KU LEUVEN

OMFS
IMPATH

Yearbook 2024

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Preface

The OMFS-IMPATH research group is a multidisciplinary research group established in 2013, with a focus on OMFS and dental applications of artificial intelligence, biofabrication, CBCT imaging, serving digital workflows in oral, orthognathic and oncological surgery as well as trigeminal nerve pathology. Over the past decade, the OMFS-IMPATH research group has become an international leader, fulfilling its role as a cradle of talented clinical researchers, an incubator of ideas, inventions and spin-offs. Our group currently comprises 50 researchers from 19 countries, resulting in 1 peer-reviewed publication per week, mostly as international collaborations. Many of our PhD students go on to develop brilliant academic careers and establish new projects and centres in their home countries.
Innovation is our driving force at the service of professionals and patients, with the dynamism of a multidisciplinary and multicultural team as the vital energy of our success story, reflected in this 2024 Yearbook.

Reinhilde Jacobs

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Team

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The OMFS-IMPATH research group is a globally diverse team comprising 50 MSc, PhD, and postdoctoral researchers, alongside clinicians. This multidisciplinary collective includes experts such as maxillofacial surgeons, pediatric dentists, orthodontists, dentomaxillofacial radiologists, endodontists, biomedical scientists, and engineers. Their core mission is to create and validate innovative surgical tools and image-based solutions that can push forward the field of oromaxillofacial surgery, aiming to improve treatment outcomes while reducing perioperative and postoperative risks.

The team consistently demonstrates high standards of excellence in research, with 83% of their work being the result of international collaboration. Over half of their publications are among the top 25 most cited in their field worldwide. Additionally, one-third of their research is published in the top 25 journals within their discipline. With a network of more than 1,050 co-authors and over 25,000 citations, their impact in the field is profound.

For the most recent developments in OMFS-IMPATH's research, visit www.omfsimpath.be.

DEPARTMENT OF IMAGING & PATHOLOGY - HEAD: PROF. KOEN VAN LAERE

Biomedical MRI	Uwe Himmelreich
Forensic Biomedical Sciences	Ronny Decorte
Medical Physics & Quality Assessment	Hilde Bosmans
Nuclear Medicine & Molecular Imaging	Koen Van Laere
Radiology	Stefan Sunaert
Translational Cell & Tissue Research	Tania Roskams
OMFS-IMPATH	**Reinhilde Jacobs** www.omfsimpath.be

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Koen VAN LAERE

Koen Van Laere is full professor and head of Nuclear Medicine, Radiopharmacy and the PET-MR unit at KU Leuven University/ University Hospital (KU/UZ Leuven), Belgium. His research focuses on brain imaging in neurodegeneration and psychiatry, as well as for drug development. He is (co)author of over 490 peer reviewed scientific manuscripts and book chapters (H-index 82; >27k citations). He is past-president of the Belgian Nuclear Medicine Society and past-chair of the NeuroImaging Committee of the European Association for Nuclear Medicine. He is co-author of several European (and joint US) guidelines on clinical PET brain imaging (FDG, dopamine, amyloid).

The Nuclear Medicine department in Leuven has a full GMP radiopharmaceutical production facility, 2 PET-CT (including GE MI4 and Siemens Vision X) and a GE Signa PET-MR (to be replaced mid-2025 with the first 1.5 ultrahigh resolution NeuroExplorer PET in Europe), as well as a full preclinical facility including microPET-SPECT-CT (4 Molecubes systems). At UZ/KU Leuven there is an established base for preclinical and clinical academic and industry-sponsored PET tracer studies, with expertise in 20 first-in-man tracer studies in close collaboration with the on-site GMP certified Phase I unit. He is responsible for the Marketing Authorisation for FDG (“Glucogast”) for University Hospital Leuven and the service distributes FDG as well as 7 other PET ligands to over 10 Belgian hospitals and for clinical trials throughout Europe.

Koen Van Laere was also founder and chair of the “Flanders Bioimaging” consortium, consisting of all Flemish universities with microscopy, preclinical and clinical imaging modalities, which is a recognized node under EuroBioImaging, a European Union ESFRI (European Strategy Forum on Research Infrastructures). He is past member of the KU Leuven Research Council, Industrial Research Council and the Commission for Scientific Integrity.

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

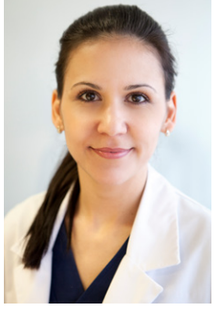
Reinhilde JACOBS

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 KULeuven and visiting professor at Karolinksa Institutet, Stockholm, Sweden and Dalian Medical University in China. R. Jacobs is heading the omfs impath research group of the KU Leuven (www.omfsimpath.be), being responsible for research, education in the field of dentomaxillofacial radiology meanwhile being Clinical Head of the DentoMaxilloFacial Imaging Center of the University Hospitals UZ KULeuven. She is Secretary General of the International Association of DentoMaxilloFacial Radiology and President-elect of Digital Dentistry Society. Furthermore, she is also section editor of Clinical Oral Investigations, International Journal of Oral Implantology, European Journal of Radiology and Journal of Dentistry. She has received the D Collen Research Travel Award (1994), a postdoctoral fellowship of the European Commission (1994-95) for work with Prof P- I Brånemark (Univ Göteborg), the IADR Young Investigators Award (1998) and the Belgian Joachim Award in the 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 and has been actively participating in 5 European projects (ref. Pisa, Minosquare, Osteodent, SedentexCT, Dimitra). She is (co-)author of 6 books and more than 700 publications in peer-reviewed journals besides multiple invited lectures and publications (2024: h-index Scopus 85).

Michel BILA

Michel Bila is trained as a maxillofacial surgeon. Between 2016 and 2024 he was appointed at the University Hospital of Leuven, where he was also a faculty member, specializing in the treatment of oral cancer and reconstruction. With a passion for advancing the field, Dr. Bila has pursued 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. Michel Bila is currently working at Antwerp University Hospital as a maxillofacial surgeon, specialising in the treatment and reconstruction of head and neck cancer.
His expertise is evident in his teaching and research, both of which are aimed at improving patient outcomes in this field. Dr Bila obtained his MD from the University of Antwerp in 2009 and his DDS from the Katholieke Universiteit Leuven in 2012. During his residency, he trained at several renowned institutions, including the University of Leuven, the University of Antwerp and University College London Hospitals (UCLH). Since 2016, he has been working as an academic clinician and researcher, consistently pursuing clinical excellence through both research and teaching.

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.

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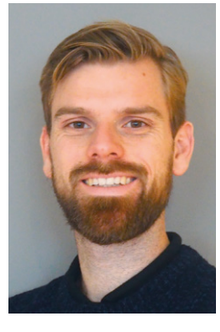
Jan MEEUS

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

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.

Roos BUDTS

Roos Budts graduated in Biomedical Sciences from KU Leuven, Belgium. She completed her Master’s thesis at the Rega Institute, where her work focused on understanding how Evasins affect neutrophil migration and activation, contributing to deeper insights into immune system behavior.
Currently, Roos is pursuing her Ph.D. at KU Leuven, under the guidance of esteemed professors Prof. Dr. Reinhilde Jacobs, Prof. Dr. Sofie Struyf, and Dr. Mostafa EzEldeen. Her doctoral research aims to develop multi-material scaffolds with immunomodulatory properties. This novel tissue engineering strategy is designed to treat dental tissue loss in children and adolescents, offering a promising approach that combines biocompatible materials with immune system modulation.

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).

Eslam DAWOOD

Born in Riyadh, Saudi Arabia in 1993, Eslam Dawood is a Prosthetic and Implant Dentistry specialist. He completed his bachelor's degree in Dentistry at Tanta University in Egypt and gained valuable experience during his internship at Tanta University Hospitals. He has worked as a General Dentist at the 6th of October military hospital and later became a resident and teaching assistant at the Department of Prosthodontics at Tanta University. In addition to his academic pursuits, he also runs his private clinic. He obtained his master's degree in Prosthetic Dentistry at Tanta University and worked as an assistant lecturer and researcher in the Department of Prosthodontics at the Faculty of Dentistry at Tanta University. He is now a Ph.D. researcher at OMFS-IMPATH in Leuven.

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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.

Bahaa ELGARBA

Bahaaeldeen M. Elgarba was born in Riyadh, Saudi Arabia, in 1990. He obtained his Bachelor's degree in Dentistry from Tanta University, Egypt, in 2012, after completing his studies from 2007 to 2012, followed by a one-year internship at Tanta University Hospitals. In 2014, he worked as a General Dentist at the Egyptian Ministry of Health. Subsequently, he joined the Department of Prosthodontics at Tanta University as a resident and research assistant while simultaneously managing his private clinic. In 2019, he earned his Master's degree in Prosthetic Dentistry from Tanta University. Since 2020, he has been serving as an assistant lecturer and researcher in the Department of Prosthodontics at the Faculty of Dentistry, Tanta University. His area of expertise lies in Prosthetic and Implant Dentistry. In 2021, Bahaaeldeen moved to Leuven, Belgium, to pursue his PhD at OMFS-IMPATH under supervision of Professor Reinhilde Jacobs. His research focuses on automating presurgical dental implant planning and creating virtual implant patient models.

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 42 international peer-reviewed papers, and 4 book chapters.

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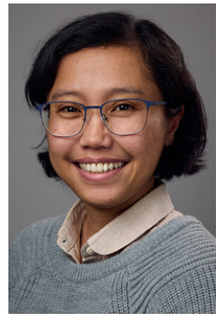
Rocharles FONTENELE

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 more than 70 peer-reviewed articles in important journals in the Dentistry, Oral Surgery & Medicine area, such as Periodontology 2000, Dentomaxillofacial Radiology, Clinical Oral Investigations, Journal of Dentistry, Journal of Endodontics, International Endodontic Journal, and Clinical Oral Implants Research. Additionally, he has received more than 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 and Master degree in Biomedical Sciences, Magna Cum Laude, from KU Leuven, Belgium. As part of her Master thesis, she performed research abroad at Karolinska Institutet, 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.
Currently, she is a PhD researcher for the OMFS-IMPATH research group under supervision of Prof. Dr. Reinhilde Jacobs, Prof. Dr. Ir. Arn Mignon and Dr. Mostafa EzEldeen. Her research topics focus primarily on Tissue Engineering and Regenerative Medicine and the application potential of polymer-based biomaterials in dentistry, with the aim to tackle dental pulp injuries in children and adolescents. For this project, she has obtained a PhD Fellowship Strategic Basic Research from the Research Foundation – Flanders (FWO) in November 2023.

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."

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Pierre LAHOUD

Pierre Lahoud is a Doctor in Dental Surgery (DDS) with Postgraduate Training in Advanced Medical Imaging (PGD). In 2024, he completed his PhD at the Faculty of Medicine of KU Leuven (Oral and Maxillofacial Surgery & Imaging and Pathology Research Group) focusing on Artificial Intelligence and Biomechanical Modelling Towards Patient-Specific Oral Surgical Procedures.
He is currently a Clinical Assistant in Periodontology and Implant Surgery (KU Leuven, Belgium) and a Post-Doctoral Fellow (OMFS-IMPATH Research Group, KU Leuven, Belgium) focusing on Artificial Intelligence, In-Silico Modelling, Periodontology, Implant and Muco-Gingival Surgery. He is also a Guest Professor at the Department of Conservative Dentistry and Periodontology, Ludwig Maximilian University of Munich, Germany, and a Principal Investigator for Benchmarking within the UN's Global Initiative on AI for Health (Geneva, Switzerland), as well as a Board Member of the Junior Committee of Digital Dentistry Belgium.
He has published over 25 peer-reviewed international publications, lectured nationally and internationally and is the recipient of numerous national and international awards, including the IADMFR Maxillofacial Research Award (First Prize - 2021, Gwangju, South Korea), the Albert J. Stichting Travel Award (Brussels, Belgium), the 2022 Journal of Endodontics Award (Chicago, IL, USA) and the 2022 Scientific Award of the Brazilian Association of Dental Radiology and Diagnostic Imaging (Goiânia, Brazil).

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. From 2020 to March of 2024, Catalina worked 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. Her thesis topic investigated 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 CEDIADR/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).
She is currently working as a general dentist in Belgium to complete her diploma recognition.

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 completed the postgraduate program in Advanced Medical Imaging at KU Leuven, Belgium with Magna cum laude in 2024. Now she is currently pursuing her PhD in KU Leuven.

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Flavia PREDA

Flavia Preda specialises in the digitisation of orthodontic workflows and has extensive experience within private orthodontic practice. Through the implementation of advanced 3D diagnostics and treatment planning, she has contributed to the optimisation of diagnosis and the expansion of treatment options, both for general orthodontic patients and those with a schisis.
Her expertise in digitalisation led to the establishment of an in-house digital orthodontic laboratory within her own practice. She is also actively involved in scientific research within the OMFS IMPATH KU Leuven, with a focus on digital orthodontics. As a board member of Digital Dentistry Belgium, she is committed to promoting digital dentistry and contributing to its further development and implementation within the Belgian dental community.

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.

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.

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. In 2018, she completed a clinical internship at UC Louvain, Belgium, 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. During the same period, she worked as a research assistant in the Cranio-Facial Research Laboratory at the same university. In 2024, she obtained a Postgraduate Diploma in Advanced Medical Imaging at KU Leuven, Belgium, graduating Magna Cum Laude. She was awarded the Second Prize Oral Presentation at the EADMFR Research Award 2024 in Freiburg, Germany. She is currently a Ph.D. researcher in the OMFS-IMPATH Research Group at KU Leuven, with a focus on using Artificial Intelligence for diagnosis and treatment planning in endodontics.

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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.

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. In 2024, she obtained her PhD in the OMFS-IMPATH research group, KU Leuven, starting December 2019 with Professor Reinhilde Jacobs as her promotor. Her research focuses on Imaging of Medication-related osteonecrosis of the jaw.

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 an oral and maxillofacial surgeon. 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. He was trained in Belgium (University Hospitals Leuven), and the Netherlands (ETZ Elisabeth Tilburg). Next, he was the first to be awarded the Gillies OMFS trauma fellowship subspecializing in maxillofacial trauma in London with prof. Simon Holmes (Royal London Hospital) and after being awarded the prestigious BAEF fellowship, he further spent one year at the University of Illinois Chicago, USA subspecializing in trigeminal nerve reconstruction under prof. Michael Miloro. He is a Harvard certified data scientist and is further certified in AI for medicine, health data systems and security. His main areas of interest lie in craniofacial trauma and nerve injuries, orthognathic surgery, data-driven evidence-based medicine and maxillofacial imaging. He is driven by the desire to continually improve patient care and spearhead advancements in the field of oral and maxillofacial surgery.

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 University Hospitals Leuven with an 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.

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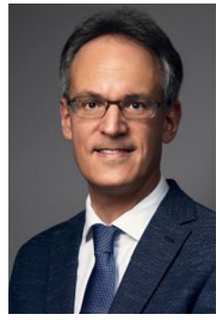
Team

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. In 2024, Dr. Verhelst obtained his PhD 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.

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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Team

Claudia NOFFKE

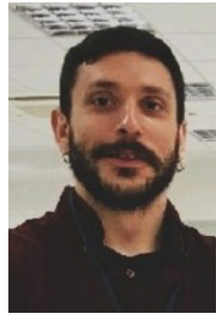
Claudia grew up and matriculated in Germany. She obtained her dental degree at the University of Pretoria and managed a private practice for several years. She completed her postgraduate training in 1992 and was appointed as the Head of an OMR Unit at a South African University in 2001, a position from 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.

D. VISITING RESEARCHERS

Athanasios ALEXANDRIDIS



Athanasios Alexandridis was born in Greece on July 26, 1992. He possesses an Integrated Master's degree from the University of Ioannina, having graduated in October 2020 from the Department of Materials Engineering. His diploma thesis, entitled *"Effect of Curing Protocol and Exposure to UV Radiation on the Mechanical Properties of Resins,"* with a flawless mark of 10/10, demonstrates his strong background in polymer science and mechanical characterization. In March 2023, Athanasios obtained a Master of Science in Materials Physics & Technology from Aristotle University of Thessaloniki. His thesis, entitled *"4D Printing of Ferromagnetic Hybrid Scaffolds: Design, Fabrication, Mechanical and Magnetic Hyperthermia Evaluation,"* graduating with a flawless mark of 10/10, underscores his proficiency in advanced materials design and structural characterisation.
Athanasios possesses a robust foundation in materials science and engineering, emphasizing polymer and biopolymer materials, mechanical, and structural characterisation. Throughout his master's studies, he developed a profound interest in biomaterials, regenerative medicine and tissue engineering. His current research focuses on employing 3D printing and electrospinning techniques to create biomimetic scaffolds for tooth root regeneration. He is the primary author of a research paper scheduled for publication in March 2025. Additionally, Athanasios gained valuable industry experience working at the Greek start-up company **Morphe**, where he managed the development of hybrid filaments for fused deposition modeling (FDM) 3D printing.

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. In 2024, he was part of the OMFS-IMPATH research group at KU Leuven for further research.

Benedetta BALDINI

Benedetta Baldini, born in 1996 in Ascoli Piceno, Italy, obtained her master's degree in Biomedical Engineering at Politecnico di Milano in 2021. During 2022 she earned a research fellowship with Department of Maxillofacial Surgery and Odontostomatology of Policlinico di Milano. From November 2022, she is a PhD student at Politecnico di Milano under the guidance of Professor Baselli, collaborating closely with Policlinico di Milano under the supervision of Professor Dr. Tartaglia.
From March to October 2024, she spent a research period abroad at OMFS-IMPATH group under the supervision of Professor Dr. Jacobs. Her research field is bioimaging, focusing on the integration of different types of maxillofacial and dental images: CBCT, IOS and facial scans.

Elena BELFIORE

Elena Belfiore obtained her master's degree in Pharmaceutical Chemistry and Technology from University of Palermo, Italy. She then completed a one-year second-level master's degree at the Sapienza University of Rome. After two years of practicing as a pharmacist, she started her PhD project, funded by MUR, PON FSE REACT EU R&I 2014-20 Action IV.5, at the University of Palermo, acquiring skills in delivery systems' design in the cosmetic and pharmaceutical technology laboratory under the mentorship of Prof. V. De Caro. Focus of her PhD project is the development of novel polyphenol-enriched extracts useful as functional excipients for development of pharmaceutical/cosmetic formulations, aimed at maintaining oral health and treating oxidative stress related-disorders. She undertook a 6-month research exchange period at KU Leuven, OMFS-IMPATH, under the supervision of Dr. Reinhilde Jacobs and Mostafa EzEldeen, collaborating with PhD researcher Una Ivković. In January 2025 she has completed her Ph.D. project (XXXVII cycle of the Ph.D. program in Oncology and Experimental Surgery-D014, Me.Pre.C.C. Department) and she is going to defend her PhD Thesis.

