KU LEUVEN

OMFS
IMPATH

# Yearbook 2023

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# Preface

OMFS-IMPATH research group has been established in 2013. It is a multidisciplinary research group with applications in OMFS and oral healthcare and a further focus on orthognathic surgery, trigeminal nerve injury and oncological 3D reconstruction.The steady increase of international applications underpins its leading international role in the field and facilitates multi-centered international studies.

Being at the fore-front of research in our field allows the university to fulfil its role as incubator of ideas, inventions and spin-offs. Many of our PhD students develop brilliant academic careers and establish their own research projects and research groups in their home countries. Despite the demanding process of a PhD or a research trajectory, we do not see burnout among our students. This is because the research group is not just an amalgamation of people from 19 countries, but because Professor Jacobs and Professor Willaert forge the group into a close-knit family. What is increasingly lacking among young people in modern society, a family and circle of friends that accepts you as you are, is often found in such a research group. This avoids loneliness, depression, fears and insecurities. Leading a research group requires more than excellence in research. Prof. Jacobs and Prof. Willaert, in addition to a rare high IQ, also possesses excellent EQ skills that come into their own within the group. A research group at the university is not viable without the necessary support from the department and higher authorities. Their support from the sidelines and from above is essential: infrastructure, administrative backup, funding opportunities, accounting units, educational support are not visible, not publishable operations, but fundamental pillars of research. Benchmarks should also be developed for this in order to value and appreciate these activities.

Within our research group, machine learning and artificial intelligence have gradually reached a level where developments in a laboratory environment can be fully used clinically. Spin-offs such as RELU and others are starting to pave the way to the market and prove that universities are also the driving force behind an important biomedical industry in Belgium.

Without adequate GDP, there is also no adequate financing basis for healthcare in Belgium, which accounts for 11% of GDP. In this way, researchers and research units not only contribute to innovation but also to the maintenance of high-level healthcare. We do not dare to label researchers as 'migrants', but no fewer than 19 nationalities contribute to the output of the research group. That appreciation must also be expressed. Naivety has no place in the debate on international cooperation, but neither does dogmatic rejection. As a university, we are dependent on multi-centered and multinational collaborations.

We therefore remain optimistic about human nature. When we surround young people with trust, a sense of belonging and adequate incentives to perform, they are capable of a lot, no matter where they are from.

em.prof.dr. C. Politis


VANS

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# Team

A. STAFF

B. RESEARCHERS

C. VISITING PROFESSORS

D. VISITING RESEARCHERS

E. ADMINISTRATIVE COORDINATOR

The OMFS-IMPATH research group consists of a diverse and global team of 50 MSc, PhD, and postdoctoral researchers, along with clinicians. This multidisciplinary ensemble consists of professionals such as maxillofacial surgeons, paediatric dentists, orthodontists, dentomaxillofacial radiologists, endodontists, biomedical scientists, and engineers. The primary objective of their research is to develop and validate surgical tools and image-based solutions that can advance the field of oromaxillofacial surgery. The overarching goal is to enhance treatment outcomes while minimizing peri- and postsurgical risks.

The team consistently showcases excellence, delivering high-quality research output, with nearly 80% of it being the result of international collaboration. Furthermore, over half of our publications rank among the top 25 most cited documents worldwide in our field. Additionally, one-third of our work is featured in the top 25 journals within our discipline. With a network of more than 1000 co-authors and accumulating over 20,000 citations, our impact is truly significant.

For the latest updates on the OMFS-IMPATH team's research, visit www.omfsimpath.be.

## DEPARTMENT OF IMAGING & PATHOLOGY - HEAD: PROF. TANIA ROSKAMS

| | |
|---|---|
| Biomedical MRI | Uwe Himmelreich |
| Forensic Biomedical Sciences | Wim Van de Voorde |
| Medical Physics & Quality Assessment | Hilde Bosmans |
| Nuclear Medicine & Molecular Imaging | Koen Van Laere |
| Radiology | Stefan Sunaert |
| Translational Cell & Tissue Research | Tania Roskams |
| **OMFS-IMPATH** | **Constantinus Politis**<br>www.omfsimpath.be |



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Team

### *Tania ROSKAMS*

Tania Roskams obtained her medical degree in 1989 at the University of Leuven. She specialized in Pathology (University of Leuven) and obtained her PhD in liver pathology in Leuven and Oklahoma University, USA. In 1996 she became head of the Liver Research Unit, in 2002 of the Research group Translational Research and Pathology and in 2015 Head of the Department of Imaging & Pathology. She was nominated Professor in pathology in 2002. From 2007-2009 she was visiting professor at the University of Utrecht. In the clinical department she is responsible for hepatobiliary, pancreas and gastrointestinal pathology. Her main interest is liver research with special emphasis on liver progenitor cells and their role in regeneration and carcinogenesis.

### *Peter VERMAELEN*

Peter Vermaelen obtained his degree in Medical Laboratory Technology in 1994 and gained experience in different clinical and research topics. In 2000, he joined the pre-clinical unit of the Nuclear Medicine & Molecular Imaging research group and was co-founder of the Molecular Small Animal Imaging Center (MoSAIC). Since 2012, he is as department manager responsible for the financial and personnel administration of the Department of Imaging & Pathology.

## A. STAFF

### *Constantinus POLITIS*

Constantinus Politis (°1958) obtained a degree in Medicine, Surgery and Obstetrics in 1982 and a degree in Dentistry from KU Leuven in 1985. After specialising in stomatology and oral, maxillofacial and maxillofacial surgery, he became, among other things, coordinating trainee master for the course in oral, maxillofacial and maxillofacial surgery at KU Leuven and UGent, and chairman of the Recognition Committee for Stomatology and Oral, Maxillofacial and Maxillofacial Surgery (STO-MKA).
He obtained his PhD in biomedical sciences in 2012 on the topic of 'complications after orthognathic surgery', after which he founded the OMFS-IMPATH research group at KU Leuven with Prof. Reinhilde Jacobs, as well as the 3D lab MKA.
Since 1982, Professor Politis has been active in numerous syndicates and associations, including the Flemish Physician Syndicate (VAS), the Belgian Association of Physician Syndicates (BVAS) and the Association of Belgian Professional Associations of Physician Specialists-MKA (VBS-MKA). He is also president of the Belgian Association for Oral-Mouth-Angeal and Head and Neck Surgery (BVMKA-HH).
From 1989 to 2012, he was medical head of oral, maxillofacial and oral surgery at Ziekenhuis Oost-Limburg (ZOL). Until his retirement on 1 October 2023, he was medical head of oral, maxillofacial and maxillofacial surgery at UZ Leuven, lecturer at UHasselt and guest lecturer at ESHAL in Brussels. As a full professor, he also taught Oral, Maxillofacial and Maxillofacial Surgery at KU Leuven to dental and medical students. He introduced 3D planning of surgical procedures where 3D printed surgical moulds could transfer precision to the patient's surgical procedure. He authored the 3-volume work Oral Diseases and MKA Surgery published in 2018, which formed the core curriculum for trainee assistants. In total, he supervised the training of 95 MKA doctors in Flanders during his career.

## *Reinhilde JACOBS*

Reinhilde Jacobs is dentist, Doctor in Dental Sciences (PhD University of Leuven), periodontologist (KU Leuven) and Master in Dental Radiology (University of London). She is full professor at the University of Leuven and visiting professor at Karolinska Institutet, Stockholm, Sweden and the Dalian Medical University in China. R. Jacobs is heading the omfs impath research group of the KU Leuven (omfsimpath.be) and the clinical center of dentomaxillofacial radiology (UZleuven). She is Secretary General of the International Association of DentoMaxilloFacial Radiology and President-elect of the Digital Dentistry Society. She is section editor of 5 journals (Clinical Oral Investigations, Journal of Dentistry (Digital Dentistry Section) European Journal of Radiology, International Journal of Oral Implantology and Oral Radiology). She has received the D Collen Research Travel Award (1994), a postdoctoral fellowship of the European Commission (1994-95), the IADR Young Investigators Award (1998) and the Belgian Joachim Award in Odontostomatology (1999). In 2013, she received a Dr Honoris Causa at the "Iuliu Hatieganu" University of Medicine and Pharmacy in Cluj-Napoca. She is involved in many multidisciplinary and interuniversity research collaborations, with a specific focus on imaging research, artificial intelligence and bioprinting. She has been actively participating in 5 European projects and is (co-)author of 5 books and more than 650 publications in peer-reviewed journals besides multiple invited lectures and publications in other journals or books. Scopus (2023): h:77

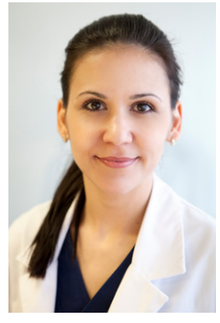
## *Michel BILA*

Michel Bila is a maxillofacial surgeon and researcher in the University Hospital of Leuven since 2016. He is currently a faculty member at the University Hospitals Leuven where he specializes in the treatment of oral cancer and reconstruction. With a passion for advancing the field, Dr. Bila is pursuing a PhD in neoadjuvant immunotherapy. His expertise in the field is evidenced by his teaching and research activities, which are focused on improving outcomes for patients with head and neck cancer. He received his medical degree from the University of Antwerp in 2009 with a master's thesis on retinal straylight before and after implementation of the bag in the lens IOL. He received his dental degree from the Catholic University of Leuven in 2012. During his residency, he was fortunate to have the opportunity to train at a number of prestigious institutions, including the University of Leuven in Belgium, University of Antwerp in Belgium and UCLH in London UK.





## *Ruxandra Gabriela COROPCIUC*



Ruxandra Gabriela Coropciuc graduated as double qualified (MD, DDS) Oral and Maxillofacial Surgeon from the University of Medicine and Pharmacy Carol Davila, Bucharest in 2013. She was trained in the Clinical Hospital or Oral and Maxillofacial Surgery, Bucharest and at Leuven University Hospitals. She joined the Department of Maxillofacial Surgery at the UZ Leuven Belgium in 2013. Her PhD research is focused on bisphosphonate-related osteonecrosis of the jaw bone. Her clinical field of interest is in oral implantology, salivary gland pathology and head and neck oncology and reconstruction. Being multilingually talented with backgrounds in Canada, Romania and Belgium allow her to easily address patients in Dutch, English, French or Romanian.

## *Jan MEEUS*

Jan Meeus obtained his dental and his medical degree at KU Leuven in 2011 and 2016 respectively. Ever since he graduated, he started working in a private practice, where he focuses on implant placement. Besides this, he further specialised to become an Oral and Maxillofacial Surgeon. He has been working as a surgeon at the University Hospital in Leuven, as well as in the Hospital ZOL in Genk. Currently, he is Clinical Staff Member at UZ Leuven in Oral and Maxillofacial Surgery. In his clinical work, he focuses on special dental implants with bone grafting in upper and lower jaws, oral implants, implantology, poor prosthetic fit due to jawbone problems, dento-alveolar surgery, and preprosthetic surgery.

### *Robin WILLAERT*

Prof. Dr. Robin Willaert finished his medical and dental studies at the Faculty of Medicine in Leuven University with the highest distinction. He successfully obtained his Board Certification in Oral and Maxillofacial Surgery in 2018. He is Clinical Staff Member in Oral and Maxillofacial Surgery at UZ Leuven since 2020. His clinical focus is Head and Neck Oncology and maxillofacial reconstruction using 3D technology. His PhD research covered orbital imaging and reconstruction surgery and was successfully defended in January 2021. He further specialized in Head and Neck Oncology in different centres in Australia, Scotland, South-Africa and different Asian Centres. In 2022, he was appointed as Professor at the Department of Imaging and Pathology at the Faculty of Medicine, KU Leuven.





## B. RESEARCHERS

### *Khalid Ayidh ALQAHTANI*

Khalid Ayidh Alqahtani was born on 21 August, 1992. He achieved his Bachelor of Dental Surgery (BDS) degree from Prince Sattam Bin Abdulaziz University, Al-Kharj, Saudi Arabia in the year 2016. He worked as a demonstrator in the department of Oral and Maxillofacial Radiology at Prince Sattam Bin Abdulaziz University from the year 2016 to 2018. In 2023, he was a postgraduate student in the field of Advanced Medical Imaging, and obtained his PhD under the supervision of Prof. Reinhilde Jacobs. His main focus of research involves three-dimensional assessment of root resorption in orthognathic surgery.

### *Soroush BASERI SAADI*

Soroush Baseri Saadi received an Associate's degree in the field of General Electronics from Shamsipour Technical College/University in Tehran, in 2005. In 2009, he graduated with a Bachelor of Science from Islamic Azad University (IAU) - South Tehran Branch, Iran, in Electrical Engineering-Electronics. In July 2016, he graduated with a Master of Science in Biomedical Engineering from the Vrije Universiteit Brussel and the University of Ghent. In 2022, he obtained a postgraduate degree in advanced medical imaging specializing in dental image processing with artificial intelligence within the OMFS-IMPATH research group. He is currently pursuing his doctoral studies under the supervision of Professor Reinhilde Jacobs and co-supervision of Professor Peter Claes, focusing on the development of AI applications in the field of oral health.

## *Oliver DA COSTA SENIOR*

Oliver da Costa Senior is a PhD candidate at the OMFS-IMPATH research group at the University of Leuven under promotorship of Prof. dr. Constantinus Politis, Prof. dr. Reinhilde Jacobs and Dr. Ir. Eman Shaheen. He graduated at the Catholic University of Leuven in Medicine in June 2018. Currently, he is an Oral and Maxillofacial trainee at the department of Oral and Maxillofacial Surgery at the University Hospitals of Leuven. His research is focused on the three-dimensional planning, follow-up and complications of orthognathic surgery with special interest in Segmental Maxillary Osteotomy and Surgical Assisted Rapid Palatal Expansion (SARPE).

## *Kathia DUBRON*

Kathia Dubron is a PhD candidate at the OMFS-IMPATH-research group at the University of Leuven under promotorship of Prof. dr. R. Willaert, Prof. dr. Constantinus Politis, Prof. dr. Reinhilde Jacobs and Dr. Ir. Eman Shaheen. She received her Medical Degree (MD) in 2017 and master's degree in Management (MM) in 2019 from the Catholic University of Leuven. Currently, she is an Oral and Maxillofacial surgery trainee at the University Hospitals of Leuven. Her research is focused on virtual planning of zygomatico-orbital complex fractures, with special interest in the implementation of extended reality.



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Team

## *Bahaa ELGARBA*

Bahaaeldeen Mohamed Abdalazeem Elgarba was born in Riyadh, Saudi Arabia, in 1990. He obtained his bachelor's degree in Dentistry at Tanta University in Egypt, between 2007 and 2012, followed by an internship for ayear at Tanta University Hospitals. He worked as a General Dentist at the Egyptian Ministry of Health for one year (2014). Afterwards, he became a resident and research assistant at the Department of Prosthodontics at Tanta University, besides working in his private clinic. Between 2016 and 2019, he obtained his master's degree in Prosthetic Dentistry at Tanta University. Since 2020, he has been an assistant lecturer and researcher in the Department of Prosthodontics at the Faculty of Dentistry at Tanta University. His specialization is Prosthetic and Implant Dentistry. In 2021, he came to Leuven as a Ph.D. researcher at OMFS-IMPATH. His research project focuses on the automation of dental implant planning and virtual implant patient creation.

## *Mostafa EZELDEEN*

Mostafa EzEldeen obtained his Bachelor of Dental Medicine and Surgery (2007) from Mansoura University, Egypt. He then moved to Belgium to obtain his Master in Dentistry, Summa cum laude, at the KU Leuven, Belgium. Further, he obtained the Master of Oral Health Research (2010) at the KU Leuven and a specialization in Paediatric Dentistry and Special Dental care (2012) at the KU Leuven. In 2013, he obtained the diploma of Postgraduate studies in Advanced Medical Imaging at the KU Leuven. He obtained his PhD in 2021 titled "Dental tissue regeneration in children: can we mimic nature?". He is now a Post-doctoral fellow at the OMFS-IMPATH research group at the KU Leuven, in addition to practicing as a Paediatric dentist in private practice and UZ Leuven (Department of Dentistry, Paediatric Dentistry and Special Dental Care). His research topics are situated at the interface of clinic, immune-modulation, and biomaterials engineering, aiming to develop novel therapies for dental tissue loss in children and adolescents. The research focuses on assessing the healing patterns in teeth and bone after regenerative processes using Cone Beam Computed Tomography (CBCT), development of reliable teeth segmentation methods utilizing Artificial Intelligence, CBCT-guided tooth autotransplantation, 3D (bio)printing and chemokine-mediated dental tissue regeneration. He has received the 1st place research award from the International Association of Dental Traumatology (2014), Journal of Endodontics Award (2016) for the best article in the category of clinical research, and the Belgian Albert Joachim Award in the Odontostomatology (2018), Journal of Endodontics Award (2022) for the best article in the category of Regenerative Endodontics. He has 38 international peer-reviewed papers, and 4 book chapters.

## *Rocharles FONTENELE*

Rocharles Cavalcante Fontenele was born in Jaguaretama, Ceara, Brazil, in 1995. He earned his dental degree in 2016 at the Federal University of Ceara, Brazil. Subsequently, he obtained his master's and Ph.D. in Oral Radiology at the University of Campinas (UNICAMP) in 2018 and 2023, respectively. During his Ph.D., he received a scholarship from the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Brazilian government) to collaborate with the OMFS-IMPATH research group under the supervision of Prof. Dr. Reinhilde Jacobs. His research primarily focused on Artificial Intelligence-driven segmentation of dental and bone structures in cone-beam computed tomography images. Since 2023, he has been a postdoctoral researcher at Katholieke Universiteit Leuven (KU Leuven) under the supervision of Prof. Dr. Reinhilde Jacobs, where he coordinates the AI research projects developed by the OMFS-IMPATH research group. His research focuses on AI-driven segmentation in CBCT images, 2D and 3D imaging diagnosis, CBCT image quality, and artifacts in CBCT images. He has published 50 peer-reviewed articles in important journals in the Dentistry, Oral Surgery & Medicine area, such as Dentomaxillofacial Radiology, Clinical Oral Investigations, Journal of Dentistry, Journal of Endodontics, International Endodontic Journal, and Clinical Oral Implants Research. Additionally, he has received 35 awards during his postgraduate courses, including ones granted by the European Academy of DentoMaxilloFacial Radiology, Digital Dentistry Society, and IADR-Brazilian section.

## *Rellyca Sola GRACEA*

Rellyca Sola Gracea (Lola) obtained her dental degree from the Faculty of Dentistry at Universitas Gadjah Mada (UGM), Indonesia, in 2015. In 2019, she completed her clinical residency in Oral and Maxillofacial Radiology at Padjadjaran University, Indonesia. She is a junior lecturer at the Dentomaxillofacial Radiology Department, Faculty of Dentistry, UGM, and an oral radiologist at UGM Dental Hospital. She is currently working as a doctoral researcher under the supervision of Professor Reinhilde Jacobs, concentrating on an artificial intelligence-driven tools for automated dental charting and structured dental radiology reporting.





## *Una IVKOVIĆ*

Una Ivković obtained her Bachelor's and Master's degree in Biomedical Sciences, Magna Cum Laude, from KU Leuven, Belgium. As part of her master's thesis, she performed research abroad at Karolinska Insitute, Department of Dental Medicine in Stockholm, Sweden (Erasmus+ Scholarship) from September 2021 until February 2022. There, she performed research on in vitro validation studies of scaffold applications within dental research. Moreover, she followed a two-week internship at Université de Paris – Department of Dental Surgery in Paris, France where she was acquainted with imaging methods within dental research. Currently, she is a Ph.D. researcher for the OMFS-IMPATH research group under supervision of Prof. Dr. Reinhilde Jacobs (KU Leuven, Belgium), Prof. Dr. Ir. Arn Mignon (KU Leuven, Belgium) and Dr. Mostafa EzEldeen (KU Leuven, Belgium). Her research topics focus primarily on Tissue Engineering and Regenerative Medicine and the application potential of polymer-based biomaterials within dentistry, with the aim to tackle dental pulp injuries in children and adolescents in a sustained manner. Next to her scientific activities within the group, she is also responsible for maintaining the social media of the research group (Instagram/LinkedIn).

