KU LEUVEN

OMFS
IMPATH

Yearbook 2018

TABLE OF CONTENTS

1. Preface 7
2. Team 11
   A. Staff 17
   B. Researchers 23
   C. Administrative Coordinator 47

3. Research 49
   A. Projects 51
   B. Awards 53
   C. Publications 55
      - International peer-reviewed publications 55
      - Book (chapter) publications 63
   D. Chairs 65

4. Lecturing 67
   A. Scientific contributions at congresses 69
      - Oral presentations 69
      - Poster presentations 73
   B. Invited lectures 81

5. 3D lab 85
   A. Team 89
   B. Projects 93
   C. Publications 95
      - International peer-reviewed publications 95
      - Oral presentations 97
      - Poster presentations 99
      - Invited lectures 101

1

Preface

OMFS-IMPATH research group has been established 6 years ago. The physical proximity between the clinical and imaging department in a university setting with easy access to a multitude of research facilities cannot be underestimated. Add to this an active 3D-facility and a daily collaboration between clinicians and research fellows, creating a nurturing environment for clinician driven projects. Gradually we've seen increasing maturity in the group resulting in improved study design, statistical depth and research methods. Young talents from many countries find their place in this research group to achieve a Master or PhD thesis. The multicultural and multidisciplinary exercise serves output and fosters tolerance. To forge a group out of a heterogeneous mix of cultures and scientific backgrounds necessitates a talented coach. Prof. Reinhilde Jacobs has been the perfect person, heading this team in the right direction. Funding remains a time-consuming and frustrating concern of those in charge. The Yearbook 2018 reflects the efforts made in a research field where imaging science, nerve damage and orthognatic surgery have been the main focus in the past few years.

2

Team

A. STAFF

B. RESEARCHERS

C. ADMINISTRATIVE COORDINATOR

2
Team

The OMFS-IMPATH research group relates to development and validation of surgical tools and image-based solutions to advance in oromaxillofacial surgery, with an ultimate aim to obtain an optimized treatment outcome while minimizing the peri- and postsurgical risks, such as neurovascular trauma. In order to achieve this, a global integration of digital datasets will enable the creation of a virtual replica of the patient. This may allow full simulation of the surgery as well as of its expected outcome. While the latter may help to further modify and fine-tune the planned surgery, the former integrated virtual data may allow presurgical simulations, development of image-based surgical tools and navigation. Research will be focused on image-based development of surgical aids with a validation of their clinical applicability. Research lines will include: optimized image acquisition with the least radiation dose, especially when children are concerned; image-based development of individualized surgical tools, while striving for advanced applications of e.g. 3D printing; maximized visualization of the trigeminal nerve pathway to minimize the surgical risks for trigeminal nerve damage. Such visualization may also assist in creating new access routes and surgical strategies to modulate trigeminal neuropathic pain.

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

Biomedical MRI	Uwe Himmelreich
Forensic Biomedical Sciences	Wim Van de Voorde
Medical Physics & Quality Assessment	Hilde Bosmans
Nuclear Medicine & Molecular Imaging	Koen Van Laere
Radiology	Raymond Oyen
Theragnostic Laboratory	Yicheng Ni
Translational Cell & Tissue Research	Tania Roskams
Translational MRI	Vincent Vandecaveye
OMFS-IMPATH	**Constantinus Politis** www.omfsimpath.be

2
Team

Tania ROSKAMS

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

Peter VERMAELEN

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

A. STAFF

Constantinus POLITIS

Constantinus Politis is Oral and Maxillo-Facial Surgeon. He is currently Professor and Chairperson of the Department of Oral and Maxillofacial Surgery at Leuven University, KULeuven, Belgium. He is an invited Lecturer at the EHSAL in Brussels. He graduated at the Catholic University of Leuven in medicine (MD, summa cum laude), in dentistry (DDS, magna cum laude). He specialized in oral and maxillofacial surgery at the Catholic University of Leuven. Postgraduate training was additionally followed in Arnhem (Stoelinga), Aachen (Koberg), Copenhagen (Pindborg), Göteborg (Bränemark) and San Francisco (Marx). He also holds a master degree in management (MM) from the Applied Economic Scienes at the University of Hasselt and a master degree in Hospital Management (MHM) from the Catholic University of Leuven. He became a recognition as medical specialist in management of health care data and is now member of the National Council of Hospital Facilities. He is Secretary General of the Professional Union of Belgian Oral and Maxillofacial Surgeons. He is acknowledged trainer of OMFS trainees. He defended his doctor's thesis on the subject of complications of orthognathic surgery (PhD). His professional field of intrest is in orthognathic and orthodontic surgery and trigeminal nerve dysfunction. Clinical research projects include prevention and repair of iatrogenic trigeminal nerve injury, transplantation of teeth and orthognathic surgery.

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 was postdoctoral fellow of the European Commission (1994-5) at the University of Göteborg (prof B Rydevik, dept Orthopaedics, Sahlgrenska University Hospital) and The Institute for Applied Biotechnology (prof P-I Brånemark). She is full professor at the University of Leuven and visiting professor at Karolinksa Institutet, Stockholm, Sweden and the Dalian Medical University in China. R. Jacobs is heading the omfsimpath research group of the KU Leuven (omfsimpath.be). She is Secretary General of the International Association of DentoMaxilloFacial Radiology, past president of the European Academy of DentoMaxilloFacial Radiology as well as DDS scientific board member. She is associate editor of Clinical Oral Investigations, European Journal of Oral Implantology, and Oral Radiology. She has received the D Collen Research Award (1994), 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 has been actively participating in European projects (ref. Minosquare, Osteodent, SedentexCT, Dimitra project (Euratom Operra)). She is (co-)author of 5 books and more than 375 publications in peer-reviewed journals besides multiple invited lectures and publications in other journals or books.

2
Team

Paul LEGRAND

Paul Legrand studied medicine at the KU Leuven and graduated as medical doctor in 1982. Afterwards he studied dentistry and graduated in 1984. He was trained as an oral- and maxillofacial surgeon at the KU Leuven and at the Rheinisch-Westfälische Technische Hochschule in Aachen. In 1988 he became a certified oral and maxillofacial surgeon. In October 1988, he founded the oral and maxillofacial surgery department in the Maria Hospital in Overpelt, where he was medical head of OMFS from 1988 to 2017. He is a certified OMFS instructor and a member of the OMFS accreditation committee. Furthermore, he is on the board of the association of Flemish oral and maxillofacial surgeons (VVMKA) and the VBS MKA. Since 2011 professor Legrand was part-time affiliated with the UZ Leuven and in 2016 he was appointed guest lecturer at the KU Leuven. Since November 2018, professor Legrand is fulltime staff member at OMFS UZ Leuven. In Belgium, professor Legrand is a pioneer in intravenous sedation in the OMFS department and he has made this his most important area of interest. His principal activities are dent alveolar surgery, implantology and further development of intravenous sedation techniques.

Titiaan DORMAAR

Titiaan Dormaar is a Cranio-Maxillofacial and Cleft surgeon currently working in the department of oral and maxillofacial surgery at UZ Leuven. He obtained his MD from Maastricht University, where he was involved in a research project focusing on liquid ventilation in neonatal respiratory distress syndrome. He obtained his DDS from the Radboud University Nijmegen (the Netherlands). Before continuing his specialist training he spent 2 years in the UK, where he worked as a senior house officer in ENT and OMFS in Guildford and London. He completed his OMFS training at Utrecht University (the Netherlands). During his training in Utrecht he was the lead surgeon in an animal model research project on alveolar bone grafting with beta-TCP bone substitute in alveolar clefts. Following this he did a 3 year Fellowship in Cleft Surgery at Guy's and St Thomas' Hospital, London (UK), whilst he also provided regular on-call duties at King's College Hospital, a tertiary trauma centre.

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 Maxillo-Facial Surgery, Bucharest and at Leuven University Hospitals. She joined the Department of Maxillo – Facial 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.

Michel BILA

Michel Bila graduated from Antwerp University in 2009 as Medical Doctor and graduated from Leuven University in 2012 as Master in Dentistry. He obtained his specialty degree in Oral and Maxillo-Facial Surgery in 2016. He further specialized in Head and Neck Oncology at the Maxillofacial and Head and Neck Service at University College London Hospitals. He is Clinical Staff Member in Oral and Maxillofacial Surgery at UZ Leuven. His clinical focus is Head and Neck Oncology and Reconstruction. His PhD research covers the use of immunotherapy in resectable head and neck squamous cell carcinoma (HNSCC).

2
Team

Robin WILLAERT

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. His clinical focus is Head and Neck Oncology and maxillofacial reconstruction using 3D technology. His PhD research covers orbital imaging and reconstruction surgery. He further specializes in Head and Neck Oncology in different centres in Australia, South-Africa and Asia.

B. RESEARCHERS

Michael M. BORNSTEIN

Michael Bornstein has been appointed in 2016 as Clinical Professor in Oral and Maxillofacial Radiology at the Faculty of Dentistry, The University of Hong Kong, Hong Kong SAR, China. He is also Visiting Professor at the OMFS-IMPATH Research Group, Department of Imaging and Pathology, University of Leuven, Belgium. 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. 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 Habitation (Privatdozent / PhD) and in 2014 he became Associate Professor in the field of „Oral Surgery and Stomatology“. 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 140 original articles, and is the author / co-author of numerous case reports, review articles, and book chapters.

Kaan ORHAN

Kaan Orhan, DDS MSc MHM PhD, BBAc is a Professor of Dentomaxillofacial Radiology at Ankara University, Faculty of Dentistry and also Visiting Professor at the OMFS-IMPATH Research Group, Leuven, Belgium. Dr. Orhan received his dental degree in 1998 and completed his PhD and Maxillofacial Radiology residency in 2002 at Osaka University and Ankara University. In 2004 he started his academic career in Ankara University as a consultant at the Faculty of Dentistry and became a professor in 2006. In 2007-2010 he was the founder and the chairman of Dentomaxillofacial Radiology Department, Near East University, continuing as a faculty in Dentomaxillofacial Radiology Department, Ankara University, Turkey. He has over 200 SCI international publications on peer-reviewed journals (h index 25) and is a sought-after lecturer at national and international conferences. Professor Orhan served as the chairman of Research and Scientific Committee, European Academy of Dentomaxillofacial Radiology between 2008-2012 and was elected Vice president position (2012-2014) and President for the same academy. He is also serving in the Research and Scientific com in IADMFR. He is a fellow of Japanese Board of Dentomaxillofacial Radiology, European Head and Neck Radiology Society (ESHNR), European society of Magnetic Resonance in Medicine and Biology (ESRMB), Turkish Magnetic Resonance Society. He is also serving Board member of the specialization committee in the Ministry of Health Turkey. He is editor and reviewer of many journals and co-author and contributor of eight books.

2
Team

Claudia NOFFKE

Claudia Noffke grew up and matriculated in Germany. She obtained her under-graduate training as a Dentist at the University of Pretoria and managed her own private practice for several years. She completed her postgraduate training in Maxillofacial and Oral Radiology in 1992 and served as Lecturer in the Departments of Radiology and Diagnostics, University of Pretoria, and Oral Pathology at the Medical University of Southern Africa where she was appointed as Head of Maxillofacial and Oral Radiology in June 2001, a position from which she retired as a Full Professor in 2016. She participated actively in 46 international congresses and refresher courses and authored or co-authored an equal number of scientific papers in peer-reviewed journals. She is on the editorial boards of several distinguished journals in her field of expertise including the Radiology Section of the Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology (Triple “O”) and the Journal of Chinese Clinical Medicine. She recently co-edited the proceedings of the 2017 21st Congress of the International Association of Dentomaxillofacial Radiology in Kaohsiung, Taiwan. In recognition for her role as reviewer for Triple “O” she received the Lincoln Manson-Hing Award for distinguished service in Scientific Review from the American Academy of Oral and Maxillofacial Radiology and Elsevier Publisher. Claudia supervised- and served as external examiner for several Master’s and PhD degrees. She is currently on the Board of Directors and Regional Director (Africa) of the IADMFR and appointed since May 2018 as Guest Professor in the Department of Imaging & Pathology at the KU Leuven. Her fields of expertise include ethics and legislation pertaining to radiation protection, fibro osseous disease and the radiological interpretation of gnathial pathology.

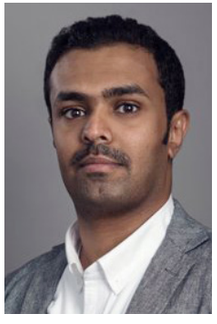
Erich RAUBENHEIMER

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.