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.
In 2024, Mariel was 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.

Oana-Elena BURLACU-VĂTĂMANU

Burlacu-Vătămanu Oana-Elena born in Bacău, Romania, is a dual graduate of Dental Medicine and Dental Technique programs at "Carol Davila" University of Medicine and Pharmacy from Bucharest. She is currently pursuing her Ph.D. studies under the esteemed guidance of Professor Corina Marilena Cristache. Her research focus on the development of virtual patients in dentistry.
Oana's commitment to academic excellence has been recognized by the Ministry of Education of Romania, awarding her a prestigious scholarship. This opportunity enabled her to undertake a six-month research project at OMFS-IMPATH, further enriching her expertise and expanding her horizons in the realm of dental science.

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. Throughout her six-year dental education, she served as Class President and was recognized at graduation with the Outstanding Student Award for Service Work and Union Collaboration by the Colegio de Cirujanos Dentistas de Chile A.G., a professional organization of dental surgeons. In her final year, María Ignacia wrote her thesis 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 and Maxillofacial Surgeon Dr. Pablo Romero Romano. She also completed a clinical internship at KU Leuven, where she treated patients in the student dental clinic and assisted residents in the specialty clinic at UZ Leuven Campus St. Rafael. Between 2022 and 2023, she worked as a general dentist in Chile and assisted in oral surgeries.
In 2023, María Ignacia moved to Belgium, where she completed the Postgraduate Studies in Advanced Medical Imaging at KU Leuven in July 2024. She is currently in the process of publishing her thesis under the supervision of Prof. Reinhilde Jacobs and Prof. Walter Coudyzer. While awaiting official recognition of her dental degree by the Belgian authorities, she is working at the private clinic of renowned implantologist David Norré.

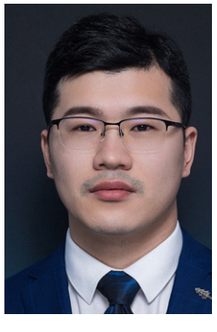
Maria Fernanda DA SILVA ANDRADE BORTOLETTO

Maria Fernanda da Silva Andrade Bortoletto was born in 1991 in Pouso Alegre, Minas Gerais, Brazil. She graduated from Piracicaba Dental School - UNICAMP, Brazil in 2017. Later, in 2022, she completed her Master's in Oral Radiology at Piracicaba Dental School - University of Campinas (FOP-UNICAMP) in Piracicaba, São Paulo, Brazil. She is currently pursuing her PhD in the same program and university (FOP-UNICAMP) under the supervision of Professor Deborah Queiroz Freitas. In 2024, Maria Fernanda was 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 artefact expression in CBCT, osteoporosis in dental imaging, and artificial intelligence.

Renata Maíra DE SOUZA LEAL

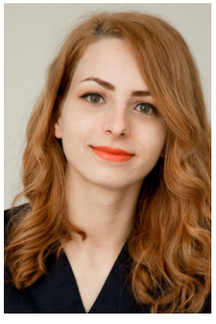
Renata Maíra de Souza Leal was born in Curitiba, Paraná, Brazil, in 1993. She earned her dental degree in 2018 at the Federal University of Paraná, Brazil (UFPR). In 2020, she obtained her title of Specialist in Endodontics from Bauru Dental School – University of São Paulo (FOB-USP) in Bauru, São Paulo, Brazil. Subsequently, in 2021, she obtained her Master's degree in Dental Clinic in Endodontics at the Federal University of Paraná (UFPR) in Brazil. She is currently pursuing her PhD in the same program and university (UFPR).
In 2024, Renata was 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 diagnosis and endodontic treatment planning by Artificial Intelligence (AI) and root fracture diagnosis in cone beam CT.

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. In 2024, he joined 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 Hațieganu 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 Hedeșiu. Her research is focused on artificial intelligence solutions for diagnostics in dentomaxillofacial radiology.

Sara ELSONBATY

Sara Elsonbaty, born in Egypt in 1994, earned her bachelor's degree in Dentistry from Tanta University in 2017, followed by a one-year internship at Tanta University and various hospitals under the Egyptian Ministry of Health in 2018. Since 2019, she has been practicing as a general dentist at the Egyptian Ministry of Health and in a private clinic, gaining extensive experience in clinical dentistry and patient care. In 2022, she moved to Leuven, Belgium and pursued postgraduate studies in the Advanced Medical Imaging program, successfully graduated in 2024 with great distinction, further enhancing her expertise in dental and medical imaging.

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Team

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.
In 2024, Fernanda was 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.

Yao GAO

In 2020, Yao was honored with the Outstanding Graduate Award upon receiving his master's degree from Shanghai Jiao Tong University, guided by Prof. Xiaojun Chen. Now, he is pursuing a Ph.D. degree at the University Hospital of Leuven and KU Leuven under the supervision of Prof. Robin Willaert. From 2017 to 2021, he has developed dynamic navigation surgical systems for the distal locking of intramedullary nails and dental implantations, recognized as the Top Cited Article for 2021-2022 in IJMRCAS. Presently, he is delving into Craniomaxillofacial Reconstruction and Repairment based on Artificial Intelligence.

Sirin GUNER ONUR

Dr Sirin Guner Onur completed her dental education and obtained her DDS degree from Marmara University, Istanbul, Turkey in 2007. She then completed the PhD programme at Marmara University, Institute of Health Sciences and obtained her PhD degree in Paediatric Dentistry in 2012, followed by the Dental Laser Mastership programme at Aachen University, Dental Laser Centre (AALZ), 2015 - 2016. Her research focuses on early childhood caries, the oral microbiome and improving children's oral health. She is also interested in the use of dental laser as an alternative method for soft and hard tissue applications in infants, children and adolescents. She has conducted many clinical trials investigating early childhood caries and associated factors. Her recent research interests include the use of artificial intelligence in dentistry. She is a member of the European Academy of Paediatric Dentistry (EAPD), the International Association of Paediatric Dentistry (IAPD), the International Association of Dental Research (IADR) and the European Organisation for Caries Research (ORCA).

Feng LI

Li Feng was born in Hunan, China. He obtained his dental degree in 2020 before pursuing his Master of Dentistry (Oral and Maxillofacial Surgery) in 2023. His undergraduate and master's research mainly included clinical research in oral and maxillofacial surgery and basic research in bone homeostasis.
Presently, he is undertaking doctoral studies under the guidance of Professor Dr. Robin Willaert. His study focuses on the clinical outcomes of computer-assisted virtual surgery in craniofacial reconstructive surgery.

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.

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 was participating in the OMFS-IMPATH research group under the tutelage of Professor Reinhilde Jacobs at the Katholieke Universiteit Leuven (KU Leuven), Leuven, Belgium, in 2024. Her research focus is cone beam computed tomography (CBCT), artifact expression in CBCT, and dental implant imaging.

Axelle NOESEN

Axelle Noesen is a graduating Master student in Biomedical Sciences - Basic and Translational Research at KU Leuven. In 2023 - 2024, she pursued 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.

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Team

Constanza Belén PASTENES SOLAR

Constanza Pastenes was born in Antofagasta, Chile in 1997. She got her degree as a Dental Surgeon with a minor in Finance for non-specialists at Universidad de los Andes in Santiago, Chile in 2022. She wrote her final thesis on the use of Cone Beam Computer Tomography (CBCT) in the exodontia of third molars under the supervision of Dr. Guillermo Concha. Her work was awarded a prize at the 2023 Latin American Oral and Maxillofacial Conference. She is currently studying a two-year postgraduate course in Oral and Maxillofacial Imaging.

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.

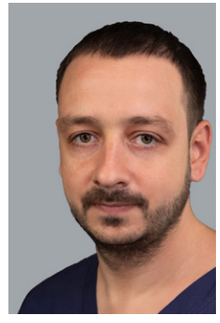
Büşra ŞENEL

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. In 2024, she was 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.

Ilya TSIKLIN



Ilya 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. In 2024, he was appointed as teaching assistant in Oral and Maxillofacial Surgery at KULeuven.

Lina VAN LINT

Lina Van Lint earned her Master's degree in Biomedical Sciences from KU Leuven in 2022. During her master's thesis, she conducted research on the quality of life of patients with oral cancer and explored the potential of smartphone applications in 3D soft tissue scanning of the face.
Currently, Lina is a Ph.D. researcher under the supervision of Prof. Dr. Robin Willaert, Dr. Jeroen Van Dessel, Dr. Michel Bila (all from KU Leuven), and Prof. Dr. Véronique Christiaens (UGent). Her doctoral research focuses on enhancing the quality of life for patients with oral cancer, with a specific emphasis on physical activity, nutrition, facial aesthetics, and speech. Her first publication is Van Lint, L., Christiaens, L., Stroo, V., Bila, M., Willaert, R., Sun, Y., & Van Dessel, J. (2023). Accuracy comparison of 3D face scans obtained by portable stereophotogrammetry and smartphone applications. Journal of Medical and Biological Engineering, 43(5), 550-560., which she presented as a pitch presentation at the IADMFR World Tour Congress in Brussels, Belgium, in July 2023 and as an oral presentation at the 3D Body Tech Conference in Lugano, Switzerland in October 2023.

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

FWO

IDENTGEL

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

PRIMORDIAL

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

INTERNAL FUNDING

SMALL RESEARCH INFRASTRUCTURE

Application for a high-end multifunctional 3D printer for innovative biomaterial technology research

SMALL RESEARCH INFRASTRUCTURE

Bench-top laboratory electrospinning and electrospraying machine

BOF C14/24/142

DESIRE-2-B: Deciphering dental pulp interaction with biomaterials through bioprinted tissue models

DREIMS

Dental Tissue Regeneration via Bioengineered Immune Modulatory Scaffolds

CRANIVAL

Departmental grant BEPAT

B. AWARDS

December 2024
CAIRNS GILLIES TRAUMA FELLOWSHIP
European Association for Craniomaxillofacial Surgery

Fréderic Van der Cruyssen

November 2024
THIRD PRIZE - ORAL PRESENTATION
24TH JABRO CONGRESS (Brazilian Association of Dental Radiology Congress)
Desenvolvimento e validação de uma inovadora ferramenta baseada em inteligência artificial dedicada à segmentação automática do canal incisivo mandibular em TCFC

Maria Fernanda da Silva Andrade Bortoletto

October 2024
FIRST PRIZE - YOUNG INVESTIGATOR SESSION FOR DENTISTRY
12th Congress of Carol Davila University of Medicine and Pharmacy Bucharest
Teeth Tech: Artificial Intelligence's Sharp Eye for Detecting Alveolar Bone Levels in Panoramic Radiographs

Oana-Elena Burlacu- Vătămanu

October 2024
ARIA DIGITAL AWARD FOR CLINICAL CATEGORY
ARIA DIGITAL LYON
Autotransplantation dentaire et digitalisation: l'innovation en application

Pierre Lahoud

September 2024
JOHN LOWRY Congress Scholarship
27th EACMFS Congres Rome

Kathia Dubron

September 2024
FIRST PRIZE - SENIOR BASIC SCIENCE
ROBERT FRANK AWARD 2024
Polymeric Nanoparticles for Chemokine Mediated Dental Pulp Tissue Engineering

Una Ivković

September 2024
LINCOLN R. MANSON-HING AWARD
for Distinguished Service as a Scientific Reviewer for 2023 - 2024
OMR section of Oral Surgery Oral Pathology Oral Medicine Oral Radiology (OOOO)

Reinhilde Jacobs

June 2024
SECOND PRIZE ORAL PRESENTATION
EADMFR Research Award 2024
19th ECDMFR
A novel convolutional neural network-based tool for automated segmentation of pulp cavity structures in single-rooted teeth using CBCT

Marie Louise Slim

June 2024
FIRST PRIZE ORAL PRESENTATION
EADMFR Research Award 2024
19th ECDMFR
Novel AI-Based Tool for Prosthetic Crown Segmentation Supporting Automated CBCT-IOS Registration in Challenging High Artifact Scenarios

Bahaa Elgarba

March 2024
HONORABLE MENTION
JOE Awards program
19th ECDMFR
Multimodal Imaging of Dental Pulp Healing Patterns Following Tooth Autotransplantation and Regenerative Endodontic Treatment

Mostafa EzEldeen

February 2024
FELLOWSHIP OF THE BELGIAN AMERICAN EDUCATION FOUNDATION
BAEF Research Fellowships

Fréderic Van der Cruyssen

C. PUBLICATIONS

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Alqahtani, K. A., Jacobs, R., Da Costa Senior, O., Politis, C., Shaheen, E. (2024). Recommendations to minimize tooth root remodeling in patients undergoing maxillary osteotomies. *SCIENTIFIC REPORTS, 14*(1), 11 pages. doi:10.1038/s41598-024-62059-2

Alqahtani, K. A., Shaheen, E., Da Costa, O., Politis, C., Jacobs, R. (2024). Three dimensional assessment of root changes after multi-segments Le Fort I osteotomy. *JOURNAL OF CRANIO-MAXILLOFACIAL SURGERY, 52*(12), 1485-1490. doi:10.1016/j.jcms.2024.08.022

Alqahtani, K. A., Shaheen, E., Politis, C., Jacobs, R. (2025). Three-dimensional assessment of root changes after Le Fort I osteotomy. *INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 54*(1), 57-64. doi:10.1016/j.ijom.2024.07.003

Amoli, M. S., Yang, H., Anand, R., EzEldeen, M., Aktan, M. K., Braem, A., Jacobs, R., Bloemen, V. (2024). Development and characterization of colloidal pNIPAM-methylcellulose microgels with potential application for drug delivery in dentoalveolar tissue engineering strategies. *INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES, 262*, 12 pages. doi:10.1016/j.ijbiomac.2024.129684

Baldini, B., Papasratorn, D., Fagundes, F. B., Fontenele, R. C., Jacobs, R. (2025). Validation of a novel tool for automated tooth modelling by fusion of CBCT-derived roots with the respective IOS-derived crowns. *JOURNAL OF DENTISTRY, 153*, 8 pages. doi:10.1016/j.jdent.2024.105546

Bangia, M., Ahmadzai, I., Casselman, J., Politis, C., Jacobs, R., Van der Cruyssen, F. (2024) 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. *EUROPEAN RADIOLOGY, 34*;7 4619-4627, doi:10.1007/s00330-023-10363-2

Bhatti, N., Mohamedbhai, H., Poon, X., Khan, P., Van Der Cruyssen, F., Holmes, S. (2024) Open management of condylar head fractures. The first 50 cases: What have we learnt and where are we going? *BRITISH JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY. PUBLISHED ONLINE AUGUST* 2024: S0266435624002146. doi:10.1016/j.bjoms.2024.08.005

Belmans, N., Gilles, L., Vermeesen, R., Virag, P., Hedesiu, M., Salmon, B., Baatout, S., Lucas, S., Lambrichts, I., Jacobs, R., Moreels, M., DIMITRA Research Group (2024). Author Correction: Quantification of DNA double strand breaks and oxidation response in children and adults undergoing dental CBCT scan. *SCIENTIFIC REPORTS, 14*,1 doi:10.1038/s41598-024-79000-2

Binvignat, P., Chaurasia, A., Lahoud, P., Jacobs, R., Pokhojaev, A., Sarig, R., Ducret, M., Richert, R. (2024). Isotopological remeshing and statistical shape analysis: Enhancing premolar tooth wear classification and simulation with machine learning. *JOURNAL OF DENTISTRY, 149*, 8 pages. doi:10.1016/j.jdent.2024.105280

Bottini, G.B., Hitzl, W., Götzinger, M., Politis, C., Dubron, K., Kordić, M., Sivrić, A., Pechalova, P., Sapundzhiev, A., Pereira-Filho, V.A., de Oliveira Gorla, L.F., Dediol, E., Kos, B., Rahman, T., Rahman, S.A., Samieirad, S., Aladelusi, T., Konstantinovic, V.S., Lazić, M., Vesnaver, A., Birk, A., Sohal, K.S., Laverick, S., Rae, E., Rossi, M.B., Roccia, F., Sobrero, F. Management of Mandibular Condyle Fractures in Pediatric Patients: A Multicentric Retrospective Study with 180 Children and Adolescents. *J CLIN MED.* 2024 Sep 14;13(18):5455. doi: 10.3390/jcm13185455

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Cena, P., Raco, I., Roccia, F., Federica, S., Dediol, E., Kos, B., Battista Bottini, G., Goetzinger, M., Samieirad, S., de Oliveira Gorla, L.F., Pereira-Filho, V.A., Pechalova, P., Sapundzhiev, A., Lazíc, M., Konstantinovic, V.S., Zavattero, E., Sivrić, A., Kordić, M., Abdur Rahman, S., Rahman, T., Singh Sohal, K., Aladelusi, Euan Rae, T., Laverick, S., Vesnaver, A., Birk, A., Politis, C., Dubron, K. (2024) An 11-year multicentric surgical experience on pediatric orbital floor trapdoor fracture: A World Oral Maxillofacial Trauma (WORMAT) project, *JOURNAL OF STOMATOLOGY, ORAL AND MAXILLOFACIAL SURGERY, Volume 126*, Issue 1, 2025, 102033, ISSN 2468-7855, https://doi.org/10.1016/j.jormas.2024.102033

Chopra, S., Vranckx, M., Ockerman, A., Ostgren, P., Kruger-Weiner, C., Benchimol, D., Shujaat, S., Jacobs, R. (2024). A retrospective longitudinal assessment of artificial intelligence-assisted radiographic prediction of lower third molar eruption (vol 14, 994, 2024). In *SCIENTIFIC REPORTS* (Vol. 14, Iss. 1, pp. 1 page). NATURE PORTFOLIO. doi:10.1038/s41598-024-57144-5

Coropciuc, R., Moreno-Rabie, C., De Vos, W., van de Casteele, E., Marks, L., Lenaerts, V., Coppejans, E., Lenssen, O., Walschap, J., Jacobs, R., Politis, C., Van den Wyngaert, T. (2024). Navigating the complexities and controversies of medication-related osteonecrosis of the jaw (MRONJ): a critical update and consensus statement. *ACTA CHIRURGICA BELGICA, 124*(1), 1-11. doi:10.1080/00015458.2023.2291295

Cremona, G., Paione, S., Roccia, F., Samieirad, S., Lazíc, M., Konstantinovic, V.S., Rae, E., Laverick, S., Vesnaver, A., Birk, A., de Oliveira Gorla, L.F., Pereira-Filho, V.A., Dediol, E., Kos, B., Pechalova, P., Sapundzhiev, A., Dubron, K., Politis, C., Zavattero, E., Battista Bottini, G., Goetzinger, M., Sivrić, A., Kordić, M., Abdur Rahman, S., Rahman, T., Singh Sohal, K., Aladelusi, T., Sobrero, F. (2024) Policy of fourteen maxillofacial divisions towards titanium plates removal after internal fixation of paediatric maxillofacial fractures: A World Oral Maxillofacial Trauma (WORMAT) project, *JOURNAL OF STOMATOLOGY, ORAL AND MAXILLOFACIAL SURGERY, Volume 125*, Issue 5, Supplement 2, 2024, 101986, ISSN 2468-7855, https://doi.org/10.1016/j.jormas.2024.101986.