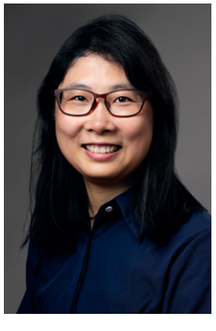
## *Thanatchaporn JINDANIL*

Thanatchaporn Jindanil was born in Bangkok, Thailand, in 1995. She studied for her bachelor degree in Dentistry at Chulalongkorn University between 2014 and 2019. After working as a teacher assistant in Department of Radiology, Faculty of Dentistry, Chulalongkorn University, she enrolled in the Postgraduate Studies in Advanced Medical Imaging at KU Leuven (2022- 2023). She is a PhD candidate in Biomedical sciences under the advice of Prof. dr. Reinhilde Jacobs, Prof. dr. Maria Cadenas Llana Perula, and dr. Rocharles Cavalcante Fontenele. She is currently working on a project called: "AI-tool on the detection of mandibular and incisive canal and virtual patient creation for oral healthcare."

## *Pierre LAHOUD*

Pierre Lahoud is a dentist, Doctor in Dental Surgery with Postgraduate Training in Advanced Medical Imaging. He concluded a clinical internship at UC Louvain in 2018 (Erasmus+ Scholarship) and performed his pre-doctoral research at the OMFS-IMPATH Research Group (KU Leuven, Belgium), focusing on artificial intelligence driven segmentation for tooth auto-transplantation - graduating Magna Cum Laude in July 2020. He is currently a Clinical Resident in Periodontology and Implant Surgery (KU Leuven, Belgium) and a Ph. D. Researcher (OMFS-IMPATH Research Group, KU Leuven, Belgium) under the promotership of Prof. Dr. Reinhilde Jacobs (KU Leuven, Belgium), Em. Prof. Dr. Marc Quirynen (KU Leuven, Belgium) and Prof. Dr. Michael Bornstein (Universität Basel, Switzerland). He is also a consultant for trans-alveolar dental transplantations (Department of Oral and Maxillofacial Surgery, University Hospitals Leuven, Belgium). His research topics focus primarily on Artificial Intelligence-driven planning for treatments and surgeries in the oral and maxillofacial region, periodontology and implantology. He is the recipient of the First Prize - IADMFR Maxillofacial Research Award 2021 (Gwangju, South Korea) and is co-recipient of the Journal of Endodontics Award (2022) in the category of Regenerative Endodontics (Chicago, IL, USA).

## *Jiqing LI*



Jiqing Li was born on April 15th, 1991. She achieved her degree in Bachelor of Dental Medicine from School of Stomatology, Shandong University, Jinan, China (2009-2014). She obtained her Master of Dental Medicine degree in Oral and Maxillofacial Surgery from West China College of Stomatology, Sichuan University, Chengdu, China, under the guidance of Professor Jihua Li and Professor Jing Hu (2014-2017). During her Masters, she worked on the effect of hyaluronidase on skin necrosis caused by hyaluronic acid. After her graduation, she worked as a general dentist at West China Hospital of Stomatology, Chengdu, China (2017-2018). In 2023, she obtained her PhD in OMFS-IMPATH research group, KU Leuven, with Prof. dr. Reinhilde Jacobs as her promoter. Her topic was to study the effect of systemic diseases on patients undergoing orthognathic surgery.





## *Joeri MEYNS*

Dr. Joeri Meyns has a degree as a Medical doctor, Dentist and Maxillofacial surgeon. After obtaining his degree as a maxillofacial surgeon in 2011 he was a staff member at the Academic Hospital Maastricht (MUMC) for almost 4 years, where he further specialised in oral oncology and reconstructive surgery. He is Medical Head of the department of Oral and Maxillofacial Surgery at Ziekenhuis Oost-Limburg (ZOL) in Genk. His main speciality is orthognathic surgery and oncology. His PhD research is growth modification of the face in children.

## *Catalina MORENO RABIE*

Catalina Moreno Rabie was born in Chile in 1992. She obtained her bachelor's and master's degree in dentistry in 2016 at the Universidad de los Andes, Chile. During her final year of dentistry, she completed a clinical and research internship at KU Leuven, where she studied anatomical variations in the retromolar area on CBCT. Between 2017 and 2018 she worked as a general dentist. Within this period she also completed a course in dental emergency management organized by the emergency unit of the Barros Luco Trudeau health care complex and the University of Chile. In 2019, she obtained her diploma in the Postgraduate studies in Advanced Medical Imaging at KU Leuven (2018- 2019, summa cum laude), the thesis topic was on guided endodontics under the supervision of dr. Andrés Torres and prof. Reinhilde Jacobs.
Currently, Catalina is working as a doctoral researcher in biomedical sciences at the KU Leuven under the tutelage of prof. dr. Reinhilde Jacobs and prof. dr. Tim Van den Wyngaert. Specifically, her thesis topic investigates the effects of antiresorptive drugs on the jaw bones, possible risk factors for the development of medication-related osteonecrosis of the jaws (MRONJ), and the prognostic risk factors for this pathology. In September 2021, she was awarded the second prize in the Robert Frank Senior Clinical Science Award at the CED-IADR/NOF Oral Health Research Congress (Brussels, Belgium), and in July 2023, the first prize in the Research Award Competition at the IADMFR World Tour Congress (Brussels, Belgium).

## *Dhanaporn PAPASRATORN*

Dhanaporn (Ning) Papasratorn is Assistant Lecturer at the Department of Oral and Maxillofacial Radiology in the Faculty of Dentistry at Mahidol University in Bangkok, Thailand. She obtained her degree of Doctor of Dental Surgery in 2018 at Mahidol University. There, she also obtained the degree of Master of Science Program in Dentistry (Major in Oral and Maxillofacial Radiology) in 2022. Moreover, she won the Innovative Thesis Award (Distinguished) for her thesis entitled "Automated Recognition of Direct Contact Between Mandibular Third Molar and Inferior Alveolar Canal on Panoramic Radiographs Using Deep Learning." She is currently following the postgraduate program in Advanced Medical Imaging at KU Leuven, Belgium.

## *Flavia PREDA*

Flavia Preda has graduated as a Dentist (2012) and as an Orthodontics Specialist (2015) in Bucharest-Romania. Since 2017 she has been practicing orthodontics in a private dental clinic in Belgium. Starting with 2019 she is a visiting Orthodontics Consultant in the cleft facility at Marie S. Curie Children's Hospital in Bucharest-Romania. Currently, she is a part-time Ph.D. student in the OMFS-IMPATH research group at KU Leuven under the supervision of Prof. Dr. Reinhilde Jacobs with the main research interest 3D supported and AI-enhanced diagnosis and treatment planning for Orthodontics.



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Team

## *Sonya RADI*

Sonya Radi was born in 1998 in Teheran, Iran. She acquired her bachelor's and master's degree in biomedical sciences at KU Leuven between 2018 – 2023. She performed her master's thesis at the OMFS-IMPATH research group in collaboration with Karolinska Institute, Sweden. Currently, she is working as a doctoral researcher under the tutelage of Prof. Dr. Reinhilde Jacobs where she focuses on identifying risk factors of medication-related osteonecrosis of the jaws (MRONJ). She is also working on the development of 3D models within dentistry.

## *Mehdi SALAR AMOLI*

Mehdi obtained his PhD in 2023 at OMFS-IMPATH in collaboration with Faculty of Engineering Technology working under supervision of Prof. Veerle Bloemen and Prof. Reinhilde Jacobs. He studied biomaterials and tissue engineering for bachelor's at Amirkabir University of Technology in Iran working on multiphasic chitosan scaffolds for cartilage regeneration. He obtained his master's degree at Imperial College London in biomaterials and tissue engineering and worked under supervision of Prof. Molly Stevens and Dr. Ioanna Mylonaki on developing non-viral methods for nucleic acid delivery to the cells. He is currently working on development of methods for regeneration of dentin-pulp region through bio printing cell encapsulated materials.

## *Eman SHAHEEN*

Eman (Emmy) Shaheen graduated with honors from the faculty of Computer Sciences and Information Technology (2003), Cairo University, Egypt where she worked as a teaching assistant from 2003 till 2007 with a major in Image Processing. Meanwhile, she obtained her Master's Degree in Video Processing (2007) from Cairo University. In 2008, she joined the team of Medical Physics where she finished with distinction her pre-doctoral studies in 2009 followed by her doctoral degree in 2014 in Biomedical Sciences at the KU Leuven, Belgium to develop/simulate 3D models of breast lesions and tools to optimize the performance of breast tomosynthesis. In the same year, she started working in the department of Maxillo-facial surgery, University hospitals Leuven (Belgium) as clinical engineer with focus on 3D planning of orthognathic surgeries. Next to the patient related work, she is part of the research group OMFS-IMPATH (KU Leuven, Belgium) where she supervises masters and PhD students and supports different research projects related to 3D printing and 3D simulations.

## *Maximiliaan SMEETS*

Maximiliaan Smeets graduated from the Catholic University of Leuven in June 2018 as a Medical Doctor and is now an active Oral and Maxillofacial trainee at the University Hospital of Leuven. His research interests include oral oncology and Oral and Maxillofacial Surgery in general. Since 2020 Maximiliaan Smeets is a PhD candidate at the OMFS-IMPATH Research Group, and he focuses on the onset, etiology, and treatment of persistent trismus after oral oncology treatment. His research is mentored by Prof. dr. Constantinus Politis, Prof. dr. Reinhilde Jacobs, dr. Michel Bila, and Jeroen Van Dessel.



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Team

## *Yi SUN*

Yi Sun obtained his PhD in Biomedical Sciences, Master of Medical imaging and Bachelor in Electronic Engineering. Since 2007, he worked in the field of computer assistant surgery planning, with focus on oral and maxillofacial surgery. Currently he is responsible for the 3D surgical simulation team in the department of oral and maxillofacial surgery (UZ Leuven). In the past years, he and the team members developed several computer assisted surgical applications in dental implant placement, cranio-maxillofacial reconstruction and patient specific implant design. He has published more than 50 articles in peer-reviewed journals and has contributed three book chapters. His research interests are 1) Computer assisted reconstruction of large bone defects in cranio-maxillofacial region; 2) statistic shape modelling to design patient specific implant.

## *Isti Rahayu SURYANI*

Isti Rahayu Suryani was born on November 20th, 1980. She obtained her Doctor of Dental Medicine (2006) from Faculty of Dentistry, UGM-Indonesia, Master of Biomedical Engineering (2012) from Graduate School of UGM-Indonesia and Specialist in Oral Radiology (2016) from Padjajaran University-Indonesia. She has worked as lecturer in Departement of Dentomaxillofacial Radiology, Faculty of Dentistry, UGM and also as Oral Radiologist at UGM Dental Hospital. Currently, she is a PhD candidate in OMFS-IMPATH research group, KU Leuven, starting December 2019 with Professor Reinhilde Jacobs as her promotor. Her research focus on Imaging of Medication-related osteonecrosis of the jaw.

## Kostas SYRIOPOULOS

Kostas Syriopoulos is dentist specialized in oral and maxillofacial radiology. He graduated as dentist from the University of Athens, Greece. He has a MSc degree (University of London) as well as a PhD degree (VU, Amsterdam) in Dental Radiology. He had an internship in the Dept. of Oral Radiology (Stellenbosch University, Cape Town). Further, he received the diploma in Health Physics level 3 (TU Delft). In the Netherlands Level 3 is a higher expert level of health physics, necessary for supervising in radionuclide laboratories or working in a medical profession with higher risk or responsibility, like clinical physics and nuclear medicine. From 2001 to 2016 he was a staff-member in the department of Dentomaxillofacial Radiology, ACTA, Amsterdam. Since February 2015 he has been a staff member in the Department of Imaging & Pathology, KU Leuven. His main professional interests are Diagnostic Radiology, Radiography Education and Radiation Protection.

## Els TIJSKENS

Els Tijskens graduated as a dentist in 1984 at KU Leuven. She has been working as an endodontist since 2000, and has a second line practice for paediatric endodontics and traumata. In 2011 she obtained a license to use N2O-sedation, which she is applying on indication. She is a Certified Member of the European Society for Endodontology (ESE), Fellow of the International Association for Dental Traumatology (IADT), founding board member and past President of the Flemish Society for Endodontology (FSfE vzw). She has been lecturing to GP's at NIVVT for more than a decade. She is involved in reading the CBCT images at UZLeuven, and has been teaching Medical Imaging at UCLL opleiding Mondzorgkunde until August 2019.





## Andres TORRES

Andres Torres was born on July 4th, 1988 in Bogota, Colombia. He obtained his degree as General Dentist in 2012 from the University of Los Andes, Santiago, Chile. During the training in Dentistry, he participated twice in a research internship on CBCT in Endodontics at the KU Leuven, Leuven, Belgium, led by Professor Reinhilde Jacobs. In March 2014 he achieved the equivalence of foreign diploma "Titulo de Cirujano Dentista" with the Flemish degree of "Master of Science in Dentistry". In 2015 he obtained the diploma of Postgraduate studies in Advance Medical Imaging at the KU Leuven, Leuven, Belgium. Further, he obtained a specialization degree in Endodontics in July 2017, under the guidance of Professor Paul Lambrechts at the KU Leuven, Leuven, Belgium. He works as an Endodontic specialist in private practice. He is instructor of the Endodontic postgraduate at KU Leuven, Leuven, Belgium and visiting instructor of the Endodontic postgraduate at KI, Stockholm, Sweden. In 2023, he obtained his PhD (OMFS-IMPATH research group, KU Leuven, Belgium) with Professor Reinhilde Jacobs as his promoter and Professor Paul Lambrechts as his co-promoter. His research topics are: 3-Dimensional Guided Endodontics, 3-Dimensional Assessment of Apical Radiolucencies, Characterisation of Root and Canal Morphology and Maxillary Sinus and Endodontics.

## Fréderic VAN DER CRUYSSEN

Fréderic Van der Cruyssen, born on January 23rd, 1992, in Waregem, Belgium, is a resident in oral and maxillofacial surgery. He graduated with honors from the Catholic University of Leuven, earning his medical and dental degrees in 2017 and 2020, respectively. In 2021, he achieved a master's degree in healthcare policy and management from the Catholic University of Leuven. In June 2023, he successfully completed his doctorate, specializing in the field of trigeminal nerve injuries. His main areas of interest lie in prediction modeling, maxillofacial imaging, trauma, and nerve injuries. He is driven by the desire to continually improve patient care and spearhead advancements in the field of oral and maxillofacial surgery (OMFS) research.

## *Jeroen VAN DESSEL*

Jeroen Van Dessel holds a Master in Biomedical Sciences and a Master in Advanced Medical Imaging from KU Leuven. As FWO-aspirant he achieved his PhD in Biomedical Sciences at the KU Leuven. He is active in the field of dentomaxillofacial radiology within the Department of Oral and Maxillofacial Surgery at the UZ Leuven and the OMFS-IMPATH research group at the KU Leuven. He also coordinates the Institute for Oral and Maxillofacial Surgery Education and Training (www.iomfcot.be). He is visiting professor at the Department of Surgery, Stomatology, Pathology and Radiology of the Dentistry Faculty at the University of São Paulo in Bauru (Brazil). He is a board member of the European Academy of DentoMaxilloFacial Radiology (EADMFR). Jeroen received the COB Oral Research Award (2013), EADMFR Oral Research Award (2012; 2014), the EUNETHYDIS Sagvolden Award (2015), the EADMFR Research Fellowship (2016), the ECNP Junior Research Award (2018) and OMFS-IMPATH Young Talent Award (2019). As a visiting researcher, he has been associated with the University of São Paulo (Brazil), Pontificia Universidade Catolica do Parana (Brazil) and Karolinska Institute (Sweden).

## *Jonas VER BERNE*

Jonas Ver Berne (MD, DDS) is a Pathology resident at the General Hospital St.-Jan in Brugge with a special interest in oral & maxillofacial pathology. He obtained his medical degree from the Catholic University of Leuven in 2020 (magna cum laude) with a thesis in oral pathology under promotorship of prof. dr. Constantinus Politis, prof. dr. Reinhilde Jacobs, and prof. dr. Erich Raubenheimer. In 2023 he obtained his dental degree from that same university (magna cum laude) and completed a three-year internship in Oral and Maxillofacial Surgery at the University Hospitals of Leuven. Since 2019 he has participated in numerous research projects at the OMFS-IMPATH research group, notably researching the effect of systemic conditions on orthognathic surgery patients. In 2023 he started his PhD project on developing clinical AI models for automated radiological diagnosis of jawbone lesions.





## *Pieter-Jan VERHELST*

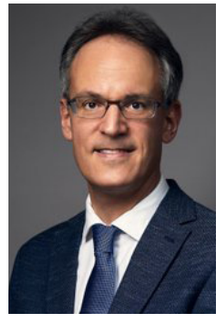
Dr. Pieter-Jan Verhelst is an Oral & Maxillofacial Surgery Resident at the University Hospitals of Leuven (Belgium) with a special interest in orthognathic, craniofacial and cleft surgery. In 2017 he obtained his medical degree (KU Leuven, magna cum laude) with a thesis on the free fibula flap in craniomaxillofacial reconstructions and in 2020 he obtained his dental medicine degree (KU Leuven, magna cum laude) with a thesis on 3D volumetric analysis of the jaw joint. He was trained at the University Hospitals of Leuven (Belgium) and the Rijnstate Hospital Arnhem (Netherlands). He is part of the Cleft Lip and Palate Team at the University Hospitals of Leuven. Dr. Verhelst is a PhD candidate within the OMFS-IMPATH research group at KU Leuven, supervised by Prof. Dr. Reinhilde Jacobs, Prof. Dr. Constantinus Politis and Prof. Dr. Hilde Peeters. His research focuses on orthognathic, craniofacial and cleft surgery, condylar resorption, 3D craniofacial phenotyping and associated genetic abnormalities.

## *Xiaotong WANG*

Xiaotong Wang received her degrees in both Bachelor and Master of Dental Medicine from Harbin Medical University, China. After her graduation, she worked as an Oral and Maxillofacial Surgeon in the First Affiliated Hospital of Harbin Medical University. In 2023, she obtained her PhD at OMFS-IMPATH research group with Prof. dr. Reinhilde Jacobs as her promoter. Her research is focused on Digital dentistry: development of AI-driven prediction and CBCT-based biomodels.

## C. VISITING PROFESSORS

### *Michael BORNSTEIN*



Michael Bornstein has been appointed in January 2020 as professor and chair of the Departement of Oral Health & Medicine at the University Center for Dental Medicine Basel (UZB) of the University of Basel, Switzerland. Since April 2020 he is also head of "research" and member of the executive board at the UZB.

He obtained his dental degree (1998) and thesis (Dr. med. dent., 2001) at the University of Basel. He continued with a specialisation in oral surgery and stomatology in Basel (1998-1999, Prof. Dr. Dr. J. Th. Lambrecht) and Bern (2000-2002, Prof. Dr. D. Buser). In 2004, he was visiting assistant professor at the Department of Periodontics (Prof. Dr. D. Cochran) at the University of Texas Health Science Center at San Antonio, USA, with a grant from the Swiss National Science Foundation. From 2007-2014 he was head of the Section of Dental Radiology and Stomatology, University of Bern. In 2009, he obtained the Habilitation (Privatdozent / PhD) and in 2014 he became Asscociate Professor in the field of „Oral Surgery and Stomatology“. From 2016-2019 he has been Clinical Professor in Oral and Maxillofacial Radiology at the Faculty of Dentistry, The University of Hong Kong, Hong Kong SAR, China. In December 2018 he is been appointed as Associate Dean of "Research and Innovation" of the Faculty of Dentistry. He currently is a Visiting Professor at the OMFS-IMPATH Research Group, Department of Imaging and Pathology, University of Leuven, Belgium, and since January 2020 a Honorary Professor of the Faculty of Dentistry, The University of Hong Kong.