Jennifer PATTERSON

Jennifer Patterson received a B.S.E. in chemical engineering from Princeton University (USA) in 1998 and a Ph.D. in bioengineering from the University of Washington (USA) in 2007. From 1998-2001 she worked for the start-up company Therics Inc. (USA) developing 3D printed dental and bone implants, and from 2007-2011 she was a postdoctoral fellow in the research group of Prof. Jeffrey Hubbell at EPFL (Switzerland) researching hydrogels for tissue engineering applications. From 2011-2017 she was an assistant professor in the department of materials engineering at KU Leuven, and she is now working for the start-up company BIOFABICS LDA (Portugal), which focuses on next-generation solutions for studying, mimicking, repairing, and replacing living tissues and organs. She is collaborating with Prof. Reinhilde Jacobs and Mostafa EzEldeen of OMFS-IMPATH in the area of hydrogel biomaterials and bioprinting for dental regenerative applications.

Khalid ALQAHTANI



Khalid Alqahtani was born on 21 August, 1992. He achieved his Bachelor of Dental Surgery (BDS) degree from Prince Sattam Bin Abdulaziz University, Al-Kharj, Saudi Arabia in the year 2016. He worked as a demonstrator in the department of oral and maxillofacial radiology at Prince Sattam Bin Abdulaziz University 2016 to 2018. Currently, he is a postgraduate student in the field of advanced medical imaging and a PhD candidate under the supervision of Prof. Reinhilde Jacobs at the OMFS-IMPATH Research Group, KU Leuven. His main focus of research involves three-dimensional assessment of root resorption in orthognathic surgery.

Birgit COUCKE

Birgit Coucke is a Master Thesis student in Biomedical Sciences at KU Leuven. She graduated as a Biomedical Laboratory Scientist (Pharmaceutical and Biological Laboratory Science, Bachelor's degree) at HOWEST University College Bruges in 2016. For completion of this grade she performed an internship at the Department of Pharmacy and Department of Biotechnology of Chandigarh Group of Colleges (Punjab, India) under supervision of Dr. Arpit Sharma and Dr. Palki Sahib Kaur. The bachelor's research project title was 'Optimisation of Parameters for fermentative Wine Production from Grapes'. From 2016, Birgit enrolled in Forensic Biomedical Sciences at KU Leuven. After short internships at the Sexual Assault Care Centre (SACC), Experimental Psychology Laboratory (KU Leuven) and the Technical and Scientific Police of West Flanders, she is currently working on the TREASURE research project for her Master's Thesis at OMFS-IMPATH. Besides that she works on several other projects in order to gain experience in the field. The internship and Master Thesis are under promotership of Prof. dr. Reinhilde Jacobs (Department Imaging and Pathology, KU Leuven) and Prof. dr. Constantinus Politis (Department of Oral and maxillofacial surgery). The mentors are Anna Ockerman and Myrthel Vranckx, PhD candidates at the OMFS-IMPATH research group.

Oliver DA COSTA SENIOR

Oliver da Costa Senior is a PhD candidate at the OMFS-IMPATH-research group at the University of Leuven under promotership 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).

Annelore DE GRAUWE

Annelore De Grauwe was born on May 9th, 1977. She graduated as a dentist in 2001 at the University of Ghent, Belgium. After one year in private practice, she decided to obtain a Master degree in Paediatric Dentistry and Special Care at the University of Ghent, which she obtained in 2005, summa cum laude. She works as a paediatric dentist in her own private practice, and performs narcodontics in the hospitals of Bruges and Dendermonde. She is an active board member of the Belgian Academy of Paediatric Dentistry since 2005. She is also active member of the EAPF, IAPD, EADMFR, IADMFR, IADR and NVDMFR. From 2016 on, she works as a researcher at OMFS-IMPATH, with special interest in paediatric dentistry and imaging.

Mostafa EZELDEEN

Mostafa EzEldeen was born on July 19th, 1984 in Mansoura, Egypt. He obtained his Bachelor of Dental Medicine and Surgery (2007) from Mansoura University, Egypt and Master in Dentistry (2013) summa cum laude, at the KU Leuven, Belgium. Further, he obtained a specialization in Paediatric Dentistry and Special Dental care (2012), at the KU Leuven under the guidance of Prof. Dr. Frans Vinckier and Prof. Dr. Dominique Declerck. In 2013, he obtained the diploma of Postgraduate studies in Advanced Medical Imaging at the KU Leuven under the guidance of Prof. Dr. Reinhilde Jacobs. He works as a dentist in private practice and UZ Leuven (department of Paediatric Dentistry and Special Dental Care). Currently he is a PhD candidate (OMFS-IMPATH, KU Leuven, Belgium) with Prof. Dr. Reinhilde Jacobs as his promoter. His research topics are; assessment of the patterns of healing in teeth and bone after regenerative processes using Cone Beam Computed Tomography, developing of reliable teeth segmentation methods, 3D bio printing and chemokine-mediated regeneration in the oral and maxillofacial region.

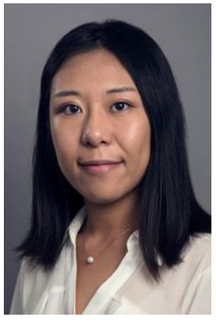
Koenraad GRISAR

Koenraad Grisar is a PhD Candidate at the OMFS-IMPATH Research Group (Department Imaging and Pathology, Faculty Medicine, Catholic University Leuven), where he studies the autogenous transplantation of maxillary canines. He received his Medical Degree from the Leuven University in 2013. He graduated in June 2016 as Master of Science in Dentistry at the Leuven University with a Master's Thesis in early dental implant survival and risk factors. He has had several articles published in internationally renowned journals on topics related to oral and maxillofacial surgery (Human papillomavirus and head and neck cancers; Osteoradionecrosis and medication-related osteonecrosis of the jaw; Dental implantology). Currently he is an oral and maxillofacial trainee at the University Hospital Leuven.

Lisanne GROENEVELDT

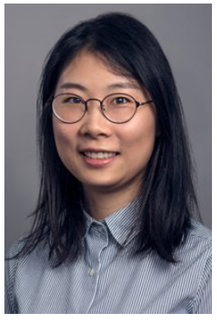
Lisanne Groeneveldt obtained her Medical Degree at the Erasmus University, Rotterdam, Netherlands, in 2015 and graduated at this university as Master of Science in Molecular Medicine in 2017. She is currently studying dentistry at the KU Leuven in order to specialize in Oral and Maxillofacial Surgery. During her studies she was introduced to research into the molecular and cellular principles of the craniofacial area. She wrote both her Master theses about bone tissue engineering and participated in biomedical research focused on the prevention of osteoradionecrosis. Currently, she is performing research as a PhD candidate into craniofacial bone tissue engineering using periosteal cells.

Yifei GU



Yifei Gu was born on April 17th, 1992. She achieved her degree in Bachelor of Medicine from West China college of Stomatology, Sichuan University, Chengdu, Sichuan, China (2010 - 2015). After that, she continued to obtain her degree in Master of Dental Medicine, majored in oral implantation, from West China college of Stomatology, Sichuan University, Chengdu, Sichuan, China, under the guidance of Professor Mo Anchun (2015-2018). During her Masters, she worked on the impact of non-steroid anti-inflammatory drugs on implant osseointegration, as well as the digital workflow in implant dentistry. She started working as a PhD candidate (OMFS-IMPATH, KU Leuven) from 2018, with Professor Constantinus Politis and Professor Reinhilde Jacobs as her promoters. Her research topic for PhD is related to tissue engineering for bone defect reconstruction by using biomimetic calcium phosphate/BMP-2 coated 3D printed implants.

Jiqing LI



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

Hongyang MA

Hongyang Ma obtained his Bachelor of Dental Medicine and Surgery from Harbin Medical University and Master degree of Oral and Maxillofacial Surgery in Department of Oral and Cranio-maxillofacial Surgery, Ninth People’s Hospital, Shanghai Jiao Tong University School of Medicine. Currently, he is a PhD candidate (OMFS-IMPATH, KU Leuven, Belgium) with Prof. dr. Reinhilde Jacobs as his promoter and Prof. dr. Constantinus Politis as his co-promoter. He studies the assessment of the long-term follow-up of patients performed with oral oncologic reconstruction surgery.

Jeroen MARTENS

Jeroen Martens is a Master Thesis student Clinical Biomedical Sciences, who graduated at the KU Leuven as a Bachelor Scientist in Biomedical Sciences in 2016. He is currently doing his Master's Thesis at the OFMS IMPATH group at the KU Leuven under the guidance of his promoters Prof. dr. Reinhilde Jacobs (Department of Imaging and Pathology, KU Leuven) and Prof. dr. Constantinus Politis (Head of department of Oral and maxillofacial surgery). His thesis comprises studying the bleeding complications after dental extractions in patients, taking new oral anticoagulants. During his final year, he will be supervised by Anna Ockerman and Myrthel Vranckx, both PhD candidates at the OMFS-IMPATH group.

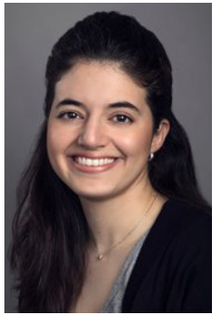
Evelyne MERTENS

Evelyne Mertens is a Master Thesis student at the KU Leuven (Biomedical Sciences – Forensic Sciences). She graduated as a BSc in Biomedical Sciences in June 2017 at the KU Leuven. She completed her internships at the Center for Developmental Psychiatry, Forensic DNA Laboratory and the laboratory for Forensic Toxicology in 2017-2018. She is currently working on multiple projects regarding her Master's Thesis at the OMFS-IMPATH research group under the promotership of Prof. dr. Reinhilde Jacobs (Department Imaging and Pathology, KU Leuven) and Prof. dr. Constantinus Politis (Department of Oral and maxillofacial surgery). Her mentors are PhD candidates Anna Ockerman and Myrthel Vranckx.

Joeri MEYNS

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 specialties are orthognathic surgery and oncology. His research topic is growth modification of the face in children.

Catalina MORENO RABIE



Catalina Moreno Rabie was born in Concepción, Chile, in 1992. She studied her bachelor and master degree in Dentistry at the University of los Andes in Chile between 2011 and 2016. During her last year of Dentistry, she did an internship in Clinical and Research training at KU Leuven, where she studied the mandibular bone on CBCT. She is currently (2018-2019) doing Postgraduate Studies in Advanced Medical Imaging at KU Leuven, combined with research work at the OMFS-IMPATH research group.

Zohre MOUSAVI NEJAD

Zohre Mousavi Nejad graduated with a Bachelor of Science degree in Biomedical Engineering from the Polytechnic University of Tehran in 2012. In her BSc project, she worked on anticancer drug delivery systems. In her MSC project, she investigated postoperative abdominal adhesions. Meanwhile she did projects on bone tissue engineering. Now she is a PhD student at Institute of Materials and Energy in Iran and is working on pulp and dentin regeneration through 3D printing. She is an international scholar at the OMFS-IMPATH research group (KU Leuven) to work on a project about 3D printing and tooth regeneration.

Delphine MULIER

Delphine Mulier is a PhD candidate at the OMFS-IMPATH-research group at the University of Leuven under promotership of Prof. dr. Constantinus Politis, Prof. dr. Reinhilde Jacobs and Dr. Ir. Eman Shaheen. She graduated at the Catholic University of Leuven in Medicine in June 2018. Currently, she is an Oral and Maxillofacial trainee at the department of Oral and Maxillofacial Surgery at the University Hospitals of Leuven. Her research is focused on the three-dimensional planning and follow-up of orthognathic surgery with special interest in new three-dimensional techniques.

Krisztian NAGY

Krisztian Nagy is a Maxillo-Facial 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-Maxillo-Facial 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 maxillo-facial 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-Maxillo-Facial 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.

Laura NICOLIELO

Laura Nicolielo is a Dental Surgeon (University of São Paulo, Brazil) (2009), Postgraduate in Oral Surgery (University of São Paulo, Brazil) (2010), Master in Applied Dental Sciences with focus in Stomatology and Radiology (University of São Paulo, Brazil) (2013), Implantologist (Opem Institute, Bauru, Brazil) (2013) and Postgraduate in Advanced Medical Imaging (KU Leuven, Belgium) (2014). In October 2013, she was granted by the Brazilian Government to start the PhD in the OMFS-IMPATH Research Group under supervision of Prof. Dr. Reinhilde Jacobs. Her main research topic is validation of 3D imaging modalities in the assessment of 1) Neurovascular structures of the jaw bones 2) Bone quality and quantity and 3) Condylar resorption after orthognathic surgery.