Da Costa, N., Da Costa, N., Van der Cruyssen, F., Nugent, G., Bhatti, N., Hassan, H. (2024) A case report of chronic osteomyelitis – A modified reconstruction technique with Platelet-Rich-Fibrin (PRF) aggregates. *BRITISH JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 62*(10): e86. doi:10.1016/j.bjoms.2024.10.208

De Clerck, H., Timmerman, H., Nguyen, T., Jacobs, R., Siciliano, S. (2024). Facial growth modification with a bone-anchored Herbst appliance part 2. *J CLIN ORTHOD, 58*(10), 608-615. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/39799590

De Moor, A., Willaert, R., Sun, Y., Hunin, Z., van Loon, J., Decramer, T., Bila, M. (2024) Surgical management of a temporal meningoencephalocele with a patient-specific combined craniofossa prosthesis: illustrative case. J Neurosurg Case Lessons, Aug 5;8(6): *CASE24132.* doi: 10.3171/CASE24132

Dhondt, R.A.L., Lahoud, P., Siawasch, M., Castro, A.B., Quirynen, M., Temmerman, A. (2024) The Socket Shield Technique: Stability of the Buccal Peri-implant Bone after Partial Root Removal - A Prospective Case Series of 20 patients, with 18 Months Follow-up. *INT J PERIODONTICS RESTORATIVE DENT, MAY 3*;0(0):1-22. doi: 10.11607/prd.6989

Doucet, K., Shaheen, E., Danneels, M., Dormaar, T., Verdonck, A., Willems, G., Politis, C., Jacobs, R., de Llano-Perula, M. C. (2024). Three-dimensional evaluation of secondary alveolar bone grafting in patients with unilateral cleft lip and palate: A 2-3 year post-operative follow-up. *ORTHODONTICS & CRANIOFACIAL RESEARCH, 27*, 100-108. doi:10.1111/ocr.12763

Dubron, K., Yang, L. H., Jacobs, R., Politis, C., Willaert, R., Shaheen, E. (2024). Symmetry recovery in zygomaticomaxillary complex fractures compared to normal unfractured population: A new reliable 3D evaluation. *JOURNAL OF STOMATOLOGY ORAL AND MAXILLOFACIAL SURGERY, 125*(3), 6 pages. doi:10.1016/j.jormas.2024.101857

Elgarba, B. M., Fontenele, R. C., Ali, S., Swaity, A., Meeus, J., Shujaat, S., Jacobs, R. (2024). Validation of a novel AI-based automated multimodal image registration of CBCT and intraoral scan aiding presurgical implant planning. *CLINICAL ORAL IMPLANTS RESEARCH, 35*(11), 1506-1517. doi:10.1111/clr.14338

Elgarba, B. M., Fontenele, R. C., Mangano, F., Jacobs, R. (2024). Novel AI-based automated virtual implant placement: Artificial versus human intelligence. *JOURNAL OF DENTISTRY, 147*, 5 pages. doi:10.1016/j.jdent.2024.105146

Elgarba, B. M., Fontenele, R. C., Tarce, M., Jacobs, R. (2024). Artificial intelligence serving pre-surgical digital implant planning: A scoping review. *JOURNAL OF DENTISTRY, 143*, 12 pages. doi:10.1016/j.jdent.2024.104862

Elgarba, B.M., Meeus, J., Fontenele, R.C., Jacobs, R. (2024) AI-Based Registration of IOS and CBCT with High Artifact Expression. *JOURNAL OF DENTISTRY, 147*, August 2024, 105166. doi: 10.1016/j.jdent.2024.105166

Elsonbaty, S., Elgarba, B. M., Fontenele, R. C., Swaity, A., Jacobs, R. (2025). Novel AI-based tool for primary tooth segmentation on CBCT using convolutional neural networks: A validation study. *INTERNATIONAL JOURNAL OF PAEDIATRIC DENTISTRY, 35*(1), 97-107. doi:10.1111/ipd.13204

Fontenele, R. C., & Jacobs, R. (2025). Unveiling the power of artificial intelligence for image-based diagnosis and treatment in endodontics: An ally or adversary?. *INTERNATIONAL ENDODONTIC JOURNAL, 58*(2), 155-170. doi:10.1111/iej.14163

Gao, Y., Gu, Y., Van Dessel, J., Lübbers, H.T., Tian, L., Politis, C., Bila, M., Willaert, R., Chen, X., Sun, Y. (2024). Orthocalc: The Six Degrees of Freedom Measurement Workflow of Rotational and Displacement Changes for Maxilla Positioning Evaluation. *COMPUTER METHODS AND PROGRAMS IN BIOMEDICINE, 247*, 108083. doi: 10.2139/ssrn.4673071

Gracea, R. S., Winderickx, N., Vanheers, M., Hendrickx, J., Preda, F., Shujaat, S., Cadenas de Llano-Pérula, M., Jacobs, R. (2025). Artificial intelligence for orthodontic diagnosis and treatment planning: A scoping review. *JOURNAL OF DENTISTRY, 152*, 12 pages. doi:10.1016/j.jdent.2024.105442

Grigoriadis, A., Saadi, S. B., Munirji, L., Jacobs, R. (2025). Development and validation of an AI-driven tool to evaluate chewing function: a proof of concept. *JOURNAL OF DENTISTRY, 153,* 10 pages. doi:10.1016/j.jdent.2024.105525

Gu, Y., Liu, Y., Bühring, J., Tian, L., Koblenzer, M., Schröder, K-U., Li, F., Van Dessel, J., Politis, C., Jahr, H., Sun, Y. (2024) Biocompatibility and osteogenic capacity of additively manufactured biodegradable porous WE43 scaffolds: An in vivo study in a canine model. *BIOMATERIALS ADVANCES* 2024 August.

Hendrickx, J., Gracea, R. S., Vanheers, M., Winderickx, N., Preda, F., Shujaat, S., Jacobs, R. (2024). Can artificial intelligence-driven cephalometric analysis replace manual tracing? A systematic review and meta-analysis. *EUROPEAN JOURNAL OF ORTHODONTICS, 46*(4), 17 pages. doi:10.1093/ejo/cjae029

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Jacobs, R., Fontenele, R. C., Lahoud, P., Shujaat, S., Bornstein, M. M. (2024). Radiographic diagnosis of periodontal diseases - Current evidence versus innovations. *PERIODONTOLOGY 2000*, 95(1), 51-69. doi:10.1111/prd.12580

Jindanil, T., Burlacu-Vatamanu, O. -E., Meyns, J., Meewis, J., Fontenele, R. C., de Llano Perula, M. C., Jacobs, R. (2024). Automated orofacial virtual patient creation: A proof of concept. *JOURNAL OF DENTISTRY, 150*, 8 pages. doi:10.1016/j.jdent.2024.105387

Jindanil, T., Xu, L., Fontenele, R. C., Perula, M. C. D. L., Jacobs, R. (2024). Smartphone applications for facial scanning: A technical and scoping review. *ORTHODONTICS & CRANIOFACIAL RESEARCH, 27*, 65-87. doi:10.1111/ocr.12821

Khan, P., Khan, P., Mohamedbhai, H., Poon, X., Van Der Cruyssen, F., Bhatti, N. (2024) Open management of condylar head fractures: The first 50 cases: What have we learnt and where are we going? *BRITISH JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 62*(10):e72. doi:10.1016/j.bjoms.2024.10.173

Lahoud, P., Faghihian, H., Richert, R., Jacobs, R., EzEldeen, M. (2024). Finite element models: A road to in-silico modeling in the age of personalized dentistry. *JOURNAL OF DENTISTRY, 150*, 11 pages. doi:10.1016/j.jdent.2024.105348

Lahoud, P., Jacobs, R., Elahi, S. A., Ducret, M., Lauwers, W., van Lenthe, G. H., Richert, R., Ezeldeen, M. (2024). Developing Advanced Patient-Specific In Silico Models: A New Era in Biomechanical Analysis of Tooth Autotransplantation. *JOURNAL OF ENDODONTICS, 50*(6), 820-826. doi:10.1016/j.joen.2024.02.022

Lemberger, M., Benchimol, D., Pegelow, M., Jacobs, R., Karsten, A. (2024). Validation and comparison of 2D grading scales and 3D volumetric measurements for outcome assessment of bone-grafted alveolar clefts in children (vol 46, cjae002, 2024). In *EUROPEAN JOURNAL OF ORTHODONTICS* (Vol. 46, Iss. 6, pp. 1 page). *OXFORD UNIV PRESS*. doi:10.1093/ejo/cjae062

Li, J., Shujaat, S., Ver Berne, J., Shaheen, E., Coucke, W., Politis, C., Jacobs, R. (2024) Postoperative complications following orthognathic surgery in patients with rheumatic diseases: A 2-year follow-up study. *ORAL DISEASES, 30*;2 586-592. doi:10.1111/odi.14417

Marinho-Vieira, L. E., Pinheiro, M. C. R., Freitas, D. Q., Jacobs, R., de Oliveira-Santos, C., Sverzut, A. T., Oliveira, M. L. (2025). Evaluation of gingival thickness obtained from intraoral scanning registration with cone beam computed tomography at different acquisition modes. *ORAL SURGERY ORAL MEDICINE ORAL PATHOLOGY ORAL RADIOLOGY, 139*(1), 101-110. doi:10.1016/j.oooo.2024.08.005

Milheiro, A., De Tobel, J., Capitaneanu, C., Shaheen, E., Fieuws, S., Thevissen, P. (2024) Quantifying the potential of morphological parameters for human dental identification: part 1—proof of concept. *INT J LEGAL MED 138*, 25–34. doi: 10.1007/s00414-022-02853-7

Moreno-Rabié, C., Fontenele, R., Oliveira-Santos, N., Nogueira-Reis, F., Van den Wyngaert, T., Jacobs, R. (2024). Key insights into antiresorptive drug use and osteonecrosis in osteoporotic patients undergoing tooth extractions: A clinical and CBCT assessment. *OSTEOPOROSIS INTERNATIONAL,* 10 pages. doi:10.1007/s00198-024-07108-2

Moreno-Rabié, C., Gaêta-Araujo, H., Ferreira-Leite, A., Coucke, W., Gielen, E., Van den Wyngaert, T., Jacobs, R. (2024) Local radiographic risk factors for MRONJ in osteoporotic patients undergoing tooth extraction. *ORAL DISEASES,* 30;3 1632-1642. doi:10.1111/odi.14496

Muresanu, S., Hedesiu, M., Iacob, L., Eftimie, R., Olariu, E., Dinu, C., Jacobs, R. (2024). Automating Dental Condition Detection on Panoramic Radiographs: Challenges, Pitfalls, and Opportunities. *DIAGNOSTICS, 14*(20), 14 pages. doi:10.3390/diagnostics14202336

Nogueira-Reis, F., Morgan, N., Suryani, I.R., Tabchoury, C.P.M., Jacobs, R. (2024) Full virtual patient generated by artificial intelligence-driven integrated segmentation of craniomaxillofacial structures from CBCT images. *JOURNAL OF DENTISTRY, 141*; 104829. doi:10.1016/j.jdent.2023.104829

Oliveira-Santos, N., Leite, A. F., Petitjean, E., Torres, A., Van der Veken, D., Curvers, F., Pinto, J.C., Lambrechts, P., Jacobs, R. (2024). The relation between Schneiderian membrane thickening and radiodiagnostic features of periapical pathology. *BRAZ DENT J,* 35, e245775. doi:10.1590/0103-6440202405775

Pereira, R.V.S., EzEldeen, M., Ugarte-Berzal, E., Vandooren, J., Martens, E., Gouwy, M., Ganseman, E., Van Damme, J., Matthys, P., Vranckx, J.J., Proost, P., Opdenakker, G. (2024). Protection of stromal cell-derived factor-1 SDF-1/CXCL12 against proteases yields improved skin wound healing. *FRONTIERS IN IMMUNOLOGY, 15*, Art.No. ARTN 1359497. doi: 10.3389/fimmu.2024.1359497

Preda, F., Nogueira-Reis, F., Stanciu, E. M., Smolders, A., Jacobs, R., Shaheen, E. (2024). Validation of automated registration of intraoral scan onto Cone Beam Computed Tomography for an efficient digital dental workflow. *JOURNAL OF DENTISTRY, 149,* 8 pages. doi:10.1016/j.jdent.2024.105282

Roccia, F., Sobrero, F., Strada, C., Bottini, G.B., Goetzinger, M., Samieirad, S., Vesnaver, A., Birk, A., de Oliveira Gorla, L.F., Pereira-Filho, V.A., Dediol, E., Kos, B., Pechalova, P., Sapundzhiev, A., Lazíc, M., Konstantinovic, V.S., Dubron, K., Politis, C., Demo, P.G., Sivrić, A., Kordić, M., Rahman, S.A., Rahman, T., Sohal, K.S., Aladelusi, T., Rae, E., Laverick, S. (2024) Open reduction and internal fixation of paediatric maxillozygomatic complex fractures: An 11-year multicentric retrospective study. *DENT TRAUMATOL*. 2024 Dec;40(6):680-687. doi: 10.1111/edt.12976. Epub 2024 Jun 20

Sabelis, J., Schreurs, R., Maal, T., Willaert, R., Shaheen, E., Dubois, L., Becking, A. (2024) OR282 – Orbital patient-specific implant: patient-specific, physician-specific or planner-specific implant? *INTERNATIONAL JOURNAL OF ORAL & MAXILLOFACIAL SURGERY, 52*,2:104, January 2024. doi: 10.1016/j.ijom.2023.10.293

Sabelis, J., Shaheen, E., Willaert, R., Becking, A.G., Dubois, L., Schreurs, R. (2024) PSI: Planner-specific, physician-specific, or patient-specific implant for orbital reconstruction? *JOURNAL OF CRANIO-MAXILLOFACIAL SURGERY, 52*(11), pages 1376-1382. doi: 10.1016/j.jcms.2024.03.004

Salar Amoli, M., Anand, R., Ezeldeen, M., Geris, L., Jacobs, R., Bloemen, V. (2024). Development of 3D Printed pNIPAM-Chitosan Scaffolds for Dentoalveolar Tissue Engineering. *GELS*, 10(2), 13 pages. doi:10.3390/gels10020140

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Salar Amoli, M., Yang, H., Anand, R., EzEldeen, M., Aktan, M.K., Braem, A., Jacobs, R., Bloemen, V. (2024) Development and characterization of colloidal pNIPAM-methylcellulose microgels with potential application for drug delivery in dentoalveolar tissue engineering strategies. *INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES, 262*;Pt 1 129684. doi:10.1016/j.ijbiomac.2024.129684

Shujaat, S., Alfadley, A., Morgan, N., Jamleh, A., Riaz, M., Aboalela, A. A., Jacobs, R. (2024). Emergence of artificial intelligence for automating cone-beam computed tomography-derived maxillary sinus imaging tasks. A systematic review. *CLINICAL IMPLANT DENTISTRY AND RELATED RESEARCH, 26*(5), 899-912. doi:10.1111/cid.13352

Shujaat, S., Vasconcelos, K. D. F., Kesztyus, A., Fontenele, R. C., Oliveira-Santos, N., Nagy, K., Shaheen, E., Jacobs, R. (2024). Optimization of orofacial cleft imaging protocols using device-specific low-dose cone-beam computed tomography. *JOURNAL OF ORAL REHABILITATION, 51*(9), 1712-1720. doi:10.1111/joor.13745

Slim, M. L., Jacobs, R., Leal, R. M. D. S., Fontenele, R. C. (2024). AI-driven segmentation of the pulp cavity system in mandibular molars on CBCT images using convolutional neural networks. *CLINICAL ORAL INVESTIGATIONS, 28*(12), 11 pages. doi:10.1007/s00784-024-06009-2

Smeets, M., Croonenborghs, T. -M., Van Dessel, J., Jacobs, R., Willaert, R., Bila, M. (2025). Evaluating the reproducibility and validity of maximal mouth opening measurement techniques. *JOURNAL OF STOMATOLOGY ORAL AND MAXILLOFACIAL SURGERY, 126*(4), 5 pages. doi:10.1016/j.jormas.2024.102107

Sobrero, F., Roccia, F., Omedè, M., Merlo, F., Dubron, K., Politis, C., Rabufetti, A., Scolozzi, P., Ramieri, G., Birk, A., Vesnaver, A., Rizvi, A.O., Laverick, S., Jelovac, D., Konstantinovic, V.S., Vilaplana, V., Roig, A.M., Goetzinger, M., Bottini, G.B., Knežević, P., Dediol, E., Kordić, M., Sivrić, A., Derkuş, F.E., Yilmaz, U.N., Ganasouli, D., Zanakis, S.N. (2024) Current Strategies for Treatment of Mandibular Fractures With Plate Osteosynthesis: A European Prospective Study. J *CRANIOFAC SURG.* 2024 Jun 1;35(4):1120-1124. doi: 10.1097/SCS.0000000000010128. Epub 2024 May 7.

