K. B., Pedersen, S. G., Wessel, I., Dalton, S. O. & Homøe, P., sep. 2021, I: Journal of voice : official journal of the Voice Foundation. 35, 5, s. 806.e7-806.e14

TORS Base-of-Tongue Mucosectomy in Human Papilloma Virus-Negative Carcinoma of Unknown Primary
Kubik, M. W., Channir, H. I., Rubek, N., Kim, S., Ferris, R. L., von Buchwald, C. & Duvvuri, U., jan. 2021, I: The Laryngoscope. 131, 1, s. 78-81 4 s.

Treatment outcomes in patients with supraglottic laryngeal cancer: a single centre study
Wærsted, S., Andersen, E. & Bentzen, J., 24 maj 2021, I: Acta Oto-Laryngologica. 141, 6, s. 649-655 7 s.

UL-skanning af hoved og hals UL-skanning af hoved og hals
Todsen, T., Melchiors, J., Larsen, K. D., Charabi, B. & von Buchwald, C., 15 feb. 2021, I: Ugeskrift for Laeger. 183, 7, s. V09200663

Ultrasound-guided fine-needle aspiration biopsy of thyroid nodules
Todsen, T., Bennedbaek, F. N., Kiss, K. & Hegedüs, L., mar. 2021, I: Head and Neck. 43, 3, s. 1009-1013 5 s.

Use of simulation-based training of surgical technical skills among ENTs: an international YO-IFOS survey
Favier, V., Ayad, T., Blanc, F., Fakhry, N. & Andersen, S. A. W., dec. 2021, 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. 278, 12, s. 5043-5050 8 s.

Review – Head & Neck Research

A Contemporary Systematic Review on Repartition of HPV-Positivity in Oropharyngeal Cancer Worldwide
Carlander, A. F., Jakobsen, K. K., Bendtsen, S. K., Garset-Zamani, M., Lynggaard, C. D., Jensen, J. S., Grønhøj, C. & Buchwald, C. V., 9 jul. 2021, I: Viruses. 13, 7, 1326.

Diagnostic Accuracy of HPV Detection in Patients with Oropharyngeal Squamous Cell Carcinomas: A Systematic Review and Meta-Analysis
Jakobsen, K. K., Carlander, A-L. F., Bendtsen, S. K., Garset-Zamani, M., Lynggaard, C. D., Grønhøj, C. & von Buchwald, C., 26 aug. 2021, I: Viruses. 13, 9, s. 1692 1692.

Health-Related Quality of Life Following Total Laryngectomy: A Systematic Review
Wulff, N. B., Højager, A., Wessel, I., Dalton, S. O. & Homøe, P., apr. 2021, I: The Laryngoscope. 131, 4, s. 820-831 12 s.

Human Papillomavirus and Squamous Cell Carcinoma of Unknown Primary in the Head and Neck Region: A Comprehensive Review on Clinical Implications
Larsen, M. H. H., Channir, H. I. & von Buchwald, C., 2 jul. 2021, I: Viruses. 13, 7, 1297.

Impact of delay in diagnosis and treatment-initiation on disease stage and survival in oral cavity cancer: a systematic review
Lauritzen, B. B., Jensen, J. S., Grønhøj, C., Wessel, I. & von Buchwald, C., sep. 2021, I: Acta Oncologica. 60, 9, s. 1083-1090 8 s.

Impact of human papillomavirus in sinonasal cancer-a systematic review
Sjöstedt, S., von Buchwald, C., Agander, T. K. & Aanaes, K., sep. 2021, I: Acta Oncologica. 60, 9, s. 1175-1191 17 s.

Mundtørhed
Dreyer, N. S., Lynggaard, C. D., Jakobsen, K. K., Pedersen, A. M. L., von Buchwald, C. & Grønhøj, C., 5 jul. 2021, I: Ugeskrift for Laeger. 183, 27

Risk Factors for Recurrence of Follicular Thyroid Cancer: A Systematic Review
Grønlund, M. P., Jensen, J. S., Hahn, C. H., Grønhøj, C. & von Buchwald, C., okt. 2021, I: Thyroid : official journal of the American Thyroid Association. 31, 10, s. 1523-1530 8 s.