His fields of research include cone beam computed tomography (CBCT) in clinical dental practice, diagnostic imaging, stomatology/oral medicine, GBR procedures and dental implants. He has published over 225 original articles, and is the author / co-author of numerous case reports, review articles, and book chapters.

## *Krisztian NAGY*

Krisztian Nagy is a Maxillofacial Surgeon with special interest and experience in cleft surgery. He has been working as the co-ordinator and leading surgeon of the Cleft Care Centre, at the 1st Department of Paediatrics, Semmelweis University, Budapest, Hungary. He has been also working as a Consultant Maxillofacial Surgeon, in AZ St-Jan Bruges-Oostende Hospital, Belgium since March 2012. He became Fellow of the European Board of Oro-Maxillofacial Surgery & Head and Neck Surgery (FEBOMS) in September 2012. He is currently Guest Professor at Leuven University, KU Leuven, Belgium. He graduated at the Semmelweis University Budapest, Hungary in medicine (MD, summa cum laude) and in dentistry (DDS, magna cum laude). He specialized in oral and Maxillofacial surgery at the Semmelweis University, at the KU Leuven and in AZ SInt Jan in Bruges, Belgium. His postgraduate training was additionally followed by clinical experiences in Bruges, Minden, Vienna, Wellington, Zürich and Taipei. He is now member of the European Association for Cranio-Maxillofacial Surgery (EACMFS), the European Academy of Facial Plastic Surgery (EAFPS) and the CranioMaxillofacial Section, Arbeitsgemeinschaft für Osteosynthesefragen (AO). He is acknowledged PhD tutor of 3 PhD students. He defended his doctoral thesis on the subject of “Objective methods for evaluation of surgical outcomes in cleft lip and palate surgery” (PhD). His professional field of interest is in orthognathic, cleft and craniofacial surgery.



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## *Claudia NOFFKE*

Claudia grew up and matriculated in Germany. She obtained her dental degree at the University of Pretoria and managed a private practice for several years. She completed her postgraduate training in 1992 and was appointed as the Head of an OMR Unit at a South African University in 2001, a position from which she retired in 2016. Claudia participated actively in 48 international congresses and refresher courses and authored or co-authored an equal number of scientific papers in peer-reviewed journals. Claudia is on the Editorial Boards of several distinguished journals including the Radiology Section of the Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology, for which she has done 99 scientific reviews. Claudia supervised- and served as external examiner for several Master’s and PhD degrees. She was appointed in May 2018 as Guest Professor in the Department of Imaging & Pathology at the KU of Leuven and is a member of the Education Track Committee of the IADMFR. Claudia moderated the Webinar Africa of the IADMFR WORLD TOUR 2023. She also serves as a private consultant in OMR. Her field of expertise includes ethics and legislation pertaining to radiation protection, fibro-osseous disease and the radiological interpretation of gnathial tumours and cysts.

### *Erich RAUBENHEIMER*

After receiving a MChD degree in Oral Pathology at the University of Pretoria, Erich Raubenheimer joined Medunsa in 1982 as Head of Oral Pathology and Acting Head of Anatomical Pathology. During the first years of appointment at this fledgling health sciences University he was responsible for the histopathology services rendered to the medical- and dental hospitals and regional community clinics. He obtained a PhD, DSc, FCP (SA) and CBCT certification with the American Academy of Oral and Maxillofacial Radiology, supervised 7 PhD degrees and a large number of Master's degrees. His research interests are in head and neck diseases and pathology of mineralized tissues, particularly the diagnosis of metabolic diseases of bone. Erich authored 139 papers in peer reviewed scientific journals (eight of which were on invitation) and contributed to three chapters of the 4th edition of the World Health Organizations' book on head and neck tumours. He was key note speaker at five international conferences and presented 99 invited scientific talks to specialist groups. Erich has a passion for the African elephant and regularly presents talks to interesting societies based on his scientific work on ivory and experience as an elephant tracker in Africa. Erich is presently employed as a senior consultant at Ampath, a large pathology practice in South Africa, holds an extraordinary professorship at the University of Pretoria and a guest professorship at KU Leuven. He is married to Claudia, a remarkable woman who blessed him with four successful children.



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## D. VISITING RESEARCHERS

### *Saleem ALI*

Saleem Saleh Ali was born in Riyadh, Saudi Arabia, in 1985. He achieved his bachelor's degree in Oral and Dental Medicine and Surgery in 2008 at the University of Jordan. In Jordan, he started working as a general dentist in a private clinic for 2 years. In 2010, he joined the Royal Medical Services and worked as a general dentist between 2010 and 2013. From 2013 to 2017, he worked in the army as a restorative dentistry resident. In 2019, he achieved the Jordanian board in restorative dentistry as a specialist, after which he became a specialist in restorative dentistry in the Jordan Army Forces. He is now joining the OMFS-IMPATH research group at KU Leuven for further research.

### *Zaid ALZYOUD*

Zaid Ali Alzyoud, was born in Sahab, Jordan, in 1981. He achieved his bachelor's degree in Oral and Dental Medicine and Surgery in 2006 at the Ukrainian Medical Stomatological Academy. In 2007, he joined the Royal Medical Services and worked as a general dentist between 2007 and 2010. From 2012 to 2015, Zaid worked in the army as a restorative dentistry resident. In 2020, he achieved the Jordanian board in restorative dentistry as a specialist, after which he became a specialist in restorative dentistry in the Jordan Army Forces. He is now joining the OMFS-IMPATH research group at KU Leuven for further research.

## *Mariel BIANCARDI*

Mariel Ruivo Biancardi was born in 1990, in Bauru, São Paulo, Brazil. In 2018, she earned her General Dentistry degree from the São Paulo State University, in Araraquara (FOAr-UNESP). Subsequently (2022), she completed her Master's degree in Stomatology and Radiology at Bauru Dental School - University of São Paulo (FOB-USP) in Bauru, São Paulo, Brazil. Currently, she is pursuing her PhD studies in the same program and university (FOB-USP), under the guidance of Dra. Izabel Regina Fischer Rubira Bullen. She also holds a specialization in oral medicine and hospital dentistry.
Presently, Mariel is actively involved in the OMFS-IMPATH research group at Katholieke Universiteit Leuven (KU Leuven) in Leuven, Belgium, under the supervision of Professor Reinhilde Jacobs. Her research focuses on artificial intelligence as a tool in diagnosing pathologies of the maxillo-mandibular complex.

## *María Ignacia BUSTAMANTE ARAYA*

María Ignacia Bustamante Araya was born in Santiago, Chile, in 1997. She obtained her bachelor's and master's degree in dentistry in 2022 at the Universidad de los Andes, Chile. She was the Class President for the six years of her dentistry career and was recognized in her graduation by the Outstanding Student Award for Service Work and Union Collaboration by the Colegiode Cirujanos Dentistas de Chile A.G., a professional organization made by dental surgeons. During her final year of dentistry, she wrote her dental thesis that focused on the use of Cone Beam Computed Tomography (CBCT) to assess the efficacy and complications of Microscrew-Assisted Rapid Palatal Expansion (MARPE) under the supervision of Oral & Maxillofacial Surgen, Pablo Romero Romano. Also, she completed a clinical internship at KU Leuven, where she treated patients in the student clinic and assisted residents in the specialty clinic of UZ Leuven Campus St. Rafael. Between 2022 and 2023 she worked as a general dentist and assisted in bucal surgeries in Chile. Currently, María Ignacia is enrolled in the Postgraduate studies in Advanced Medical Imaging at KU Leuven, and working on her thesis under the supervision of prof. Reinhilde Jacobs and prof. Walter Coudyzer.



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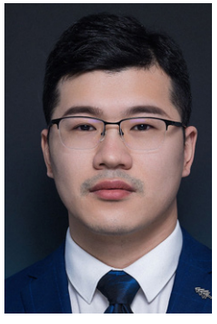
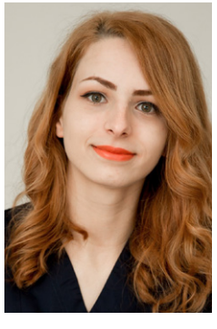
Team

## *Xijin DU*



Du Xijin was born in Henan Province, China, in 1987. He obtained his bachelor and master degree in Dentistry at School of Stomatology, Wuhan University, China in 2010. He continued to study at Wuhan University after that. He completed the thesis and obtained his PhD degree in Prosthodontics in 2013. Then he joined in Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, China and worked as Prosthodontist and Implantologist until now. He is also a Lecturer of the Faculty of Prosthodontics and Implantology, School of Stomatology, Tongji Medical College, HUST. His research focuses on the basic and clinical application related to the restorative materials, the dental implant and the digital technology used in dentistry. He is now joining the OMFS-IMPATH research group at KU Leuven for further research.

## *Sorana Andreea EFTIMIE*



Sorana Andreea Eftimie was born in 1994 in Cluj-Napoca, Romania. She obtained her Doctor of Dental Surgery degree in 2019 and her specialization in Periodontology in 2023, both from Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca. She is currently pursuing a Ph.D. at the same university, under the mentorship of Prof. Dr. Mihaela Hedesiu. Her research is focused on artificial intelligence solutions for diagnostics in dentomaxillofacial radiology.

## Sara ELSONBATY

Sara Elsonbaty was born in Egypt, in 1994. She obtained her bachelor's degree in Dentistry at Tanta university in Egypt in 2017, followed by an internship year at Tanta university and hospitals of ministry of health in 2018. After that, she started to work in a private clinic. Since 2019, she has been working as a general dentist at the Egyptian ministry of health. In 2022, she came to Leuven as a post graduate student in the advanced medical imaging program.

## Hessam FAGHIHIAN

Hessam Faghihian obtained his Doctor of Dental Surgery (D.D.S.) degree from Isfahan University of Medical Sciences, Isfahan, Iran, in2019. He is now studying master's in biomedical sciences at KU Leuven,working on biomechanical computational modeling of oral and maxillofacial tissues under the guidance of Prof. Dr. Reinhilde Jacobs and Dr. Mostafa EzEldeen at OMFS-IMPATH as part of his master's thesis.





## Fernanda FAGUNDES

Fernanda Bulhões Fagundes was born in 1997 in Salvador, Bahia, Brazil. In 2019, she graduated in General Dentistry at the Federal University of Bahia in Salvador. Subsequently (2022), she completed her Master's degree in Oral Radiology at the Piracicaba Dental School - University of Campinas (FOP-UNICAMP) in Piracicaba, São Paulo, Brazil. She is currently pursuing her doctoral studies in the same programme and University (FOP-UNICAMP) under the supervision of Dr. Frederico Sampaio Neves.
Currently, Fernanda is actively involved in the OMFS-IMPATH research group at the Katholieke Universiteit Leuven (KU Leuven) in Leuven, Belgium, under the supervision of Professor Reinhilde Jacobs. Her research focuses is intraoral imaging and endodontic diagnostic tasks, cone beam computed tomography (CBCT) and artefact expression in CBCT.

## Omid JAZIL

Omid Jazil received his degree -cum laude- in civil engineering technology in September 2020 from the University of Antwerp. In June 2022 he also obtained the certificate of honourstudent after following a honoursprogram of two years at OMFS-IMPATH under promotorship of prof. dr. Reinhilde Jacobs. Currently he is studying for his master's in dentistry. His research topics focus primarily on artificial Intelligence and growth modification of the face in children.

## John LOH

John Ser Pheng Loh is a practicing Oral and Maxillofacial surgeon from the National University Centre for Oral Health, Singapore (NUCOHS) as well as the National University Cancer Institute, Singapore (NCIS), under the National University Healthcare System (NUHS) in Singapore. He graduated with the Bachelor of Dental Surgery from the National University of Singapore and the Masters in Dental Surgery from the University of Hong Kong. He obtained his medical degree (MBBS) from Barts and the London School of Medicine and Dentistry, Queen Mary College, University of London, UK. John holds a concurrent appointment as Assistant Professor in the Faculty of Dentistry, National University of Singapore. He subspecializes in Oral Oncology and Reconstruction Surgery and has undergone dual fellowship training in the Department of Head and Neck Oncology and Reconstructive Surgery, Shanghai 9th Hospital, China and Mund-, Kiefer- und Gesichtschirurgie (MKG), Klinikum Rechts der Isar at the Technical University of Munich (TUM), Germany. He is also pursuing a PhD from Karolinska Insitutet, Stockholm, with Professor Reinhilde Jacobs as main supervisor. His PhD project involves the innovation of a medical device system for microsurgical anastomoses of both arteries and veins in reconstructive surgery.

## Nermin MORGAN

Nermin Morgan, BDS, MSc, Diploma in Advanced Medical Imaging, PhD, OMFR-Consultant, Assistant Professor of Oral and Maxillofacial Radiology at the Faculty of Dentistry, Mansoura University, Egypt, Course Director of Oral Radiology at the Faculty of Dentistry, New Mansoura University, and Associate researcher at OMFS-IMPATH research group, KU Leuven. Author and co-author of scientific papers, speaker at national, international, and online events. Her research work has focused on Cone Beam CT (CBCT) and its different clinical applications in the maxillofacial region, Dental Implantology, and Artificial Intelligence in maxillofacial radiology and dentistry.



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## Sâmia MOUZINHO MACHADO

Sâmia Mouzinho Machado, born on August 23th, 1997, in Campina Grande, Paraíba, Brazil. She received her degree as General Dentist in 2019 at the State University of Paraíba, Campina Grande, Paraíba, Brazil. She obtained her master's in Oral Radiology at Piracicaba Dental School - University of Campinas (FOP-UNICAMP), Piracicaba, São Paulo, Brazil, in 2021. She is currently a Ph.D. student in the same program and at the same university (FOP-UNICAMP), under the tutelage of Professor Sergio Lins de Azevedo Vaz, and is participating in the OMFS-IMPATH research group under the tutelage of Professor Reinhilde Jacobs at the Katholieke Universiteit Leuven (KU Leuven), Leuven, Belgium. Her research focus is cone beam computed tomography (CBCT), artifact expression in CBCT, and dental implant imaging.

## Frederico NEVES

Frederico Sampaio Neves was born on October 19th, 1984 in Salvador, Bahia, Brazil. He received his Dental degree in 2008 at the Federal University of Bahia, Brazil. He obtained his Master (2011) and PhD (2013) degrees in Oral Radiology at the University of Campinas, Brazil. Also, he developed the PhD research at the Gothenburg University under the supervision of the Professors Annika Ekestubbe and Sara Lofthag-Hansen. Since 2015, he is a Professor in the Oral Radiology Department at the Federal University of Bahia. His research topics are: CBCT related to Endodontics, Virtual planning in Dentistry and morphological aspects of maxillofacial structures.

## *Axelle NOESEN*

Axelle Noesen is a graduating Master student in Biomedical Sciences - Basic and Translational Research at KU Leuven. Currently pursuing four months of her Master's thesis research at the Department of Dental Medicine at Karolinska Institutet, Stockholm, Sweden. The focus lies on proteomics and thus the statistical implementation of protein data.

## *Ranida PONBUDDHICHAI*

Ranida Ponbuddhichai was born in Bangkok, Thailand, in 1986. She studied for her bachelor's degree in Dentistry (D.D.S.) at the faculty of dentistry, Srinakharinwirot University, Bangkok between 2004 and 2010. Then, in 2014 she graduated with a higher graduate diploma in dentistry, majoring in Pediatric Dentistry at, the faculty of dentistry, Mahidol university. In 2019, she graduated diploma in Mental health (CBT; Cognitive Behavioral Therapy) from the Faculty of Medicine, Chulalongkorn university. Regarding her work experiences, she works for the government as a dentist in Rayong hospital and also several private dental clinics and hospitals. She also attended a volunteer project as a CBT therapist at Chulalongkorn university. She graduated from Postgraduates studies in Advanced Medical imaging, Faculty of Medicine, KU Leuven (2022-2023), with her thesis title: Three Dimensional Facial Imaging: A Qualitative Analysis of Facial Scanner. Now she is exploring her career opportunity in Belgium.



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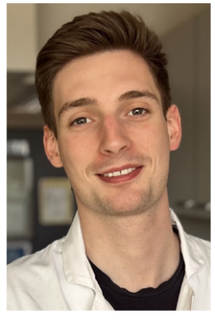
## *Débora RUIZ*

Débora Costa Ruiz was born in Piracicaba, São Paulo, Brazil. She obtained her dental degree in 2019 and completed her Master's degree (Oral Radiology) in 2022 at the University of Campinas (Unicamp). Currently, she is pursuing her doctoral studies and collaborating with the OMFS-IMPATH research group under the supervision of Prof. Dr. Reinhilde Jacobs. The studies focus on Artificial Intelligence-driven segmentation of bone structures on cone-beam computed tomography images.

## *Nick SAEYS*



Nick Saeys is a master student in Biomedical Sciences at KU Leuven. His special interest in dental tissue engineering became clear after completing an internship in the OMFS-IMPATH research group last year. Currently, he is writing his master's thesis under the supervision of Prof. Reinhilde Jacobs, dr. Mostafa EzEldeen (OMFS-IMPATH group, KU Leuven), and Prof. Sofie Struyf (Molecular Immunolgy - Rega Institute, KU Leuven). During this collaboration, his research will focus on gaining a deeper understanding in the role of chemokines in dental pulp regeneration.

## *Airton Oliveira SANTOS-JUNIOR*

Airton Oliveira Santos Junior was born on June 13th, 1993 in Castanhal, Pará, Brazil. He obtained his Dental Degree in 2016 at the University Center of the State of Pará (CESUPA), Brazil. He has a specialization in Endodontics from the Hospital for Rehabilitation of Craniofacial Anomalies of the University of São Paulo (HRAC / USP-Bauru), Brazil (2018). He received his degree Master in Dentistry, Endodontics area, at the Faculty of Dentistry of Araraquara, São Paulo State University "Júlio de Mesquita Filho" (FOAr-UNESP), Brazil (2020). He is currently a PhD student in Dentistry, in the field of Endodontics, at FOAr-UNESP, under the supervision of Prof. Dr. Mario Tanomaru Filho, with a scholarship granted by the Fundação de Amparo à Pesquisa do Estado de São Paulo – FAPESP (process number: 2020/11012-3) and he is performing a sandwich PhD at OMFS-IMPATH Research Group, Katholieke Universiteit Leuven (KU Leuven), Leuven, Belgium, under the supervision of Prof. Dr. Reinhilde Jacobs, with a scholarship granted by FAPESP, in the BEPE modality (process number: 2022/13774-3). His research focuses on the applications of micro-computed tomography and cone-beam computed tomography images for evaluating different stages of endodontic treatment. More recently he has been working with an artificial intelligence-driven tool on CBCT images for automatic segmentation of endodontic structures.

## *Büşra ŞENEL*

Büşra Şenel was born in Bursa,Turkey. She obtained her 'Doctor of Dental Surgery (DDS)' degree in 2023 from Ankara University Faculty of Dental Medicine. She worked as a visiting researcher at Basel University under the supervision of Prof. Dr. Michael Bornstein and Dr. Viktoriya Skyp during the summer period 2022. She worked as an undergraduate researcher at Ankara University and published a paper at TAOMS "Yurttutan M.E, Şenel B, Conservative Treatment of Central Giant Cell Granuloma" also worked on 'Dental anxiety on oral surgery patients'. Other than these she conducted and participated in different research projects during her dentistry study. Currently, she is a Postgraduate student in Advanced Medical Imaging and she is working as a part of the OMFS-IMPATH research team with the supervision of Prof. Dr. Reinhilde Jacobs.