Suryani, I.R., Shujaat, S., Ivković, U., Coucke, W., Coropciuc, R., Jacobs, R. (2024) Risk of healing impairment following tooth extraction in patients administered with antiresorptive and non-antiresorptive polypharmacy. *JOURNAL OF STOMATOLOGY, ORAL AND MAXILLOFACIAL SURGERY, 125*;2 101645. doi:10.1016/j.jormas.2023.101645

Suryani, I. R., Shujaat, S., That, M. T., Coucke, W., Jacobs, R. (2024). Prediction of wound healing status following dental extraction using Adapted-University of Connecticut osteonecrosis numerical scale: A retrospective study. *HEALTH SCIENCE REPORTS, 7*(6), 10 pages. doi:10.1002/hsr2.2184

Swaity, A., Elgarba, B. M., Morgan, N., Ali, S., Shujaat, S., Borsci, E., Chilvarquer, I., Jacobs, R. (2024). Deep learning driven segmentation of maxillary impacted canine on cone beam computed tomography images. *SCIENTIFIC REPORTS, 14*(1), 8 pages. doi:10.1038/s41598-023-49613-0

Tarce, M., Becker, K., Lahoud, P., Shujaat, S., Jacobs, R., Quirynen, M. (2024). Non-invasive oral implant position assessment: An ex vivo study using a 3D industrial scan as the reference model to mimic the clinical situation. *CLINICAL ORAL IMPLANTS RESEARCH,* Volume 35, Issue 8, ugust 2024, 10 pages. doi:10.1111/clr.14206

3
Research

Torres, A., Dierickx, M., Lerut, K., Bleyen, S., Shaheen, E., Coucke, W., Pedano, M.S., Lambrechts, P., Jacobs, R. (2024). Response to letter to editor: Clinical outcome of guided endodontics versus freehand drilling: A controlled clinical trial, single arm with external control group. *INTERNATIONAL ENDODONTIC JOURNAL, 3* pages. doi:10.1111/iej.14177

Torres, A., Dierickx, M., Lerut, K., Bleyen, S., Shaheen, E., Coucke, W., Pedano, M.S., Lambrechts, P., Jacobs, R. (2025). Clinical outcome of guided endodontics versus freehand drilling: A controlled clinical trial, single arm with external control group. *INTERNATIONAL ENDODONTIC JOURNAL, 58*(2), 209-224. doi:10.1111/iej.14157

Van Cleemput, T., Van Der Cruyssen, F., Smets, L.H.M., van Loon, B. (2024) Implant-Retained Mandibular Advancement Device Therapy for Edentulous Patients. *SLEEP VIGILANCE, 8*(2):273-280. doi:10.1007/s41782-024-00289-0

Van Der Cruyssen, F., Miloro, M. (2024) Comment on Permanent lingual nerve injury after dental procedures: a retrospective study of 228 patients. *INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY.* Published online January 2025:S0901502725000062. doi:10.1016/j.ijom.2025.01.006

Van der Cruyssen, F., Palla, B., Jacobs, R., Politis, C., Zuniga, J., Renton, T. (2024) Consensus guidelines on training, diagnosis, treatment and follow-up care of trigeminal nerve injuries. *INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 53*;1 68-77. doi:10.1016/j.ijom.2023.06.003

Van Gorp, G., EzEldeen, M. (2024). Interdisciplinary Approach to Managing Complex Traumatic Dental Injuries in the Young Permanent Dentition. *DENTAL TRAUMATOLOGY.* doi: 10.1111/edt.13023

Ver Berne, J., Vermeire, S., van den Bruel, A., De Paepe, P. (2024) DICER1 Mutations Define the Landscape of Poorly Differentiated Thyroid Carcinoma in Children and Young Adults: Case Report and Literature Review. *AM J SURG PATHOL,* Oct 1;48(10):1277-1283. doi: 10.1097/PAS.0000000000002265. Epub 2024 Jun 24.

Ver Berne, J., De Ceulaer, J., Dalle, I., Creytens, D., Vanwalleghem, L. (2024) Intraductal Carcinoma of the Salivary Gland With Extensive Bone Invasion. *JAMA OTOLARYNGOL HEAD NECK SURG.* Jan 1;151(1):84-86. doi: 10.1001/jamaoto.2024.3720.

Verbist, M., Dubron, K., Bila, M., Jacobs, R., Shaheen, E., Willaert, R. (2024) Accuracy of surgical navigation for patient-specific reconstructions of orbital fractures: A systematic review and meta-analysis. *JOURNAL OF STOMATOLOGY, ORAL AND MAXILLOFACIAL SURGERY, 125*;3 101683. doi:10.1016/j.jormas.2023.101683

Verbist, M., Vandevelde, A.L., Geusens, J., Sun, Y., Shaheen, E., Willaert, R. (2024) Reconstruction of Craniomaxillofacial Bone Defects with 3D-Printed Bioceramic Implants: Scoping Review and Clinical Case Series. *JOURNAL OF CLINICAL MEDICINE, 13*(10), 2805. doi: https://doi.org/10.3390/jcm13102805

Vueghs, C., Shakeri, H., Renton, T., Van Der Cruyssen, F. (2024) Development and Evaluation of a GPT4-Based Orofacial Pain Clinical Decision Support System. *DIAGNOSTICS, 14*(24):2835. doi:10.3390/diagnostics14242835

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Wang, X., Alqahtani, K. A., van den Bogaert, T., Shujaat, S., Jacobs, R., Shaheen, E. (2024). Convolutional neural network for automated tooth segmentation on intraoral scans. *BMC ORAL HEALTH, 24*(1), 9 pages. doi:10.1186/s12903-024-04582-2

Wang, X., Shujaat, S., Shaheen, E., Jacobs, R. (2024) Quality and haptic feedback of three-dimensionally printed models for simulating dental implant surgery. *THE JOURNAL OF PROSTHETIC DENTISTRY, 131*;4 660-667. doi:10.1016/j.prosdent.2022.02.027

Xu, L., Ma, Y., Du, X., Qing, Y., Cao, Y., Sun, X., Jacobs, R., Song, K. (2025). Retrospective study on the clinical and radiographic outcomes of 2.8 mm diameter implants supporting fixed prostheses up to 11 years. *CLINICAL IMPLANT DENTISTRY AND RELATED RESEARCH, 27*(1), 17 pages. doi:10.1111/cid.13395

Xu, L., Jacobs, R., Cao, Y., Sun, X., Qin, X. (2024). Tissue-engineered bone construct promotes early osseointegration of implants with low primary stability in oversized osteotomy. *BMC ORAL HEALTH, 24*(1), 13 pages. doi:10.1186/s12903-023-03834-x

3
Research

BOOK (CHAPTER) PUBLICATIONS

Nagy, K. (2024)
Developmental disorders of the nose and nasopharynx, Developmental deviations of the maxilla and mandible, Cleft lip, palate, alveolar ridges. Clinical pediatrics (pp 492-493). Medicina

3
Research

OTHER PUBLICATIONS

Ivković, U. (2024) What if Teeth Could Heal Themselves? (2024), Educative Pitch for General Audience, *SCIENCE FIGURED OUT,* July 2024

Ivković, U. (2024) Zelfgenezing laat zijn tanden zien. *EOS WETENSCHAP BLOG*, Published online December 2024

Jacobs, R. (2024) AI als ideale tandartsassistent.*CONSULTAND*. Jaargang 24, nr 98, mei 2024, p16-17

Van der Cruyssen F. (2024) Trigeminal nerve injuries. Evaluation and optimization of diagnostic methods. *TANDHEELKUNDIGE TIJDINGEN*. 2024

Van der Cruyssen F. (2024) Cairns Gillies Craniofacial Trauma Fellowship. *EACMFS NEWSLETTER THE PULSE*, 6, 04, Published online December 2024

Van Der Cruyssen, F., Verhelst, P.J., Jacobs, R. (2024) The Use of Artificial Intelligence in Third Molar Surgery Risk Assessment. *DENTAL UPDATE*, 51(1):28-33. doi:10.12968/denu.2024.51.1.28

D. CHAIRS

NOBEL BIOCARE CHAIR FOR ADVANCED DENTAL IMPLANT AND ORAL REHABILITATION RESEARCH
3 YEARS (01.10.2024-30.09.2027)

The purpose of the Chair is to support a research project for complex oral rehabilitation with dental implants.

ANTHOGYR-STRAUMANN CHAIR FOR ORAL AND MAXILLOFACIAL SURGERY
3 YEARS (01.09.2018-30.11.2027)

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)

The purpose of the Chair is to support research in the field of trigeminal neuropathy in OMFS.

E. DOCTORAL THESIS DEFENSES

OMFS-IMPATH SUPERVISED PhDs

Lahoud, Pierre (2024)
Artificial Intelligence and Biomechanical Modeling Towards Patient-Specific Oral Surgical Procedures
Supervisor: Reinhilde Jacobs, Co-supervisors: Marc Quirynen, Michael Bornstein, Mostafa EzEldeen

Verhelst, Pieter-Jan (2024))
Condylar Resorption: Decoding Diagnostics, Etiology & Prediction.
Supervisor: Reinhilde Jacobs, Co-supervisors: Constantinus Politis, Hilde Peeters

Suryani, Isti Rahayu (2024)
Polypharmacy and Medication-Related Osteonecrosis of the Jaw (MRONJ): Identifying Patients at Risk
Supervisor: Reinhilde Jacobs, Co-supervisor: Sohaib Shujaat

Moreno Rabié, Catalina (2024)
Medication-Related Osteonecrosis of the Jaws (MRONJ): imaging assessment of risk factors
Supervisor: Reinhilde Jacobs, Co-supervisor: Tim Van den Wyngaert

OMFS-IMPATH COSUPERVISED PhDs

Dhondt, Rutger (2024)
Maintenance, regeneration and long-term stability of buccal bone around oral implants
Supervisor: Andy Temmerman, Co-supervisors: Marc Quirynen, Reinhilde Jacobs, Joke Duyck

Merken, Karen (2024)
A simulation framework for quality assessment and optimization in dento-maxillofacial CBCT imaging
Supervisor: Prof. Dr. Ir. Hilde Bosmans, Co-supervisors: Prof. Dr. Nicholas Marshall, Prof. Dr. Constantinus Politis, Dr. Guozhi Zhang

Thijssen, Quinten (2024)
The Perfect Fit: Light-Based 3D printing of Biodegradable Bone Implants
Supervisors: Sandra Van Vlierberghe, Robin Willaert

Bila, Michel (2024)
Novel applications for immune checkpoint blockers in head and neck cancer
Supervisor: Paul Clement, Co-supervisors: Diether Lambrechts, Vincent Vander Poorten

OMFS-IMPATH SUPERVISED PhDs

Lahoud, Pierre

Artificial Intelligence and Biomechanical Modeling Towards Patient-Specific Oral Surgical ProcedureS

Supervisor: Reinhilde Jacobs, Co-supervisors: Marc Quirynen, Michael Bornstein, Mostafa EzEldeen

Pierre Lahoud is a dentist (DDS, Université Libanaise) with postgraduate training in advanced medical imaging (PGD, KU Leuven). Currently, he is a Clinical Assistant in Periodontology and Implant Surgery at KU Leuven and serves as a Guest Professor at the Department of Conservative Dentistry and Periodontology at Ludwig Maximilian University of Munich (LMU), Munich, Germany.

He is additionally a scientific collaborator and a principal investigator for benchmarking withing the World Health Organization, International Telecommunication Union and World Intellectual Property Organization's Global Initiative on AI for Health, a Junior Committee Board Member of Digital Dentistry Belgium and has served as a consultant for transalveolar dental transplantations at the Department of Oral and Maxillofacial Surgery, University Hospitals Leuven. His research focuses mainly on artificial intelligence, in-silico modelling, periodontology and implant surgery.

During his doctoral studies, he published over 20 peer-reviewed international articles, lectured at national and international conferences, and received numerous awards including the IADMFR Maxillofacial Research Award (2021), Journal of Endodontics Award (2022), Albert J. Stichting Travel Award (2023), ARIA Digital Award (2024).

This doctoral thesis explores the integration of Artificial Intelligence (AI) and biomechanical analysis for enhancing oral surgical planning. Key findings include:

- Demonstrating how AI can make complex surgical planning tools accessible and precise, comparable to expert use.
- Highlighting the potential of AI-driven segmentation of dental structures in CBCT imaging, enabling patient-specific modeling for tailored treatment.
- Validating in-silico models for studying tooth auto-transplantation, revealing how patient-specific anatomy and biomechanics influence outcomes.
- Employing Model Order Reduction for real-time simulation of dental biomechanics and assessing individual bone dimensions' impact on surgical outcomes using patient-specific modeling.

This research underscores AI's promise in advancing personalized dentistry by improving workflow efficiency and predictive surgical capabilities.

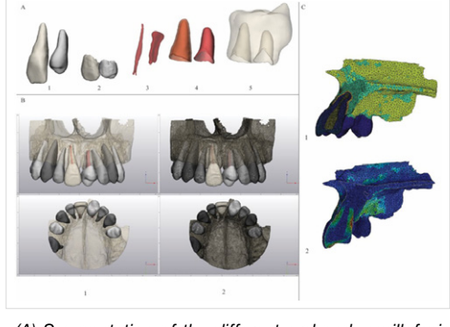


Figure 1. Workflow of the in-silico modeling procedure: (A) Segmentation of the different oral and maxillofacial structures, ranging from segmentation of the (A-1) teeth, (A-2) enamel, (A-3) pulp, (A-4) periodontal ligament and (A-5) surrounding maxillary bone. (B-1) The different structures are then combined into a patient-specific in-silico model and (B-2, C-1) meshed for further (C-2) finite element analysis.

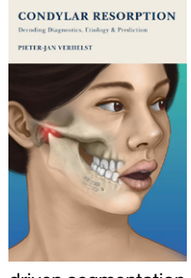
OMFS-IMPATH SUPERVISED PhDs

Verhelst, Pieter-Jan

Condylar Resorption: Decoding Diagnostics, Etiology & Prediction.

Supervisor: Reinhilde Jacobs, Co-supervisors: Constantinus Politis, Hilde Peeters

Pieter-Jan Verhelst was trained as an Oral & Maxillofacial Surgeon 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 and Craniofacial 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.



Condylar resorption (CR) is a disorder affecting the temporomandibular joint (TMJ), characterized by the progressive loss of condylar volume. This condition can occur post-orthognathic surgery (PCR), spontaneously (ICR), or as part of autoimmune disorders (ACR). CR is clinically identified by the (re)occurrence of a malocclusion (class 2 malocclusion and anterior open bite) and facial changes, including retrognathia of the mandible and increased anterior lower facial height. CR can also limit joint function, resulting in pain and restricted movement. This makes CR a particularly dreaded complication as it destroys the results of lengthy treatments of combined orthodontics and orthognathic surgery.

Cone beam computed tomography (CBCT) plays a crucial role in diagnosis of CR. Investigations into PCR should utilize voxel-based registration using a portion of the mandibular ramus, along with automated or artificial intelligence (AI)-driven segmentation techniques and three-dimensional (3D) volumetric analysis, which have shown excellent accuracy and consistency. The use of AI-driven segmentation also improves time efficiency. Automated 3D dense phenotyping for shape analysis allows for the comparison of preoperative mandibular shapes with and without condylar resorption.

PCR occurs in 9.5% of patients having orthognathic surgery of the mandible. On average, patients with CR experience a 17% reduction in condylar volume, a 3.9mm decrease in ramal height, and a 3.1mm posterior displacement of the mandible. Several risk factors were identified on a patient level: younger age, having combined bimaxillary and genioplasty surgery, greater mandibular advancements, upward movements of the distal segment, a pronounced counterclockwise pitch rotation of the distal segment, smaller preoperative condylar volumes, and a higher ratio of anterior to posterior lower facial height. Additional condylar-level risk factors include compressive movements of the ramus and an increased mandibular plane angle. Utilizing machine learning for multivariable analysis, we determined that the extent of mandibular advancement is the most critical predictor of CR.

CR is a complex phenotype, with a minority of patients having monogenic causes the majority of patients have a multifactorial model behind the susceptibility. Haploinsufficiency of the BMP2 gene causes taurodontism and a high susceptibility for CR. Variants in the EFCAB3 and ACAN genes warrant further investigation into a possible link with CR. This work indicates that it seems prudent to screen patients with CR for medical issues or signs indicative of a possible monogenic condition.

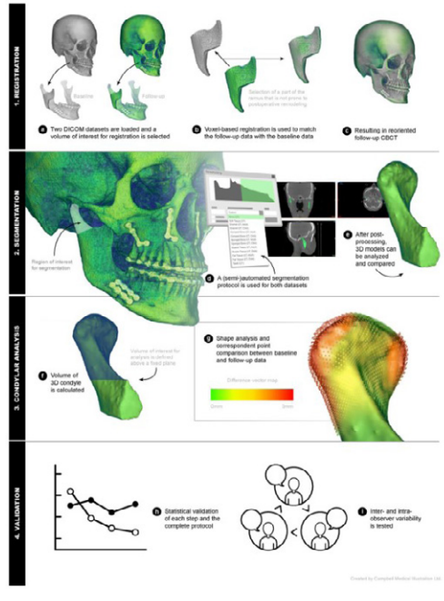


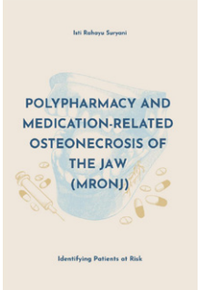
Figure 3.2: infographic illustrating the suggested criteria and steps for an accurate condylar remodeling analysis protocol.

OMFS-IMPATH SUPERVISED PhDs

Suryani, Isti Rahayu

Polypharmacy and Medication-Related Osteonecrosis of the Jaw (MRONJ): Identifying Patients at Risk
Supervisor: Reinhilde Jacobs, Co-supervisor: Sohaib Shujaat

Isti Rahayu Suryani 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 (2017) from Padjajaran University-Indonesia. From December 2019 till June 2024, she was a PhD candidate in OMFS-IMPATH research group with Professor Reinhilde Jacobs as her promotor. Her research focuses on risk factors of Medication-related osteonecrosis of the jaw (MRONJ) in correlation to patients with polypharmacy. Currently, she is a lecturer in the Department of Dentomaxillofacial Radiology, Faculty of Dentistry, UGM-Indonesia and also a Radiology Specialist at UGM Dental Hospital-Indonesia.



This PhD project shed light on various aspects of medication-related osteonecrosis of the jaw (MRONJ), contributing to our understanding of its systemic and local factors.

1. Systemic factors:
This study highlighted advanced age and high polypharmacy scores correlated significantly with delayed healing and MRONJ occurrence. These findings underscore the importance of personalized treatment approaches and close monitoring of medically compromised patients undergoing dental interventions. Additionally, higher A-UCONNS scores correlated with an increased likelihood of MRONJ occurrence, emphasizing the tool's potential in predicting healing outcomes and guiding tailored treatment strategies.