Systematic review on the current knowledge and use of Single-cell RNA Sequencing in Head and Neck Cancer
Stampe, H., Jakobsen, K. K., Bendtsen, S. K., Grønhøj, C. & von Buchwald, C., nov. 2021, I: APMIS - Journal of Pathology, Microbiology and Immunology. 129, 11, s. 619-625 7 s.

The Effect of Prophylactic HPV Vaccines on Oral and Oropharyngeal HPV Infection-A Systematic Review
Nielsen, K. J., Jakobsen, K. K., Jensen, J. S., Grønhøj, C. & Von Buchwald, C., 11 jul. 2021, I: Viruses. 13, 7, 1339
.

9. PUBLICATIONS 2021

Follow our on-going Research output

HEAD & NECK

The impact of HPV genotypes on survival in HPV-positive oropharyngeal squamous cell carcinomas: a systematic review
Skovvang, A., Jensen, J. S., Garset-Zamani, M., Carlander, A., Grønhøj, C. & von Buchwald, C., jul. 2021, I: Acta Oto-Laryngologica. 141, 7, s. 724-728 5 s .

Training and education of healthcare workers during viral epidemics: a systematic review
Nayahangan, L. J., Konge, L., Russell, L. & Andersen, S., 28 maj 2021, I: BMJ Open. 11, 5, s. e044111 e044111.

Use of Generalizability Theory for Exploring Reliability of and Sources of Variance in Assessment of Technical Skills: A Systematic Review and Meta-Analysis
Andersen, S. A. W., Nayahangan, L. J., Park, Y. S. & Konge, L., 1 nov. 2021, I: Academic medicine : journal of the Association of American Medical Colleges. 96, 11, s. 1609-1619 11 s.

Other - Head & Neck

Incidence of head and neck cancer in adolescents and young adults: a Danish nationwide study from 1978-2014
Jakobsen, K. K., Hjuler, T., Laier, G. H., von Buchwald, C. & Grønhøj, C., mar. 2021, I: Acta Oncologica. 60, 3, s. 343-346 4 s.

Otorhinolaryngologist performed transcervical versus transoral ultrasonography in the management of peritonsillar abscess
Todsen, T., 2021, I: Archives of Otolaryngology. 42, 5, 102768.

Reply to Letter to the Editor regarding "Elective neck dissection and its extent in Salivary gland cancers: A Dilemma"
Westergaard-Nielsen, M., Godballe, C., Eriksen, J. G., Larsen, S. R., Kiss, K., Agander, T., Ulhøi, B. P., Wittenborg Charabi, B., Klug, T. E., Jacobsen, H., Johansen, J., Kristensen, C. A., Andersen, E., Andersen, M. & Bjørndal, K., sep. 2021, I: Head and Neck. 43, 9, s. 2861-2862 2 s.

Reply to Letter to the Editor regarding "In reference to Surgical treatment of the neck in patients with salivary gland carcinoma"
Westergaard-Nielsen, M., Godballe, C., Grau Eriksen, J., Rosenkilde Larsen, S., Kiss, K., Agander, T., Parm Ulhøi, B., Wittenborg Charabi, B., Ehlers Klug, T., Jacobsen, H., Johansen, J., Andrup Kristensen, C., Andersen, E., Andersen, M. & Bjørndal, K., nov. 2021, I: Head and Neck. 43, 11, s. 3699-3700 2 s.

Evidence of Mobile Applications in Otolaryngology Targeted at Patients
Andersen, S. A. W. & Hsueh, W. D., jan. 2021, I: Annals of Otology, Rhinology and Laryngology. 130, 1, s. 118-118 1 s.

Special Issue "HPV in the Head and Neck Region"
Dalianis, T., Buchwald, C. V. & Näsman, A., 6 dec. 2021, I: Viruses. 13, 12, 2452.

Correction to: Value of pre- and intraoperative diagnostic methods in suspected glottic neoplasia (European Archives of Oto-Rhino-Laryngology, (2020), 277, 1, (207-215), 10.1007/s00405-019-05698-w)
Mehlum, C. S., Kjaergaard, T., Grøntved, Å. M., Lyhne, N. M., Jørkov, A. P. S., Homøe, P., Tvedskov, J. F., Bork, K. H., Möller, S., Jørgensen, G., Philipsen, B. B. & Godballe, C., jan. 2021, 2 s.