Anna OCKERMAN

Anna Ockerman is a PhD candidate at the OMFS-IMPATH research group in cooperation with the Department of Cardiovascular Sciences. She performs research in the domain of antithrombotics in the oral and maxillofacial surgery and dentistry. More specifically, she investigates how to reduce bleeding complications after dental extractions in patients on non-vitamin K oral anticoagulants (NOACs) and what the influence of antithrombotic drugs is on the characteristics of Leukocyte Platelet Rich Fibrin (L-PRF) membranes. Her promoters are Prof. dr. Reinhilde Jacobs, Prof. dr. Constantinus Politis (Department Imaging and Pathology, KU Leuven) and Prof. dr. Peter Verhamme (Department of Cardiovascular Sciences, KU Leuven). Anna graduated in June 2017 as MSc in Biomedical Sciences (KU Leuven). Her Master's Thesis 'The eruption potential of wisdom teeth predicted by tooth inclination in a premature development stage', was awarded with the Best Master's Thesis Biomedical Sciences 2017, third place.

Ruben PAUWELS

Ruben Pauwels is a Master in Biomedical Sciences (2007), Master of Medical Imaging (2008) and PhD in Biomedical Sciences (2012). His research has focused on the use of CBCT in dentistry. His research topics include: 1. Radiation dosimetry 2. Technical image quality analysis 3. Optimization of exposures in CBCT 4. Applicability of Hounsfield Units in CBCT 5. Bone structure analysis in CBCT. As a Consortium member of the SEDENTEXCT project, he was a contributor to the European Guidelines on dental CBCT. He was a corresponding member of International Commission on Radiological Protection (ICRP) Task Group 88, and a co-author of ICRP Publication 129. He is currently acting as a consultant for the International Organization of Medical Physics (IOMP), the Thailand National Electronics and Computer Technology Center (NECTEC) and the International Atomic Energy Agency (IAEA). He received the European Academy of Dentomaxillofacial Radiology (EADMFR) Research Award and Fellowship Grant in 2012. He is Associate Editor of the British Journal of Radiology.

Clarissa Teles RODRIGUES

Clarissa Teles Rodrigues is a dentist, specialist in Endodontics (Hospital for Rehabilitation of Craniofacial Anomalies, University of São Paulo, Brazil), PhD and MSc in Endodontics (Bauru School of Dentistry, University of São Paulo). She is a professor of the Dentistry Undergraduate Course at Northeast Independent Faculty (FAINOR) in Bahia, Brazil. Currently, she is a postdoctoral researcher at Bauru School of Dentistry (University of São Paulo) and a visiting researcher at the OMFS-IMPATH research group (KU Leuven). Her research topic is related to morphological aspects of the root canal using different dental imaging modalities.

Lesly Paola Gaitán ROMERO

Lesly Paola Gaitán Romero is a PhD researcher at the OMFS-IMPATH Group. She is a dentist (University San Martin, Colombia), and an orthodontist (University Carabobo, Venezuela). She obtained Master of Health Care Management and Policy from KU Leuven. She was a lecturer of Orthodontic at the University of Jose Antonio Paez, Venezuela from 2010 - 2012. She was recognized for her Professionalism and Quality in delivering her knowledge and skills in the care of the Soldiers and Indigenous in Inírida - Colombia. She obtained high Average in the State Quality Examination of the National Higher Education Colombia 2007.

Eman SHAHEEN

Eman (Emmy) Shaheen was born on July 12th, 1982 in Giza, Egypt. She graduated with honor from the faculty of Computer Sciences and Information Technology (2003), Cairo University, Egypt where she also worked as a teaching assistant from 2003 till 2007 with 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 about mammography and breast cancer (2009) in Biomedical Sciences at the KU Leuven, Belgium. She was granted a PhD scholarship from the OPTIMAM project (UK) in 2010 to develop, simulate and validate 3D models of breast lesions and tools to optimize the performance of breast tomosynthesis. She obtained her doctoral degree in 2014, KU Leuven, Belgium. In the same year, she started working in the department of Maxillo-facial surgery, University hospitals Leuven (Belgium) with Prof. Constantinus Politis as clinical engineer with focus on 3D planning of orthognathic surgeries. Next to the patient related work, she is part of the research group of the OMFSIMPATH (KU Leuven, Belgium) where she supervises students, supports different research projects related to 3D printing and 3D simulations. She is also collaborating with Materialise (Leuven, Belgium) as consultant to improve the CMF software for orthognathic surgeries next to other research related projects.

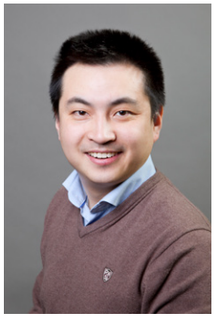
Sohaib SHUJAAT

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. Currently he is a PhD candidate (OMFS- IMPATH, KU Leuven) with Professor Reinhilde Jacobs as his promoter. His research topic for PhD is related to three-dimensional analysis of hard and soft tissue changes in orthognathic surgery patients and to develop a start of art predictive model for treatment planning.

Dandan SONG

Dandan Song was born on March 11th, 1990. She achieved her degrees in both Bachelor and Master of Oral Medicine from Dalian Medical University, China. During her Master, she worked on the effect of the different implant placement and loading protocols on the osseoperception around the implant. Currently she is a PhD Candidate in OMFS-IMPATH, KU Leuven, with professor Reinhilde Jacobs as her promoter. She is studying the effect of the bisphosphates and radiation on the jaw bone and blood vessel changes.

Yi SUN



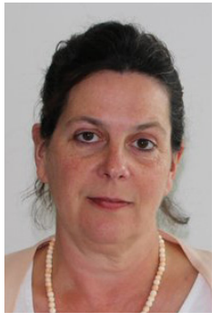
Yi Sun obtained his PhD in Biomedical Sciences, Master of Medical imaging and Bachelor in Electronic Engineering. Since 2007, he worked in the field of computer assistant surgery planning, with focus on oral and maxillofacial surgery. His main professional interest is template-based and image-guided 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).

Kostas SYRIOPOULOS

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

2
Team

Els TIJSKENS



Els Tijskens graduated as a dentist in 1984 at KULeuven. She has been working as an endodontist since 2000, and has a second line practice for paediatric endodontics and tooth 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 Secretary 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 is teaching Medical Imaging at UCLL Opleiding Mondzorgkunde.

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. Currently he is a PhD candidate (OMFS-IMPATH, 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.

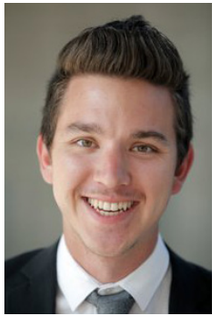
Tamara TRAD ALZOUBI

Tamara Trad Alzoubi is a Jordanian Specialist in restoration and conservative dentistry. Graduated from the University of Jordan from where she obtained here Bachelor degree in Dental Surgery and Medicine. She then joined the Jordanian Armed Forces -The Royal Medical Services working as a dentist and where she did her internship and later on received her specialty in Restotive and Conservative Dentistry (Jordanian National Board)
She is a visiting researcher in OMFS-IMPATH and her fields of interests are Esthetic, Restoration, and Digital dentistry.

Fréderic VAN DER CRUYSSEN

Fréderic Van der Cruyssen is a PhD candidate at OMFS-IMPATH research group under promotership of Prof. dr. Constantinus Politis, Prof. dr. Reinhilde Jacobs and Prof. dr. Tara Renton. He received his Medical Degree from the Catholic University of Leuven in June 2017 with a Master's thesis on trigeminal nerve physiology. His research is focused on trigeminal nerve injuries: MRI, diagnosis and treatment. Currently he is an oral and maxillofacial trainee at the University Hospitals Leuven.

Jeroen VAN DESSEL



Jeroen Van Dessel has an MSc in Biomedical Sciences (KU Leuven) and Msc in Advanced Medical Imaging (KU Leuven). He was a PhD FWO-aspirant at the Center for Developmental Psychiatry, KU Leuven. Besides his PhD in the psychiatry domain, he remained active in dental radiology field as a researcher at the OMFS-IMPATH research group. Currently, he works as clinical support and research manager at the department of Oral MaxilloFacial Surgery, UZ Leuven (Belgium) with Prof. Constantinus Politis and coordinates the start-up of the Institute for MaxilloFacial Training and Education (IMFTE). He has received the COB Oral Research award (2013), EADMFR Oral Research Award (2012; 2014), the EUNETHYDIS Sagvolden Award (2015), the EADMFR Research Fellowship (2016) and the ECNP Junior Research Award (2018). He was a visiting researcher at University of São Paulo (Brazil), Pontifical Catholic University of Paraná (Brazil) and Karolinska Institutet (Sweden). His research topics include developing and validating tools for standardized bone quality assessment on CBCT, micro-CT analysis, finite element analysis, computer-aided predictions and oral oncology.

Karla de Faria VASCONCELOS

Karla de Faria Vasconcelos is dentist (2006), Doctor in Dental Radiology (2015; PhD at State University of Campinas - Brazil, with one year of external internship at KU Leuven - Belgium), Master in Dentistry (2010; Federal University of Goiás - Brazil) and Specialist in Oral Radiology (2012; University of Campinas). She has worked, as Radiologist, in private radiology clinics, and as a Collaborator Professor of Graduate Program of Dentistry from the Federal University of Goias at the Discipline of "Imaging Diagnostic". She performed postdoctoral research at Dental Radiology Department, Piracicaba, Brazil (Prof. Dr. Francisco Haiter-Neto) and OMFS-IMPATH Research Group, Leuven, Belgium (Prof. Dr. Reinhilde Jacobs), with a FAPESP fellowship (2015-2017). In 2018 she obtained the diploma of Postgraduate Studies in Advanced Medical Imaging at KU Leuven, Leuven, Belgium. At present, she is a collaborator researcher in the OMFS-IMPATH Group, under the supervision of Prof. Dr. Reinhilde Jacobs and Prof. Dr. Politis Constantinus. She has been involved in interuniversity research collaborations, with a specific focus on digital radiography, cone beam computed tomography, micro and nano-CT.

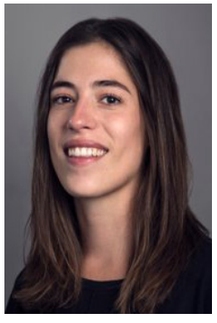
Pieter-Jan VERHELST

Pieter-Jan Verhelst is a PhD candidate at the OMFS-IMPATH research group at the University of Leuven under promotership of Prof. dr. Reinhilde Jacobs and Prof. dr. Constantinus Politis. He graduated at the University of Leuven in Medicine (MD, magna cum laude) in 2017 with a master's thesis on the fibula free flap in facial reconstruction. He has published in internationally renowned journals on reconstructive surgery and orthognathic surgery. Currently, he is an Oral and Maxillofacial trainee at the department of Oral and Maxillofacial Surgery at the University Hospitals of Leuven. His active research projects focus on the three-dimensional planning and follow-up of orthognathic surgery with a keen interest in condylar remodeling and its effect on postoperative stability.

Laurence VERSTRAETE

Laurence Verstraete is a PhD candidate at the OMFS-IMPATH-research group at the University of Leuven under promotership of Prof. dr. Constantinus Politis, Prof. dr. Reinhilde Jacobs and Dr. Ir. Eman Shaheen. She obtained her Medical Degree at the University of Ghent in June 2018. Currently, she is an Oral and Maxillofacial surgery trainee at the University Hospitals of Leuven. Her research is focused on the three-dimensional planning, evaluation and follow-up of orthognathic surgery with special interest in soft tissue analysis.

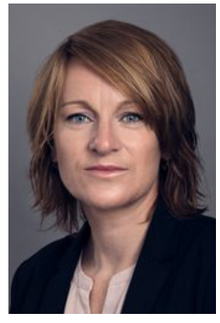
Myrthel VRANCKX



Myrthel Vranckx is a PhD-candidate at the OMFS-IMPATH research group under promotership of Prof. dr. Reinhilde Jacobs and Prof. dr. Constantinus Politis (Department Imaging and Pathology, KU Leuven). She graduated in June 2016 as MSc in Biomedical Sciences with a Master's Thesis in the use of CT imaging in Forensic Medicine (Faculty of Medicine, KU Leuven). Her research is mainly focused on third molar pathology and postoperative complications associated with third molar surgery. Her multicentric research project is ongoing in different hospitals in Belgium. More info on www.m3mka.be. Moreover, she is involved in multiple radiological studies with regard to third molar pathology and anatomical variations of the mandibular canal. Currently, she is also following Postgraduate Studies in Advanced Medical Imaging.