## *Sohaib SHUJAAT*

Sohaib Shujaat was born on November 29th, 1985. He achieved his degree in Bachelor of Dental Surgery (B.D.S) from Lahore Medical and Dental College, Lahore, Pakistan (2004 - 2008). After his graduation, he worked as an Internee in all clinical departments of dentistry at Lahore Medical and Dental College, Lahore, Pakistan (2009-2010). He obtained his Master of Science (MSc. Dent Sci) degree in Oral and Maxillofacial Surgery (360 credits) with merit from Glasgow Dental School and Hospital, University of Glasgow, Glasgow, United Kingdom, under the guidance of Professor Ashraf Ayoub (2010-2012). During his Masters, he worked on 4-Dimensional facial soft tissue changes in oncology patients. From March 2013 till September 2017, he worked as a Lecturer in the Department of Oral and Maxillofacial Surgery and Course Director of Internal Medicine and Comprehensive Patient Management (CPM) for dental students at Imam AbdulRahman Bin Faisal University (Formerly University of Dammam), Dammam, Kingdom of Saudi Arabia. At the same instance, he served as a Specialist (Registrar) in the Department of Oral and Maxillofacial Surgery, King Fahd Hospital of the University. He obtained his PhD in Oral and Maxillofacial Surgery (2017-2021) under the supervision of with Professor Reinhilde Jacobs and Professor Constantinus Politis. His research topic during PhD was related to relapse of orthognathic surgical procedures. Currently he is appointed as Assistant Professor in Oral and Maxillofacial Surgery, King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia and acting as a co-supervisor for PhD students at OMFS-IMPATH Research Group, KU Leuven, Leuven, Belgium.

## *Marie Louise SLIM*

Marie Louise Slim was born in Beirut, Lebanon, in 1996. She earned her Doctor of Dental Surgery degree in 2019, followed by a Master's in Endodontics in 2022, both from Saint Joseph University of Beirut. She completed a clinical internship at UC Louvain in 2018, supported by the Erasmus+ Scholarship. From 2022 to 2023, she served as a pre-clinical and clinical instructor in the Endodontic Department at Saint Joseph University of Beirut. She worked as a research assistant in the Cranio-Facial Research Laboratory at Saint Joseph University of Beirut from 2022 to 2023. Currently, she is pursuing Postgraduate Studies in Advanced Medical Imaging at KU Leuven, with a research focus on Artificial Intelligence-driven root canal segmentation under the supervision of Prof. Dr. Reinhilde Jacobs.

## *Abdullah SWAITY*

Abdullah Yousif Swaity was born in Abu Dhabi, United Arab Emirates, in 1987. He achieved his bachelor's degree in Oral and Dental Medicine and Surgery in 2009 at the Misr University for Science and Technology in Egypt. Afterwards, he started working as a general dentist in private clinics for 2 years. In 2011, he joined the Royal Medical Services and worked as a general dentist between 2011 and 2014. From 2014 to 2018 he worked in the army as a prosthodontic resident. In 2020, he achieved the Jordanian board in Prosthodontics to become a specialist, after which he become a prosthodontic specialist in the army as well. He is now joining the OMFS-IMPATH research group at KULeuven do to further research.

## *Ilya TSIKLIN*

Iya Tsiklin was born in Moscow, Russian Federation, in 1978. He graduated from Dental and Medical schools at the Moscow State University of Medicine and Dentistry in 2001 and 2007, respectively. After graduation from the Dental school, he attended the two-year residence program in Oral Surgery. The General Surgery internship and the advanced course in Maxillofacial Surgery and Reconstructive Microsurgery followed the Medical School graduate program. Ilya completed the thesis and obtained his PhD degree in 2007. With around 20 years of clinical and research experience in oral and maxillofacial surgery, he has been acting as a maxillofacial surgeon and a research scientist. His clinical career predominantly focuses on facial trauma, post-traumatic deformities, tumors, facial paralysis, and reconstruction. Ilya attended various educational events and scientific conferences in Russia, Europe, and the US. His research interests include orbital reconstruction, bone graft prefabrication, and tissue engineering. Ilya received multiple awards during his career and published more than 30 research papers.



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Team

## *Femke VANDEPUT*

Femke Vandeput, born in Belgium, in 1999. She studied her bachelor in Biomedical Sciences at the University of Hasselt and performed a bachelor's thesis at Biomed in 2021. She completes her master's degree in Biomedical sciences at KU Leuven. She performes her master thesis about the risk factors and treatment prognosis of medication-related osteonecrosis of the jaws (MRONJ), supporting the research of Catalina Moreno Rabie under tutelage of prof. Jacobs.

## *Luiz Eduardo Marinho VIEIRA*

Luiz Eduardo was born on June 27th, 1993 in Princesa Isabel, Paraíba, Brazil. He obtained his degree as General Dentist in 2016 from the Federal University of Campina Grande, Patos, Paraíba, Brazil. After working as a General Dentist from 2016 to 2017 in the Brazilian Unified Health System (SUS), he obtained his degree of "Master in Dentistry" in 2019 from the State University of Paraíba, Campina Grande, Paraíba, Brazil. He is currently a PhD student in Oral Radiology at Piracicaba Dental School, University of Campinas, Piracicaba, São Paulo, Brazil, under the advice of Professor Matheus L. Oliveira and participates in the OMFS-IMPATH research group under the advice of Professor Reinhilde Jacobs at KU Leuven, Leuven, Belgium. His research topics are: digital radiography, cone beam computed tomography, intraoral scanning and infrared thermography.

### *Milda VITOSYTĖ*

Milda Vitosyte was born in 1997, Vilnius, Lithuania She obtained her master's degree in Dentistry (D.D.S.) at the faculty of dentistry, Vilnius university between 2015 and 2020, including Erasmus+ studies at Malmö University in Sweden and an internship at New York University in the United States. In 2020, she started her post-graduate residency studies in Oral surgery at Vilnius University and will complete them in 2023. Currently she is a PhD candidate at Vilnius University, beginning in November 2022, under the supervision of Prof. Vygandas Rutkunas and Dr. Ieva Gendviliene. Her research focuses on the development and application of 3D printed bone scaffolds in vivo and in vitro.

### *Lianyi (Amy) XU*

Lianyi Xu obtained her Bachelor's degree in Stomatology from Huazhong University of Science and Technology and accepted a 1-year medical residency training in Tongji Hospital. In 2010, she became a Ph.D. candidate in the Ninth People's Hospital, affiliated with Shanghai Jiao Tong University. Her mentor was Prof. Xinquan Jiang. Since 2016, she worked as a prosthodontist and implantologist in the Stomatology Center of Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology. Dr. Xu focused her study on the field of tissue regeneration as well as dental implant early osseointegration in the oral and maxillofacial region. More recently she has broadened her horizon to immunology reaction and tried to explain the balance between hard/soft tissue formation and immunological/inflammatory response in the processes of re-osseointegration and periodontal apparatus re-establishment following regenerative treatment of peri-implantitis and periodontitis.



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Team

## E. ADMINISTRATIVE COORDINATOR

### *Nele VANLOOCKE*

Nele Vanloocke obtained her Master's Degree in Western Literature in 2013 and has a professional commercial background as well as experience as an all-round project coordinator. She is currently working as the administrative coordinator for the OMFS-IMPATH research group and also handles financial and personnel matters as antenna of the Department of Imaging & Pathology.

# 3

# Research

## A. PROJECTS

### NATIONAL FUNDING

**M3-OBSERVATORIUM**

Epidemiological study on the surgical removal of third molars

*In samenwerking met Vlaams Ziekenhuisnetwerk KU Leuven*

### VLAIO

**AIPLANT**

CBCT-based Automated Implant PLANning for single implant Treatments

### FWO

**IDENTGEL**

Immune-modulated dental pulp regeneration through dual-cure injectable nanocomposite hydrogel

**TOOTH AUTOTRANSPLANTATION**

The development and clinical application of CBCT-based tooth auto transplantation

**TREASURE**

Dentomaxillofacial paediatric imaging: an investigation towards low dose radiation induced risks

**EXTRACT-NOAC**

Use of new oral anticoagulants in oral surgery

**PRIMORDIAL**

An artificial intelligence (AI) driven prediction model to detect risk factors for medication-related osteonecrosis of the jaws

## INTERNAL FUNDING

**DREIMS**

Dental Tissue Regeneration via Bioengineerd Immune Modulatory Scaffolds

**CRANIVAL**

Departmental grant BEPAT

**BOF CELSA/18/038**

Harmonization of the use of cone-beam computed tomography for developmental disorders in the maxillofacial region

**BOF C24/18/068**

De ontwikkeling van beeldvorming-gebaseerde bioprinttechnieken voor volledig tand- en bot-regeneratie in de dentoalveolaire regio

**BOF C24/18/065**

Beeldkwaliteitsoptimalisatie van dentale cone-beam CT

## INTERNATIONAL FUNDING

**NZ ROYAL SOCIETY CATALYST FUND**

Digital Dentistry Collaboration

## INDUSTRIAL FUNDING

**BETCON**

Beste behandeling voor kaaknecrose





## B. AWARDS

November 2023
5TH BEST PRESENTATION PRIZE OF THE KBVSMFH 2021-2023
Belgian Society of Oral & Maxillo Facial Surgery Head & Neck

**Jonas Ver Berne**

November 2023
FIRST SCIENTIFIC AWARD FROM THE BELGIAN SOCIETY FOR ORAL AND MAXILLOFACIAL HEAD AND NECK SURGERY FOR PREVIOUS CONTRIBUTIONS TO THE OMFS SPECIALTY
Belgian Society of Oral & Maxillo Facial Surgery Head & Neck

**Fréderic Van der Cruyssen**

October 2023
PRIJS PROF. DR. BARON ALBERT LACQUET 2022 TER BEVORDERING VAN DE HEELKUNDE
KONINKLIJKE ACADEMIE VOOR GENEESKUNDE VAN BELGIE

**Kathia Dubron**

October 2023
THIRD BEST E-POSTER AWARD
Basic Research Session
3rd DDS Global Congress

**Bahaa Elgarba**

October 2023
FIRST BEST E-POSTER AWARD
Basic Research Session
3rd DDS Global Congress

**Rocharles Cavalcante Fontenele**

July 2023
BEST ONLINE PITCH AWARD
IADMFR WORLD TOUR 2023

**Rocharles Cavalcante Fontenele**

July 2023
AI IN MAXILLOFACIAL IMAGING AWARD
IADMFR WORLD TOUR 2023

**Rocharles Cavalcante Fontenele**

July 2023
THIRD PRIZE IADMFR RESEARCH AWARD
IADMFR WORLD TOUR 2023

**Karen Merken**

July 2023
SECOND PRIZE IADMFR RESEARCH AWARD
IADMFR WORLD TOUR 2023

**Thanatchaporn Jindanil**

July 2023
FIRST PRIZE IADMFR RESEARCH AWARD
IADMFR WORLD TOUR 2023

**Catalina Moreno Rabie**





## C. PUBLICATIONS

### INTERNATIONAL PEER-REVIEWED PUBLICATIONS

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Casselman, J., Van der Cruyssen, F., Vanhove, F., Peeters, R., Hermans, R., Politis, C., Jacobs, R. (2023) 3D CRANI, a novel MR neurography sequence, can reliable visualise the extraforaminal cranial and occipital nerves. *EUROPEAN RADIOLOGY* 2023 33;4 2861-2870 doi:10.1007/s00330-022-09269-2

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Research

Zhong, S., Shi, Q., Van Dessel, J., Gu, Y., Luebbers, H. -T., Yang, S., Sun, Y., Politis, C. (2023). Biomechanical feasibility of non-locking system in patient-specific mandibular reconstruction using fibular free flaps. *JOURNAL OF THE MECHANICAL BEHAVIOR OF BIOMEDICAL MATERIALS,* 148, 11 pages. doi:10.1016/j.jmbbm.2023.106197

## BOOK (CHAPTER) PUBLICATIONS

Nagy, K., Gulyás, G. (ed)
Facial Development Disorders. PLASTIC SURGERY. Kossuth Kiadó Zrt.
Hardcover (to be published)
eBook (to be published)





## OTHER PUBLICATIONS

Dhooghe, N., Verhelst, P.J., Vandenbosch, K., Engelen, B., Vanderhaeghe, F., Nagy, K., Roche, N., Hens, G. (2023) Chirurgische behandeling lip- en verhemeltespleet. *TIJDSCHRIFT VOOR GENEESKUNDE EN GEZONDHEIDSZORG,* Jaargang 2023, volume 79, nummer 6, p. 493-502 DOI-nummer: 10.47671/TVG.79.23.045

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## D. CHAIRS

### *ANTHOGYR-STRAUMANN CHAIR FOR ORAL AND MAXILLOFACIAL SURGERY*
*3 YEARS (01.09.2018-30.11.2024)*

The purpose of the Chair is prevention and treatment of neuropathic pain following dento-aveolar and dental implant surgery. Professor Politis is the chair holder and professor Jacobs is the co-chair holder.

### *THE ALEAMED & KLS MARTIN CHAIR FOR OMFS*
*3 YEARS (01.08.2019 - 31.07.2025)*

To support research in the field of trigeminal neuropathy in OMFS.

## E. DOCTORAL THESIS DEFENSES

OMFS-IMPATH SUPERVISED PhDs

**Ayidh Alqahtani, K. (2023)**
Three-dimensional evaluation of root resorption after maxillary orthognathic surgery.
Promotor: Reinhilde Jacobs, Co-promotor: Eman Shaheen

**Li, J. (2023)**
Evaluation of Postoperative Outcomes in Orthognathic Surgery Patients with Systemic Diseases.
Promotor: Reinhilde Jacobs, Co-promotors: Constantinus Politis, Eman Shaheen

**Torres, A. (2023)**
Guided Endodontics. A critical evaluation by means of in vitro studies and a clinical trial.
Promotor: Reinhilde Jacobs, Co-promotor: Paul Lambrechts

**Van der Cruyssen, F. (2023)**
Trigeminal nerve injuries - evaluation and optimization of diagnostic methods.
Promotor: Reinhilde Jacobs, Co-promotors: Constantinus Politis, Tara Renton, Jan Casselman

**Wang, X. (2023)**
Digital dentistry: Simplifying the workflow via 3D modelling and artificial intelligence assistance.
Promotor: Reinhilde Jacobs, Co-promotors: Eman Shaheen, Sohaib Shujaat

OMFS-IMPATH COSUPERVISED PhDs

**Salar Amoli, M. (2023)**
Development of inks for tissue engineering of the dentoalveolar region through bioprinting.
Promotor: Veerle Bloemen, Co-promotor: Reinhilde Jacobs

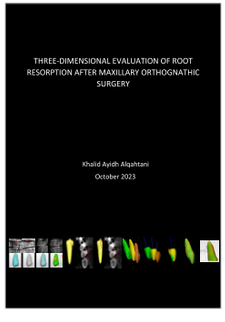
**Van Gorp, G. (2023)**
Management of traumatized immature teeth in children needing orthodontic tooth regulation.
Promotor: Dominique Declerck, Co-promotors: Reinhilde Jacobs, Guy Willems

## OMFS-IMPATH SUPERVISED PhDs

### Khalid Ayidh Alqahtani

**Three-dimensional evaluation of root resorption after maxillary orthognathic surgery.**

The author of this PhD manuscript, Khalid Ayidh Alqahtani, obtained his degree in Bachelor of Dental Surgery (B.D.S.) from the Faculty of Dentistry, Prince Sattam Bin Abdulaziz University, Alkharj (2010-2016), followed by an internship year at the faculty clinics. After his graduation, he worked there as a teaching assistant in the department of Oral radiology and Diagnostic sciences (2017-2018). From September 2018 till October 2023, he was a PhD researcher in the OMFS-IMPATH research group, with Prof. Dr. Reinhilde Jacobs and Dr. Eman Shaheen as his scientific promoters. The research topic for his PhD was focused towards three-dimensional evaluation of root resorption following maxillary orthognathic surgery. During his PhD studies, he also achieved his degree in Postgraduate studies in advanced medical imaging at KU Leuven, Belgium.




The majority of studies assessing root changes following maxillary orthognathic surgery in conjunction with orthodontic treatment have been either short-term or two-dimensionally assessed, which is prone to human error. There is no standard 3D protocol for objectively quantifying root changes. This doctoral thesis aimed to present and validate a novel automated approach for objectively quantifying linear and volumetric root changes on CBCT images following combined orthodontic-orthognathic surgical treatment.

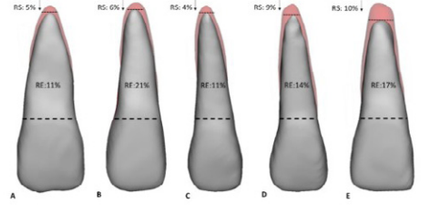
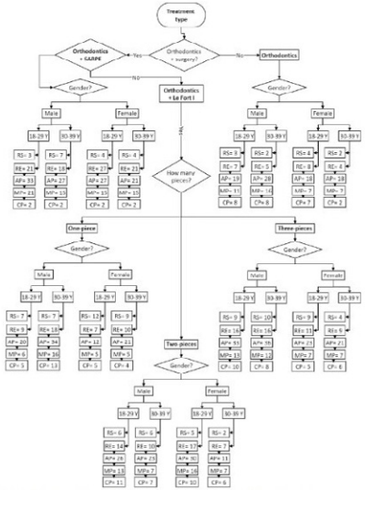



*Illustration of root changes in 3Dfor a typical central incisor of male patients agend between 18-29 years undergoing the five treatment types: A. Orthodontics only, B. SARPE + orthodontics, C. One-piece Le Fort I + orthodontics, D. Two-pieces Le Fort I + orthodontics, E. Three-pieces Le Fort I + orthodontics reporting root resorption (RS) and root remodeling (RE). Preoperative tooth is in transparent red and 1 year postoperativetooth in gray.*




*Flowchart reporting the percentage of root remodeling (RE), resorption (RS) and morphological changes (AP: apical part, MP: middle part, CP: coronal part)*

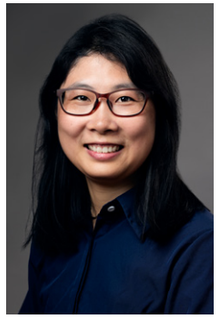




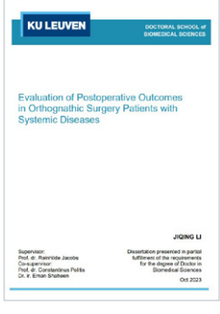
## OMFS-IMPATH SUPERVISED PhDs

### Jiqing Li

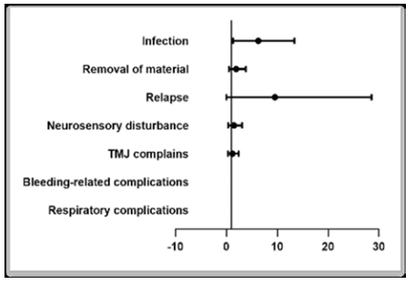
**Evaluation of Postoperative Outcomes in Orthognathic Surgery Patients with Systemic Diseases.**



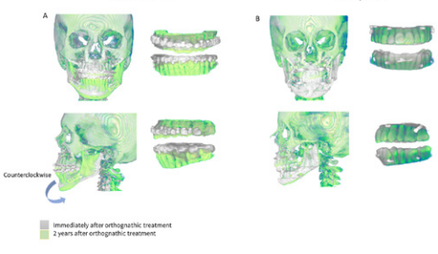
Jiqing Li achieved her degree in Bachelor of Dental Medicine from School of Stomatology, Shandong University, Jinan, China (2009- 2014). She obtained her “Master of Dental Medicine” degree from West China College of Stomatology, Sichuan University, Chengdu, Sichuan, China (2014 - 2017). After her graduation, she worked as a general dentist at West China Hospital of Stomatology, Chengdu, China (2017-2018). She started working as a Ph.D. candidate (OMFSIMPATH, KU Leuven) in 2018, with Prof. Reinhilde Jacobs, Prof. Constantinus Politis, and Dr. Eman Shaheen as her (co- )promotors.