Correction to: Major driver mutations are shared between sinonasal intestinal-type adenocarcinoma and the morphologically identical colorectal adenocarcinoma (Journal of Cancer Research and Clinical Oncology, (2020), 10.1007/s00432-020-03421-5)
Sjöstedt, S., Schmidt, A. Y., Vieira, F. G., Willemoe, G. L., Agander, T. K., Olsen, C., Nielsen, F. C. & von Buchwald, C., apr. 2021, 1029 s.

Follow our on-going Research output

COVID-19

Papers in peer-reviewed journals – COVID-19

Accuracy and cost description of rapid antigen test compared with reverse transcriptase-polymerase chain reaction for SARS-CoV-2 detection
Jakobsen, K. K., Jensen, J. S., Todsen, T., Tolsgaard, M. G., Kirkby, N., Lippert, F., Vangsted, A-M., Martel, C. J-M., Klokker, M. & von Buchwald, C., 14 jun. 2021, I: Danish Medical Journal. 68, 7

Appropriateness for SARS-CoV-2 vaccination for otolaryngologist and head and neck surgeons in case of pregnancy, breastfeeding, or childbearing potential: Yo-IFOS and CEORL-HNS joint clinical consensus statement
Saibene, A. M., Allevi, F., Ayad, T., Baudoin, T., Bernal-Sprekelsen, M., Briganti, G., Carrie, S., Cayé-Thomasen, P., Dahman Saidi, S., Dauby, N., Fenton, J., Golusiński, W., Klimek, L., Leclerc, A-A., Longtin, Y., Mannelli, G., Mayo-Yáñez, M., Meço, C., Metwaly, O., Mouawad, F., Niemczyk, K., Pedersen, U., Piersiala, K., Plzak, J., Remacle, M., Rommel, N., Saleh, H., Szpecht, D., Tedla, M., Tincati, C., Tucciarone, M., Zelenik, K. & Lechien, J. R., okt. 2021, 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. 278, 10, s. 4091-4099 9 s.

A randomized, double-blind, placebo-controlled phase 1 trial of inhaled and intranasal niclosamide: A broad spectrum antiviral candidate for treatment of COVID-19
Backer, V., Sjöbring, U., Sonne, J., Weiss, A., Hostrup, M., Johansen, H. K., Becker, V., Sonne, D. P., Balchen, T., Jellingsø, M. & Sommer, M. O. A., maj 2021, I: The Lancet regional health. Europe. 4, s. 100084 100084.

COVID-19 infection rate among tertiary referral center otorhinolaryngology healthcare workers
Rasmussen, K. M. B., Andersen, P. A., Channir, H. I., Aanæs, K., Knudsen, J. D., Kirkeby, N. S., Klokker, M., von Buchwald, C., Cayé-Thomasen, P. & Jensen, R. G., aug. 2021, 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. 278, 8, s. 3091-3098 8 s.

Danish Citizen´s Preferences for at-home Oropharyngeal/nasal SARS-CoV-2 Specimen Collection
Bundgaard, J. S., Raaschou-Pedersen, D. T., Todsen, T., Ringgaard, A., Torp-Pedersen, C., Von Buchwald, C., Iversen, K. & Bundgaard, H., aug. 2021, I: International journal of infectious diseases : IJID : official publication of the International Society for Infectious Diseases. 109, s. 195-198 4 s.

Effectiveness of Adding a Mask Recommendation to Other Public Health Measures to Prevent SARS-CoV-2 Infection in Danish Mask Wearers: A Randomized Controlled Trial
Bundgaard, H., Bundgaard, J. S., Raaschou-Pedersen, D. E. T., von Buchwald, C., Todsen, T., Norsk, J. B., Pries-Heje, M. M., Vissing, C. R., Nielsen, P. B., Winsløw, U. C., Fogh, K., Hasselbalch, R., Kristensen, J. H., Ringgaard, A., Porsborg Andersen, M., Goecke, N. B., Trebbien, R., Skovgaard, K., Benfield, T., Ullum, H., Torp-Pedersen, C. & Iversen, K., 1 mar. 2021, I: Annals of Internal Medicine. 174, 3, s. 335-343 9 s.