2. Local factors:
Changes in salivary properties and constituents in response to medications and diseases, suggesting a potential link between decreased saliva production and MRONJ development. Factors such as polypharmacy, conditions like Sjögren's syndrome and diabetes contribute to xerostomia, increasing the susceptibility to MRONJ. In relation to site extraction, the last study showed that a significant positive correlation was observed between the total number of tooth roots extracted in the lower jaw and the extraction sites that developed MRONJ. Indeed, half of the extracted mandibular tooth roots seem to develop MRONJ in polypharmacy patients undergoing multiple tooth extractions. As the number of tooth roots extracted increased, the alveolar socket surface area exposed to the oral cavity also increased.

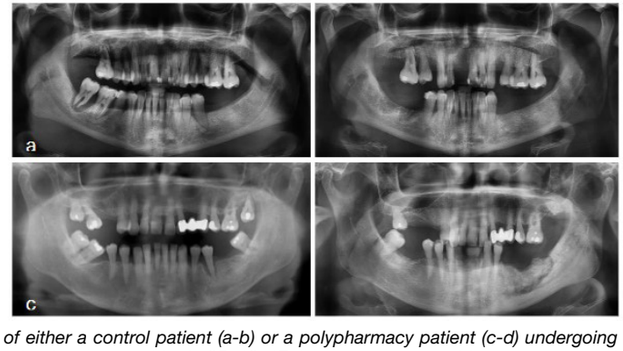


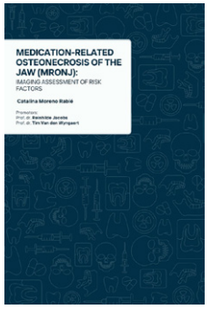
Figure 5.1. Panoramic radiograph of either a control patient (a-b) or a polypharmacy patient (c-d) undergoing multiple tooth extractions. (a) pre- extraction image of teeth 35, 46, 47; (b) normal healing of the alveolar socket of teeth 35, 46, 47. (c) pre-extraction of teeth 17, 28, 37, 35, 31, 41, 42, 47; (d) MRONJ observed at site of tooth 31, 41, 35, 37 and normal healing at sites of teeth 17, 28, 42, 47

OMFS-IMPATH SUPERVISED PhDs

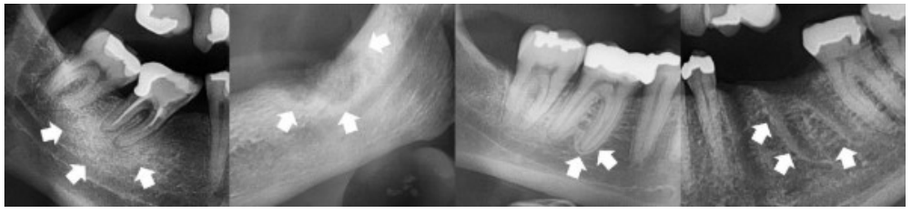
Moreno Rabié, Catalina

Medication-Related Osteonecrosis of the Jaws (MRONJ): imaging assessment of risk factors
Supervisor: Reinhilde Jacobs, Co-supervisor: Tim Van den Wyngaert

Catalina Moreno Rabié is a dental surgeon, who obtained her bachelor's and master's degree in 2016 at Universidad de los Andes in 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. In 2018, she enrolled in the Postgraduate studies in Advanced Medical Imaging at KU Leuven graduating one year later with the highest distinction.
Between 2020 and 2024, Catalina worked as a doctoral researcher in biomedical sciences at KU Leuven under the supervision of prof. dr. Reinhilde Jacobs and prof. dr. Tim Van den Wyngaert. She investigated the effects of antiresorptive drugs on the jaw bones, possible risk factors for the development of Medication-Related Osteonecrosis of the Jaw (MRONJ), and therapeutic prognostic risk factors for this pathology.



This doctoral thesis aimed to utilize two- and three-dimensional radiographic images to identify risk factors for MRONJ. Divided into three parts with six chapters, studies investigated radiographic findings associated with antiresorptive drug use, risk factors for MRONJ in tooth extractions, and prognostic factors for conservative and surgical MRONJ treatment.
Notable findings include thickening of the lamina dura and prolonged postoperative healing as an indicator of antiresorptive drug use. Different risk factors were identified for MRONJ after tooth extractions, but emphasizing that certain radiographic signs, such as bone sequestrum formation and periosteal reaction, are highly suggestive of latent MRONJ lesions. Additionally, an automated tool using neural networks for classifying mandibular trabecular bone patterns was developed with 96% accuracy.
In summary, the research underscores the crucial role of radiographic imaging in early MRONJ diagnosis, understanding local risk factors, and supporting treatment prognosis.



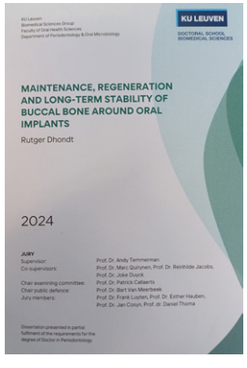
Examples of radiographic findings in patients treated with antiresorptive drugs. From left to right exhibiting osteosclerosis, osteolytic area, thickening of the lamina dura, and visibility of the extraction socket.

OMFS-IMPATH CO-SUPERVISED PhDs

Dhondt, Rutger

Maintenance, regeneration and long-term stability of buccal bone around oral implants
Supervisor: Andy Temmerman, Co-supervisors: Marc Quirynen, Reinhilde Jacobs, Joke Duyck

Rutger Dhondt is a dental specialist in periodontology and implantology. He completed his Bachelor (2006-2009) and Master (2009-2011) in Dentistry at KU Leuven, followed by a Postgraduate degree in Periodontology (2011-2014) at the same university.
Since 2014, he has been working as a consultant in the Department of Periodontology at UZ Leuven. In addition to his clinical work, he is an independent entrepreneur and managing director of Dhondt BV, overseeing the specialized dental practices Radix Heist-op-den-Berg and Radix Antwerp since 2017.
In 2023, he founded Supps By Science BV, which developed the 'Oraguard' brand.



The thesis, 'Maintenance, regeneration and long-term stability of buccal bone around oral implants,' explores innovative approaches in oral implantology to address the challenges of maintaining, regenerating, and stabilizing the buccal bone plate (BBP) following tooth extraction. The research includes systematic reviews and experimental studies evaluating techniques such as the socket shield method, bone augmentation procedures, and guided bone regeneration (GBR) using novel biomaterials like leukocyte- and platelet-rich fibrin (L-PRF). The study assesses both the effectiveness of these interventions and their long-term outcomes, focusing on reducing invasiveness, costs, and treatment times for patients.
Additionally, it evaluates diagnostic tools, such as CBCT and ultrasound, for visualizing BBP dimensions, aiming to improve the precision of treatment planning and follow-up care. The findings contribute valuable insights to improve aesthetic and functional outcomes in dental implantology.

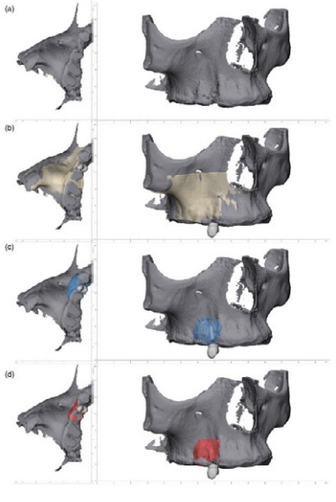


Figure 1: 3-D modelling of consecutive CBCTs. (A) the pre-operative maxilla, (B) the superimposed contra-lateral side (beige), (C) the augmentation following guided bone regeneration (blue), and (D) the bone dimensions after Eres + Lres (red).

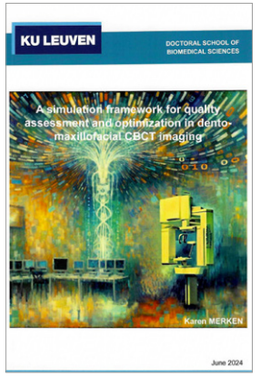
3
Research

OMFS-IMPATH CO-SUPERVISED PhDs

Merken, Karen

A simulation framework for quality assessment and optimization in dento-maxillofacial CBCT imaging
Supervisor: Prof. Dr. Ir. Hilde Bosmans, Co-supervisors: Prof. Dr. Nicholas Marshall, Prof. Dr. Constantinus Politis, Dr. Guozhi Zhang

Karen Merken received her BSc in Electrical Engineering (minor: mechanical engineering) at KU Leuven in 2015. In 2017, she obtained, at KU Leuven, her MSc degree in Electrical Engineering (option electronics and integrated circuits). In 2018, she obtained a MSc in Medical Radiation Physics, at KU Leuven. In October 2018 she joined the PhD training program at the Faculty of Medicine in the Medical Physics & Quality Assessment research group at the KU Leuven. Her PhD project focused on the development of a simulation framework for quality assessment and optimization in dento-maxillofacial CBCT imaging.



This thesis focuses on optimizing dento-maxillofacial Cone Beam Computed Tomography (CBCT) imaging by developing a Virtual Imaging Trials (VIT) platform. While CBCT has gained widespread use in dental radiology due to its ability to overcome the limitations of 2D imaging, variations in imaging protocols and system performance remain a challenge. To address this, the thesis presents methodologies for evaluating and improving CBCT performance, including the development of a virtual patient model, in silico scanner simulations, and model observer studies for root fracture detection. Through case studies and clinical applications, the research demonstrates how VIT can enhance image quality while minimizing radiation exposure, ultimately contributing to the standardization and optimization of CBCT imaging in clinical practice.

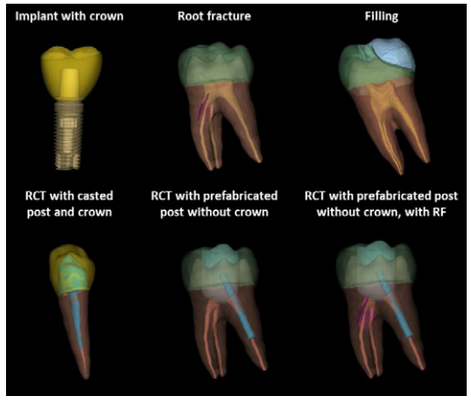


Figure 10. Examples of the modelled root fractures (RFs) and dental restorations (implants, fillings, root canal treatments (RCTs)).

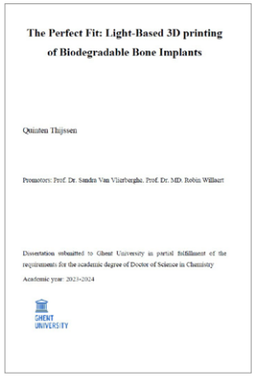
OMFS-IMPATH CO-SUPERVISED PhDs

Thijssen, Quinten

The Perfect Fit: Light-Based 3D printing of Biodegradable Bone Implants

Supervisors: Sandra Van Vlierberghe, Robin Willaert

Quinten Thijssen is a PhD researcher in Chemistry at Ghent University, focusing on polymer chemistry and additive manufacturing. His research, supported by an FWO Strategic Basic Fellowship, involves developing biodegradable bone grafts for maxillofacial reconstruction.
He has conducted research abroad at UC Berkeley (USA), working on thiol-ene crosslinkable poly(ε-caprolactone) for Computed Axial Lithography, and at POLYMAT (University of the Basque Country, Spain), studying photo-acid and photo-base interactions in vitrimers.
He holds an MSc in Chemistry (Magna Cum Laude) and a BSc in Chemistry from Ghent University.


The Perfect Fit: Light-Based 3D printing of Biodegradable Bone Implants

Quinten Thijssen

Promotors: Prof. Dr. Sandra Van Vlierberghe, Prof. Dr. MD. Robin Willaert

Dissertation submitted to Ghent University in partial fulfillment of the requirement for the academic degree of Doctor of Science in Chemistry

Academic year: 2023-2024

GHENT UNIVERSITY

This PhD research focuses on developing a biomaterial ink for light-based 3D printing of temporary scaffolds to support bone regeneration. By optimizing polymer chemistry, photo-crosslinkable poly(ε-caprolactone) networks were designed to match the mechanical properties of trabecular bone. These materials were further refined for volumetric 3D printing, enabling the rapid fabrication of complex, porous structures with high resolution. To enhance biological integration, cell-adhesive properties were introduced through thiol-ene chemistry, and hydroxyapatite was incorporated to better mimic bone composition. This work contributes to the advancement of tissue engineering by combining biodegradable materials with innovative 3D printing technologies, offering a potential solution for bone defect treatment and future applications in regenerative medicine.

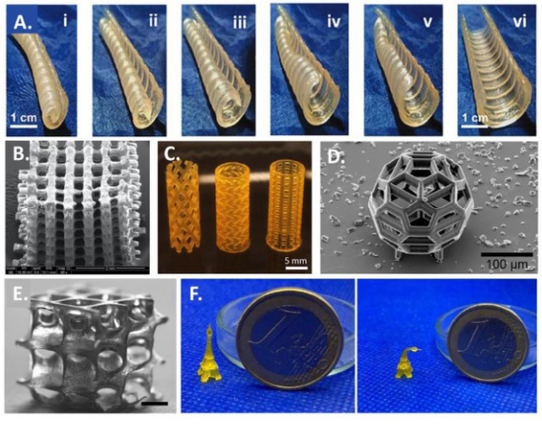


Figure II.20. (A) Digital light processing of a shape memory tracheal stent, (B) porous structure printed by tri-functional PCL methacrylate, (C), elastomeric airway stent, (D) buckyball printed with two-photon polymerization, (E) lattice digital light processing-printed with PCL-PLA copolymers, and (F) shape memory polymers printed with PCL-PLA copolymers.

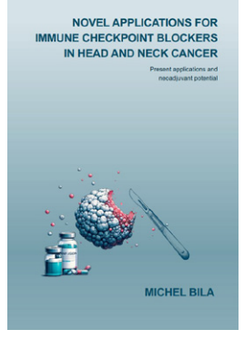
OMFS-IMPATH CO-SUPERVISED PhDs

Bila, Michel

Novel applications for immune checkpoint blockers in head and neck cancer

Supervisor: Paul Clement, Co-supervisors: Diether Lambrechts, Vincent Vander Poorten

Michel Bila is trained as a maxillofacial surgeon. Between 2016 and 2024 he was appointed at the University Hospital of Leuven, where he was also a faculty member, specializing in the treatment of oral cancer and reconstruction. With a passion for advancing the field, Dr. Bila has pursued 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. Michel Bila is currently working at Antwerp University Hospital as a maxillofacial surgeon, specialising in the treatment and reconstruction of head and neck cancer. His expertise is evident in his teaching and research, both of which are aimed at improving patient outcomes in this field. Dr Bila obtained his MD from the University of Antwerp in 2009 and his DDS from the Katholieke Universiteit Leuven in 2012. During his residency, he trained at several renowned institutions, including the University of Leuven, the University of Antwerp and University College London Hospitals (UCLH). Since 2016, he has been working as an academic clinician and researcher, consistently pursuing clinical excellence through both research and teaching.



Durvalumab has shown activity in squamous cell carcinoma of the head and neck. Locally advanced resectable cancers of this type represent a challenge, as the majority of these patients still die from this disease in spite of surgery, radio- and chemotherapy. Checkpoint inhibitors have proven to prolong life in recurrent/metastatic SCCHN, and several molecules are currently tested in clinical trials in this indication, including PD-1, PD-L1, and CTLA-4 antibodies, either as single agent or in combination. These compounds might represent a valuable treatment for SCCHN patients in the adjuvant setting, given the favorable toxicity profile. Combination of durvalumab (PD-L1 inhibition) and tremelimumab (CTLA-4 inhibition) is currently tested in recurrent/metastatic head and neck cancer, and compared to durvalumab as single agent, and to standard of care chemotherapy. In this study both options, i.e. durvalumab as a single agent or durvalumab in combination with tremelimumab, will be tested. Newly diagnosed patients with SCCHN of the oral cavity, will be treated with a single dose of durvalumab with or without tremelimumab two weeks before scheduled surgery. When patients are first diagnosed with a resectable oral SCC, a biopsy is taken to confirm the diagnosis, and surgery is planned. This standard practice thus involves sequential tissue harvesting, both at the time of biopsy as well as the final resection specimen, making it possible to observe hallmarks of immune response when patients are treated once with durvalumab with or without tremelimumab after confirmation of the diagnosis on biopsy, but before surgery.

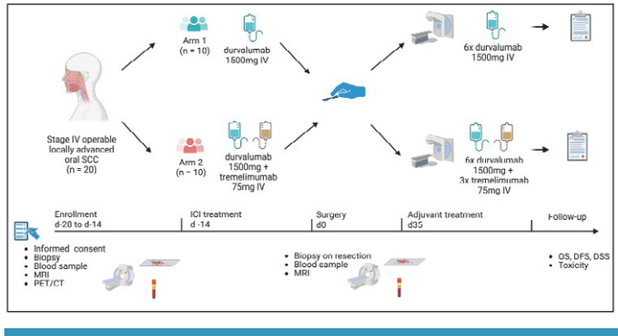


Figure 1. Study diagram of the DUTRELASCO trial.