C. ADMINISTRATIVE COORDINATOR

Gabriela CASTEELS



For over 10 years, Gabriela has dedicated her career to keeping academic experts and senior officials organized, prioritized and less stressed.
She practices a streamlined and intuitive approach to assistance. It rests on empathy, efficiency, and astute problem solving.
Gabriela is a delivery-focused design enthusiast who incorporates both traits into her take on problem solving, and function in and around the office.
As a professional who is willing to lead by example or follow directives and make a difference in her area of expertise, she is keen on collaborating with other individuals irrespective

3

Research

A. PROJECTS

B. AWARDS

C. PUBLICATIONS

- International peer-reviewed publications
- Book (chapter) publications

D. CHAIRS

3
Research

A. PROJECTS

National funding

M3-OBSERVATORIUM

Epidemiological study on the surgical removal of third molars.

In samenwerking met Vlaams Ziekenhuisnetwerk KU Leuven

RADIATION DOSE SIMULATIONS

Patient-specific approach of CBCT imaging: custom made Monte Carlo simulations.

- OT

TOOTH AUTOTRANSPLANTATION & BIOPRINTING

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

- FWO

COMPUTER-ASSISTED MAXILLOFACIAL SURGERY

The development and clinical application of a computer assisted oral and maxillofacial surgery system.

- in collaboration with Materialise

EXTRACT-NOAC

Use of new oral anticoagulants in oral surgery

TREASURE

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

CELSA

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

C2 – PROJECT

The development of imaging-based bioprinting techniques for full tooth and bone regeneration in the dentoalveolar region.

B. AWARDS

JUNE 2018
FIRST PRICE POSTER PRESENTATION EADMFR RESEARCH AWARD 2018

Jeroen Van Dessel

JUNE 2018
SECOND PRICE SCIENTIFIC RESEARCH AWARD ECDMFR 2018

Niels Belmans

SEPTEMBER 2018
POSTER PRESENTATION AWARD
12TH ASIAN CONGRESS OF ORAL & MAXILLOFACIAL RADIOLOGY
5TH GREEN HEALTH CONFERENCE

Kaan Orhan

SEPTEMBER 2018
SCIENTIFIC REVIEWER AWARD AAOMR 2017-2018

Kaan Orhan

SEPTEMBER 2018
POSTER AWARD 10º INTERNATIONAL CONGRESS
OF THE BRAZILIAN SOCIETY OF ENDODONTICS

Fernanda Ferrari Esteves Torres,
Reinhilde Jacobs, Mostafa EzEldeen, Berando Camargo dos Santos,
Juliane Maria Guerreiro-Tanomaru, Mário Tanomaru-Filho

DECEMBER 2018
2ND PLACE DOKTORCLUB AWARDS OF TURKEY

Kaan Orhan

C. PUBLICATIONS

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Aerden T., Grisar K., Nys M., Politis C. (2018). Secondary hyperparathyroidism causing increased jaw bone density and mandibular pain: a case report. *ORAL SURGERY ORAL MEDICINE ORAL PATHOLOGY ORAL RADIOLOGY, 125* (3), E37-E41. (Impact factor: 1.72).

Agbaje JO., Adisa AO., Petrova MI., Olusanya AA., Osayomi T., Effiom OA., Soyele OO., Omitola OG., Olawuyi AB., Okiti RO., Saiki TE., Fomete B., Ibikunle AA., Okwuosa C., Olajide MA., Ladeji AM., Adebiyi KE., Emmanuel MM., Lawal HS., Uwadia E., Fakuade BO., Abdullahi YM., Politis C. (2018). Biological profile of ameloblastoma and its location in the jaw in 1246 Nigerians. *ORAL SURGERY ORAL MEDICINE ORAL PATHOLOGY ORAL RADIOLOGY, 126* (5), 424-431. (Impact factor: 1.72).

Agbaje J., Luyten J., Politis C. (2018). Pain Complaints in Patients Undergoing Orthognathic Surgery. *PAIN RESEARCH & MANAGEMENT Art.No. ARTN 4235025*. (Impact factor: 1.27).

Albdour EA., Shaheen E., Vranckx M., Mangano FG., Politis C., Jacobs R. (2018). A novel in vivo method to evaluate trueness of digital impressions. *BMC ORAL HEALTH, 18, Art.No. ARTN 117. (*Impact factor: 1.60).

Albrektsson T., Goodacre C., Jacobs R., Jerjes W., Korfage A., Larsson C., Neukam F., Packer M., Pommer B., Van Steenberghe D., Veitz-Keenan A., Wennerberg A. (2018). FOR Consensus Conference - November 16 & 17, 2017 Diagnosis, avoidance and management of complications of implant-based treatments. *EUROPEAN JOURNAL OF ORAL IMPLANTOLOGY, 11, S9-S13*. (Impact factor: 2.81).

Albrektsson T., Goodacre C., Jacobs R., Jerjes W., Korfage A., Larsson C., Neukam F., Packer M., Pommer B., Van Steenberghe D., Veitz-Keenan A., Wennerberg A. (2018). FOR Consensus Conference - November 16 & 17, 2017. *EUROPEAN JOURNAL OF ORAL IMPLANTOLOGY, 11 Suppl 1, S9-S13.* (Impact factor: 2.81).

Austah O., Joon R., Fath WM., Chrepa V., Diogenes A., Ezeldeen M., Couve E., Ruparel NB. (2018). Comprehensive Characterization of 2 Immature Teeth Treated with Regenerative Endodontic Procedures. *JOURNAL OF ENDODONTICS, 44* (12), 1802-1811. (Impact factor: 2.89).

Awarun B., Blok J., Pauwels R., Politis C., Jacobs R. (2019). Three-dimensional imaging methods to quantify soft and hard tissues change after cleft-related treatment during growth in patients with cleft lip and/or cleft palate: a systematic review. *DENTOMAXILLOFAC RADIOL, 48* (2), (Impact factor: 1.85).

Bornstein MM., Yeung AW K., Tanaka R., Von Arx T., Jacobs R., Khong P-L. (2018). Evaluation of Health or Pathology of Bilateral Maxillary Sinuses in Patients Referred for Cone Beam Computed Tomography Using a Low-Dose Protocol. *INTERNATIONAL JOURNAL OF PERIODONTICS & RESTORATIVE DENTISTRY, 38* (5), Art.No. PMID 30113608, 699-710. (Impact factor: 1.25).

Celikten B., Jacobs R., De Faria Vasconcelos K., Huang Y., Shaheen E., Nicolielo LF P., Orhan K. (2018). Comparative evaluation of cone beam CT and micro-CT on blooming artifacts in human teeth filled with bioceramic sealers. *CLINICAL ORAL INVESTIGATIONS* (Impact factor: 2.39).

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Christiaens V., De Bruyn H., De Vree H., Lamoral S., Jacobs R., Cosyn J. (2018). A controlled study on the accuracy and precision of intraoral radiography in assessing interproximal bone defect morphology around teeth and implants. *EUROPEAN JOURNAL OF ORAL IMPLANTOLOGY,* 2018;11(3):361-367.

Cifuentes J., Yanine N., Jerez D., Barrera A., Agbaje JO., Politis C. (2018). Use of Bone Grafts or Modified Bilateral Sagittal Split Osteotomy Technique in Large Mandibular Advancements Reduces the Risk of Persisting Mandibular Inferior Border Defects. *JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 76* (1), 189.e1-189.e6. (Impact factor: 1.78).

Corpas L., Huang Y., Mowafey B., Semal P., Liang X., Lambrichts I., Politis C., Jacobs R. (2018). *INTERNATIONAL JOURNAL OF HUMAN ANATOMY, 1* (2), 1-10.

Cortellini S., Castro AB., Temmerman A., Van Dessel J., Pinto N., Jacobs R., Quirynen M. (2018). Leucocyte- and platelet-rich fibrin block for bone augmentation procedure: A proof-of-concept study. *JOURNAL OF CLINICAL PERIODONTOLOGY, 45 (*5), 624-634. (citations: 1) (Impact factor: 4.05).

Damaskos S., Syriopoulos K., Sens RL., Politis C. (2018). An Investigation of the Morphology of the Petrotympanic Fissure Using Cone-Beam Computed Tomography. *JOURNAL OF ORAL & MAXILLOFACIAL RESEARCH, 9* (1).

De Bruyn L., Coropciuc R., Coucke W., Politis C. (2018). Microbial population changes in patients with medication-related osteonecrosis of the jaw treated with systemic antibiotics. *ORAL SURGERY ORAL MEDICINE ORAL PATHOLOGY ORAL RADIOLOGY, 125* (3), 268-275. (citations: 2) (Impact factor: 1.72).

De Grauwe A., Mangione F., Mitsea A., Kalyvas D., Yfanti Z., Ahbab G., Salmon B., Jacobs R. (2018). Update on a rare mandibular osteolytic lesion in childhood: the buccal bifurcation cyst. *BJR CASE REPORTS, 4* (2), Art.No. ARTN 20170109

De Grauwe A., Ayaz I., Shujaat S., Dimitrov S., Gbadegbegnon L., Vande Vannet B., Jacobs R. (2018). CBCT in orthodontics: a systematic review on justification of CBCT in a paediatric population prior to orthodontic treatment. *EUROPEAN JOURNAL OF ORTHODONTICS* (Impact factor: 2.03).

De Mulder D., Cadenas de Llano-Pérula M., Jacobs R., Verdonck A., Willems G. (2018). Three-dimensional radiological evaluation of secondary alveolar bone grafting in cleft lip and palate patients: a systematic review. *DENTOMAXILLOFACIAL RADIOLOGY.*

De Mulder D., De Llano-Perula MC., Willems G., Jacobs R., Dormaar JT., Verdonck A. (2018). An optimized imaging protocol for orofacial cleft patients. *CLINICAL AND EXPERIMENTAL DENTAL RESEARCH, 4* (5), 152-157.

De Tobel J., Parmentier GIL., Phlypo I., Descamps B., Neyt S., Van De Velde WL., Politis C., Verstraete KL., Thevissen PW. (2018). Magnetic resonance imaging of third molars in forensic age estimation: comparison of the Ghent and Graz protocols focusing on apical closure. *INTERNATIONAL JOURNAL OF LEGAL MEDICINE, 133* (2): 583-592.

Dobbeleir M., De Coster J., Coucke W., Politis C. (2018). Postoperative nausea and vomiting after oral and maxillofacial surgery: a prospective study. *INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 47* (6), 721-725. (Impact factor: 2.16).

Dubron K., Politis C. (2018). Cranial osteomyelitis 7 years after orbital exenteration and orbital implants: A cascade of problems with a good final outcome. *ORAL AND MAXILLOFACIAL SURGERY CASES, 4* (2), 58-62.

Esposito M., Jacobs R., Nieri M. (2018) Editorial. *EUROPEAN JOURNAL OF ORAL IMPLANTOLOGY*, 11 Suppl 1:S3.

Grisar K., Vanpoecke J., Raes M., Albdour EA., Willems G., Politis C., Jacobs R. (2018). Development and validation of the autotransplanted maxillary canine radiological index. *CLINICAL AND EXPERIMENTAL DENTAL RESEARCH, 4* (5), 167-173.

Grisar K., Claeys G., Raes M., Albdour EA., Willems G., Politis C., Jacobs R. (2018). Development and validation of the Maxillary Canine Aesthetic Index. *CLINICAL AND EXPERIMENTAL DENTAL RESEARCH, 4* (5), 216-223.

Grisar K., Chaabouni D., Romero LP G., Vandendriessche T., Politis C., Jacobs R. (2018). Autogenous transalveolar transplantation of maxillary canines: a systematic review and meta-analysis. *EUROPEAN JOURNAL OF ORTHODONTICS, 1-9*. (Impact factor: 2.03).

Grisar K., Piccart F., Al-Rimawi AS., Basso I., Politis C., Jacobs R. (2018). Three-dimensional position of impacted maxillary canines: Prevalence, associated pathology and introduction to a new classification system. *CLINICAL AND EXPERIMENTAL DENTAL RESEARCH*.

Govaerts D., Shaheen E., Coopman R., De Mol A., Sun Y., Politis C. (2018). Accuracy of Le Fort I osteotomy in bimaxillary splint-based orthognathic surgery: focus on posterior maxillary movements. *INTERNATIONAL JOURNAL OF ORAL & MAXILLOFACIAL SURGERY, 47* (11), 1398-1404. (Impact factor: 2.16).

Hedesiu M., Marcu M., Salmon B., Pauwels R., Oenning AC., Almasan O., Roman R., Baciut M., Jacobs R., DIMITRA Research Group (2018). Irradiation provided by dental radiological procedures in a pediatric population. *EUROPEAN JOURNAL OF RADIOLOGY, 103, 112-117*. (Impact factor: 2.84).

Jacobs R., Salmon B., Codari M., Hassan B., Bornstein MM. (2018). Cone beam computed tomography in implant dentistry: recommendations for clinical use. *BMC ORAL HEALTH, 18, Art.No. ARTN 88*, (citations: 5) (Impact factor: 1.60).