This doctoral thesis investigates the impact of systemic diseases on orthognathic surgery outcomes, aiming to enhance treatment approaches. Through prevalence studies and retrospective cohort analyses, the research reveals distinct complications associated with conditions such as rheumatic diseases, osteopenia, myotonic dystrophy, congenital myopathy, asthma, and autoimmune diseases. These findings offer valuable insights into the challenges and considerations when treating orthognathic surgery patients with systemic diseases. Ultimately, this work contributes to the advancement of patient care and surgical strategies in this specialized context.




*Adjusted odds ratios of all outcome variables for patients with and without rheumatic diseases by Logistic regression analysis. Compared to healthy patients, the risk of infection (adjusted OR=4.191 [1.313, 13.380], P=0.016) was increased in patients with rheumatic diseases.*



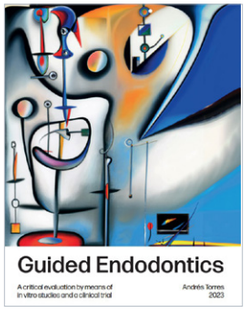

*Three-dimensional superimposition of CBCT images illustrating skeletal relapse in asthmatic patient and no relapse in healthy control patient. (A) Maxilla remains stable up to 2 years after surgery, while mandible relapsed counterclockwise in asthmatic patient, and (B) both maxilla and mandible remain stable in healthy control patient.*

## OMFS-IMPATH SUPERVISED PhDs

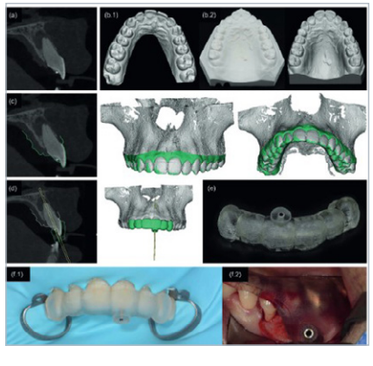
### Andrés Torres

**Guided Endodontics. A critical evaluation by means of in vitro studies and a clinical trial.**

The author, Andrés Torres obtained his degree as General Dentist in 2012 from the University of Los Andes, Santiago, Chile. In March 2014 he achieved the equivalence of foreign diploma “Titulo de Cirujano Dentista” with the Flemish degree of “Master of Science in Dentistry”. In 2015 he obtained the diploma of Postgraduate studies in Advance Medical Imaging at the KU Leuven. Further, he obtained a specialization degree in Endodontics in July 2017, under the guidance of Prof. Paul Lambrechts at the KU Leuven. He started his PhD in November of 2017 under the guidance of Prof. Reinhilde Jacobs and Prof. Paul Lambrechts. Currently he works part-time as an Endodontist specialist in a private practice, and he is part-time instructor in Endodontics at the UZ Leuven (University Hospitals Leuven), Dentistry, Endodontics, Leuven, Belgium.




Pulp canal obliteration (PCO), is a process characterized by the deposition of hard tissue within the root canal, which presents mainly as a result of traumatic dental injuries (TDI). TDI are highly common and account for 85% of patients presenting with injuries in the oral region. They affect one billion people globally with a prevalence of 15.2% in permanent dentition. Most often, patients with a history of TDI, present years after the accident with a single discolored tooth as result of PCO. If root canal treatment is needed, localizing the root canal can be a difficult and long task, and in such cases, there is a higher probability of technical failures which can compromise the treatment outcome. Guided Endodontics (GE), in which a 3D printed guide is used to guide the bur up to the target location, can reduce the chance of iatrogenic damage or excessive loss of tooth structure, and increase the likelihood of finding the canal. The general aim of this PhD project was to investigate the clinical applications and accuracy of various methods for GE, and to provide an answer to the question: does GE treatment results in less technical failures compared to free-handed treatment? We have shown in this thesis that with the help of GE, complex clinical cases, which were otherwise doomed for failure or extraction, can be successfully treated. However, it is still a complex procedure, with some limitations, and should be carried out by an experienced Endodontist with the aid of a dental microscope.



*Workflow for guided endodontics. A CBCT from the patient is acquired (a) as well as a digital intraoral impression directly (b.1) or indirectly (b.2). The information from both sources is combined and registered in a digital planning software (c). Then, a treatment guide is designed (d) and fabricated (e). Finally, the guide is either used during guided access cavity preparation (f.1) or apical surgery (f.2).*



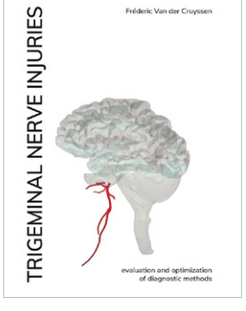


OMFS-IMPATH SUPERVISED PhDs

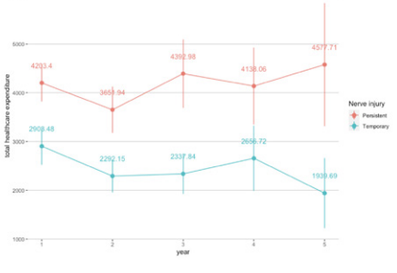
### Fréderic Van der Cruyssen

**Trigeminal nerve injuries - evaluation and optimization of diagnostic methods.**

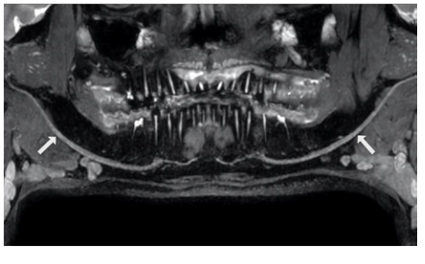
Fréderic Van der Cruyssen was born in Waregem, Belgium on January 23th 1992. He received his medical degree magna cum laude from the Catholic University of Leuven in June 2017 with a master’s thesis on trigeminal nerve physiology and his dental degree at the same university in 2020. In 2019 he commenced his PhD project at the OMFS-IMPATH research group under promotorship of Prof. dr. Reinhilde Jacobs, Prof. dr. Constantinus Politis, Prof. dr. Jan Casselman and Prof. dr. Tara Renton. In 2020 he started his oral and maxillofacial surgery residency at the University Hospitals Leuven. In 2021 he obtained a master's degree in healthcare policy and management at the Catholic University of Leuven. Currently, he is a third-year oral and maxillofacial resident at the ETZ Elisabeth Hospital, Tilburg, The Netherlands.




Trigeminal nerve injuries (TNIs) are detrimental to patients' quality of life, arising from various dental and facial procedures and leading to post-traumatic trigeminal neuropathy (PTN) with diverse symptoms. This PhD highlights the limited usefulness of standard magnetic resonance (MR) imaging in diagnosing PTN. We validated a specialized MR neurography sequence, 3D CRANI, for better diagnostic accuracy. We also underscores the significance of integrating clinical and patient-reported data for early prediction of outcomes. Experts in a Delphi study emphasize the need for spreading awareness among oral and maxillofacial surgeons, developing consensus guidelines, and combining diagnostic methods for improved management of TNIs and PTN. Prompt and multifaceted treatment approaches, involving diverse experts and continuous training, are recommended for effective management.




*Time series analysis of total healthcare expenditure between temporary and persistent trigeminal nerve injury cohorts in the first five years after onset. Mean prices ± standard deviations are given. Prices are given in 2019 € for Belgium. Costs increased when the injury was permanent.*



*Panoramic curved reconstruction of the inferior alveolar nerve using our newly developed and validated magnetic resonance neurography (3D CRANI) sequence allowing a full nerve evaluation at a glance.*

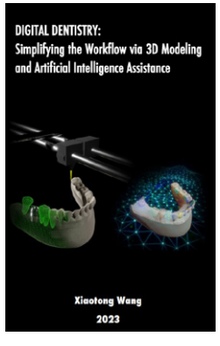
## OMFS-IMPATH SUPERVISED PhDs

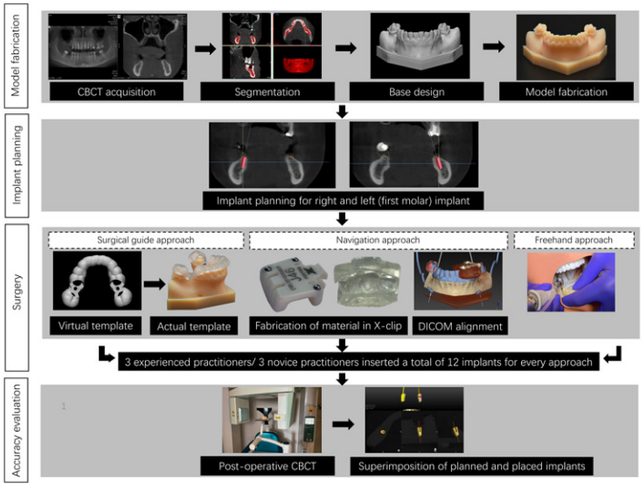
### Xiaotong Wang

**Digital dentistry: Simplifying the workflow via 3D modelling and artificial intelligence assistance.**

Xiaotong Wang achieved her Bachelor and Master of dental medicine from Harbin Medical University, China (2010-2018). From June 2018 till August 2019, she worked as a resident doctor in the department of Oral and Maxillofacial Surgery at First Affiliated Hospital of Harbin Medical University. She was a PhD researcher under the supervision of Prof. Reinhilde Jacobs in the OMFS-IMPATH research group, KU Leuven, Belgium (2019-2023).

The use of digital technologies in the practice of dentistry can improve the accuracy and efficiency of dental procedures, and lead to better outcomes for patients. This doctoral thesis aimed to study the impact of digital technologies on dentistry and to explore how digital dentistry can simplify the workflow through the use of 3D modeling and AI assistance. The outcome of this thesis could allow dental treatment, surgical training, and education with the integration of digital technologies to achieve enhanced accuracy and efficiency. However, it is crucial to carefully consider the potential benefits and drawbacks before implementing these technologies in practice, taking into account the unique needs and resources of both the practice and its patients.




*The 3D printed model incorporates patient CBCT-based trabecular and cortical bone with haptic feedback for computer-assisted surgical training. Both experienced practitioners and novices performed implant surgery using dynamic navigation, surgical guides, and a freehand approach. An assessment of accuracy, surgical time, and self-confidence aimed to determine the potential enhancement of novice surgeons' performance through computer-assisted technologies, with experienced surgeons serving as a clinical reference.*





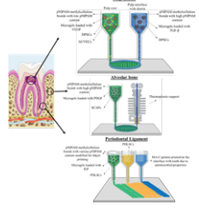
## OMFS-IMPATH CO-SUPERVISED PhDs

### Mehdi Salar Amoli

**Development of inks for tissue engineering of the dentoalveolar region through bioprinting.**

Mehdi Salar Amoli is a PhD candidate at OMFS-IMPATH in collaboration with Faculty of Engineering Technology working under supervision of Prof. Veerle Bloemen and Prof. Reinhilde Jacobs. He studied biomaterials and tissue engineering for bachelor's at Amirkabir University of Technology in Iran working on multiphasic chitosan scaffolds for cartilage regeneration. He obtained his master's degree at Imperial College London in biomaterials and tissue engineering and worked under supervision of Prof. Molly Stevens and Dr. Ioanna Mylonaki on developing non-viral methods for nucleic acid delivery to the cells. He is currently working on development of methods for regeneration of dentin-pulp region through bio printing cell encapsulated materials.


Oral health issues in the dentoalveolar region are considered to have a significant impact on the individual's quality of life. Consequently, a range of treatment options have been developed to address complications in this region. However, certain shortcomings of these treatments have resulted in the exploration of regenerative strategies and tissue engineering approaches aimed at reconstructing tissue structures in this region. The emerging technique of bioprinting, capable of potentially addressing limitations of traditional tissue engineering strategies, has recently gained widespread attention. This is because bioprinting has an enhanced potential to fabricate tissue analogues in a robust manner and with a high degree of geometrical resemblance to natural tissue by incorporating multiple biomaterials, cell types and biological factors within the manufacturing process. Still, the application of bioprinting in dentoalveolar tissue engineering is a relatively unexplored field of study. The aim of the research presented here is to combine both and to develop biomaterial-based strategies capable of being utilized in bioprinting and addressing heterogeneities such as the localized differentiation in dental pulp, the gradient structure of periodontal ligament interfacing bone and cementum, as well as the layered structure of the alveolar bone. In particular, this thesis focuses on the development of novel biomaterials which could be used as biomaterial inks, bioinks and drug delivery systems to bioprint constructs, and which are able to recapitulate the dentoalveolar structures. To achieve this, first, an overview of the materials used for this application was made, highlighting the current demands in this field of research. Next, hydrogels based on chitosan and poly nisopropylacrylamide were developed, and their ability to be used in the fabrication process, and to support viability of dental pulp stem cells was demonstrated. A part of this thesis was dedicated to the development of microgels capable of delivering molecules within tissue engineering strategies. It was demonstrated that these microgels are capable of loading and sustained release of small molecules, and that they could be integrated in bioinks without having any negative impact on their printability. Overall, the biomaterials developed in this thesis provide a solid basis for the fabrication of constructs through bioprinting which would be able to address the physical, mechanical and biological heterogeneity of the inherently complex dentoalveolar region.



*During this PhD, several solutions for use in bioprinting strategies aimed at regeneration of the dentoalveolar region were developed, providing a platform to address physical, mechanical and biological heterogeneities in this region. This figure represents a schematic representation of suggestive approaches for further utilization of the developed strategies towards addressing the complexities in tissue engineering of the dentoalveolar region, the top picture represents a suggestive strategy for pulp-dentin regeneration, followed by alveolar bone and periodontal ligament. Abbreviations: pNIPAM: poly n-isopropylacrylamide, VEGF: vascular endothelial growth factor, DPSC: dental pulp stem cell, hUVEC: human umbilical vein endothelial cell, TGF: transforming growth factor, PDGF: platelet derived growth factor, SCAP: stem cells from apical papilla, IGF: insulin like growth factor, PDLSC: periodontal ligament stem cell, MA-C: maleic grafted chitosan*

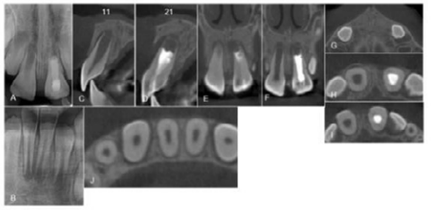
## OMFS-IMPATH CO-SUPERVISED PhDs

### Gertrude Van Gorp

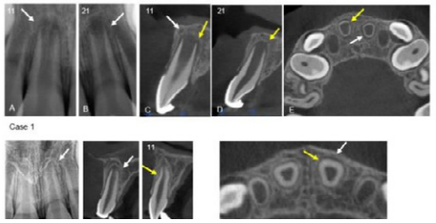
**Management of traumatized immature teeth in children needing orthodontic tooth regulation.**

Geertje Van Gorp is a certified dentist (Catholic University of Leuven, Belgium). She obtained a specialization in Paediatric Dentistry and Special Dental care (1986) at the KU Leuven and a specialization in Endodontics (2001) at the KU Leuven. She obtained here PhD in 2023 titled “Management of traumatized immature teeth in children needing orthodontic tooth regulation”. She is currently working as a pediatric dentist-endodontologist at the Catholic University of Leuven (Belgium). She is involved in the postgraduate training program in Pediatric dentistry and Special dental care, an also in the postgraduate training program in Endodontics.
Within the University Hospitals Leuven, she provides dental treatment to children and adolescents, with main focus on dental traumatology and management of carious lesions in primary and (immature) permanent dentition.
She has obtained the fellowship of the International Association of Dental Traumatology (2015) and she is currently a member of the board of Directors of the International Association of Dental Traumatology. She has received the 1st place for oral presentation at the European Academy of Paediatric dentistry (2019) and the 1st place of the International Association of Dental Traumatology case report competition (2019). She has 16 international peer-reviewed papers, and 1 book chapter.


Orthodontic treatment after dental trauma. Orthodontic tooth regulation is a type of treatment frequently offered to children, usually in the stages of development of the dentition and surrounding orofacial structures. Teeth affected by trauma are most often situated in the esthetic zone. Visible defects and discolorations may have a lifelong impact on self-esteem, overall well-being and quality of life of the individual. Complications require additional treatment sessions and eventual tooth loss will have consequences on the development of the surrounding structures since childhood and adolescence are the periods in life where growth of orofacial structures and development of the dentition take place. Finally, economical aspects should not be disregarded both at the level the patient (and his parents) and society (health care system). To ensure optimal orthodontic care of children with a history of traumatized anterior teeth, certainly teeth with poor prognosis, interdisciplinary long-term management is required including the general dentist, the pediatric dentist and the orthodontist. Reports from the literature show that the knowledge on dental trauma and its implications on orthodontic tooth movement is rather poor.