4

Lecturing

A. SCIENTIFIC CONTRIBUTIONS AT CONGRESSES

- Oral presentations
- Poster presentations

B. INVITED LECTURES

A. SCIENTIFIC CONTRIBUTIONS AT CONGRESSES

ORAL PRESENTATIONS

Aerden, T. (2024)
Donorsite morbidity after fibula free flap harvesting
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy

Bila, M. (2024)
Potential for neoadjuvant application of immune checkpoint inhibitors in hnscc
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy

Casselman, J., Van der Cruyssen, F. (2024)
New imaging techniques in head and neck region and 3D CRANI imaging of the extracranial cranial nerves
BVMKA Autumn Meeting – Maxillofacial Imaging, BVMKA HH, 23 November 2024, Brussels, Belgium

Da Costa Senior, O. (2024)
Facing a new reality: significant increase in necrotizing fasciitis in the post-covid era?
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy

Da Silva, M.F.A.B., Zintan, D., Fontenele, R.C., Jacobs, R., Freitas, D.Q. (2024)
Desenvolvimento e validação de uma inovadora ferramenta baseada em inteligência artificial dedicada à segmentação automática do canal incisivo mandibular em TCFC
24th JABRO Congress, Brazilian Association of Dental Radiology, 13-15 November 2024, Santa Catarina, Brazil

Degraeve, M., Coropciuc, R., Meeus, J., Bila, M., Willaert, R. (2024)
Revision after orbital reconstruction: what about overcorrection
BVMKA Spring Meeting – The Orbit, BVMKA HH, 23 March 2024, Brussels, Belgium

Degraeve, M. (2024)
Revision after orbital reconstruction: what about overcorrection
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy

De Moor, A. (2024)
Free fibula flap for maxillomandibular reconstruction with immediate prosthodontic rehabilitation
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy

De Poortere, A., Neyt, J., Meeus, J., Coropciuc, R., Bila, M., Willaert, R. (2024)
Defining globe position in orbital floor fractures: pre-, peri and postoperative management
BVMKA Spring Meeting – The Orbit, BVMKA HH, 23 March 2024, Brussels, Belgium

De Poortere, A. (2024)
Changes in 3d globe position following orbital floor reconstruction, a retrospective study
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy

ORAL PRESENTATIONS

Dubron, K., Shaheen, E., Jacobs, R., Politis, C., Willaert, R. (2024)
Clinical implementation of mixed reality for planning orbital reconstruction with patient-specific implants
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy

El Bachaoui, S., Willaert, R., Bila, M., Meeus, J., Coropciuc, R. (2024)
Orbital invasion in head and neck oncology: treatment planning and surgical management
BVMKA Spring Meeting – The Orbit, BVMKA HH, 23 March 2024, Brussels, Belgium

Elgarba, B. (2024)
Novel AI-Based Tool for Prosthetic Crown Segmentation Serving Automated CBCT-IOS Registration in Challenging High Artifact Scenarios
19th European Congress of DentoMaxilloFacial Radiology, EADMFR, 12-15 June 2024, Freiburg, Germany

Elgarba, B. (2024)
A novel AI-driven virtual implant planning tool: Artificial Intelligence battling Human
32th Annual Scientific Meeting, European Association for Osseointegration (EAO), 24-26 October 2024, Milan, Italy

Fontenele, R.C., Santos-Junior, A.O., Neves, F.S., Ali, S.S.S., Jacobs, R. (2024)
A new era in root canal segmentation: an innovative AI-driven tool for automated bi-rooted premolar root canal segmentation
19th European Congress of DentoMaxilloFacial Radiology, EADMFR, 12-15 June 2024, Freiburg, Germany

Geusens, J. (2024)
The use of patient specific implants with condylar head preservation following resection of tumors in the mandible
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy

Goormans, F., Shaheen, E., Milants, A.S., Willaert, R., Coropciuc, R., Meeus, J. (2024)
Optimizing Precision and Outcomes in Alveolar Reconstruction Using Mandibular Ramus Grafts: The Advantage of CAD/CAM Technology
BVMKA Autumn Meeting – Maxillofacial Imaging, BVMKA HH, 23 November 2024, Belgium

Ivković, U., Belfiore, E., Vaz Sousa Pereira, R., Murgia, D., Gouwy, M., Struyf, S., Mercelis, B., Van Meerbeek, B., Braem, A., Mignon, A., Jacobs, R., EzEldeen, M. (2024)
Polymeric Nanoparticles for Chemokine Mediated Dental Pulp Tissue Engineering
Oral Health Research Congress, CED-IADR, 12 September 2024, Geneva, Switzerland

Loh, J., Tan, J., Jacobs, R. (2024)
The microsurgical anastomosis system for arteries and veins
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy

Merken, K. (2024)
Improving dental CBCT imaging: introduction of a virtual platform as a teaching and optimization tool
Virtual Imaging Trials in Medicine 2024, Center for Virtual Imaging Trials, 22-24 April 2024, Duke University, Durham, USA

Milants, A., Modhvadia, E., Coropciuc, R., Meeus, J., Van der Cruyssen, F., Shaheen, E., Willaert, R., Verhelst, P. (2024)
Imaging techniques to assess facial asymmetry: a systematic review
BVMKA Autumn Meeting – Maxillofacial Imaging, BVMKA HH, 23 November 2024, Brussels, Belgium

Mouzinho Machado, S., Fagundes, F.B., Fontenele, R.C., Van Aelst, S., Coudyzer, W., Lins de-Azevedo-Vaz, S., Jacobs, R. (2024)
O volume das coroas dentárias é afetado pelo dispositivo de TC, material e número de coroas?
24th JABRO Congress, Brazilian Association of Dental Radiology, 13-15 November 2024, Ribeirão Preto, Brazil

Mulier, D., Shaheen, E., Verstraete, L., Coropciuc, R., Willaert, R., Meeus, J. (2024)
The use of stackable guides in oral implantology
BVMKA Autumn Meeting – Maxillofacial Imaging, BVMKA HH, 23 November 2024, Brussels, Belgium

Santos-Junior, A.O., Fontenele, R.C., Neves, F.S., Ali, S.S., Guerreiro-Tanomaru, J.M., Jacobs, R., Tanomaru-Filho, M. (2024)
Inteligência artificial na segmentação de canais radiculares em TCFC: uma nova era na endodontia digital
COBE 2024, Congresso Brasileiro de Endodontia, 16-18 October 2024, São Paulo, Brazil

Slim, M.L., Fontenele, R.C., Oliveira Santos-Junior, A., Sampaio Neves, F., Jacobs, R. (2024)
A novel convolutional neural network-based tool for automated segmentation of pulp cavity structures in single-rooted teeth using CBCT.
19th European Congress of DentoMaxilloFacial Radiology, EADMFR, 12-15 June 2024, Freiburg, Germany

Smeets, M., Van de Casteele, E., De Vos, W., Bila, M., Dielen, D., Govaerts, D., Jonkergouw, J., Nadjmi, N., Renier, L., Stevens, S., Van de Perre, J., Van Genechten, M., Van Hemelen, G., Vanhove, F., Vercruysse, H. Jr, Winderickx, P. (2024)
The clinical and radiological prevalence of accessory nerve damage after selective neck dissections and radiotherapy on the neck
BVMKA Autumn Meeting – Maxillofacial Imaging, BVMKA HH, 23 November 2024, Brussels, Belgium

Smeets, M. (2024)
Prospective study on the predictive factors in chronic trismus in the treatment of oral cancer
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy

Tsiklin, I. (2024)
Novel Approach to Orbital Hard- and Soft- Tissue Symmetry Analysis
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy

Tsiklin, I., Meyns, J., Willaert, R., Jindanil, T., Morgan, N., Preda, F., Shaheen, E., Jacobs, R. (2024)
Novel Approach to Orbital Hard- and Soft- Tissue Symmetry Analysis: A Pilot Validation
BVMKA Autumn Meeting – Maxillofacial Imaging, BVMKA HH, 23 November 2024, Brussels, Belgium

ORAL PRESENTATIONS

Van Aelst, S., Elgarba, B.M., Jacobs, R., Vandamme, K. (2024)
The objective and subjective comparison of implant crowns designed manually and those designed by AI
Association for Dental Education in Europe, Annual Meeting, 7-10 September 2024, Leuven, Belgium

Van Butsele, J., Meeus, J., Coropciuc, R., Bila, M., Willaert, R. (2024)
Pediatric orbital fractures
BVMKA Spring Meeting – The Orbit, BVMKA HH, 23 March 2024, Brussels, Belgium

Van Dessel, J., Vanslambrouck, P., Politis, C., Willaert, R., Bila, M., Claes, P., Sun, Y. (2024)
Advancements in orbital defect reconstruction planning: A statistical shape model approach outperforms traditional mirroring methods
19th European Congress of DentoMaxilloFacial Radiology, EADMFR, 12-15 June 2024, Freiburg, Germany
Vandevelde, A., Verbist, M., Ver Berne, J., Geusens, J., De Vleesschouwer, S., Jacobs, R., Willaert, R., Bila, M. (2024)
Radiological and clinical differential diagnostics of CPPD in the temporomandibular joint extending into the cranium: insights from the literature and a rare clinical case
BVMKA Autumn Meeting – Maxillofacial Imaging, BVMKA HH, 23 November 2024, Brussels, Belgium

Ver Berne, J., Willaert, R., Politis, C., Jacobs, R. (2024)
Beyond the Biopsy – The Role of Imaging in Diagnosing Maxillofacial Fibro-osseous Lesions
BVMKA Autumn Meeting – Maxillofacial Imaging, BVMKA HH, 23 November 2024, Brussels, Belgium

Verbist, M., Vandevelde, A., Geusens, J., Sun, Y., Shaheen, E., Willaert, R. (2024)
Patient specific ceramic implants in orbital reconstruction surgery: technical aspects and clinical application
BVMKA Spring Meeting – The Orbit, BVMKA HH, 23 March 2024, Brussels, Belgium

Verhelst, P-J. (2024)
Prediction of condylar resorption following orthognathic surgery: a prospective observational study
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy

Verstraete, L., Schillemans, P., Coropciuc, R., Bila, M., Meeus, J., Willaert, R. (2024)
Transorbital approach for frontal sinus fractures
BVMKA Spring Meeting – The Orbit, BVMKA HH, 23 March 2024, Brussels, Belgium

Verstraete, L. (2024)
Transorbital approach for frontal sinus fractures
27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, 17-20 September 2024, Rome, Italy
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

POSTER PRESENTATIONS

**Binvignat, P., Akhilanand, C., Lahoud, P., Jacobs, R., Pokhojaev, A., Sarig, R., Ducret, M., Richert, R. (2024)
Accuracy to Diagnose and Simulate Premolar Alterations Using Statistical Shape Analysis.
2024 IADR/AADOCR/CADR General Session, IADR, 13-16 March 2024, New Orleans, USA**

Accuracy to Diagnose and Simulate Premolar Alterations Using Statistical Shape Analysis

P Binvignat[1], C Akhilanand[2], P Lahoud[3,4,5], R Jacobs[3,4,6], A Pokhojaev[7,8], R Sarig[7,8], M Ducret[1,9], Raphael Richert[1,10]
[1] Hospices Civils de Lyon, France, [2] King George's Medical University, India,[3] OMFS-IMPATH Research Group, Belgium,[4] University Hospitals Leuven, Belgium, [5] Department of Oral Health Sciences, KU Leuven, Belgium,[6] Karolinska Institute, Stockholm, Sweden,[7] Faculty of Medicine. Tel Aviv University,, Israel, [8] Dan David Center for Human Evolution and Biohistory Research, Tel Aviv University, Israel, [9]Laboratoire de Biologie Tissulaire et Ingénierie thérapeutique, France, [10]Laboratoire de Mécanique Des Contacts Et Structures, Villeurbanne,France

Introduction

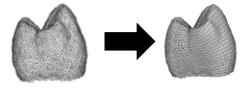
Tooth wear is an escalating dental concern that leads to significant changes in structure and texture, profoundly impacting patients' quality of life. It presents a significant challenge for practitioners, especially with tissue loss affecting the entire dental arch. Early intervention is crucial, yet patients may not grasp the severity of their condition until substantial anatomical damage becomes visible. Recently, artificial intelligence (AI) approaches have been developed to learn dental forms and suggest ideal restorative shapes.

Goal: Evaluate the accuracy of an AI approach to capture the key anatomical features of premolars

Materials & Methods

Study Sample
A set of STL files was retrospectively collected from the Goldschleger School of Dental Medicine Sackler Faculty of Medicine, Tel Aviv, Israel; and from the Faculty of Medicine, Leuven). Only mature premolar teeth without decay or cervical lesions were included. Dental experts noted tooth type and occlusal surface condition using the tooth wear index.

Remeshing and Principal Component Analysis:
Files underwent remeshing to ensure a uniform mesh structure and were then subjected to principal component analysis (PCA) to identify shape variations. Principal modes of variation were extracted to reduce dimensionality.



Classification of Tooth Wear:
Four machine learning (ML) algorithms - linear discriminant analysis (LDA), support vector machine (SVM), random forest (RF), and gradient boosting machine (GBM) - were tested for tooth type and wear classification. Models were cross-validated, and performance metrics such as precision, recall, F1 score, and accuracy were evaluated using confusion matrices.

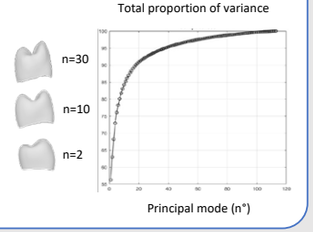
Simulation of Tooth Wear:
Twenty intact teeth were randomly chosen for simulated wear. Altered surfaces were generated by projecting surfaces in shape space and modifying eigenvalues identified in PCA. Similarly, repaired surfaces were simulated from altered ones. Differences in anatomical features were calculated, including tooth volume, external surface, cusp angle, tooth length, and mean Euclidean distance between intact and repaired surfaces.

Results

Statistical Shape Analysis: Out of 245 STL files, 113 were included. The first ten shape modes accounted for 84.5% of this variability, with mean landmark deviation at 10.4 µm.

Classification of Tooth Wear: ML models demonstrated high accuracy (>83%) and precision (>84%) for tooth type classification. Regarding tooth wear classification, models exhibited high recall (>82%) and F1-score (>80%), with varying precision and accuracy across different algorithms.

Simulation of Tooth Wear: Simulated intact teeth closely resembled repaired teeth, with minimal differences in key anatomical features. Euclidean distance between intact and repaired teeth nodes was small, indicating accurate repairs in 95% of cases. Conversely, simulations of altered teeth showed more pronounced differences in cusp angles, external surfaces, and volumes, highlighting the impact of wear on tooth morphology.



Conclusions

The integrated approach of isotopological remeshing and SSA proved reliable in capturing key anatomical features of premolars in a multicentric population. The ML algorithms also showed promising performance in learning and predicting both altered and intact premolar shapes, thereby offering new perspectives for future dental diagnostics and computer assisted fabrication.

Significance: ML algorithms, combined with remeshing, demonstrate strong potential for accurate tooth wear classification and simulation, enhancing clinical diagnosis and treatment planning..

1 Mehl A, Blanz V, Hickel R. 2005. Biogeneric tooth: a new mathematical representation for tooth morphology in lower first molars. Eur J Oral Sci. 113(4):333–340
2 Maquart T, Elguedj T, Gravouil A, Rochette M. 2021. 3D B-Rep meshing for real-time data-based geometric parametric analysis. Adv Model Simul Eng Sci. 8(1):1–28.

Ivković, U., Belfiore, E., Vaz Sousa Pereira, R., Murgia, D., Gouwy, M., Struyf, S., Van Meerbeek, B., Braem, A., Mignon, A., Jacobs, R., EzEldeen, M. (2024)
Chitosan Nanoparticles for CXCL12/SDF-1 Mediated Dental Pulp Tissue Regeneration
11th Belgian Symposium on Tissue Engineering, Belgian Society for Tissue Engineering, 21-22 November 2024, Leuven, Belgium

KU LEUVEN

OMFS IMPATH

SMART POLYMERIC BIOMATERIALS

fwo

Chitosan Nanoparticles for CXCL12/SDF-1 Mediated Dental Pulp Tissue Regeneration

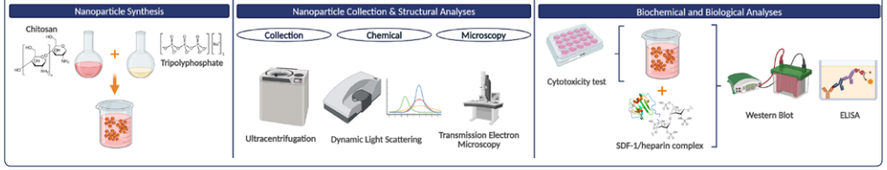
Una Ivković [1], Elena Belfiore [2], Rafaela Vaz Sousa Pereira [3], Denise Murgia [4], Mieke Gouwy [5], Sofie Struyf [5], Bart Van Meerbeek [6], Annabel Braem [7], Arn Mignon [8], Reinhilde Jacobs [1,9], Mostafa EzEldeen [1,10]

1 OMFS-IMPATH Research Group, Faculty of Medicine, Department of Imaging and Pathology, KU Leuven
2 Department of Surgical, Oncological and Oral Sciences, University of Palermo, Via L. Giuffrè 5, 90127 Palermo, Italy
3 Laboratory of Immunobiology, Rega Institute for Medical Research/KU Leuven, Department of Microbiology, Immunology and Transplantation, Leuven, Belgium
4 Laboratory of Nanotechnology for Precision Medicine, Fondazione Istituto Italiano di Tecnologia, Via Morego 30, Genoa 16163, Italy
5 Laboratory of Molecular Immunology, Department of Microbiology, Immunology and Transplantation, Rega Institute for Medical Research, KU Leuven, Belgium
6 KU Leuven (University of Leuven), Department of Oral Health Sciences, BIOMAT - Biomaterials Research Group & UZ Leuven (University Hospitals Leuven), Dentistry, Leuven, Belgium
7 Biomaterials and Tissue Engineering Research Group, Department of Materials Engineering (MTM), KU Leuven, Leuven, 3000, Belgium
8 Surface and Interface Engineered Materials, Campus Group T, KU Leuven, Andreas Vesaliusstraat 13, 3000 Leuven, Belgium
9 Department of Dental Medicine, Karolinska Institute, Stockholm, Sweden
10 Department of Oral Health Sciences, KU Leuven and Paediatric Dentistry and Special Dental Care, University Hospitals Leuven, Kapucijnenvoer 7, 3000 Leuven, Belgium

Introduction

Chemokines can stimulate endogenous cell migration to injury sites and initiate wound healing. However, using chemokines like CXCL12, also known as stromal derived factor 1 (SDF-1), has many hurdles due to their instability, short half-life, and sensitivity to enzymatic degradation. This study aims to develop polymeric nanoparticles for SDF-1 encapsulation and efficient delivery for dental pulp tissue regeneration.

Materials & Methods



Results

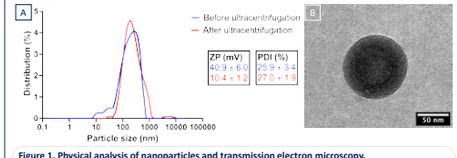


Figure 1. Physical analysis of nanoparticles and transmission electron microscopy.
A) Dynamic Light Scattering showed a monodisperse nanoparticle solution with the low polydispersity index (PDI), before and after collection. The nanoparticle charge drops significantly after collection and neutralisation as shown by the zeta potential (ZP), yet remains stable. B) Microscopy image of a nanoparticle in water solution.

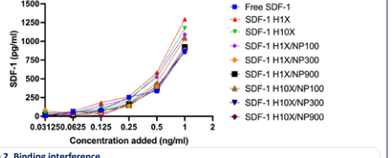


Figure 2. Binding interference.
ELISA showed no interference with the binding site of SDF-1 to the capture antibody in the presence of heparin and nanoparticles, validating ELISA for downstream analyses.