Metoder til opsamling af øvre luftvejsmateriale til COVID-19-diagnostik
Todsen, T., Kirkby, N., Lippert, F., Benfield, T. & von Buchwald, C., nov. 2021, I: Ugeskrift for Laeger. 183, 21, V03210265.

SARS-CoV-2 in saliva, oropharyngeal and nasopharyngeal specimens
Todsen, T., Tolsgaard, M., Folke, F., Jakobsen, K. K., Ersbøll, A. K., Benfield, T., von Buchwald, C. & Kirkby, N., 7 apr. 2021, I: Danish Medical Journal. 68, 5, s. 1-6 6 s., A01210087.

Stress reactions in a tertiary oto-rhino-laryngological department during the first wave of the COVID-19 pandemic in the Danish Capital region
Brejnebøl, M. W., Walvik, L., Christensen, A. K., Jensen, R. G. & von Buchwald, C., aug. 2021, I: Acta Oto-Laryngologica. 141, 8, s. 791-795 5 s.

The impact and prevalence of SARS-CoV-2 in patients with head and neck cancer and acute upper airway infection in a tertiary otorhinolaryngology referral center in Denmark
Andersen, P. A., Rasmussen, K. M. B., Channir, H. I., von Buchwald, C., Cayé-Thomasen, P., Klokker, M., Knudsen, J. D., Kirkby, N. S., Aanaes, K. & Jensen, R. G., sep. 2021, 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. 278, 9, s. 3409-3415 7 s.

The impact of the COVID-19 pandemic on mental health among healthcare workers in ear-nose-throat clinics
Walvik, L., Brejnebøl, M. W., Ravn, A. T., Jensen, R. G., Christensen, A. K. & von Buchwald, C., 11 maj 2021, I: Danish Medical Journal. 68, 6

Valid and Reliable Assessment of Upper Respiratory Tract Specimen Collection Skills during the COVID-19 Pandemic
Todsen, T., Bohr, A., Hovgaard, L. H., Eið, R. C., Benfield, T., Svendsen, M. B. S., Kirkby, N., Konge, L., von Buchwald, C., Melchiors, J. & Tolsgaard, M., 26 okt. 2021, I: Diagnostics. 11, 11, s. 1-10 10 s., 1987.

Review – COVID-19 Research

Metoder til opsamling af øvre luftvejsmateriale til COVID-19-diagnostik
Todsen, T., Kirkby, N., Lippert, F., Benfield, T. & von Buchwald, C., 16 aug. 2021, I: Ugeskrift for Laeger. 183, 33, s. 1-9 9 s., V03210265.

10. 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.

We are grateful to the following sponsors:

- Aage og Johanne Louis-Hansens Fond
- Candys Foundation
- Demant
- Diatec
- DTU (Danmarks Tekniske Universitet)
- Fonden for Faglig Udvikling af Speciallægepraksis
- Forskningspuljen at Righospitalet and Odense University Hospital
- GCHSP = Greater Copenhagen Health Science Partners
- GN Store Nord Fonden
- Greater Copenhagen Health Science Partners
- House of Hearing
- Høreforeningen
- Innovationsfonden
- Interacoustics
- Interfond
- Købmands-fondsstøtten
- Læge Fritz Karners og hustrus Fond
- Novo Nordisk Fonden
- Region Hovedstadens Forskningsfond til Sundhedsforskning
- Region Hovedstadens Forskningsråd
- Rigshospitalets Forskningsudvalg
- Royal Danish Air Force/Danish Armed Health Forces
- Sundhedsstyrelsen
- Velux Fonden