*Two typical examples of 2D and 3D images shown to the observational panel of paediatric dentists. (A,B) Periapical radiographs. (C-J) CBCT images. Reported are the benchmark findings both on 2D and 3D images: (A-D) immature upper and lower front teeth. (B,J) widening of the periodontal ligament of teeth 31/41. Seven additional benchmark findings are detected on 3D: (C,D,E) teeth 11/21: disappearance of the lamina dura and widening of the periodontal ligament. (E,F) tooth 21: apical pathology. (D) tooth 21: perforation cortical vestibular bone plate. (G) teeth 11, 21: apical sclerotic bone (indicative of an earlier traumatic insult). (H,I) tooth 21: cracks in roots. (J) teeth 41/42: cracks in alveolar bone between 42-41.*




*Two examples of clinical cases illustrating the benchmark diagnoses on 2D and on 3D images; Case 1 - (A,B) Periapical radiographs. (C-E) CBCT images. Benchmark findings visible both on 2D and 3D images: (A,C) immature tooth 11 with apical pathology (white arrow); (B,E) immature tooth 21 with limited widening of the periodontal ligament space, indicating subluxation (white arrow). Benchmark findings additionally detected on 3D images: (C) immature tooth 11: no apical lamina dura or periodontal ligament space, indicating apical pathology (yellow arrow); (D) immature tooth 21: discrete interruption in the apical lamina dura (yellow arrow); (E) immature tooth 11: apical external inflammatory root resorption (yellow arrow). Case 2 - (A) Periapical radiograph. (B-D) CBCT images. Benchmark findings visible both on 2D and 3D images: (A,B,D) immature tooth 21 with widening of the periodontal ligament, indicating subluxation (white arrow). Benchmark findings additionally detected on 3D images: (C) immature tooth 11: dilacerated root, probably because of an earlier dental trauma (yellow arrow); (D) immature tooth 21: root crack (yellow arrow).*



# 4

# Lecturing

A. SCIENTIFIC CONTRIBUTIONS AT CONGRESSES

- Oral presentations
- Poster presentations

B. INVITED LECTURES



## A. SCIENTIFIC CONTRIBUTIONS AT CONGRESSES

### ORAL PRESENTATIONS

Aelterman, N., Coropciuc, R., Willaert, R., Bila, M., Meeus, J., Politis, C. (2023)
Dysesthesia in orthognathic surgery
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Ahmadizai, I., Casselman, J., Politis, C., Jacobs, R., Van der Cruyssen, F. (2023)
Morphometric and Signal Intensity Benchmarking Values of 3D Crani MR Neurography of Peripheral Cranial and Occipital Nerves
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium

Bangia, M., Ahmadzai, I., Casselman, J., Politis, C., Jacobs, R., Van der Cruyssen, F. (2023)
Accuracy of MR neurography as a diagnostic tool in detecting injuries to the lingual- and inferior alveolar nerve in patients with iatrogenic post-traumatic trigeminal neuropathy
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Brijs, K., Van der Cruyssen, F., Willaert, R., Bila, M., Coropciuc, R., Meeus, J., Politis, C. (2023)
Value of nerve surgery in the treatment of neuropathic pain
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Chopra, S., Vranckx, M., Ockerman, A., Östgren, P., Kruger-Weiner, C., Lund, B., Benchimol, D., Jacobs, R. (2023)
AI-Assisted Radiographic Predication of Mandibular Third Molar Eruption
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium

Da Costa Senior, O., Vercruysse, H. Jr., Van de Casteele, E., Collier, E., De Vos, W., Dielen, D., Jonkergouw, J., Nadjmi, N., Renier, L., Stevens, S., Van de Perre, J., Van Genechten, M., Van Hemelen, G., Vanho, F., Winderickx, P. (2023)
Facing a new reality: significant increase in necrotising fasciitis in the post-covid era?
Autumn Meeting BV-MKA-HH, KBVSMFH, 18 November 2023, Thor Central, Genk, Belgium

De Moor, A., Bila, M., Coropciuc, R., Geusens, J., Meeus, J., Missinne, K. (2023)
Full Virtual Workflow for Immediate Prosthodontic Rehabilitation in Free Flap Maxillomandibular Reconstruction: a Single-Center Cohort Series
Autumn Meeting BV-MKA-HH, KBVSMFH, 17 November 2023, Thor Central, Genk, Belgium

De Poortere, A., Meeus, J., Coropciuc, R., Bila, M., Willaert, R. (2023)
In-house manufacturing in Oral and Maxillofacial Surgery, present state and impact of the Medical Device Regulation
Autumn Meeting BV-MKA-HH, KBVSMFH, 17 November 2023, Thor Central, Genk, Belgium

Dubron, K., Willaert, R., Shaheen, E., Politis, C. (2023)
Clinical application of preoperative trauma planning with Mixed Reality for orbital reconstructions with patient-specific implants
Autumn Meeting BV-MKA-HH, KBVSMFH, 17 November 2023, Thor Central, Genk, Belgium

Dubron, K., Verbist, M., Shaheen, E., Dormaar, T., Jacobs, R., Politis, C. (2023)
Neuropathic pain and hypoaesthesia of the infra-orbital nerve in zygomaticomaxillary complex fractures
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

## ORAL PRESENTATIONS

Dubron, K., Yang, L.H., Jacobs, R., Politis, C., Willaert, R., Shaheen, E. (2023)
Symmetry Recovery in Zygomaticomaxillary Complex Fractures Compared to Normal Unfractured Population: A New Reliable Three-Dimensional Evaluation
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium

El Bachaoui, S., Van der Cruyssen, F., Willaert, R., Bila, M., Meeus, J., Coropciuc, R., Politis, C. (2023)
Postoperative pain after M3 removal: the power of machine learning based prediction models
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Elgarba, B.M., Swaity, A., Van Aelst, S., Shujaat, S., Jacobs, R. (2023)
Deep learning based- segmentation of dental implant restorations with artifact removal on CBCT
IADMFR World Tour 2023, IADMFR, 6 July 2023, KBR Brussels, Belgium

Elgarba, B., Swaity, A., Ali, S., Meeus, J., Jacobs, R. (2023)
AI-based registration of CBCT and intra-oral scan for integrated hard and soft tissue modelling
30th annual scientific meeting, EAO, 28-30 September 2023, Berlin, Germany

Ezeldeen, M., Vaz Sousa Pereira, R., Pedano de Piero, M. N. S., Martens, E., Dillemans, L., Noppen, S., Murgia, D., Schols, D., Proost, P., Van Meerbeek, B., Lambrichts, I., Jacobs, R., Opdenakker, G. (2023).
A Novel Glycosaminoglycan Mimetic for Chemokine Hydrogel Functionalization.
Symposium CED/NOF-IADR, IADR, 22 September 2023, Rhodos Palace Hotel, Rhodes, Greece

Fontenele, R.C., Gerhardt, M.d.N., Picoli, F.F., Van Gerven, A., Nomidis, S., Willems, H., Freitas, D.Q., Jacobs, R. (2023)
Convolutional Neural Network-Driven Tool for Automated Segmentation of Maxillary Alveolar Bone on Cone-Beam Computed Tomography Images
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium

Geusens, J., Sun, Y., Vuylsteke, P., De Moor, A., Willaert, R., Bila, M. (2023)
The Use of Patient Specific Implants with Condylar Head Preservation following Resection of Tumors in the Mandible
Autumn Meeting BV-MKA-HH, KBVSMFH, 17 November 2023, Thor Central, Genk, Belgium

Ivković, U., Ezeldeen, M., Jacobs, R. (2023).
Revolutionizing Oral Healthcare: Bioprinting Advances in Dentoalveolar Complex Regeneration.
3D Medical Conference, 28 November 2023, Veldhoven, The Netherlands

Ivković, U., Ezeldeen, M., Jacobs, R., Mignon, A. (2023).
Care for Dental Care.
3 Minute Thesis Competition, Katholieke Universiteit Leuven, 14 December 2023, Leuven, Belgium

Janssens, E., Coropciuc, R., Willaert, R., Bila, M., Meeus, J., Van der Cruyssen, F., Politis, C. (2023)
Phenotyping in trigeminal neuropathic pain patients - A single-center retrospective study
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Jindanil, T., Eduardo Marinho-Vieira, L., Lins de-Azevedo-Vaz, S., Jacobs, R. (2023)
A unique artificial intelligence-based tool for automated mandibular and incisive canal segmentation on cone beam computed tomography scans
IADMFR World Tour 2023, IADMFR, 6 July 2023, KBR Brussels, Belgium





Kantert, J., Jacobs, R., Faria de Vasconcelos, K., Drescher, D., Becker, K. (2023)
Influence of Orthodontic Appliances on the Detectability of Pathologies in CBCT Images With and Without Dose Reduction
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium

Khalil, B. (2023)
CBCT to Quantify Maxillary Changes after Secondary Alveolar Bone Grafting
Symposium CED/NOF-IADR, IADR, 22 September 2023, Rhodos Palace Hotel, Rhodes, Greece

Lahoud, P. (2023)
Advancing Tooth Autotransplantation: In-Silico Modelling and Finite Element Analysis Insights
Symposium CED/NOF-IADR, IADR, 22 September 2023, Rhodos Palace Hotel, Rhodes, Greece

Lahoud, P., Badrou, A., Ducret, M., Farges, J.C., Jacobs, R., Bel-Brunon, A., EzEldeen, M., Blal, N., Richert, R. (2023)
Model order reduction for real-time simulation of transplanted teeth
Symposium CED/NOF-IADR, IADR, 22 September 2023, Rhodos Palace Hotel, Rhodes, Greece

Lahoud, P. (2023)
Individual “alveolar phenotype” limits dimensions of lateral bone augmentation
ITI 's 3rd ITI Inter-University Meeting, International Team of Implantology, 7 March 2023, Van der Valk Hotel Liège, Belgium

Lahoud, P., Castro, A., Jacobs, R. ((2023)
A Novel AI-driven 3D-Printed Sealing Socket Abutment for Immediate Implantology
3rd DDS Global Congress, 12-14 October 2023, Casablanca, Morocco

Lahoud, P., Faghihian, H., Ducret, M., Jacobs, R., Richert, R., Ezeldeen, M. (2023)
Advancing Tooth Autotransplantation: In-Silico Modelling and Finite Element Analysis Insights.
Symposium CED/NOF-IADR, IADR, 22 September 2023, Rhodos Palace Hotel, Rhodes, Greece

Leyman, B., Meeus, J., Coropciuc, R., Bila, M., Willaert, R., Politis, C. (2023)
Value of cryotherapy in recurrent trigeminal neuralgia
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Loh, J.S.P. (2023)
The Microsurgical Anastomosis System for Arteries and Veins – a prototype study
Annual Scientific Meeting, British Association of Oral and Maxillofacial Surgeons, 28-30 June 2023, King’s Place, London, United Kingdom

Loh, J.S.P. (2023)
The Microsurgical Anastomosis System for Arteries and Veins – a prototype study
35th Annual Congress on Oral and Maxillofacial Surgery, Taiwanese Association of Oral and Maxillofacial Surgeons, 11 March 2023,

Maleux, O., Coropciuc, R., Willaert, R., Bila, M., Meeus, J., De Loot, A., Politis, C. (2023)
The ownership of pain
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Merken, K., Marshall, N., Monnens, J., Nuyts, J., Brasil, D.M., Santaella, G.M., Politis, C., Jacobs, R., Bosmans, H. (2023)
A dental CBCT virtual imaging trial platform for indication- and patient-specific optimization as well as educational purposes
IADMFR World Tour 2023, IADMFR, 6 July 2023, KBR Brussels, Belgium

## ORAL PRESENTATIONS

Merken, K., Marshall, N., Politis, C., Jacobs, R., Bosmans, H. (2023)
The role of virtual imaging trials to study future applications of CT and CBCT imaging in dento-maxillofacial radiology
Autumn Meeting BV-MKA-HH, KBVSMFH, 17 November 2023, Thor Central, Genk, Belgium

Moors, W., Coropciuc, R., Willaert, R., Bila, M., Meeus, J., Politis, C. (2023)
Symptoms and signs of nociceptive odontogenic pain vs neuropathic pain in OMFS
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Moreno Rabie, C., Garcia-Larrain, S., Contreras, D., Cabello-Salazar, I., Van den Wyngaert, T., Jacobs, R. (2023)
How does the radiographic appearance of MRONJ influence its conservative and surgical prognosis?
IADMFR World Tour 2023, IADMFR, 6 July 2023, KBR Brussels, Belgium

Papasratorn, D., Pornprasertsuk-Damrongsri, S., Yuma, S., Weerawanich, W. (2023)
Minimum Number of Images Required for the Convolutional Neural Network in Classifying Contact Between the Mandibular Third Molar and Mandibular Canal
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium

Shaheen, E., Verhelst, P.J., Politis, C. (2023)
Comparison of the different evaluation methods of orthognathic surgery outcome versus planning
Autumn Meeting BV-MKA-HH, KBVSMFH, 18 November 2023, Thor Central, Genk, Belgium

Shakeri, H., Renton, T., Baad-Hansen, L., Van der Cruyssen, F., Politis, C. (2023)
International Classincation of orotacial pain:An algorithm
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Smeets, M., Willaert, R., Coropciuc, R., Meeus, J., Bila, M. (2023)
Why do we irradiate a free flap shortly after an oncologic reconstruction?
Autumn Meeting BV-MKA-HH, KBVSMFH, 18 November 2023, Thor Central, Genk, Belgium

Suryani, I.R., Shujaat, S., Ivković, U., Coucke, W., Jacobs, R. (2023)
Risk of Healing Impairment Following Tooth Extraction in Patients Administered with Antiresorptive and Non-Antiresorptive Polypharmacy
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium

Van der Cruyssen, F., Palla, B., Van der Tas, J., Jacobs, R., Politis, C., Zuniga, J., Renton, T. (2023)
Consensus guidelines on training, diagnosis, treatment and follow-up care of trigeminal nerve injuries
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Van Gorp, G., Declerck, D. (2023)
Long-term outcome of endodontically treated traumatized immature upper incisors
International Association of Paediatric Dentistry (IAPD), June 14-17, 2023, Maastricht, The Netherlands.

van Gorp, G., Declerck, D., Jacobs, R., Maes, A., Lambrechts, M. (2023)
Is Use of Cone Beam Computed Tomography Without Proper Training Justified in Paediatric Dental Traumatology? An Exploratory Study
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium





Van Lint, L., Christiaens, L., Stroo, V., Bila, M., Willaert, R., Sun, Y., Van Dessel, J. (2023)
Can Smartphone Applications Become the Standard in Future Facial Scanning? An Accuracy Comparison Study
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium

Vanslambrouck, P., Sun, Y., Van Dessel, J., Willaert, R., Bila, M., Claes, P., Politis, C. (2023)
From automated orbit reconstruction to patient specific implant design
Autumn Meeting BV-MKA-HH, KBVSMFH, 17 November 2023, Thor Central, Genk, Belgium

Vanslambrouck, P., Willaert, R., Bila, M., Politis, C., Claes, P., Van Dessel, J., Sun, Y. (2023)
Orbital reconstruction with Gaussian processes.
CARS 2023, Computer Assisted Radiology and Surgery, 20-23 June 2023, Munich, Germany

Ver Berne, J., Baseri Saadi, S., Oliveira Santos, N., Eduardo Marinho, L., Jacobs, R. (2023)
A novel CNN-LSTM network with spatial relationship mapping as a screening tool for inflammatory periapical lesions on panoramic imaging
Autumn Meeting BV-MKA-HH, KBVSMFH, 17 November 2023, Thor Central, Genk, Belgium

Ver Berne, J., Baseri Saadi, S., Santos, N.O., Marinho-Vieira, L.E., Jacobs, R. (2023)
A Novel CNN-LSTM Network with Spatial Relationship Mapping as a Screening Tool for Radiolucent Jawbone Lesions on Panoramic Imaging
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium

Ver Berne, J., Baseri Saadi, S., Politis, C., Jacobs, R. (2023)
A deep learning approach for detection and classification of radicular cysts and periapical granulomas on panoramic images
Autumn Meeting BV-MKA-HH, KBVSMFH, 17 November 2023, Thor Central, Genk, Belgium

Ver Berne, J., De Poortere, A., Coropciuc, R., Meeus, J., Engelen, B., Bila, M., Willaert, R., Politis, C. (2023)
Painful vesiculobullous diseases of the oral cavity: rare conditions with common symptoms
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Ver Berne, J., Saadi, S.B., Politis, C., Jacobs, R. (2023)
A Deep Learning Approach for Radiological Detention and Classification of Radicular Cysts and Periapical Granulomas Enhancing Clinical Decision Making
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium

Verbist, M., Duborn, K., Bila, M., Jacobs, R., Olszewski, R., Shaheen, E., Willaert, R. (2023)
Accuracy of augmented reality, virtual reality and surgical navigation for patient-specific reconstructions in orbital fractures
Autumn Meeting BV-MKA-HH, KBVSMFH, 17 November 2023, Thor Central, Genk, Belgium

Verbist, M., Dubron, K., Shaheen, E., Dormaar, T., Jacobs, R., Politis, C. (2023)
Associated Fracture Patterns of Infraorbital Nerve Injuries Following Zygomaticomaxillary Complex Fractures: A Retrospective Analysis of 272 Patients
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium

Verhelst, P.J., Matthews, H., Verstraete, L., Van der Cruyssen, F., Mulier, D., Croonenborghs, T.M., Da Costa, O., Smeets, M., Fieuws, S., Shaheen, E., Jacobs, R., Claes, P., Politis, C., Peeters, H. (2023)
Automatic quantification of mandibular and facial shape: next-gen phenotyping
Autumn Meeting BV-MKA-HH, KBVSMFH, 18 November 2023, Thor Central, Genk, Belgium

## ORAL PRESENTATIONS

Verstraete, L., Coropciuc, R., Bila, M., Willaert, R., Meeus, J. (2023)
Quality indicators and the evolution of 3D technologies in dental implantology
Autumn Meeting BV-MKA-HH, KBVSMFH, 18 November 2023, Thor Central, Genk, Belgium

Vervaeke, K., Verhelst, P.J., Orhan, K., Lund, B., Benchimol, D., Van der Cruyssen, De Laat, A., Jacobs, R., Politis, C. (2023)
Correlation of MRI and arthroscopic findings with clinical outcome in temporomandibular joint disorders: a retrospective cohort study
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Vueghs, C., Coropciuc, R., Willaert, R., Bila, M., Meeus, J., Van der Cruyssen, F., Politis, C. (2023)
Assessing pain in the backyard of somatization
Spring Meeting KBVSMFH, KBVSMFH, 18 March 2023, Belgium

Wang, X., Shujaat, S., Shaheen, E., Ferraris, E., Jacobs, R. (2023)
Efficacy of Cone-Beam Computed Tomography-Derived Skull Models Fabricated by Three-Dimensional Printers at Different Cost Levels
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium

Würsching, T., Molnár, B., Sólyom, E., Pálvölgyi, L., Palkovics, D., Drajkó, Z., Nagy, K. (2023)
Alveolar cleft hard- and soft tissue reconstruction with an autogenous tooth derived particulate graft and a novel split thickness papilla curtain flap
PhD Scientific Days, 22-23 June 2023, Semmelweis, Budapest, Hungary

Xu, L., Jindanil, T., Ponbuddhichai, R., Massant, C., Jacobs, R. (2023)
Qualitative Comparison of 3D Face Scanners
IADMFR World Tour 2023, IADMFR, 7 July 2023, KBR Brussels, Belgium



## POSTER PRESENTATIONS

**Elgarba, B., Meeus, J., Fontenele, R.C., Jacobs, R. (2023)**
**AI-Based Registration of IOS and CBCT with High Artifact Expression**
**3rd DDS Global Congress, 12-14 October 2023, Casablanca, Morocco**

## Fontenele, R. (2023)
## A novel AI-driven tool for automated root canal segmentation of single and bi-rooted teeth on cone-beam computed tomography
## 3rd DDS Global Congress, 12-14 October 2023, Casablanca, Morocco








## Ivković*, U., Radi* (co-first authors), S., Liany, X., Ezeldeen, M., & Jacobs, R. (2023)
## Gelatin-Methacryloyl within regenerative dentistry.
## CELLINK Partnership Conference, 25-27 October 2023, Portsmouth, United Kingdom

KU LEUVEN OMFS IMPATH

# Gelatin-Methacryloyl within regenerative dentistry

Una Ivković [1], Sonya Radi [1], Liany Xu[2], Mostafa EzEldeen [1], Reinhilde Jacobs [1]

1 OMFS-IMPATH Research Group, Department of Imaging and Pathology, Faculty of Medicine, KU Leuven, Leuven, Belgium
2 Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China



**Introduction** — Approximately 3.5 billion people worldwide are affected by oral disease. Oral health is crucial for overall well-being, including physical and socio-psychological health. Missing teeth can result from trauma or dental conditions such as caries and periodontitis. Currently, tooth loss is often treated with dental implants. However, due to its age-related and non-biological aspects, techniques to regenerate vital tooth tissue are necessary. Therefore, tissue engineering and regenerative medicine are being explored to provide a solution.

**Materials and Methods** — Gelatin-Methacryloyl (GelMA) hydrogel at 5% was prepared by dissolving dry GelMA in PBS at 45°C using a heated magnetic stirrer. After, 0.1% Lithium Phenyl Phosphonate (LAP) photoinitiator was added to the mixture. GelMA was mixed with the cell solution (2 x 106 cells) in a 10:1 ratio using a CELLMIXER tool (CELLLINK™). The cell-loaded hydrogel samples were printed using an extrusion-based bioprinter (BioX, CELLLINK™) and cultured for seven days. Cell viability was analysed using a CCK-8 viability assay, while the cytoskeleton was observed using confocal microscopy combined with a DAPI-Phalloidin staining.