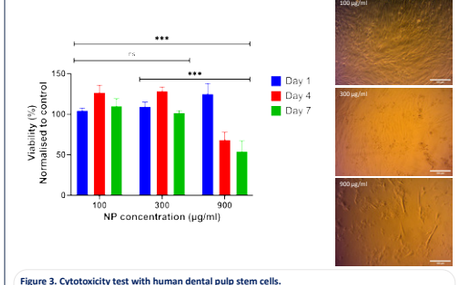


Figure 3. Cytotoxicity test with human dental pulp stem cells.
Nanoparticles were incubated with the cells over 7 days in 3 different concentrations. After performing Alamar Blue, the results showed that the viability of human dental pulp stem cells is influenced both by nanoparticle (NP) concentration as well as exposure time. When comparing the results, 100 and 300 µg/ml were not significantly different, while 900 µg/ml had significant influence on the viability.

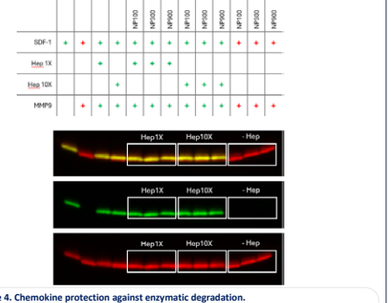


Figure 4. Chemokine protection against enzymatic degradation.
Western Blot showed that, with the presence of heparin with both 1X and 10X molar excess, the chemokine is protected against enzymatic degradation by matrix metalloproteinase 9 (MMP9). This will ensure the bioactivity of SDF-1 in a physiological environment, as MMP9 is released in a stressed environment of dental pulp. Nanoparticles on their own do not protect SDF-1 against MMP9.

Conclusion

Uniform nanoparticles have been successfully synthesized and have shown biocompatibility with human dental pulp stem cells. After complex forming with heparin and SDF-1, ELISA has confirmed that there is no interference with the binding site of the chemokine in the presence of heparin and/or nanoparticles. Viability assay has confirmed that the cytotoxicity of the nanoparticles is concentration and time dependent. Moreover, heparin protects the chemokine from enzymatic degradation by MMP9, ensuring SDF-1 remains active in a physiological environment.

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una.ivkovic@kuleuven.be
www.omfsimpath.be
Una Ivković

Jindanil, T., Ponbuddhichai, R., Massant, C., Xu, L., Fontenele, R.C., Cadenas de Llano-Pérula, M., Jacobs, R. (2024)
Three-dimensional Facial Imaging: A qualitative analysis of current technologies
19th European Congress of DentoMaxilloFacial Radiology, EADMFR, 12-15 June 2024, Freiburg, Germany

KU LEUVEN

OMFS IMPATH

Three-dimensional Facial Imaging: A qualitative analysis of current technologies

Thanatchaporn Jindanil [1,2], Ranida Ponbuddhichai [1,2], Céline Massant [1,2], Lianyi Xu [1,3], Rocharles Cavalcante Fontenele [1,2], Maria Cadenas de Llano-Pérula [4], Reinhilde Jacobs [1,2,5]

1 OMFS-IMPATH Research Group, Department of Imaging and Pathology, Faculty of Medicine, KU Leuven, Leuven, Belgium. 2 Department of Oral and Maxillofacial Surgery, University Hospitals Leuven, Leuven, Belgium. 3 Department of Stomatology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China. 4 Department of Oral Health Sciences - Orthodontics, KU Leuven and Dentistry, University Hospitals Leuven, Leuven, Belgium. 5 Department of Dental Medicine, Karolinska Institute, Stockholm, Sweden

Introduction

Face scan
3D facial scan
Quantitative
- Accuracy
- Precision
- Reliability
Qualitative?

Objectives: To compare the patient perception, clinical applicability and similarity to the real patient of SPG, static and portable SL 3D face scanning

Methods

20 subjects
2D
SPG
Static SL
Portable SL
2 Practitioners
13 observers
(7 medical, 6 non-medical)
Patient perception
Overall Similarity Score(OSS)
Comfort
Clinical applicability
Time
User-friendliness
Retake rate
Similarity
Instant Similarity Rank (ISR)
Similarity Score (SS)

Results
Patient perception

Overall Similarity Score (Mode (Range)) 3 (1-3) Good, Moderate
Comfort

3: Good, 2: Moderate, 1: Poor

Results (continue)
Clinical applicability

	Time	3D Scanner	User-friendliness	Retake rate
Scanning time	=			10%
Processing time	* >			15%
Total time	* >			35%

* Statistically significant difference ($p<0.05$)

Similarity

Rater	3D scanner	Similarity Score (Mode (Range)) Upper	Middle	Lower	Overall	Instant Similarity Rank
		3 (2-3) A	3 (2-3) A	3 (2-3) A	3 (2-3)	1
		2 (1-3) B	3 (1-3) B	3 (2-3) A	3 (1-3)	2
		3 (2-3) A	3 (1-3) AB	3 (1-3) A	3 (1-3)	3
		3 (2-3) A	3 (2-3) A	3 (2-3) A	3 (2-3)	1
		2 (2-3) B	3 (1-3) BC	3 (1-3) A	3 (1-3)	2
		3 (2-3) A	3 (2-3) B	3 (2-3) A	3 (2-3)	3

3: Good, 2: Moderate, 1: Poor; Different uppercases: Significant difference between groups ($p<0.05$); 1 2 3 Most frequent rank obtained

Conclusion
- All scanners showed good performance and suitability for clinical use with varying pros and cons
  → weigh all scanner features to optimally balance clinical needs
- No significant difference in similarity perception across scanners for medical and non-medical observers

Acknowledgement The authors would like to express sincere gratitude to the participants and observers for their contributions to this study by participating and completing the questionnaire.

Citations Aronovich P and Sarokhan S, 2019. Int J Environ Res Public Health. Ayaz I et al., 2020. Imaging Sci Dent. Dicle I et al., 2019. Adv Exp Med Biol. Germec-Cakan D et al., 2010. Hajeer MY et al., 2012. Int J Adult Orthodon Orthognath Surg. Mostafa D et al., 2022. J Prosthodont Res.

Jindanil, T., Fontenele, R.C., Lins de Azevedo-Vaz, S., Lahoud, P., Neves, F.S., Jacobs, R. (2024)
AI-based incisive canal visualization for preventing and detecting post-implant mandibular nerve injuries using CBCT: A retrospective cohort study
OHS Department Day 2024, Department Oral Health Sciences KU Leuven, 18 April 2024, Leuven, Belgium

KU LEUVEN

OMFS IMPATH

AI-based incisive canal visualization for preventing and detecting post-implant mandibular nerve injuries using CBCT: A retrospective cohort study

Thanatchaporn Jindanil[1,2], Rocharles Cavalcante Fontenele[1,2], Sergio Lins de-Azevedo-Vaz[3], Pierre Lahoud[1,2,4], Frecorico Sampaio Neves[5], Reinhilde Jacobs[1,2,4]

1 OMFS IMPATH Research Group, Department of Imaging and Pathology, Faculty of Medicine, KU Leuven, Leuven, Belgium, 2 Department of Oral and Maxillofacial Surgery, University Hospitals Leuven and OMFS IMPATH Research Group, Department of Imaging & Pathology, Faculty of Medicine, KU Leuven, Leuven, Belgium, 3 Department of Oral and Maxillofacial Radiology, Ribeirão Preto Dental School, University of São Paulo, Ribeirão Preto, Brazil, 4 Periodontology and Oral Microbiology, Department of Oral Health Sciences, KU Leuven, Leuven, Belgium, 5 Department of Oral and Maxillofacial Radiology, Faculty of Dentistry, Federal University of Bahia, Salvador, Bahia, Brazil, 6 Department of Dental Medicine, Karolinska Institutet, Stockholm, Sweden

Background

- Mandibular Incisive Canal (MIC) is a complex structure that decreases size toward the symphysis.
- Cone Beam Computed Tomography (CBCT) provides MIC details.
- Missing MIC or injury detection can result in neurovascular damage.
- Artificial Intelligence (AI) can segment the MIC on CBCT but lacks clinical validation.

Objective

To clinically validate AI tool for automated segmentation of MIC on CBCT, enabling prevention and detection of iatrogenic implant-related nerve injuries.

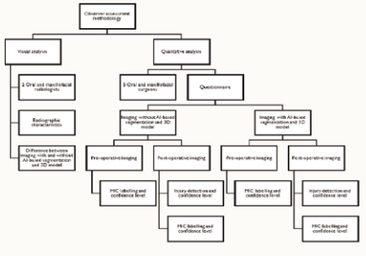
Results

- Among 10 selected patients, 8 were females and 2 males, aged between 49 and 81 years (62 ± 10 years).
- AI-based tool enabled clear visualization of bilateral MIC in both pre- and post-operative images.
- Compared to human visual CBCT observations, AI-based segmentation and 3D modeling significantly improved MIC detection by 25% with 8% increase in confidence for pre-operative assessment ($p < 0.05$).
- 5% improvement of MIC identification with 3.5% confidence level post-operatively ($p > 0.05$).
- Fair to almost perfect inter-observer agreement (0.23-1.00) and substantial to almost perfect intra-observer agreement (0.62 to 1.00).

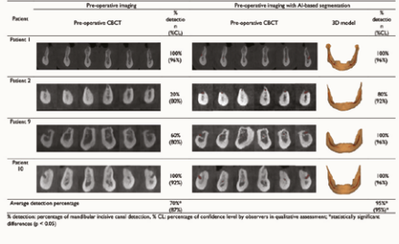
Materials and methods

This retrospective study screened records of patients who visited Dentomaxillofacial Imaging Center at University Hospitals of Leuven between 2013 and 2016 to identify pre- or post-operative CBCT related to iatrogenic nerve injuries following interforaminal implant surgery. CBCT scans were imported into the Virtual Patient Creator for mandibular canal and MIC segmentation.

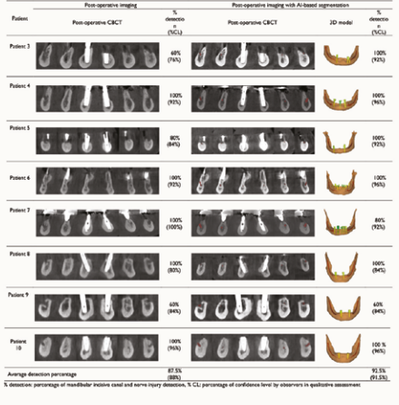
- Two oral and maxillofacial radiologists compared AI-driven 3D model and segmented MIC to conventional CBCT images.
- Five observers completed questionnaire regarding MIC identification and injury detection using binary scale, followed by confidence assessment using five-point Likert scale.



Pre-operative canal visualization



Post-operative canal visualization and/or nerve injury detection



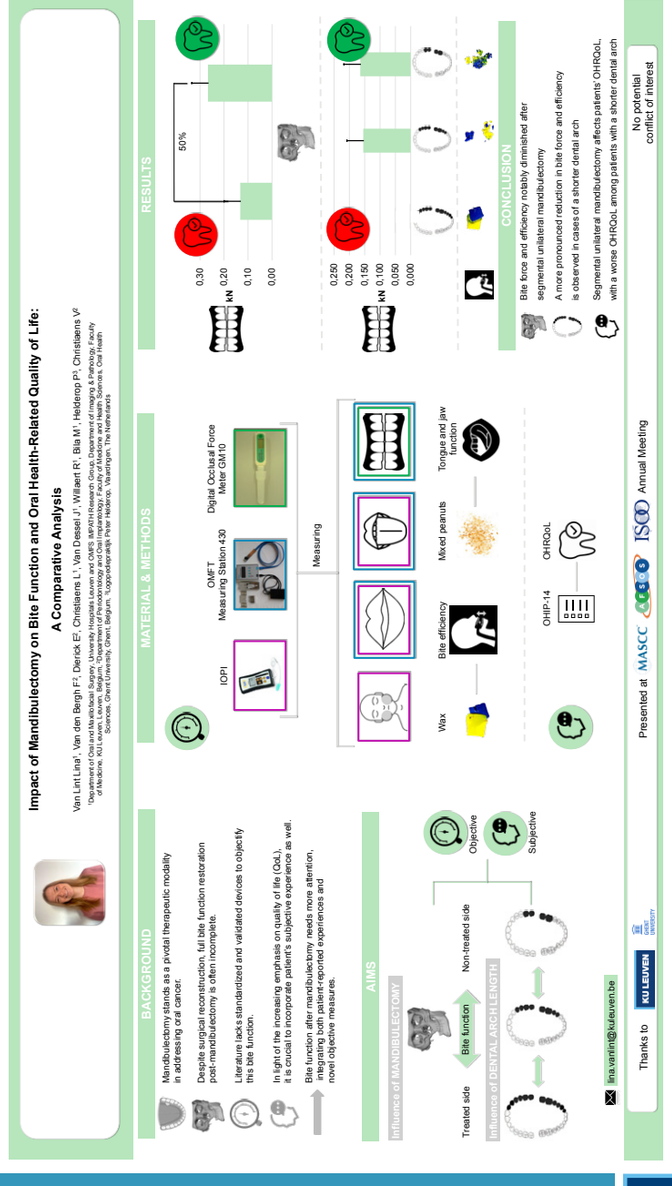
Discussion

- This study highlights AI's critical role in MIC clinical detection.
- AI aids in pre-surgical nerve injury prevention and identifies potential injury points.
- AI successfully segments MIC regardless of trabecular variations, cortex thickness, and artifacts.
- AI tools increase pre-operative MIC identification accuracy and observer confidence across specialties.
- AI may speed up the identification of potential complications for prompt identification post-operatively.

Conclusion

A novel AI-based tool proved to be clinically useful to enable bilateral MIC visualization, aiding pre-operative planning and post-operative complications identification. It significantly improved pre-operative MIC detection and observers' confidence level through MIC segmentation and 3D modeling.

Van Lint, L., Van den Bergh, F., Dierick, E., Christiaens, L., Van Dessel, J., Willaert, R., Bila, M., Helderop, P., Christiaens V. (2024)
Impact of Mandibulectomy on Bite Function and Oral Health-Related Quality of Life: A Comparative Analysis
- **First Belgian Precision and Personalised Oncology Meeting, BE-PRECISE, 18 April 2024, Antwerp, Belgium**
- **LKI Onfocorum, Leuven Cancer Institute, 28 May 2024, Leuven, Belgium**
- **2024 Annual Meeting on Supportive Care in Cancer, MASCC/AFSOS/ISOO, 28 June 2024, Lille, France**



B. INVITED LECTURES

R. Jacobs, K. Bacher	08/01/2024 - 09/01/2024	2-day Course on Radio-protection in Dentistry	PAV Mondgezondheidswetenschappen De Jacht Heverlee, Leuven, Belgium
R. Jacobs	11/01/2024	Een diagnostische kijk op CBCT	Studieclub Mechelen, TCM, Feestzaal Familia, Putte, Belgium
P. Lahoud	12/01/2024	Automation in the Diagnosis, Treatment Planning and Follow-up of Tooth Auto-Transplantation	International Team of Implantology - ITI 's 4rd ITI Inter-University Meeting, Van der Valk Hotel Ghent, Belgium
R. Jacobs	16/01/2024	The impact of radiographic segmentation on oral and maxillofacial surgery	Oral Surgery, Oral Medicine, Radiology and Pathology Journal Club, Glasgow Dental School, Glasgow, Scotland, United Kingdom
R. Jacobs	25/01/2024	Workshop: 3D CBCT imaging as a liaison between research and clinic: potentials and limitations	Department of Dental Medicine, Karolinska Institutet Stockholm, Sweden, Online
R. Jacobs	31/01/2024	Workshop: 3D CBCT imaging as a liaison between research and clinic: potentials and limitations	Department of Dental Medicine, Karolinska Institutet Stockholm, Sweden
R. Jacobs	02/02/2024	Low-dose & DVT	Digitale Volumentomographie, Swiss Association of Dentomaxillo-facial Radiology, Hotel Arte, Olten, Switzerland
M. Bornstein	02/02/2024	KI & DVT – wo stehen wir?	Digitale Volumentomographie, Swiss Association of Dentomaxillofacial Radiology, Hotel Arte, Olten, Switzerland
R. Jacobs	08/02/2024	CBCT & AI @OMFS IMPATH	Siemens Healthineers, Erlangen, Germany
F. Van der Cruyssen	16/02/2024	MR Neurography of the head and neck	IADMFR Webinar, British Institute of Radiology, Online
R. Jacobs	24/02/2024	CBCT and 3D Radiology	Quality Forum Meeting, Digital Dentistry Society, Rome, Italy
J. Ver Berne	05/03/2024	Kaakbeencysten: klinisch-pathologische correlatie en pitfalls	LOK anatoom-pathologie regio Brugge, Bruges, Belgium
R. Jacobs	06/03/2024	Imagerie CBCT: l'automatisation au-delà de l'imagination	International Team for Implantology, Study Club Paris 75, NSK France, Paris, France
I. Tsiklin	23/04/2024	Heelkundige basisbegrippen voor de tandarts : Basic Concepts of Oral and Maxillofacial Surgery. Part 1	2nd year Bachelor in Dentistry, KU Leuven, Leuven, Belgium

I. Tsiklin	30/04/2024	Heelkundige basisbegrippen voor de tandarts : Basic Concepts of Oral and Maxillofacial Surgery. Part 2	2nd year Bachelor in Dentistry, KU Leuven, Leuven, Belgium
R. Jacobs	09/05/2024	The artist behind artificial intelligence for oral health care	European Medical Writers Association, Expert Seminar Series, Valencia, Spain, Online
R. Jacobs	14/05/2024	The use of 2D versus 3D imaging in dental practice. The digital dental practice, the virtual patient and how AI can help shaping this	VI International Dental Week, Adema Escola Universitaria, Mallorca, Spain
R. Jacobs	14/05/2024	The use of 2D versus 3D imaging in dental practice. The digital dental practice, the virtual patient and how AI can help shaping this	VI International Dental Week, Adema Escola Universitaria, Mallorca, Spain
R. Jacobs, K. Bacher, T. Clarijs	30/05/2024 - 31/05/2024	2-day Interuniversity Programme on the Use of Cone Beam CT for Dentomaxillofacial Diagnostics	PAV Mondgezondheidswetenschappen-De Jacht Heverlee, Leuven, Belgium
I. Tsiklin	30/05/2024	Introduction to CBCT Reading, Orofacial Anatomy, Parts I, II, III	PAV Mondgezondheidswetenschappen-De Jacht Heverlee, Leuven, Belgium
R. Jacobs	09/06/2024	The Dental Artist Behind AI	International Digital Dentistry Congress 2024, Jio Convention Centre, Mumbai, India
R. Jacobs	12/06/2024	The PhD recipe: from research & training to supervision & coaching	DentMed Doctoral Studies Day, Department of Dental Medicine, Karolinska Institutet Stockholm, Sweden
R. Jacobs	13/06/2024	The Dental Artist behind Artificial Intelligence	17th Congress of the European Academy of Paediatric Dentistry, Satellite Symposium, Gothia Towers, Gothenburg, Sweden
P. Lahoud	18/06/2024	Digitalisation et Autotransplantation Dentaire : Innovations, Perspectives et Impact	ARIA Digital Meeting, Eurexpo, Lyon, France
R. Jacobs	27/06/2024	Workshop Cone Beam CT in de praktijk: basis	PAV Mondgezondheidswetenschappen-De Jacht Heverlee, Leuven, Belgium
R. Jacobs	28/06/2024	Workshop Cone Beam CT in de praktijk: diagnostiek	PAV Mondgezondheidswetenschappen-De Jacht Heverlee, Leuven, Belgium
R. Jacobs	30/08/2024	How high is radiation dose of CBCT?	Dental MOOC DMFR MOOC University of Hong Kong Hong Kong, China Online