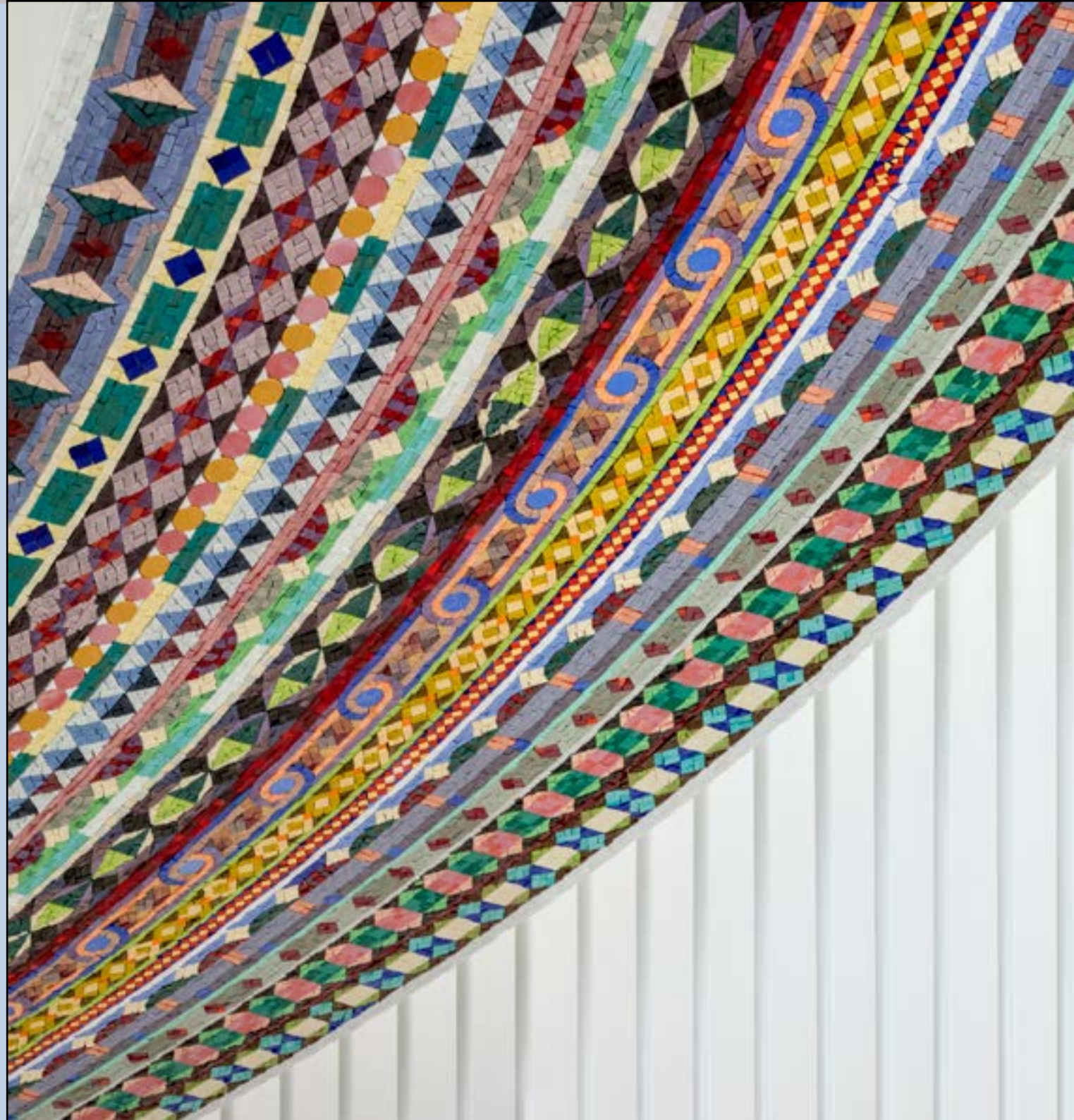
Department of ENT, H&N and Audiology
Clinical and Research Report, 2021
© Department of ENT, Rigshospitalet, Denmark

Editors & Proof-readers:
Abigail Anne Kressner
Louie Rogalla
Mads Klokker
Rikke Schriver Nielsen

Input and photos:
The entire team

Graphic Design
Department of ENT, H&N and Audiology

Printed in Denmark 2022



Rigshospitalet / Department of Ear, Nose, and Throat, Head & Neck, and Audiology
Section 6032, entrance 6, 3rd floor
Inge Lehmanns vej 8, 2100 Copenhagen East
Denmark

REGION Rigshospitalet