Jacobs R., Pauwels R., Scarfe WC., De Cock C., Dula K., Willems G., Verdonck A., Politis C. (2018). Pediatric cleft palate patients show a 3-to 5-fold increase in cumulative radiation exposure from dental radiology compared with an age- and gender-matched population: a retrospective cohort study. *CLINICAL ORAL INVESTIGATIONS, 22* (4), 1783-1793. (citations: 3) (Impact factor: 2.39).

Jacobs R., Vranckx M., Vanderstuyft T., Quirynen M., Salmon B. (2018). CBCT vs other imaging modalities to assess peri-implant bone and diagnose complications: a systematic review. *EUROPEAN JOURNAL OF ORAL IMPLANTOLOGY, 11, S77-S92.* (Impact factor: 2.81).

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Jacobs R., Van Steenberghe D. (2018). The Foundation for Oral Rehabilitation (FOR) as the basis for this consensus conference. *EUROPEAN JOURNAL OF ORAL IMPLANTOLOGY, 11, S5-S5*. (Impact factor: 2.81).

Kaur J., Jacobs R., Huang Y., Salvo N., Politis C. (2018). Salivary biomarkers for oral cancer and pre-cancer screening: a review. *CLINICAL ORAL INVESTIGATIONS, 22* (2), 633-640. (Impact factor: 2.39).

Klazen Y., Van der Cruyssen F., Vranckx M., Van Vlierberghe M., Politis C., Renton T., Jacobs R. (2018). Iatrogenic trigeminal post-traumatic neuropathy: a retrospective two-year cohort study. *INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 47* (6), 789-793. (Impact factor: 2.16).

Kudva A., Luyten F., Patterson J. (2018). In Vitro Screening of Molecularly Engineered Polyethylene Glycol Hydrogels for Cartilage Tissue Engineering using Periosteum-Derived and ATDC5 Cells. *INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES, 19*, Art.No. 3341. (Impact factor: 3.69).

Loyson T., Van Cann T., Schoffski P., Clement PM., Bechter O., Spriet I., Coropciuc R., Politis C., Vandeweyer RO., Schoenaers J., Dumez H., Berteloot P., Neven P., Nackaerts K., Woei-A-Jin FJ S H., Punie K., Wildiers H., Beuselinck B. (2018). Incidence of osteonecrosis of the jaw in patients with bone metastases treated sequentially with bisphosphonates and denosumab. *ACTA CLINICA BELGICA, 73* (2), 100-109. (citations: 2) (Impact factor: 0.92).

Massahud BC., Guimares Henriques JC., Jacobs R., Rosa RR., Bardi Matai CV. (2018). Evaluation of renal osteodystrophy in the dental clinic by assessment of mandibular and phalangeal cortical indices. *ORAL RADIOLOGY, 34* (2), 172-178. (Impact factor: 0.47).

Meschi N., EzEldeen M., Garcia AE T., Jacobs R., Lambrechts P. (2018). A Retrospective Case Series in Regenerative Endodontics: Trend Analysis Based on Clinical Evaluation and 2-and 3-dimensional Radiology. *JOURNAL OF ENDODONTICS, 44* (10), 1517-1525. (Impact factor: 2.89).

Meschi N., Fieuws S., Vanhoenacker A., Strijbos O., Van der Veken D., Politis C., Lambrechts P. (2018). Root-end surgery with leucocyte- and platelet-rich fibrin and an occlusive membrane: a randomized controlled clinical trial on patients' quality of life. *CLINICAL ORAL INVESTIGATIONS, 22 (6), 2401-2411.* (Impact factor: 2.39).

Meyns J., Brasil DM., Mazzi-Chaves JF., Politis C., Jacobs R. (2018). The clinical outcome of skeletal anchorage in interceptive treatment (in growing patients) for class III malocclusion. *INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 47* (8), 1003-1010. (Impact factor: 2.16).

Miclotte I., Agbaje JO., Spaey Y., Legrand P., Politis C. (2018). Incidence and treatment of complications in patients who had third molars or other teeth extracted. *BR J ORAL MAXILLOFAC SURG, 56* (5), 388-393. (Impact factor: 1.26).

Misselyn D., Nijs S., Fieuws S., Shaheen E., Schepers T. (2018). Improved Interobserver Reliability of the Sanders Classification in Calcaneal Fractures Using Segmented Three-Dimensional Prints. *JOURNAL OF FOOT & ANKLE SURGERY, 57* (3): 440-444 01.

Natsis K., Piagkou M., Chryssanthou I., Skandalakis GP., Tsakotos G., Piagkos G., Politis C. (2019). A simple method to estimate the linear length of the orbital floor in complex orbital surgery. *JOURNAL OF CRANIO-MAXILLOFACIAL SURGERY, 47* (1), 185-189. (Impact factor: 1.96).

Nicolielo LF P., Van Dessel J., Van Lenthe GH., Lambrichts I., Jacobs R. (2018). Computer-based automatic classification of trabecular bone pattern can assist radiographic bone quality assessment at dental implant site. *BRITISH JOURNAL OF RADIOLOGY, 91* (1092), Art.No. ARTN 20180437. (Impact factor: 1.81).

Nys M., Van der Cruyssen F., David K., Politis C. (2018). A case of giant cell arteritis and polymyalgia rheumatica misdiagnosed as temporomandibular dysfunction. *ORAL SCIENCE INTERNATIONAL, 15* (2), 81-85.

Ockerman A., Miclotte I., Vanhaverbeke M., Verhamme P., Poortmans L-L., Vanassche T., Politis C., Jacobs R. (2018). Local haemostatic measures after tooth removal in patients on antithrombotic therapy: a systematic review. *CLINICAL ORAL INVESTIGATIONS* (Impact factor: 2.39).

Oenning AC., Jacobs R., Pauwels R., Stratis A., Hedesiu M., Salmon B. (2018). Cone-beam CT in paediatric dentistry: DIMITRA project position statement. *PEDIATRIC RADIOLOGY, 48* (3), 308-316. (citations: 6) (Impact factor: 1.83).

Oenning AC., Salmon B., Vasconcelos KD F., Nicolielo LF P., Lambrichts I., Sanderink G., Pauwels R., Jacobs R. (2018). DIMITRA paediatric skull phantoms: development of age-specific paediatric models for dentomaxillofacial radiology research. *DENTOMAXILLOFACIAL RADIOLOGY, 47* (3), Art.No. ARTN 20170285, (citations: 1) (Impact factor: 1.85).

Orhan K., Jacobs R., Celikten B., Huang Y., Vasconcelos KD F., Nicolielo LF P., Buyuksungur A., Van Dessel J. (2018). Evaluation of Threshold Values for Root Canal Filling Voids in Micro-CT and Nano-CT Images. *SCANNING Art.No. ARTN 9437569.* (citations: 1) (Impact factor: 0.99).

Pedemonte E., Cabrera C., Torres A., Jacobs R., Harnisch A., Ramirez V., Concha G., Briner A., Brizuela C. (2018). Root and canal morphology of mandibular premolars using cone-beam computed tomography in a Chilean and Belgian subpopulation: a cross-sectional study. *ORAL RADIOLOGY, 34 (2), 143-150.* (citations: 1) (Impact factor: 0.47).

Pittayapat P., Jacobs R., Bornstein MM., Odri GA., Lambrichts I., Willems G., Politis C., Olszewski R. (2018). Three-dimensional Frankfort horizontal plane for 3D cephalometry: a comparative assessment of conventional versus novel landmarks and horizontal planes. *EUROPEAN JOURNAL OF ORTHODONTICS, 40* (3), 239-248. (citations: 1) (Impact factor: 2.03).

Politis C., Piagkou M., Lambrichts I., Agbaje JO. (2018). Wide Intraoral Surgical Access to the Inferior Alveolar Nerve During Cryotherapy at the Infratemporal Fossa: Technical Modification. *JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 76* (10), Art.No. ARTN 2090.e1. (Impact factor: 1.78).

Politis C., Jacobs R., De Laat A., De Grauwe A. (2018). TMJ surgery following orthognathic surgery: A case series. *ORAL AND MAXILLOFACIAL SURGERY CASES, 4* (2), 39-52.

Politis C., Van De Vyvere G., Agbaje JO. (2018). Condylar Resorption After Orthognathic Surgery. *JOURNAL OF CRANIOFACIAL SURGERY, 30* (1), 169-174. (Impact factor: 0.77).

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Qin C., Cao Z., Fan S., Wu Y., Sun Y., Politis C., Wang C., Chen X. (2018). An oral and maxillofacial navigation system for implant placement with automatic identification of fiducial points. *INTERNATIONAL JOURNAL FOR COMPUTER ASSISTED RADIOLOGY AND SURGERY (IJCARS).* (Impact factor: 1.96).

Rabiee H., McDonald NJ., Jacobs R., Aminlari A., Inglehart MR. (2018). Endodontics Program Directors', Residents', and Endodontists' Considerations About CBCT-Related Graduate Education. *JOURNAL OF DENTAL EDUCATION, 82* (9), 989-999. (Impact factor: 1.09).

Schiodt M., Vadhan-Raj S., Chambers MS., Nicolatou-Galitis O., Politis C., Coropciuc R., Fedele S., Jandial D., Zhang J., Ma H., Saunders DP. (2018). A multicenter case registry study on medication-related osteonecrosis of the jaw in patients with advanced cancer. *SUPPORTIVE CARE IN CANCER, 26* (6), 1905-1915. (Impact factor: 2.68).

Schiodt M., Vadhan-Raj S., Chambers MS., Nicolatou-Galitis O., Politis C., Coropciuc R., Fedele S., Jandial D., Zhang J., Ma H., Saunders DP. (2018). A multicenter case registry study on medication-related osteonecrosis of the jaw in patients with advanced cancer. *SUPPORTIVE CARE IN CANCER, 26* (6), 1905-1915. (citations: 1) (Impact factor: 2.68).

Schryvers A., Govaerts D., Politis C., Lambrechts P. (2018). Endodontic management of a maxillary first molar with two palatal roots: A case report. *AUSTRALIAN ENDODONTIC JOURNAL* (Impact factor: 1.37).

Shaheen E., Coopman R., Jacobs R., Politis C. (2018). Optimized 3D virtually planned intermediate splints for bimaxillary orthognathic surgery: A clinical validation study in 20 patients. *JOURNAL OF CRANIO-MAXILLOFACIAL SURGERY, 46* (9), 1441-1447. (Impact factor: 1.96).

Shaheen E., Alhelwani A., Van De Casteele E., Politis C., Jacobs R. (2018). Evaluation of Dimensional Changes of 3D Printed Models After Sterilization: A Pilot Study. *OPEN DENTISTRY JOURNAL, 12, 72-79.*

Shaheen E., Shujaat S., Saeed T., Jacobs R., Politis C. (2018). Three-dimensional planning accuracy and follow-up protocol in orthognathic surgery: a validation study. *INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 48* (1), 71-76. (Impact factor: 2.16).

Silveira Soares MQ., Van Dessel J., Jacobs R., Da Silva Santos PS., Cestari TM., Garlet GP., Hungaro Duarte MA., Nozu Imada TS., Lambrichts I., Fischer Rubira-Bullen IR. (2018). Zoledronic Acid Induces Site-Specific Structural Changes and Decreases Vascular Area in the Alveolar Bone. *JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 76* (9), 1893-1901. (Impact factor: 1.78).

Simon I., Hedesiu M., Virag P., Salmon B., Tarmure V., Baciut M., Bran S., Jacobs R., Falamas A. (2018). Raman Micro-Spectroscopy of Dental Pulp Stem Cells: An Approach to Monitor the Effects of Cone Beam Computed Tomography Low-Dose Ionizing Radiation. *ANALYTICAL LETTERS.* (Impact factor: 1.21).

Smeets M., Gemels B., Groeneveldt L., Politis C. (2019). Is there need for technical investigations in order to predict potential length of hospital stay of oral infections?. *AMERICAN JOURNAL OF EMERGENCY MEDICINE, 37* (2), 231-236. (Impact factor: 1.29).

3
Research

Smeets M., Matthys E., Verhelst PJ., Politis C. (2018). Bridging mandibular bony defect with patient-specific reconstruction plates without hard tissue component of the vascularised grafts. *ORAL AND MAXILLOFACIAL SURGERY CASES, 4* (3), 84-90.

Snel R., Van De Maele E., Politis C., Jacobs R. (2018). Digital dental radiology in Belgium: a nationwide survey. *DENTOMAXILLOFACIAL RADIOLOGY, 47* (8), Art.No. ARTN 20180045, (Impact factor: 1.85).