*Figure 1: Photograph of the hDPSC-laden GelMA hydrogel scaffolds one day after the bioprinting process.*




*Figure 2: CCK-8 Viability Assay results of the hDPSC-loaded GelMA hydrogels. The absolute number of viable cells is shown for day 1, 4 and 7. The cell viability (%) was calculated 41 by dividing the absorbance of the samples by the absorbance of the blank groups. The mean and standard deviation are shown. The significant differences with a p-value < 0.05 are indicated with an asterix.*




*Figure 3: DAPI-Phalloidin Staining confocal microscope images of the hDPSC-laden GelMA hydrogel scaffolds. DAPI-Phalloidin staining images were captured with a laser scanning confocal microscope (LSM 880, ZEISS) after culturing the cells for 1 day and 4 days. (Blue: nucleus stained with DAPI. Green: actin filaments stained with Phalloidin.)*

**Results** — This research aimed to evaluate the outcome of various bioprinting parameters while assessing the cell viability of human dental pulp stem cells (hDPSCs) within GelMA. These results showed significant decreases in cell viability from day 1 to day 4, followed by a significant recovery after day 4. This suggests proper cell attachment over time, as confirmed with confocal imaging. Results of the fluorescent staining indicate that the cells are producing more actin filaments after 4 days, implying cells are embedding within the hydrogel. The overall results support the suitability of 5% GelMA hydrogel within applications using hDPSCs.

**Conclusion** — GelMA has proven to be a suitable environment for the attachment and proliferation of hDPSCs. Further experiments are needed to refine the bioprinting protocol and to examine osteogenic and odontogenic differentiation possibilities.

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**Kantert, J., Jacobs, R., Faria de Vasconcelos, K., Drescher, D., Becker, K. (2023)**
**Einfluss kieferorthopädischer Apparaturen auf die Erkennbarkeit von Pathologien in DVT-Aufnahmen mit und ohne Dosisreduktion**
**95th Annual Conference, German Society of Orthodontics (DGKFO), 27 – 30 September 2023, International Congress Center, Stuttgart, Germany**

# Einfluss kieferorthopädischer Apparaturen auf die klinische Auswertbarkeit von DVT-Aufnahmen bei Kindern und Jugendlichen

J. Kantert[1], R. Jacobs[2], K. Faria de Vasconcelos[2], D. Drescher[1], K. Becker[1]
[1] Universitätsklinikum Düsseldorf, Poliklinik für Kieferorthopädie, Düsseldorf, Deutschland
[2] KU Leuven, OMFS-IMPATH, Leuven, Belgien

## Hintergrund

Für Kinder und Jugendliche schreibt das Strahlenschutzgesetz vor, alle Möglichkeiten der Dosisreduktion auszuschöpfen. Es ist jedoch unklar, ob kieferorthopädische Apparaturen einen Einfluss auf die Erkennbarkeit von Pathologien haben und Aufnahmen mit höherer Strahlendosis erfordern.
Deshalb sollen folgende Fragestellungen untersucht werden:

- Beeinflussen kieferorthopädische Apparaturen die Erkennbarkeit von Pathologien?
- Erreicht man bei Verwendung von Low Dose Modi während einer Behandlung mit kieferorthopädischen Apparaturen noch eine ausreichende Aufnahmequalität?
- Gibt es Unterschiede zwischen den Geräteherstellern?

## Material und Methoden

- Ummantelung eines humanen Kadaver Schädels mit einem das Weichgewebe simulierenden Material (Mix-D).
- Kieferorthopädische Apparaturen und Brackets wurden temporär inseriert.
- Röntgenaufnahmen erfolgten mit (Ultra-)Low-Dose, Standard-Dosis und High-Definition-Programmen an Geräten 6 verschiedener Hersteller.
- Alle DVT-Aufnahmen wurden mit einer Referenzaufnahme (Aufnahme mit max. Dosis) überlagert und korrespondierende Schichten extrahiert (Amira-3D)
- Die korrespondierenden 2D-Schichten wurden von 3 zuvor kalibrierten Ratern mit Hilfe eines Fragebogens in abgedunkelter Umgebung an Befundungsmonitoren auf verschiedene Pathologien (Wurzelfraktur, Kronenfraktur, Knochenersatzmaterial) und Knochenstrukturen (bukkale Knochenlamelle) untersucht und hinsichtlich der Erkennbarkeit (0-100%) bewertet.
- Statistische Analyse (Kruskal-Wallis-Test, Interrater-Reliabilität, Intrarater-Reliabilität durch Wiederholung nach 6 Wochen) erfolgte mit SPSS.


*Abb.1: Humaner Kadaver-Schädel mit Mix-D ummantelt*

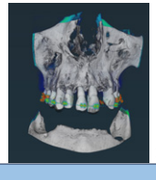


*Abb.2: Überlagerte DVT-Aufnahmen*

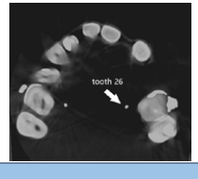


*Abb.3: Beispiel für eine extrahierte 2D-Schicht*

## Ergebnisse

- Interrater-Reliabilität: ICC: 0,84; Intrarater-Reliabilität: ICC: 0,77-0,86.
- Verschiedene kieferorthopädische Apparaturen beeinflussen die Erkennbarkeit von Pathologien (P=0,016), bei Subgruppen-Analyse (nach Modus) nur im HD Modus signifikant bessere Erkennbarkeit der Pathologien bzw. der bukkalen Knochenlamelle in der Kontroll-Gruppe
- Die Erkennbarkeit von Pathologien variierte ebenfalls abhängig vom Gerät (P<0,01) und in Abhängigkeit des gewählten Protokolls signifikant (p<0,01). Insgesamt waren Pathologien bzw. die bukkale Knochenlamelle bei Protokollen mit höherer Dosis besser erkennbar als mit niedrigerer Dosis.

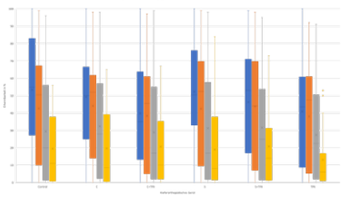


*Abb.5: Erkennbarkeit der Pathologie bzw. bukk. Knochenlamelle in Abhängigkeit des kieferorthopädischen Geräts und Modus*

Gruppen:
Control: Kontrollgruppe (keine KFO-Apparatur)
C: Keramik-Brackets
C+ TPA: Keramikbrackets, Molarenbänder + Transpalatinalbogen
S: Stahl-Brackets
S+TPA: Stahlbrackets, Molarenbänder + Transpalatinalbogen
TPA: Transpalatinalbogen

Modus:
HD: High Definition Modus
SD: Standard Dose
LD: Low Dose
ULD: Ultra Low Dose

## Schlussfolgerung

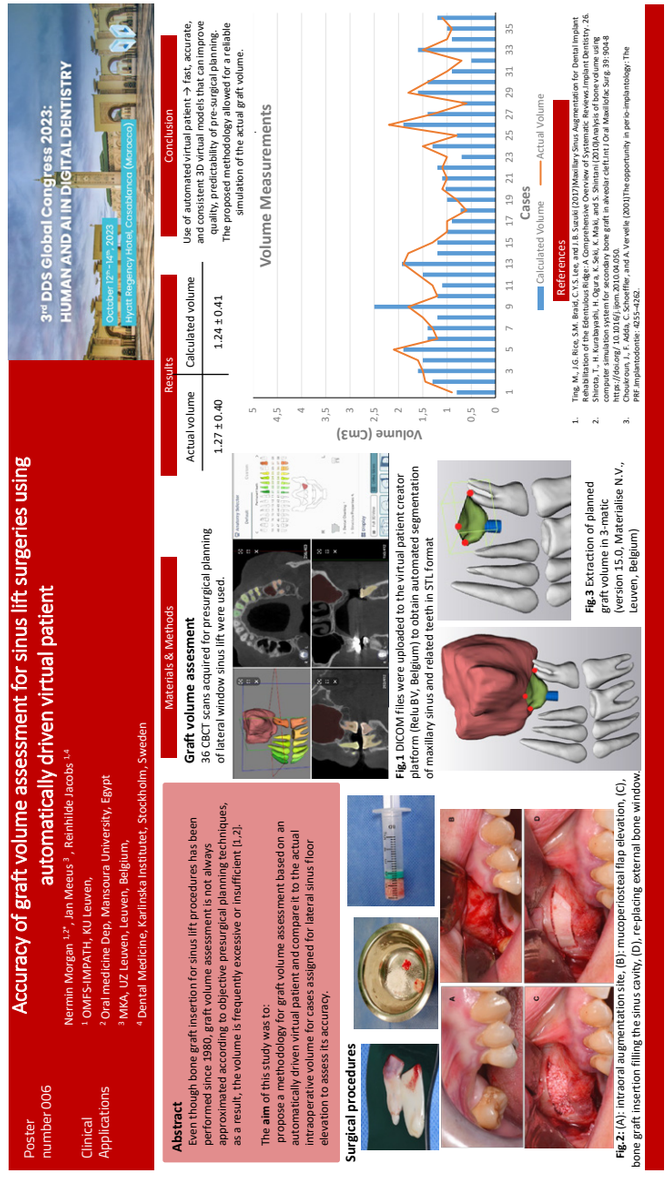
Unter den Limitationen einer Kadaver-Studie deuten die vorliegenden Daten an, dass kieferorthopädische Apparaturen im Field-of-View die Erkennbarkeit von Pathologien herabsetzen können. Insbesondere bei einer Indikation für Aufnahmen mit hoher Strahlendosis kann das Herausnehmen von KFO-Apparaturen (soweit möglich) erwogen werden.

Johanna Kantert: +4915788932443
Es liegt kein Interessenkonflikt vor.





**Morgan, N. (2023)**
**Accuracy of graft volume assessment for sinus lift surgeries using automatically driven virtual patient**
**3rd DDS Global Congress, 12-14 October 2023, Casablanca, Morocco**



**Santos-Junior, A.O., Jacobs, R., Neves, F.S., Saleh-Ali, S., Guerreiro-Tanomaru, J.M., Fontenele, R.C., Tanomaru-Filho, M. (2023)**
**Revolucionando a segmentação tridimensional de canais radiculares com inteligência artificial em imagens de TCFC**
**15º International Congress of the Brazilian Society of Endodontics, SBENDO, 16-18 November 2023, Fortaleza-Ceará, Brazil**








## B. INVITED LECTURES

| | | | |
|---|---|---|---|
| R. Jacobs<br>K. Bacher | 09/01/2023-<br>10/01/2023 | 2-day Course on Radio-protection in Dentistry | PAV<br>Mondgezondheidswetenschappen<br>De Jacht Heverlee, Leuven |
| R. Jacobs | 19/01/2023 | The artificial art of scanning and planning | 6th Cairo International Dental Congress, Grand Nile Tower Hotel, Cairo, Egypt |
| D. Papasratorn | 19/01/2023 | Prediction of Nerve Contact to the Lower Wisdom Teeth from Dental Radiograph Using Deep Learning | Innovative Tech & Procedures to Enhance Oral Health Care with AI as part of Biomedical Cross Cultural Educational Program (BioCEP) 2023, Mahidol University, Bangkok, Thailand |
| R. Jacobs | 25/01/2023 | 3D CBCT imaging as a liaison between research potentials and limitations | Theory and Methodology of Science in Odontology, Dentmed, Karolinska Institutet<br>Stockholm, Sweden |
| C. Politis | 27/01/2023 | Nieuwe perspectieven in de orthodontie met skeletale verankering | Symposium Botankers in de orthodontie, IOMFCOT,<br>Leuven, Belgium |
| C. Politis | 28/01/2023 | De perfecte storm komt eraan: schuilen kan niet meer | VVMKA 2023, Botanic Sanctuary,<br>Antwerp, Belgium |
| C. Politis,<br>S. Siciliano | 28/01/2023 | OBA-ankers | UZ Leuven, Leuven, Belgium |
| R. Jacobs | 28/01/2023 | State of the AI art for scanning & planning | Barcelona Dental Show 2023, CCIB,<br>Barcelona, Spain |
| D. Papasratorn | 01/02/2023 | CBCT and daily dental practices | Thai Society of Oral Diagnostic Sciences Online Conference, online |
| C. Politis | 04/02/2023 | Politieke actualiteit in MKA | Algemene Vergadering MKA-artsen, Van der Valk Hotel Diegem, Belgium |
| R. Jacobs | 15/02/2023 | The diagnostic use of CBCT in children and adolescents | 3rd European Academy of Paediatric Dentistry Athena Master Class for Paediatric Dentists, Ramada Hotel, Jerusalem, Israel |
| C. Moreno Rabié | 17/02/2023 | Radiographic signs of antiresorptive drug therapy and osteonecrosis of the jaws | IADMFR Webinars, International Association of DentoMaxilloFacial Radiology, online |
| C. Politis | 21/02/2023 | Wondhelingsproblemen in de mond | NIVVT, NH Brugge, Bruges,<br>Belgium |
| C. Politis | 23/02/2023 | Bisfosfonaten anno 2023 | Huisartsenvereniging LOK, MCH Wezenbeek- Oppem, Belgium |
| C. Politis | 28/02/2023 | Extracties durven en doen | NIVVT, Stiemerheide, Genk,<br>Belgium |

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|---|---|---|---|
| R. Jacobs | 02/03/2023 | Advanced technology in implant planning and oral surgery | Department of Dentistry, Faculty of Health Science, UiT Arctic University of Norway, Tromsø, Norway |
| C. Politis | 07/03/2023 | Iatrogene problemen in de mond | NIVVT, Stiemerheide, Genk, Belgium |
| C. Politis | 09/03/2023 | Chronische pijn na tandheelkundige ingrepen | Tandartsenvereniging, ITI – Hotel Van der Valk, Eindhoven, The Netherlands |
| S. Shujaat | 13/03/2023 | Deep Learning Artificial Intelligence Paradigms and Radiomics in 3D Dentomaxillofacial Workflows | College of Dentistry, King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia |
| C. Politis | 14/03/2023 | Differentiële diagnose van aangezichtspijn | NIVVT, Stiemerheide, Genk, Belgium |
| K. Nagy | 22/03/2023-29/03/2023 | Principles of care for patients with cleft lip and palate and overview of modern surgical procedures, Surgical treatment of cleft lips | Modern multidisciplinary care of patients with cleft lip and palate, Semmelweis University, Faculty of Health Sciences, Budapest, Hungary |
| R. Jacobs | 23/03/2023 | AI for dental imaging & imagination | The International Salon of Stomatological Research, Tongji Medical College, Wuhan, China, online |
| C. Politis, J. Lenaerts, J. Mebis | 23/03/2023 | MRONJ vanuit MKA, Rheumatologie en Oncologie | KLTV, Thorpark, Genk, Belgium |
| C. Politis, L. Vrielinck, E. Roumans | 28/03/2023 | Mijn patiënt heeft implantaten, wat nu? | NIVVT, NH Brugge, Bruges, Belgium |
| C. Politis, F. Dewallens | 01/04/2023 | Ziekenhuisfinanciering – Ziekenhuiswetgeving | St.Blasius Dendermonde – EHSAL, Dendermonde, Belgium |
| C. Politis | 18/04/2023 | Nouvelle nomenclature en CMF | LOK Charleroi, GLEM Charleroi, Belgium |
| R. Jacobs | 21/04/2023 | Automated virtual patient creation | Digital Experts, Digital Dentistry Conference, Digital Dentistry Society, Hilton Hotel & Conference Centre, Warsaw, Poland |
| C. Politis | 22/04/2023 | Wat moet de tandarts weten over biologicals, disease modifying agents en bisfosfonaten | LUTV aan zee, LUTV, Casino Kursaal, Oostende, Belgium |
| R. Jacobs, K. Bacher, T. Clarijs | 27/04/2023-28/04/2023 | 2-day Interuniversity Programme on the Use of Cone Beam CT for Dentomaxillofacial Diagnostics | PAV Mondgezondheidswetenschappen De Jacht Heverlee, Leuven |
| C. Politis | 11/05/2023 | Kaakgewrichtsdiagnostiek: even op de tanden bijten | IOMFCOT, Leuven, Belgium Online |





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| J. Van Dessel | 11/05/2023 | Artificiële Intelligentie: (R) evolutie in de tandheelkunde | IOMFCOT, Leuven, Belgium Online |
| K. Nagy | 11/05/2023 | Ear, nose and throat problems of children born with clefts | Bókay Academy XVIII. part – The music, Budapest, Bókay J. u. 54. I. em. classroom |
| G. Van Gorp | 01/06/2023-03/06/2023 | Management of traumatized young permanent incisors endodontic and orthodontic considerations | 9th Conference of the Polish Academy, Krakow, Poland |
| P. Lahoud | 03/06/2023 | Artificial Intelligence Based In-Silico Modelling for Oral Surgical Procedures: A Fantasy or a Reality? | IADMFR World Tour, IADMFR, KBR, Brussels, Belgium Online |
| F. Van der Cruyssen | 09/06/2023 | Wijsheidstanden verwijderen, is dat wel wijs | VBT Symposium, Genk, Belgium |
| G. Van Gorp | 14/06/2023-17/06/2023 | Materials and clinical techniques for endodontic therapy of deciduous teeth | International Association of Paediatric Dentistry, Maastricht, The Netherlands |
| R. Jacobs | 29/06/2023 | Workshop Cone Beam CT in de praktijk: basis | PAV Mondgezondheidswetenschappen De Jacht Heverlee, Leuven |
| R. Jacobs | 30/06/2023 | Workshop Cone Beam CT in de praktijk: diagnostiek | PAV Mondgezondheidswetenschappen De Jacht Heverlee, Leuven |
| M. Ezeldeen, R. Fontenele, P. Lahoud, A. Leite, S. Lins, C. Moreno, N. Morgan, N. Santos | 07/07/2023 | The Art of Artificial Intelligence | IADMFR World Tour, IADMFR, KBR, Brussels, Belgium |
| M. Bornstein | 07/07/2023 | Why and how to get published in our DMFR Journal – meet the Editor-in-Chief | IADMFR World Tour, IADMFR, KBR, Brussels, Belgium |
| F. Preda, I. Savoye, P.J. Verhelst | 07/07/2023 | Digitalisation and automation in orthodontics and orthognathic surgery | IADMFR World Tour, IADMFR, KBR, Brussels, Belgium |
| P. Lambrechts, A. Torres | 08/07/2023 | Digitalisation and automation in endodontics | IADMFR World Tour, IADMFR, KBR, Brussels, Belgium |
| J. Casselman, F. Van der Cruyssen, I. Lambrichts | 08/07/2023 | MR Neurography: feasibility, validation and clinical examples | IADMFR World Tour, IADMFR, KBR, Brussels, Belgium |
| K. Dubron | 14/07/2023 | Clinical application of Mixed Reality in Cranio-Maxillofacial Surgery | Brainlab, Munich, Germany |
| F. Van der Cruyssen | 03/08/2023 | Consensus guidelines on trigeminal nerve injuries | Global Nerve Foundation, USA, online |