R. Jacobs	30/08/2024	Ideal CBCT imaging – Case by case optimization	Dental MOOC DMFR MOOC University of Hong Kong Hong Kong, China Online
R. Jacobs	30/08/2024	CBCT: Impact, Limitations, and Possibilities in Dental Medicine	Dental MOOC DMFR MOOC University of Hong Kong Hong Kong, China Online
R. Jacobs, K. Bacher	02/09/2024 - 03/09/2024	2-day Course on Radioprotection in Dentistry	PAV Mondgezondheidswetenschappen-De Jacht Heverlee, Leuven, Belgium
R. Jacobs	05/09/2024	Workshop Cone Beam CT in de praktijk: presentatie van eigen casus	PAV Mondgezondheidswetenschappen-De Jacht Heverlee, Leuven, Belgium
M. Tarce	05/09/2024	Clinical photography course	Department Oral Health Sciences, KU Leuven Leuven, Belgium
M. Tarce	06/09/2024	Clinical photography course: mini-studio	Department Oral Health Sciences, KU Leuven Leuven, Belgium
R. Jacobs	09/09/2024	Could Artificial assist Human dental intelligence in treatment planning?	Association for Dental Education in Europe, Annual Meeting, Leuven, Belgium
R. Jacobs, R. Fontenele, B. Elgarba, T. Jindanil	09/09/2024	The dentist meets AI: Integrating AI from Anatomy to Automated Implant Planning	Association for Dental Education in Europe, Annual Meeting, Leuven, Belgium
P. Lahoud	12/09/2024	Artificial Intelligence and Dental Research: from Bench to Chair-side	Central European Division of the International Association of Dental Research (CED-IADR), International Conference Centre, Geneva, Switzerland
M. EzEldeen	12/09/2024-14/09/2024	Future Smiles: Digital Innovations Paediatric Dentistry, and Orthodontics	Central European Division of the International Association of Dental Research (CED-IADR), International Conference Centre, Geneva, Switzerland
M. EzEldeen	12/09/2024-14/09/2024	Comprehensive Guide to Tooth Autotransplantation in Children: From A to Z Including the Role of Sustained Oral Hygiene	Central European Division of the International Association of Dental Research (CED-IADR), International Conference Centre, Geneva, Switzerland
R. Jacobs, F. Schwendicke, S. Uribe	12/09/2024	It Sees, It Talks, It Walks – Artificial Intelligence in Dentistry – What It Is, How It Works, and What It Can Do for Dental Practice and Education	World Dental Congres, FDI, Istanbul, Turkey

R. Jacobs	13/09/2024	Women Empowering: Excellence in Dentistry: AI, my Team and me: A Perfect Cohousing?	World Dental Congres, FDI, Istanbul, Turkey
R. Jacobs	18/09/2024	Diagnosis, classification and prediction of oral diseases in an A.I. perspective	27th EACMFS Congress, European Association for Cranio-Maxillo-Facial Surgery, Rome Convention Center La Nuvola, Rome, Italy
R. Jacobs	22/09/2024	AI for automated surgical planning	19th International Symposium, METAL IONS, Nehru Science Centre, Mumbai, India, Online
R. Fontenele	22/09/2024	AI-driven 3D dentomaxillofacial models for precision care	19th International Symposium, METAL IONS, Nehru Science Centre, Mumbai, India, Online
R. Jacobs	28/09/2024	Can AI become the perfect dental assistant?	17th International Sofia Dental Meeting, Sofia, Bulgary
R. Jacobs	11/10/2024	An Eye on Ai for Diagnosis and Planning Procedures in Oral Healthcare	VA's First International Virtual Symposium on Artificial Intelligence in Dentistry, VA Greater Los Angeles Healthcare Systems, US, Online
M. Bornstein	11/10/2024	AI and its Impact in Dento-maxillofacial Radiology: A True Disruptor?	VA's First International Virtual Symposium on Artificial Intelligence in Dentistry, United States, Online
R. Jacobs	16/10/2024	Intro about OMFS-IMPATH research group	From dental imaging to AI imagination, Università degli Studi di Milano, Milano, Italy
R. Jacobs	16/10/2024	AI for Surgical Planning	From dental imaging to AI imagination, Università degli Studi di Milano, Milano, Italy
R. Fontenele	16/10/2024	AI applications in digital dentistry	From dental imaging to AI imagination, Università degli Studi di Milano, Milano, Italy
R. Fontenele	16/10/2024	AI software demo	From dental imaging to AI imagination, Università degli Studi di Milano, Milano, Italy
B. Baldini	16/10/2024	AI projects OMFS-IMPATH-UNIMI	From dental imaging to AI imagination, Università degli Studi di Milano, Milano, Italy
R. Jacobs	17/10/2024	Deep learning-based segmentation of dental implants on cone-beam computed tomography images: A validation study	Lecture Circus, University of Pennsylvania, United States, Online
R. Jacobs	17/10/2024	Reports from the DDS Quality Forum: CBCT group	Digital Dentistry Society, State of the Art Conference, The Indigo Hotel, Florence, Italy
R. Fontenele, H. Gaêta-Araujo	17/10/2024	Reports from the DDS Quality Forum: CBCT group	Digital Dentistry Society, State of the Art Conference, The Indigo Hotel, Florence, Italy

R. Jacobs	18/10/2024	Artificial Intelligence in Digital Dentistry	Digital Dentistry Society, State of the Art Conference, Palazzo del Congressi, Florence, Italy
R. Jacobs	24/10/2024	Webinar: wanneer nemen we een CBCT?	PAV Mondgezondheidswetenschappen-Leuven, Belgium, Online
R. Jacobs	05/11/2024	De l'imagerie 3D à l'imagerie de l'IA	Association Dentaire Académique Belge, Liège, Belgium, Online
R. Jacobs	08/11/2024	Het brein achter kunstmatige intelligentie in de mondzorg	Najaarsvergadering, Nederlandse Vereniging MKA, Musis Sacrem, Arnhem, Nederland
P.J. Verhelst	08/11/2024	Het ontrafelen van condylaire resorptie – de rol van AI in diagnostiek en predictie	Najaarsvergadering, Nederlandse Vereniging MKA, Musis Sacrem, Arnhem, Nederland
R. Jacobs	14/11/2024	De stralende tandarts	Studieclub Noord-Oost-Brabant, VVT, Gasthof Ter Venne, Langdorp, Belgium
L. Van Lint	27/11/2024	Beweging als sleutel tot herstel - Beweging bij Hoofd Halskanker	LOK, Leuven, Belgium
M. EzEldeen	28/11/2024	Digital Frontiers in Paediatric Dentistry: Spotlight on Tooth Autotransplantation and More	Congrès International, Association Dentaire Française, Palais des Congrès de Paris, Porte Maillot, France
R. Jacobs	29/11/2024	L'artiste dentaire derrière l'IA	Congrès International, Association Dentaire Française, Palais des Congrès de Paris, Porte Maillot, France
R. Jacobs	03/12/2024	Webinar: stralingshygiëne in de praktijk	PAV Mondgezondheidswetenschappen-Leuven, Belgium, Online
L. Van Lint, R. Willaert, A. Van Mierlo	05/12/2024	Op weg naar herstel: Hoe kwaliteit van leven terugkrijgen na mondkanker	IOMFCOT, Leuven, Belgium, Online
P. Lahoud	10/12/2024	Webinar: Artificiële intelligentie bij chirurgische planning	PAV Mondgezondheidswetenschappen-Leuven, Belgium, Online
R. Jacobs, M. Bornstein	12/12/2024	Optimale straling voor juiste diagnose en therapie	PAV Mondgezondheidswetenschappen-De Jacht Heverlee, Leuven, Belgium
R. Jacobs	19/12/2024	Het brein achter kunstmatige intelligentie in de mondzorg	Terugkomdag VAPR, Faculty Club Leuven, Belgium

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 surgical planning. They virtualize the patient's data into a treatable virtual patient, allowing simulation for different treatment plans. These plans then can easily be exported towards multidisciplinary teams and used for 3D printing of patient-specific implants and image-guided surgery. The 3D lab continues to play a key role in complex and reconstructive treatment planning, while pioneering in new applications and novel digital technologies.

A. TEAM

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 700 publications in peer-reviewed journals besides multiple invited lectures and publications in other journals or books. (2024: h-index Scopus 85).

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).

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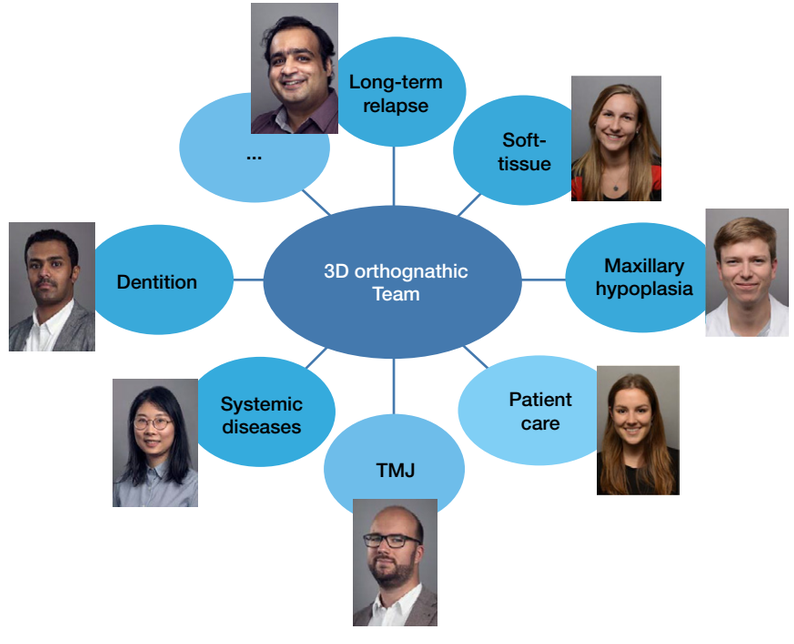
3D Lab

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. 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., Da Costa Senior, O., Politis, C., Shaheen, E. (2024). Recommendations to minimize tooth root remodeling in patients undergoing maxillary osteotomies. *SCIENTIFIC REPORTS, 14*(1), 11 pages. doi:10.1038/s41598-024-62059-2

Alqahtani, K. A., Shaheen, E., Da Costa, O., Politis, C., Jacobs, R. (2024). Three dimensional assessment of root changes after multi-segments Le Fort I osteotomy. *JOURNAL OF CRANIO-MAXILLOFACIAL SURGERY, 52*(12), 1485-1490. doi:10.1016/j.jcms.2024.08.022

Alqahtani, K. A., Shaheen, E., Politis, C., Jacobs, R. (2025). Three-dimensional assessment of root changes after Le Fort I osteotomy. *INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 54*(1), 57-64. doi:10.1016/j.ijom.2024.07.003

De Moor, A., Willaert, R., Sun, Y., Hunin, Z., van Loon, J., Decramer, T., Bila, M. (2024) Surgical management of a temporal meningoencephalocele with a patient-specific combined craniofossa prosthesis: illustrative case. *J NEUROSURG CASE LESSONS, AUG 5;8*(6):CASE24132. doi: 10.3171/CASE24132

Doucet, K., Shaheen, E., Danneels, M., Dormaar, T., Verdonck, A., Willems, G., Politis, C., Jacobs, R., de Llano-Perula, M. C. (2024). Three-dimensional evaluation of secondary alveolar bone grafting in patients with unilateral cleft lip and palate: A 2-3 year post-operative follow-up. *ORTHODONTICS & CRANIOFACIAL RESEARCH, 27*, 100-108. doi:10.1111/ocr.12763

Dubron, K., Yang, L. H., Jacobs, R., Politis, C., Willaert, R., Shaheen, E. (2024). Symmetry recovery in zygomaticomaxillary complex fractures compared to normal unfractured population: A new reliable 3D evaluation. *JOURNAL OF STOMATOLOGY ORAL AND MAXILLOFACIAL SURGERY, 125*(3), 6 pages. doi:10.1016/j.jormas.2024.101857

Gao, Y., Gu, Y., Van Dessel, J., Lübbers, H.T., Tian, L., Politis, C., Bila, M., Willaert, R., Chen, X., Sun, Y. (2024). Orthocalc: The Six Degrees of Freedom Measurement Workflow of Rotational and Displacement Changes for Maxilla Positioning Evaluation. *COMPUTER METHODS AND PROGRAMS IN BIOMEDICINE, 247*, 108083. doi: 10.2139/ssrn.4673071

Gu, Y., Liu, Y., Bühring, J., Tian, L., Koblenzer, M., Schröder, K-U., Li, F., Van Dessel, J., Politis, C., Jahr, H., Sun, Y. (2024) Biocompatibility and osteogenic capacity of additively manufactured biodegradable porous WE43 scaffolds: An in vivo study in a canine model. *BIOMATERIALS ADVANCES* 2024 August.

Li, J., Shujaat, S., Ver Berne, J., Shaheen, E., Coucke, W., Politis, C., Jacobs, R. (2024) Postoperative complications following orthognathic surgery in patients with rheumatic diseases: A 2-year follow-up study. *ORAL DISEASES, 30*;2 586-592. doi:10.1111/odi.14417

Milheiro, A., De Tobel, J., Capitaneanu, C., Shaheen, E., Fieuws, S., Thevissen, P. (2024) Quantifying the potential of morphological parameters for human dental identification: part 1—proof of concept. *INT J LEGAL MED 138*, 25–34. doi: 10.1007/s00414-022-02853-7

Preda, F., Nogueira-Reis, F., Stanciu, E. M., Smolders, A., Jacobs, R., Shaheen, E. (2024). Validation of automated registration of intraoral scan onto Cone Beam Computed Tomography for an efficient digital dental workflow. *JOURNAL OF DENTISTRY, 149*, 8 pages. doi:10.1016/j.jdent.2024.105282

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Sabelis, J., Schreurs, R., Maal, T., Willaert, R., Shaheen, E., Dubois, L., Becking, A. (2024) OR282 – Orbital patient-specific implant: patient-specific, physician-specific or planner-specific implant? *INTERNATIONAL JOURNAL OF ORAL & MAXILLOFACIAL SURGERY, 52*,2:104, January 2024. doi: 10.1016/j.ijom.2023.10.293

Sabelis, J., Shaheen, E., Willaert, R., Becking, A.G., Dubois, L., Schreurs, R. (2024) PSI: Planner-specific, physician-specific, or patient-specific implant for orbital reconstruction? *JOURNAL OF CRANIO-MAXILLOFACIAL SURGERY, 52*(11), pages 1376-1382. doi: 10.1016/j.jcms.2024.03.004

Shujaat, S., Vasconcelos, K. D. F., Kesztyus, A., Fontenele, R. C., Oliveira-Santos, N., Nagy, K., Shaheen, E., Jacobs, R. (2024). Optimization of orofacial cleft imaging protocols using device-specific low-dose cone-beam computed tomography. *JOURNAL OF ORAL REHABILITATION, 51*(9), 1712-1720. doi:10.1111/joor.13745

Torres, A., Dierickx, M., Lerut, K., Bleyen, S., Shaheen, E., Coucke, W., Pedano, M.S., Lambrechts, P., Jacobs, R. (2024). Response to letter to editor: Clinical outcome of guided endodontics versus freehand drilling: A controlled clinical trial, single arm with external control group. *INTERNATIONAL ENDODONTIC JOURNAL, 3* pages. doi:10.1111/iej.14177

Torres, A., Dierickx, M., Lerut, K., Bleyen, S., Shaheen, E., Coucke, W., Pedano, M.S., Lambrechts, P., Jacobs, R. (2025). Clinical outcome of guided endodontics versus freehand drilling: A controlled clinical trial, single arm with external control group. *INTERNATIONAL ENDODONTIC JOURNAL, 58*(2), 209-224. doi:10.1111/iej.14157

Verbist, M., Dubron, K., Bila, M., Jacobs, R., Shaheen, E., Willaert, R. (2024) Accuracy of surgical navigation for patient-specific reconstructions of orbital fractures: A systematic review and meta-analysis. *JOURNAL OF STOMATOLOGY, ORAL AND MAXILLOFACIAL SURGERY, 125*;3 101683. doi:10.1016/j.jormas.2023.101683

Verbist, M., Vandevelde, A.L., Geusens, J., Sun, Y., Shaheen, E., Willaert, R. (2024) Reconstruction of Craniomaxillofacial Bone Defects with 3D-Printed Bioceramic Implants: Scoping Review and Clinical Case Series. *JOURNAL OF CLINICAL MEDICINE, 13*(10), 2805. doi: https://doi.org/10.3390/jcm13102805

Wang, X., Alqahtani, K. A., van den Bogaert, T., Shujaat, S., Jacobs, R., Shaheen, E. (2024). Convolutional neural network for automated tooth segmentation on intraoral scans. *BMC ORAL HEALTH, 24*(1), 9 pages. doi:10.1186/s12903-024-04582-2

Wang, X., Shujaat, S., Shaheen, E., Jacobs, R. (2024) Quality and haptic feedback of three-dimensionally printed models for simulating dental implant surgery. *THE JOURNAL OF PROSTHETIC DENTISTRY, 131*;4 660-667. doi:10.1016/j.prosdent.2022.02.027

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3D Lab

University of Leuven
Department of Imaging & Pathology
OMFS IMPATH Research Group
Kapucijnenvoer 7 blok a - box 7001
3000 Leuven
BELGIUM
+32 16 33 24 52
+32 16 33 27 48
www.omfsimpath.be

v.u. Reinhilde Jacobs