Soares MQS., Van Dessel J., Jacobs R., da Silva Santos PS., Cestari TM., Garlet GP., Duarte MAH., Imada TSN., Lambrichts I., Rubira-Bullen IRF. (2018). Zoledronic Acid Induces Site-Specific Structural Changes and Decreases Vascular Area in the Alveolar Bone. *JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY,* 76 (9):1893-1901.

Sousa-Neto MD D., Silva-Sousa YC., Mazzi-Chaves JF., Carvalho KK T., Barbosa AF S., Versiani MA., Jacobs R., Leoni GB. (2018). Root canal preparation using micro-computed tomography analysis: a literature review. *BRAZILIAN ORAL RESEARCH, 32* (suppl 1),. (Impact factor: 1.22).

Sun Y., Tian L., Luebbers H-T., Politis C. (2018). Relapse tendency after BSSO surgery differs between 2D and 3D measurements: A validation study. *JOURNAL OF CRANIO-MAXILLOFACIAL SURGERY, 46* (11), 1893-1898. (Impact factor: 1.96).

Suryani IR., Salvo Villegas N., Shujaat S., De Grauwe A., Azhari A., Sitam S., Jacobs R. (2018). Image quality assessment of pre-processed and post-processed digital panoramic radiographs in paediatric patients with mixed dentition. *IMAGING SCIENCE IN DENTISTRY, 48* (4), 261-268.

Torres A., Shaheen E., Lambrechts P., Politis C., Jacobs R. (2018). Microguided Endodontics: a case report of a maxillary lateral incisor with pulp canal obliteration and apical periodontitis. *INTERNATIONAL ENDODONTIC JOURNAL.* (Impact factor: 3.02).

Van Cann T., Loyson T., Verbiest A., Clement PM., Bechter O., Willems L., Spriet I., Coropciuc R., Politis C., Vandeweyer RO., Schoenaers J., Debruyne PR., Dumez H., Berteloot P., Neven P., Nackaerts K., Woei-A-Jin FJ S H., Punie K., Wildiers H., Beuselinck B. (2018). Incidence of medication-related osteonecrosis of the jaw in patients treated with both bone resorption inhibitors and vascular endothelial growth factor receptor tyrosine kinase inhibitors. *SUPPORTIVE CARE IN CANCER, 26* (3), 869-878. (Impact factor: 2.68).

Van Camp P., Vrielinck L., Gemels B., Politis C. (2018). Intraorbital hemorrhage following a secondary intervention at integrated zygomatic implants: *A case report. INTERNATIONAL JOURNAL OF SURGERY CASE REPORTS, 43, 21-24.*

Van der Cruyssen F., Meeus J., Schoenaers J., Politis C. (2018). Parry Romberg syndrome: A long-term retrospective cohort study of 10 patients. *ORAL AND MAXILLOFACIAL SURGERY CASES, 4* (3), 73-83.

Van der Cruyssen F., Politis C. (2018). Neurophysiological aspects of the trigeminal sensory system: an update. *REVIEWS IN THE NEUROSCIENCES, 29* (2), 115-123. (Impact factor: 2.59).

Van Hevele J., Nout E., Claeys T., Meyns J., Scheerlinck J., Politis C. (2018). Bone-anchored maxillary protraction to correct a class III skeletal relationship: A multicenter retrospective analysis of 218 patients. *JOURNAL OF CRANIO-MAXILLOFACIAL SURGERY, 46* (10), 1800-1806. (Impact factor: 1.96).

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Vasconcelos KF., Codari M., Queiroz PM., Nicolielo LFP., Freitas DQ., Sforza C., Jacobs R., Haiter-Neto F. (2018). The performance of metal artifact reduction algorithms in cone beam computed tomography images considering the effects of materials, metal positions, and fields of view. *ORAL SURGERY, ORAL MEDICINE, ORAL PATHOLOGY, ORAL RADIOLOGY, AND ENDODONTOLOGY.*

Verhelst P-J., Grosjean L., Shaheen E., Politis C. (2018). Surgical Management of an Aggressive Multifocal Squamous Odontogenic Tumor. *JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 76* (2), 355-362.. (Impact factor: 1.78).

Vandeput A-S., Verhelst P-J., Jacobs R., Shaheen E., Swennen G., Politis C. (2018). Condylar changes after orthognathic surgery for class III dentofacial deformity: a systematic review. *INTERNATIONAL JOURNAL OF ORAL & MAXILLOFACIAL SURGERY, 48* (2), 193-202. (Impact factor: 2.16).

Virag P., Hedesiu M., Soritau O., Perde-Schrepler M., Brie I., Pall E., Fischer-Fodor E., Bogdan L., Lucaciu O., Belmans N., Moreels M., Salmon B., Jacobs R. (2018). Low-dose radiations derived from cone-beam CT induce transient DNA damage and persistent inflammatory reactions in stem cells from deciduous teeth. *DENTOMAXILLOFACIAL RADIOLOGY.*

Zogheib T., Jacobs R., Bornstein MM., Agbaje JO., Anumendem D., Klazen Y., Politis C. (2018). Comparison of 3D Scanning Versus 2D Photography for the Identification of Facial Soft-Tissue Landmarks. *OPEN DENTISTRY JOURNAL, 12, 61-71.*

3
Research

BOOK (CHAPTER) PUBLICATIONS

Jacobs R., Scarfe WC. (2018).
Dental implants, *Maxillofacial Cone Beam Computed Tomography: Principles, Techniques and Clinical Applications*, Chapt. 20, (pp 745-830) Springer.
ISBN: 9783319620619

Mandelaris GA., Angelopoulos C., Jacobs R., Levine RA., Scarfe WC. (2018).
Planning and assessment of bone reconstruction for dental implants. *Maxillofacial Cone Beam Computed Tomography: Principles, Techniques and Clinical Applications*, Chapt. 21, (pp 831-869) Springer
ISBN: 9783319620619

Orhan K. (2018)
Introduction to TMJ Imaging. Imaging of the Temporomandibular Joint, Chapt. 1 (pp 1-8) Springer
ISBN: 978-3-319-99468-0

Orhan K., Kalinowska IR. (2018)
Ultrasonography. Imaging of the Temporomandibular Joint, Chapt. 9 (pp 133-154) Springer
ISBN: 978-3-319-99468-0

Orhan K. (2018) Incidental Findings in TMJ Imaging. Imaging of the Temporomandibular Joint, Chapt. 11 (pp 204-246) Springer
ISBN: 978-3-319-99468-0

Orhan K. (2018) Connection Between the Temporomandibular Joint and Temporal Bone. Imaging of the Temporomandibular Joint, Chapt. 17 (pp 323-359) Springer
ISBN: 978-3-319-99468-0

Orhan K., Ocak M., Bilecenoglu B. (2018) Micro-CT Applications in TMJ Research. Imaging of the Temporomandibular Joint, Chapt. 19 (pp 377-394) Springer
ISBN: 978-3-319-99468-0

Orhan K., Kurşun Ş. (2018) AIDS and Periodontal Diseases. Periodontology and Implantology. Chapt. 23 (pp 369-373
ISBN 9786059382175

Orhan K., Kolsuz EM. (2018). The radiographic diagnosis of periodontal diseases. Periodontology and Implantology, Chapt. 35 (pp 515-517) Quintessence
ISBN 9786059382175

Orhan K., Kurşun Ş. Anatomy of implant surgical sites. Periodontology and Implantology, Chapt. 58 (pp 775-787) Quintessence
ISBN 9786059382175

Pauwels R. (2018)
Radiation Protection. Imaging of the Temporomandibular Joint, Chapt. 4 (pp 59-77) Springer
ISBN: 978-3-319-99468-0

Pauwels R. (2018).
CBCT quality assurance, *Maxillofacial Cone Beam Computed Tomography: Principles, Techniques and Clinical Applications*, Chapt. 7, (pp 213-226) Springer
ISBN: 9783319620619

Pauwels R., Scarfe, WC. (2018)
Radiation dose, risks, and protection in CBCT, *Maxillofacial Cone Beam Computed Tomography: Principles, Techniques and Clinical Applications*, Chapt. 8 (pp 227-246) Springer
ISBN: 9783319620619

Pauwels R. (2018)
What is CBCT and how does it work? *Maxillofacial Cone Beam Computed Tomography: Principles, Techniques and Clinical Applications*, Chapt. 2 (pp 13-42) Springer
ISBN: 9783319620619

Politis C. (2018) Mondziekten en MKA-chirurgie deel 1-2-3. Uitgeverij KU Leuven.

D. CHAIRS

STRAUMANN CHAIR FOR ORAL AND MAXILLOFACIAL SURGERY
Duration: 3 years (2016-2019)

The purpose of the Chair is prevention and treatment of nerve damage following implant surgery. Professor Politis is the chair holder and professor Jacobs is the co-chair holder.

NOBEL BIOCARE CHAIR FOR ORAL AND MAXILLOFACIAL SURGERY
Duration: 3 years (2016-2019)

To support the research concerning the damage of the inferior alveolar nerve during mandibular surgery.

ALEAMED
KLS MARTIN CHAIR FOR OMFS
Duration: 3 years (2013-2017)

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

BICON CHAIR FOR ORAL AND MAXILLOFACIAL SURGERY
Duration: 3 years (2014-2017)

To help to cover the teaching and/or research expenses in oral rehabilitation after oncology therapy and treatment modalities after iatrogenic damage of the inferior alveolar nerve.

UEG CHAIR FOR NEW ADVANCES IN THREEDIMENSIONAL IMAGING FOR MAXILLOFACIAL DIAGNOSTICS AND THERAPY
Duration: 3 years (2017-2019)

To help to cover the teaching and/or research expenses in oral rehabilitation after oncology therapy and treatment modalities after iatrogenic damage of the inferior alveolar nerve.

ANTHOGRY CHAIR FOR ORAL AND MAXILLOFACIAL SURGERY
Duration: 3 years (2018-2021)

The purpose of the Chair is prevention and treatment of nerve damage following implant surgery.

DENTSPLY SIRONA CHAIR FOR ORAL AND MAXILLOFACIAL SURGERY
duration: 3 years 2018-2021

The purpose of the Chair is prevention and treatment of nerve damage following implant surgery. Professor Politis is the chair holder and professor Jacobs is the co-chair holder.

4

Lecturing

A. SCIENTIFIC CONTRIBUTIONS AT CONGRESSES

- Oral presentations
- Poster presentations

B. INVITED LECTURES

A. SCIENTIFIC CONTRIBUTIONS AT CONGRESSES

ORAL PRESENTATIONS

Ayaz I., Shaheen E., Gallo G., Politis C., Jacobs R. (2018). Validation of 3D facial imaging versus 2D clinical imaging for clinical assessment during treatment planning and follow up.
XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland, OP.04.05.

Awarun B., Pauwels R., Stratis A., Blok J., Politis C., Bosmans H., Jacobs R. (2018). Optimization of cone-beam ct exposure protocols for planning and follow-up of cleft palate treatment.
XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland, OP.01.06.

Awarun B., Pauwels R. Stratis A., Bosmans H., Jacobs R. (2018). Optimization of Cone-beam CT Exposure Protocols for Planning and Follow-up of Cleft Palate Treatment.
XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland, OP.01.06.

Belmans N., Gilles L., Vranckx M., Lambrichts I., Baatout S., Jacobs R., Moreels M. (2018). Dental CBCT exposure in children: can we detect biological changes in saliva samples? .
XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland, EA.01.01.

Belmans N. (2018) Increased oxidative stress and adaptive antioxidant response in saliva after dental CBCT exposure in children. Pre- and clinical research supporting human radiotherapy II.
ERRS 2018, August 24th, 2018, Pécs, Hungary.

Belmans N. (2018) Biological effects of ionizing radiation in medical imaging. A prospective study in children and adults following dental cone-beam CT. he Netherlands Society for Radiobiology (NVRB), Utrecht, The Netherlands, 16 November, 2018 – NVRB, Utrecht

Brasil D.M., Pauwels R., Almeida S.M., Coucke W., Haiter-Neto F., Jacobs R. (2018) Image quality optimisation using a narrow vertical detector dental cone-beam computed tomography.
XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland, EA.01.03

Castro A, Temmerman A, Van Dessel J, Jacobs R, Quirynen M. Leucocyte- and platelet rich fibrin (L-PRF) and advanced platelet rich fibrin+ (A-PRF+) for ridge preservation: a randomized controlled clinical trial.
2nd European Meeting on Enchanced Natural Healing in Dentistry, Leuven, Belgium

Cortellini S., Castro Sarda A., Temmerman A., Dhondt R., Van Dessel J., Jacobs R., Quirynen M. (2018). L-PRF block for horizontal bone augmentation, clinical results and histology: a prospective case series. 27th Annual Scientific Meeting of the European Association for Osseointegration (EAO) 11 October 2018, Vienna, Austria, Abstract n° 12446.