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|---|---|---|---|
| R. Jacobs | 24/08/2023 | The PhD recipe: From research and training to supervision and coaching | Kickoff, avdelningen för oral diagnostik och rehabilitering, Scheelesalen, Solna, Sweden |
| R. Jacobs | 01/09/2023 | Workshop Cone Beam CT in de praktijk: presentatie van eigen casus | PAV Mondgezondheidswetenschappen De Jacht Heverlee, Leuven |
| R. Jacobs | 04/09/2023-05/09/2023 | 2-day Course on Radio-protection in Dentistry | PAV Mondgezondheidswetenschappen De Jacht Heverlee, Leuven |
| F. Van der Cruyssen | 07/09/2023 | Zenuwschade & orofaciale pijn | Symposium MKA Pelt, Pelt, Belgium |
| R. Willaert | 07/09/2023 | De gecompromiteerde patiënt | IOMFCOT, Leuven, Belgium Online |
| R. Jacobs | 09/09/2023 | The endodontic artist behind artificial intelligence | ESE congress, ESE, Helsinki, Finland |
| R. Jacobs | 15/09/2023 | The art of artificial intelligence for scanning & planning | 46th Congress of EPA, European Prosthodontic Debates, Vilnius, Lithuania |
| R. Jacobs | 16/09/2023 | Digital Technologies and Artificial Intelligence | National Congress Associazione Nazionale Dentisti Italiani & Digital Dentistry Society, Hotel Royal Continental, Napoli, Italy |
| R. Jacobs | 22/09/2023 | Wetenschappelijke dag Radiologie | VBT, Thor Central, Genk, Belgium |
| P. Lahoud | 21/09/2023 | Artificial Intelligence Applications For Oral Health: A Hype or a Hope? | Young CED-IADR Workshop, International Association of Dental Research, Rhodos Palace Hotel, Rhodes, Greece |
| P. Lahoud | 22/09/2023 | Artificial Intelligence-Driven Planning For Oral Surgical Procedures: How Far Have We Come? | Symposium CED/NOF-IADR, International Association of Dental Research, Rhodos Palace Hotel, Rhodes, Greece |
| R. Jacobs | 23/09/2023 | CBCT for diagnosis of oral diseases in children and adolescents | LVOD Conference 2023, Lietuvos vaikų odontologų draugija, Kaunas, Lithuania, online |
| C. Moreno Rabié | 27/09/2023 | Signos radiográficos del tratamiento con fármacos antirresortivos y de la osteonecrosis de los maxilares | Taller de Casos Clínicos Bucomaxilofacial y Medicina Oral, Universidad de Chile, online |
| R. Jacobs | 13/10/2023 | Artificial intelligence in implant dentistry | 3rd DDS Global Congress, Hyatt Regency Hotel, Casablanca, Morocco |





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| K. Nagy | 12/10/2023-14/10/2023 | Cleft management and orthognathic surgery | The Scientific Committee of the 2nd International Congress of Azerbaijan Society of Oral and Maxillofacial surgeons, Baku, Azerbaijan |
| C. Politis | 18/10/2023 | Nomenclatuur MKA | ASO MKA, UZ Leuven, Leuven, Belgium |
| R. Jacobs | 19/10/2023 | Webinar: wanneer nemen we een CBCT? | PAV Mondgezondheidswetenschappen Leuven, Online |
| C. Politis | 21/10/2023 | Herziening van de nomenclatuur: waar gaan we naartoe? | Horizons Cardiologie, Ronchinne-Wallonië IZIDOK Academy, Belgium |
| F. Van der Cruyssen | 21/10/2023 | Optimizing trigeminal nerve injury care | Australian New Zeeland Academy of Orofacial Pain, Adelaide, Australia |
| R. Jacobs | 28/10/2023 | The art of artificial scanning & planning in Dentomaxillo-facial Imaging | 18th International Symposium on Metal Ions in Biology and Medicine, Metal Ions 2023, Nehru Science Centre, Mumbai, India, online |
| P.J. Verhelst | 09/11/2023 | Condylaire resorptie | Emeritaatsviering prof. dr. C. Politis, IOMFCOT, Thor Central, Genk, Belgium |
| K. Brijs | 09/11/2023 | Vooruitgang in de farmacotherapie: een vloek maar ook een zege voor de mond | Emeritaatsviering prof. dr. C. Politis, IOMFCOT, Thor Central, Genk, Belgium |
| F. Van der Cruyssen | 09/11/2023 | Patiënt profiling en pijnmedicatie | Emeritaatsviering prof. dr. C. Politis, IOMFCOT, Thor Central, Genk, Belgium |
| R. Jacobs | 09/11/2023 | Artificiële intelligentie in tandheelkunde | Emeritaatsviering prof. dr. C. Politis, IOMFCOT, Thor Central, Genk, Belgium |
| M. Bila | 09/11/2023 | Topchirurgie vergt centralisatie in oncologie | Emeritaatsviering prof. dr. C. Politis, IOMFCOT, Thor Central, Genk, Belgium |
| J. Meeus | 09/11/2023 | Botopbouw in implantologie | Emeritaatsviering prof. dr. C. Politis, IOMFCOT, Thor Central, Genk, Belgium |
| R. Jacobs | 17/11/2023 | The radiant surgeon | Autumn Meeting BV-MKA-HH, KBVSM-FH, Thor Central, Genk, Belgium |

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| R. Jacobs | 25/11/2023 | De juiste keuze van radiologische opname bij diagnostiek | LUTV najaarssymposium 2023, Leuven, Belgium |
| M. Bila | 25/11/2023 | Diagnose, behandeling en evoluties op vlak van mondkanker | Symposium Inauguratie SmakSmak, IOMFCOT, Leuven, Belgium |
| R. Jacobs | 30/11/2023 | Webinar: stralingshygiëne in de praktijk | PAV Mondgezondheidswetenschappen Leuven, Online |
| R. Willaert | 02/12/2023 | Les lésions cancéreuses de la tête et du cou | Dental Congrès 2023, Dental Education, Hôtel Le Plaza, Brussels, Belgium |
| R. Jacobs | 02/12/2023 | De l'imagerie 3D à l'imagination de l'IA | Dental Congrès 2023, Dental Education, Hôtel Le Plaza, Brussels, Belgium |
| K. Nagy, B. Mészáros | 03/12/2023 | Clinical aspects of modern facial cleft surgery | Démoszthenész Egyesület, Orrhangzósságról, online konferencia |
| R. Jacobs | 07/12/2023 | CBCT in de tandartspraktijk: hoe te beginnen – een update | PAV Mondgezondheidswetenschappen De Jacht Heverlee, Leuven |
| P.J. Verhelst, J. Scheerlinck | 09/12/2023 | Orthognatische chirurgie in UZ Leuven: van hedendaagse wijsheden naar toekomstige beloftes | Symposium Surgical Orthodontics, IOMFCOT, Leuven, Belgium |
| F. Preda | 09/12/2023 | Digital planning for skeletal anchorage in orthodontics | Symposium Surgical Orthodontics, IOMFCOT, Leuven, Belgium |
| E. Shaheen | 09/12/2023 | The next frontier: het belang van onderzoek in orthognatische chirurgie | Symposium Surgical Orthodontics, IOMFCOT, Leuven, Belgium |
| C. Politis | 09/12/2023 | Centralisation of head and neck malignancies in Belgium | B-ORL annual congress 2023, Palais de Congrès, Liège, Belgium |
| R. Jacobs, P. Lahoud | 14/12/2023 | CBCT beelvorming: automatisering voor diagnose en therapie | 2e Congres Digital Dentistry Belgium, Vestar, Antwerpen, Belgium |
| M. Bornstein | 21/12/2023 | Webinar: Diagnostic Challenges In Oral Medicine – A Clinical Quiz | PAV Mondgezondheidswetenschappen Leuven, Online |



# 5

# 3D lab

A. TEAM

B. PROJECTS

C. PUBLICATIONS

- International peer-reviewed publications



The 3D lab facility was officially introduced in autumn 2014, as an integrated part of the Department of Oral and Maxillofacial surgery at UZ Leuven. Together with the maxillofacial imaging centre, the 3D-lab facility is fully integrated in the workflow of the daily clinic. The work started from simple segmentation and 3D printing of anatomical structures to 3D planning of complex surgeries. The 3D-lab engineers are part of the daily decision support flow when it concerns planning of surgery. They virtualize the patient's data into a treatable virtual patient, allowing simulation for different treatment plans. This plan then can easily be exported towards multidisciplinary teams and used for 3D printing of patient specific implants and image-guided surgery.

Whereas cutting guides and patient specific implants are the 3D-standard for margin detection of surgery, the future will probably be different. The rapid evolution in virtual and augmented reality possibilities is also finding its way into daily practice. Instead of using a cutting guides to set the osteotomy margin, the same margin could be projected on the tissue. At this moment the angulation of the cut cannot be adequately controlled by only viewing the margin as this does not provide depth control for human surgeons. Robotic surgery fed with the information of the virtual planning could certainly replace this human part during certain parts of the operation as more pre-fetched information can be programmed into robotic brain including the angulation of a cut.

These exciting developments pop up as opportunities all over the world. In Belgium however the Medical Device Regulatory which came into effect in 2021 as a European directive and has been implemented in European Hospitals is a game changer in the wrong direction. Instead of enhancing patient safety it only enhances costs and hampers 3D-developments in a country which is renowned for its biomedical research. This simply is due to its interpretation where the pointer has been set on “0”-risk or “no margin of error”-interpretation. In most parts of industry one aims for risks to be “as low as possible” but not “0”.

In contrast to the industrial environment no official agency exists to help Hospitals implement these new regulations. These regulatory requirements are deeply affecting patient care and inflict collateral damage, while companies retract existing patient solutions from the market. MDR slows down the efforts to establish point-of-care metal printing facilities in the hospitals. MDR acts mainly as a cost-multiplicator far more than its positive effect on patient quality. Only patients who can afford the increased cost of 3D-constructs will benefit from MDR. In contrast to TÜV in Germany, FAGG is not really helping hospitals to find in-house solutions. Society, at large, can impossibly carry the cost burden of regulatory overload. Hospitals are also gradually starting to realize that they cannot continue to finance the ever-expanding legal departments.

A beacon of hope is the KU Leuven Institute on Additive Manufacturing with Prof. Brecht Van Hooreweder as CEO. The Department of Mechanical Engineering has a very long track record and a rock-solid research reputation. It has been an incubator for important spinoffs. If any Institute could mitigate the daunting task of correcting the MDR-track in Belgium, it is this Institute.

## A. TEAM

### *Constantinus POLITIS*

Constantinus Politis (°1958) obtained a degree in Medicine, Surgery and Obstetrics in 1982 and a degree in Dentistry from KU Leuven in 1985. After specialising in stomatology and oral, maxillofacial and maxillofacial surgery, he became, among other things, coordinating trainee master for the course in oral, maxillofacial and maxillofacial surgery at KU Leuven and UGent, and chairman of the Recognition Committee for Stomatology and Oral, Maxillofacial and Maxillofacial Surgery (STO-MKA).
He obtained his PhD in biomedical sciences in 2012 on the topic of 'complications after orthognathic surgery', after which he founded the OMFS-IMPATH research group at KU Leuven with Prof. Reinhilde Jacobs, as well as the 3D lab MKA.
Since 1982, Professor Politis has been active in numerous syndicates and associations, including the Flemish Physician Syndicate (VAS), the Belgian Association of Physician Syndicates (BVAS) and the Association of Belgian Professional Associations of Physician Specialists-MKA (VBS-MKA). He is also president of the Belgian Association for Oral-Mouth-Angeal and Head and Neck Surgery (BVMKA-HH).
From 1989 to 2012, he was medical head of oral, maxillofacial and oral surgery at Ziekenhuis Oost-Limburg (ZOL). Until his retirement on 1 October 2023, he was medical head of oral, maxillofacial and maxillofacial surgery at UZ Leuven, lecturer at UHasselt and guest lecturer at ESHAL in Brussels. As a full professor, he also taught Oral, Maxillofacial and Maxillofacial Surgery at KU Leuven to dental and medical students. He introduced 3D planning of surgical procedures where 3D printed surgical moulds could transfer precision to the patient's surgical procedure. He authored the 3-volume work Oral Diseases and MKA Surgery published in 2018, which formed the core curriculum for trainee assistants. In total, he supervised the training of 95 MKA doctors in Flanders during his career.

## Reinhilde JACOBS

Reinhilde Jacobs is dentist, Doctor in Dental Sciences (PhD University of Leuven), periodontologist (KU Leuven) and Master in Dental Radiology (University of London). She is full professor at the University of Leuven and visiting professor at Karolinska Institutet, Stockholm, Sweden and the Dalian Medical University in China. R. Jacobs is heading the omfs impath research group of the KU Leuven (omfsimpath.be) and the clinical center of dentomaxillofacial radiology (UZleuven). She is Secretary General of the International Association of DentoMaxilloFacial Radiology and President-elect of the Digital Dentistry Society. She is section editor of 5 journals (Clinical Oral Investigations, Journal of Dentistry (Digital Dentistry Section) European Journal of Radiology, International Journal of Oral Implantology and Oral Radiology). She has received the D Collen Research Travel Award (1994), a postdoctoral fellowship of the European Commission (1994-95), the IADR Young Investigators Award (1998) and the Belgian Joachim Award in Odontostomatology (1999). In 2013, she received a Dr Honoris Causa at the "Iuliu Hatieganu" University of Medicine and Pharmacy in Cluj-Napoca. She is involved in many multidisciplinary and interuniversity research collaborations, with a specific focus on imaging research, artificial intelligence and bioprinting. She has been actively participating in 5 European projects and is (co-)author of 5 books and more than 650 publications in peer-reviewed journals besides multiple invited lectures and publications in other journals or books. Scopus (2023): h:77



5
3D Lab

## Eman SHAHEEN

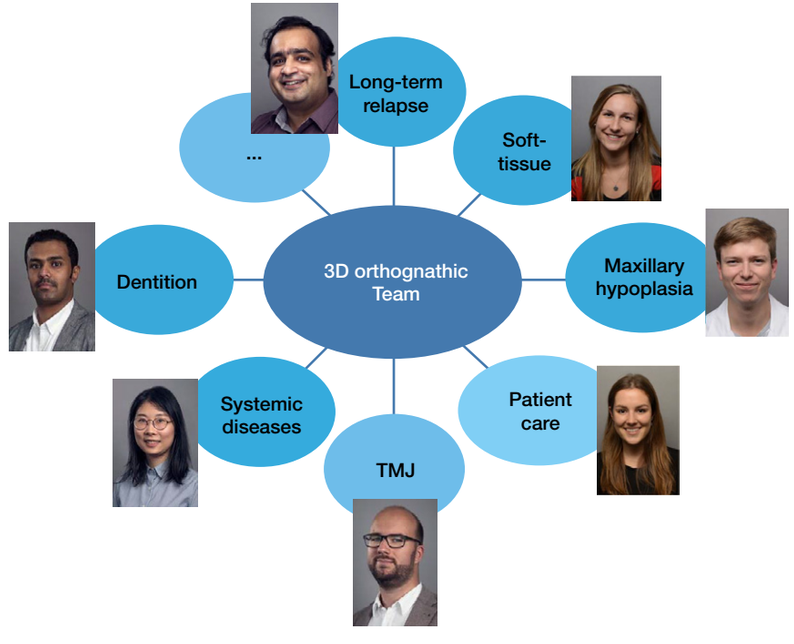
Eman (Emmy) Shaheen graduated with honors from the faculty of Computer Sciences and Information Technology (2003), Cairo University, Egypt where she worked as a teaching assistant from 2003 till 2007 with a major in Image Processing. Meanwhile, she obtained her Master's Degree in Video Processing (2007) from Cairo University. In 2008, she joined the team of Medical Physics where she finished with distinction her pre-doctoral studies in 2009 followed by her doctoral degree in 2014 in Biomedical Sciences at the KU Leuven, Belgium to develop/simulate 3D models of breast lesions and tools to optimize the performance of breast tomosynthesis. In the same year, she started working in the department of Maxillo-facial surgery, University hospitals Leuven (Belgium) as clinical engineer with focus on 3D planning of orthognathic surgeries. Next to the patient related work, she is part of the research group OMFS-IMPATH (KU Leuven, Belgium) where she supervises masters and PhD students and supports different research projects related to 3D printing and 3D simulations.

## Yi SUN

Yi Sun obtained his PhD in Biomedical Sciences, Master of Medical imaging and Bachelor in Electronic Engineering. Since 2007, he worked in the field of computer assistant surgery planning, with focus on oral and maxillofacial surgery. His main professional interest is template-based and image-guided solution for dental implant placement, design of digital splint for orthognathic surgery, orofacial reconstruction using fibular or DCIA flap. Currently he is responsible for the 3D surgical simulation team in the department of oral and maxillofacial surgery (UZ Leuven). His current research interest are: design of patient specific implant, tissue engineering by using 3D printed titanium scaffold and development of image-guided surgical simulation system (navigation system).

## B. PROJECTS

- Long-term bone relapse: maxillary relapse and mandibular remodeling
- Soft tissue changes after orthognathic surgery
- Transverse maxillary hypoplasia for orthognathic patients
- Continuous Quality Improvement in orthognathic surgery
- Condylar changes after orthognathic surgery
- Systemic diseases related to orthognathic surgery
- Dental changes evaluation in 3D after orthognathic surgery
- 3D evaluation of airway changes after orthognathic surgery
- Maxillofacial trauma management
- Cost-benefit of  in-house designed 3Dprinted reconstruction plates
- VR design and planning in traumatology



## C. PUBLICATIONS

### INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Alqahtani, K.A., Jacobs, R., Shujaat, S., Politis, C., Shaheen, E. (2023) Automated three-dimensional quantification of external root resorption following combined orthodontic-orthognathic surgical treatment. A validation study. *JOURNAL OF STOMATOLOGY, ORAL AND MAXILLOFACIAL SURGERY* 2023 124;1S 101289-doi:10.1016/j.jormas.2022.09.010

Alqahtani, K. A., Jacobs, R., Smolders, A., Van Gerven, A., Willems, H., Shujaat, S., & Shaheen, E. (2023). Deep convolutional neural network-based automated segmentation and classification of teeth with orthodontic brackets on cone-beam computed-tomographic images: a validation study. *EUROPEAN JOURNAL OF ORTHODONTICS*, 45(2), 169-174. doi:10.1093/ejo/cjac047

Bila, M., Franken, A., Van Dessel, J., Garip, M., Meulemans, J., Willaert, R., Hoeben, A., Vander Poorten, V., Clement, P.M. (2023) Exploring long-term responses to immune checkpoint inhibitors in recurrent and metastatic head and neck squamous cell carcinoma. *ORAL ONCOL.* 2024 Feb;149:106664. doi: 10.1016/j.oraloncology.2023.106664. Epub 2023 Dec 18. PMID: 38113661.

De Ketele, A., Meeus, J., Shaheen, E., Verstraete, L., Politis, C. (2023) The usefulness of cutting guides for resection or biopsy of mandibular lesions: A technical note and case report. Journal of *STOMATOLOGY, ORAL AND MAXILLOFACIAL SURGERY* 124 (1), 101272

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Li, J., Shujaat, S., Shaheen, E., Ver Berne, J., Politis, C., & Jacobs, R. (2023). Postoperative complications in asthmatic patients following orthognathic surgery: A two-year follow-up study. *JOURNAL OF STOMATOLOGY ORAL AND MAXILLOFACIAL SURGERY*, 124(3), 6 pages. doi:10.1016/j.jormas.2023.101388

Nys, M., van den Bempt, M., Shaheen, E., Dormaar, J. T., & Politis, C. (2023). Three-dimensional planning accuracy and follow-up of Le Fort I osteotomy in cleft lip/palate patients.. *JOURNAL OF STOMATOLOGY ORAL AND MAXILLOFACIAL SURGERY*, 124(4), 6 pages. doi:10.1016/j.jormas.2023.101421

Smeets, M., Croonenborghs, T.M., Van Dessel, J., Politis, C., Jacobs, R., Bila, M. (2023) The Effectiveness of Surgical Methods for Trismus Release at Least 6 Months After Head and Neck Cancer Treatment: Systematic Review. *FRONTIERS IN ORAL HEALTH* 2022,2,10.3389/froh.2021.810288

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Starovoyt, A., Shaheen, E., Putzeys, T., Kerckhofs, G., Politis, C., Wouters, J., & Verhaert, N. (2023). Anatomically and mechanically accurate scala tympani model for electrode insertion studies. *HEARING RESEARCH*, 430. doi:10.1016/j.heares.2023.108707

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Verbist, M., Dubron, K., Bila, M., Jacobs, R., Shaheen, E., & Willaert, R. (2023). Accuracy of surgical navigation for patient-specific reconstructions of orbital fractures: A systematic review and meta-analysis.. *J STOMATOL ORAL MAXILLOFAC SURG*, 125(3), 101683. doi:10.1016/j.jormas.2023.101683

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