De Faria Vasconcelos K., Orhan K., Jacobs R., Celikten B., Huang Y., Ferreira P. Nicolielo L., Buyuksungur A., Van Dessel J. (2018). Threshold voxel value assessment for root canal filling voids in micro-CT and nano-CT images.
XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland, OP.02.06.

ORAL PRESENTATIONS

De Faria Vasconcelos K., Codari M., Nicolielo L., Queiroz P., Freitas DQ., Sforza Ch., Jacobs R., Haiter Neto F. (2018) The performance of metal artifact reduction algorithms in cbct images considering materials, metal positions and field of views.
5th EADMFR Junior Meeting, 4th - 7th February 2018, Budapest, Hungary.

Degraeve M., Meyns J. (2018) The use of mentoplate and corticotomy to correct agenesis in the lower jaw. KBVSMFH meeting, 22-23 en 24 February 2018, Brussels, Belgium

De Tobel J., Parmentier G., Phlypo I., Descamps B., Neyt S., Van De Velde W., Verstraete K., Thevissen P. (2018). Magnetic Resonance Imaging of Third Molars in Forensic Age Estimation: Comparison of the Ghent and Graz Protocols focusing on Apical Closure. Treffen der Arbeitsgemeinschaft für Forensische Altersdiagnostik (AGFAD), 16 March 2018, Berlin, Germany, Abstract No. 07.

EzEldeen M., Wyatt J., Stratis A., Jacobs R. (2018). CBCT-based tooth autotransplantation – Part I: 3D planning, D printing and 3D analysis of treatment outcome. 2nd Congress on Tooth Autotransplantation, 25-26 May 2018, Rotterdam, Netherlands.

Ezeldeen M., Toprakhisar B., Smisdom N., Deschaume O., Bartic C., Opdenakker G., Lambrichts I., BronckaersA., Jacobs R., Patterson J. (2018). The effect of microstructural differences of fibrin and self-assembling peptide hydrogels on dental pulp stem cells' behaviour.6th Belgian Symposium on Tissue Engineering, 21 - 23 Nov 2018, Ghent, Belgium.

Ferreira Pinheiro Nicolie L., Van Dessel J., Van Lenthe G.H., Lambrichts I., Jacobs R. (2018). Computer-aided bone quality classification.
XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland, OP.09.01.

Grisar K., Schepers S., Nys M., The V., Vrielinck L., Jacobs R., Politis C. (2018). Long-term outcome of autogenously transplanted maxillary canines. KBVSMFH meeting, 22-23 en 24 February 2018, Brussels, Belgium

Mangione F., Ezeldeen M., Bardet C., Lesieur J., Bonneau M., Decup F. Jacobs R., Salmon B., Chaussain C., Opsahl-Vital S. (2018). Perspectives of tridimensional microct analysis for regenerative endodontics procedures.
XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland, OP.09.03.

Marcu M., Salmon B. Pauwels R., Stratis A., Oennning AC., Cohen M., Jacobs R., Roman R., Hedesiu M., DIMITRA research group (2018). Estimation of the irradiation dose of children exposed to CBCT for various dental pathologies.
European Congress of Radiology, 28 February - 4 March 2018, Vienna, Austria, Abstract nr. B-1484

Meewis J., Vandenhoven F., Schreurs A., Schreurs N. ,Aerts J., Scheerlinck J., Meyns J. (2018) Class III malocclusion: Mentoplate hybrid hyrax combination. Concept and results of first 100 cases. KBVSMFH meeting, 22-23 en 24 February 2018, Brussels, Belgium

4
Lecturing

Molemans B.,Cortellini S., Jacobs R., Pinto N., Teughels W., Quirynen M. (2018) . Simultaneous sinus floor elevation and implant placement using L-PRF as a sole graft material.
2nd European Meeting on Enhanced Natural Healing in Dentistry , 7 - 9 September 2018, Leuven, Belgium.

Ockerman A., Moreno Rabie C., Deambrosio C., Ignacia Rusque M., Vranckx M., Politis C., Jacobs R. (2018). Cone-beam computed tomography assessment of the retromolar canal and its relation to wisdom tooth angulation.
XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland, OP.06.03.

Ockerman A., Poortmans LL., Famaey N., Vastmans J., Castro A., Quirynen M., Verhamme P., Politis C., Jacobs R. (2018) The influence of antithrombotic drugs on biomechanical characteristics of Leukocyte Platelet Rich Fibrin membranes.
2nd European Meeting on Enhanced Natural Healing in Dentistry , 7 - 9 September 2018 , Leuven, Belgium.

Oenning A. C., Jacobs R., Pauwels R., Stratis A., Brasil D.M., Vasconcelos K.F., Dimitra Research Group, Salmon B. (2018) an optimization proposal for paediatric CBCT exposures.
XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland, OP.01.02.

Simone C, Castro A, Temmerman A, Dhondt R, Van Dessel J, Jacobs R, Quirynen M. L-PRF block for horizontal bone augmentation, clinical results and histology: a prospective case series.
27th Annual Scientific Meeting of the European Association for Osseointegration, 10-13 October 2018, Vienna, Austria.

Stratis A., Zhang G., Jacobs R., Bogaerts R., Bosmans H. (2018). Task-based radiation dose assessment for paediatric dental CBCT imaging.
European Congress of Radiology, 28 February - 4 March 2018, Vienna, Austria, abstract nr. B-1431

Temmerman A., Cortellini S., Van Dessel J., Teughels W., Quirynen M. (2018). The benefits in L-PRF in implant surgery.
2nd European Meeting on Enhanced Natural Healing in Dentistry, 7 - 9 September 2018, Leuven, Belgium.

Torres A. (2018) Clinical poster oral prize presentation "Guided Endodontics: A case report".
18th ESE Biennial Congress, 13 September, Brussels, Belgium

Vranckx M., Ockerman A., Claerhout E., Grommen B., Miclotte A., Van Vlierberghe M., Politis C., Jacobs R. (2018). Radiographic prediction model for mandibular wisdom tooth eruption.
XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland, EA.01.05.

Vranckx M. (2018). Prediction of mandibular wisdom tooth eruption based on angulation.
5th EADMFR Junior Meeting, 4th - 7th February 2018, Budapest, Hungary.

Wyatt J., EzEldeen M., Shahbazian M., Jacobs R. (2018). CBCT-based tooth autotransplantation – Part II: Surgical technique, follow-up, short and long-term treatment outcome.
2nd Congress on Tooth Auto transplantation, 25-26 May 2018, Rotterdam, Netherlands.

POSTER PRESENTATIONS

XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland

Influence of a Dedicated Medical Display on Radioanatomical Observations

Carolina Letelier [1,2], Annelore De Grauwe [1], Karla de Faria Vasconcelos [1], Berkan Celikten, [1] Guillermo Concha [2], Reinhilde Jacobs [1,3]

Correspondence to: cletelier@miuandes.cl

INTRODUCTION

Every dentist is using intraoral radiographs, panoramic and cone-beam computed tomography (CBCT) images for daily diagnostics in dental practice. An important aspect of imaging is the diagnostic task on a dedicated screen. It can however be questioned whether dentistry might benefit from specifically adapted "dental" settings on medical displays, allowing us to refine our diagnostic everyday job and enhance the diagnostic performance of the entire radio-diagnostic system.

OBJECTIVES: To assess detection and rating of normal anatomical features on either a standard screen (SS) or a dedicated medical display (MD) and to assess whether there is a differential effect of the display characteristics on the observational tasks

MATERIALS AND METHODS

Anatomical landmarks were assessed on intraoral, panoramic, cephalometric and Cone Beam Computed Tomography (CBCT) images. Images were generated from a commercially available skull phantom with soft tissue equivalent (*in vitro*).

Secondly, the same imaging techniques were used, but now retrospectively acquired from 60 patients referred to a dentomaxillofacial radiology center (*in vivo; informed consent*). Dataset comprised anterior and posterior areas of dentate jaws, with sharply delineated normal anatomical structures. A total of 80 image datasets were provided for assessment. **EXCLUSION CRITERIA**: positioning and metal artifacts hampering radiodiagnosis.

Structures were detected and rated by two independent observers (dentists) after initial training and calibration, on both standard screen (SS) and dedicated medical screen (MD). Observational tasks included detection and IQ rating both at the level of the individual landmarks and the overall image.

In vitro

Minray Soredex

Skull Phantom
Mix D soft tissue simulation

Promax 2D Planmeca Vistapano Ceph Durr

Rando Phantom
Soft tissue simulation

Table 1. Cone Beam CT devices and fields of view used for assessing anatomical landmarks

CBCT	FOV (cm)
3D Accuitomo® 170 (J. Morita, Kyoto, Japan)x	4x6 6x6 8x8
NewTom® VGI Evo (QR, Verona, Italy)	8x5 Regular Standard 8x8 Regular Standard 8x8 Regular ECO
Promax 3D Max® (Planmeca, Helsinki, Finland)	10x9 Ultra Low Dose 10x9 Ultra Low Dose HD 10x9 Normal HD

In vivo

20 INTRAORALS	20 PANORAMICS	20 CEPHALOMETRICS	20 CBCT

Table 2. Normal anatomical structures analyzed on both *in vivo* and *in vitro*

Teeth fractures	Cemento-Enamel Junction (CEJ) Pulp Canal (PC) Apical third of Pulp Canal (APC) Periodontal Ligament Space (PLS)
Trabecular bone pattern	Lamina Dura (LD) Alveolar Crest (AC) Trabecular Structure (TS)

Table 3. Inter- and intra-observer agreement

		Inter- Obs. A. (kappa)	Intra-Obs. A. (kappa)
Observer 1 (BC)	PA	T1: 0,5 / T2: 0,6	0,93
	PAN	T1: 0,8 / T2: 0,7	0,9
	CBCT	T1: 0,6 / T2: 0,7	1
Observer 2 (CL)	PA	T1: 0,7 / T2: 0,7	0,97
	PAN	T1: 0,89 / T2: 0,87	0,94
	CBCT	T1: 0,69 / T2: 0,75	0,94

RESULTS

Both *in vitro* and *in vivo* images, significant ($P < 0.001$) preference for observing anatomical structures on medical display were noted when observing panoramic radiographs (Figure 1) and Cone Beam CT. Overall, analysis of the *in vivo* observational task for all imaging modalities revealed a significantly better rating for dedicated medical display ($P < 0.001$)(Figure 2). In a number of cases, both MD and SS were equally preferred. Yet, in general, the standard screen was seldom preferred (see Figure 2). For *in vitro* intraoral images, the medical display had improved observational ratings in 15% of the images. For panoramic images, the medical display was preferred in the majority of the observations, especially when analyzing trabecular structure (93% preference for medical display versus standard screen). For CBCT, there was an overall preference of medical display observations in 54% of the observations. Remaining observations could not show a preference between either screens.

Figure 1. *In vitro* observations of anatomical features on panoramic radiographs

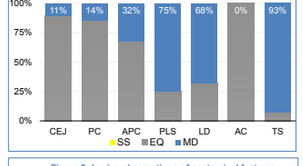
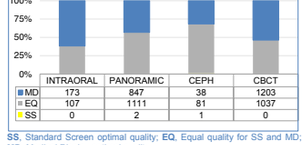


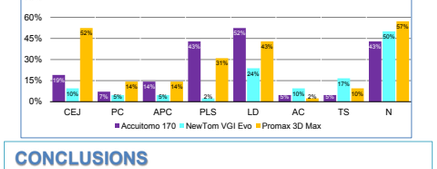
Figure 2. *In vivo* observations of anatomical features for all imaging modalities



	INTRAORAL	PANORAMIC	CEPH	CBCT
MD	173	847	38	1203
EQ	107	1111	81	1037
SS	0	2	1	0

SS, Standard Screen optimal quality; **EQ**, Equal quality for SS and MD; **MD**, Medical Display optimal quality.

Figure 3. *In vitro* MD %for different CBCTs per anatomical structure



CONCLUSIONS

For *in vivo* imaging, it appears that dentists may obtain a beneficial effect when observing the anatomical features on those images using a dedicated medical display. For the *in vitro* images this observational benefit was only noted for panoramic radiographs and CBCT images which may have an inherently lower spatial resolution, requiring optimized display characteristics to better delineate the anatomical features. This is in line with previous publications, assessing the usefulness of diagnostic displays in medical radiology and dentomaxillofacial radiology. The current findings need to be verified on a larger data sample and for diagnostic features. Also, it may call for the need to develop specific dedicated diagnostic displays aiding dental diagnosis.

[1]*OMFS-IMPATH research group, Department of Imaging and Pathology, Faculty of Medicine, University of Leuven and Department of Oral & Maxillofacial Surgery, University Hospitals Leuven, Leuven, Belgium.*
[2] *University of Los Andes, Department of Oral and Maxillofacial Radiology, Faculty of Dentistry, Santiago, Chile.*
[3]*Department of Dental Medicine, Karolinska Institutet, Stockholm, Sweden.*

XVI European Congress of Dentomaxillofacial Radiology 2018
(ECDMFR), 14 June 2018, Luzern, Switzerland

Validation and optimization of CBCT scanning protocols for volumetric analysis of extraction sockets

Van Dessel J[1,2], Nicolielo LFP[1,2], Stratis A[1], Benchimol D[2], Lambrichts I[3], Jacobs R[1,2]

[1]OMFS-IMPATH Research Group, KU Leuven, Belgium [2]Deparment of Dental Medicine, Karolinska Institutet, Sweden
[3]Morphology Group, Biomedical Research Institute, Hasselt University,Belgium

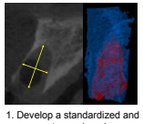
PP28

Topic: EADMFR Award Poster Session

BACKGROUND

Nowadays, Cone-beam Computed Tomography (CBCT) can be considered as the method of choice in preoperative planning of dental implant sites. During the healing process after tooth removal, bone is deposited and remodeling takes place causing a reduction of the extraction socket volume. Unfortunately, current radiographic evaluations have not yet fully exploited the advantage of three-dimensional (3D) bone analysis. Measurements on width and height of the alveolar ridge are mostly limited to subjective linear measurements performed on arbitrary chosen 2D slices of a 3D dataset. For an accurate evaluation of the alveolar healing process, the complete 3D morphology of the extraction socket and trabecular bone formation should be taken into account.

AIMS



1. Develop a standardized and easy-to-use imaging methodology that semi-automatically calculate socket volume from CBCT scans

2. Evaluation of accuracy by comparison to the gold standard micro-CT

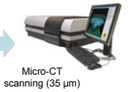
3. CBCT scan protocol optimization

MATERIAL & METHODS

STUDY PROTOCOL:

8 mandibles immersed in Mix-D soft tissue equivalent material

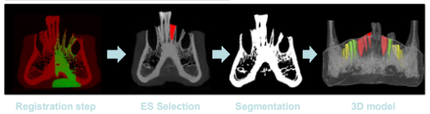
Scan Parameters	Unit	ProMax 3D Max				3D Accuitomo 176			NewTom VGi evo	
		HD	N	LD	ULD	HD	LD	ULD	HD	N
Voxel Size	(µm)	150	200	400	400	250	250	250	150	200
Tube voltage	(kV)	96	96	96	96	90	90	90	90	90
Tube current	(mA)	11	11	11	11	5	5	3	TCM	TCM
Rotation	(°)	360	360	360	360	360	180	180	360	360
Tube current x exposure time	(mAs)	144	108	33.6	9.6	87.5	45	27	14.4	32.2
Field of view	(mm)	100x55	100x55	100x55	100x55	100x50	100x50	100x50	100x50	100x50



Micro-CT scanning (35 µm)

Monte-Carlo dose simulations & GLM model rankings

IMAGE PROCESSING & ANALYSIS:



Registration step
The micro-CT (green) and CBCT (red) were automatically aligned to minimize the errors generated by comparing ≠ anatomical structures

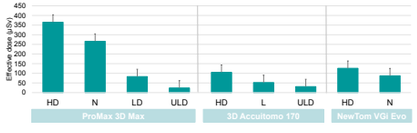
ES Selection
using an automatic boundary extraction

Segmentation
to allow an automatic and objective 3D quantification

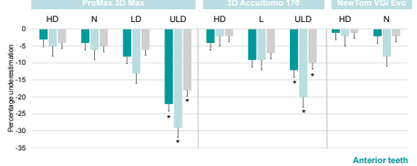
3D model
generation of ES volume and alveolar bone

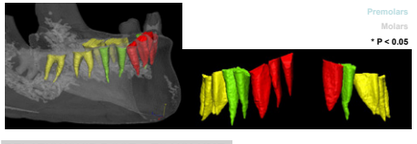
RESULTS

DOSIMITRY:



ES VOLUME COMPARISON:





RELATIONSHIP DOSE – ES VOLUME

Brand name	Protocol	Rating*	Does not differ from best (95% confidence interval)
3D Accuitomo 170	HD	2.1	X
NewTom VGi evo	HD	2.2	X
NewTom VGi evo	N	2.2	X
3D Accuitomo 170	LD	2.4	X
ProMax 3D Max	LD	2.7	X
ProMax 3D Max	N	3.7	
3D Accuitomo 170	ULD	4.3	
ProMax 3D Max	HD	5.6	
ProMax 3D Max	ULD	5.8	

*The closer the rating to 0 the better the balance between ES volume measurment and radiation dose

CONCLUSION

Objective automated 3D measurements ↔ subjective 2D measurements

High definition CBCT scan protocols = reliable for automatic evaluation of ES

Although ultra low-dose CBCT scan protocols greatly reduce the administered radiation dose to the patient, these protocols underestimate the socket volume

Optimization of CBCT scan protocols with respect to clinically significant outcomes and radition dose is essential

Jeroen.VanDessel@kuleuven.be

Thanks to KU LEUVEN, Karolinska Institutet, UHASSELT, fwo

Presented at

XVI European Congress of Dentomaxillofacial Radiology 2018
(ECDMFR), 14 June 2018, Luzern, Switzerland

KU LEUVEN

Universidad de los Andes

Influence of a dedicated medical display for radiological diagnosis of dentomaxillofacial pathologies

Carolina Letelier, Annelore De Grauwe, Karla de Faria Vasconcelos, Francesca Mangione, Reinhilde Jacobs*

INTRODUCTION

Digital diagnostic imaging provides an effective mean to electronically acquire, archive, distribute, and view medical images. Image display screens are an integral part of these operations.

Dedicated medical displays (diagnostic screens adapted for detecting minute changes in grey values on radiographs) are available for this task. It is questionable whether dentistry might benefit from specifically adapted "dental" settings on medical displays, allowing us to refine our diagnostic everyday tasks and enhance the diagnostic performance of the entire radio diagnostic system.

The aim of the present study was to retrospectively evaluate the diagnostic image quality of specific dentomaxillofacial pathologies which are often difficult to diagnose, on either standard screens (SS) and dedicated medical displays (MD).

MATERIALS AND METHODS

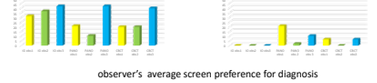
- **Radiographs and resources used for the study:**
  - patients of the DMFR centre, University Hospital, Leuven
  - 20 digital intraoral images
  - 20 panoramic images
  - 20 Cone Beam Computed Tomography images
- **Examples of pathology involved in the radiographs**:
  - Additional root canal (ARC)
  - Root crack/fracture (RF)
  - Pulp stone (PS)
  - Incipient caries (IC)
  - Periodontal ligament space widening (PLSW)
  - Fusion
  - Dens in dente (DD)
- **Observers:**
  - 3 dentists with different specializations: *DMFR* (obs 1), *paediatric dentistry* (obs 2) and *oral surgery* (obs 3) analyzed the datasets
  - answered a questionnaire to determine whether they distinguished pathology or not, and in case they did, the type of corresponding pathology was determined
  - scored each image with a confidence level, using a 5 point rating scale:

    1: not confident at all
    2: poorly confident
    3: satisfactory confident
    4: confident
    5: very confident
- **Set-up of this study**
  - Randomizing the images for the observers
  - Day A: screen "N 1" (standard screen, Dell® U2415b, 61.1 cm diagonally viewable size, 1920 × 1080 pixels)
  - Day B: screen "N 2" (medical display, Barco ® MDRC-2221, 54 cm diagonally viewable size, 1600 × 1200 pixels)
  - Day C: observers analyzed the images on a duplicated screen setting in order to see both screens at the same time for the diagnosis, and determine whether they diagnose pathology or not and which screen they would prefer for diagnostics in daily dental practice
  - The observers were blinded regarding the type of screen
  - Observations took place in a dimmed room at 60 cm viewing distance
  - Gold standard for the correct diagnosis was set by 2 DMFR specialists

RESULTS

Intra-oral images	Panoramic images	CBCT images
• 7% more correct diagnoses on MD compared to SS	• 8% more correct diagnoses on MD compared to SS	• 2% more correct observations on SS compared to MD
• More over-diagnosis on SS compared to MD	• More over-diagnosis on SS compared to MD by all observers	• More over-diagnoses on SS compared to MD
• more under-diagnosis on SS compared to MD	• More under-diagnosis on SS compared to MD, except by observer 1 who scored identical on both screens	• More under-diagnosis on SS compared to MD
	• incipient caries, root cracks and dens in dente were the most common underdiagnosed pathologies on both screens	• additional root canal and root cracks were the most underdiagnosed pathologies on both screens

% pathologies correctly diagnosed on



observer's average screen preference for diagnosis

CONCLUSIONS

- MD established better results when analyzing panoramic images and IO images
- Difference between over- and underdiagnosis on MD is lower. There seems to be less confidence when analyzing on SS compared with MD
- Observers appeared to have more preference for MD when assessing intra-oral and panoramic images
- Observers appeared to have no preference for a specific monitor when assessing CBCT images

Correspondence to: *Annelore De Grauwe (anneloredegrauwe@gmail.com)*
OIC, OMFS-IMPATH research group, Dept Imaging & Pathology, Faculty of Medicine, University of Leuven and Oral & Maxillofacial Surgery, University Hospitals Leuven, Leuven, Belgium

XVI European Congress of Dentomaxillofacial Radiology 2018
(ECDMFR), 14 June 2018, Luzern, Switzerland

Comparison of manual and semiautomatic tracing methods for volume determination of paranasal sinuses using sequences of CT and CBCT images

BT Szabo[1], S Aksoy[2], G Repassy[3], K Csomo[1], C Dobo-Nagy[1], K Orhan[4, 5]

[1]Department of Oral Diagnostics, Faculty of Dentistry, Semmelweis University, Budapest, Hungary
[2]Department of Dentomaxillofacial Radiology, Faculty of Dentistry, Near East University, Nicosia, Northern Cyprus
[3]Department of Otorhinolaryngology, Head and Neck Surgery, Faculty of Medicine, Semmelweis University, Budapest, Hungary
[4]Department of Dentomaxillofacial Radiology, Faculty of Dentistry, Ankara University, Ankara, Turkey

[5]OMFS IMPATH Research Group, Department of Imaging & Pathology, Faculty of Medicine, University of Leuven and Oral &Maxillofacial Surgery, University Hospitals Leuven, Leuven, Belgium

INTRODUCTION

The proper knowledge and visualization of the osteomeatal complex is essential for the treatment of sinonasal disorders. Our aim was to compare the paranasal sinus volumes obtained from hand and semiautomatic tracing methods of an imaging software programs using CT and CBCT image sequences.

MATERIAL & METHODS

From the authors' institutes 121 CT *(Philips Brilliance 16 (Koninklijke Philips N.V., Amsterdam, Netherlands))* and 119 CBCT *(Newtom 3G (Quantitative Radiology s.r.l., Verona, Italy))* examinations were selected. The DICOM image sequences were imported into a 3D imaging software (*Invivo 5.1.2, Anatomage, San Jose, CA, USA)*. The volumes of both maxillary sinuses and the sphenoid sinus were determined by using "hand mode" (Figure 1.) and "semiautomatic mode" (Figure 2.) tracing methods of the software. The determined volumetric means were compared to previously published averages.

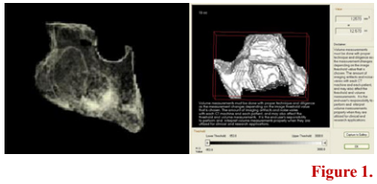


Figure 1.
"hand mode" tracing method

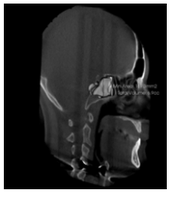


Figure 2.
"semiautomatic" tracing method

RESULTS

CBCT-based volume determination results obtained from hand mode (right maxillary sinus: 14.58786 ± 5.644339; left maxillary sinus: 15.53317 ± 5.834832; sphenoid sinus: 10.05895 ± 4.398836) were closer to the real volume conditions (maxillary sinus: 15 ± 2 cc, sphenoid sinus: 12.5 ± 2.5 cc), but the non-isometric CT based volume measurements showed coherently lower volumes (right maxillary sinus: 8.07443 ± 3.169671; left maxillary sinus: 8.10816 ± 3.258038; sphenoid sinus: 4.74580 ± 2.615067). By comparing the two volume determination methods the differences of the values showed very strong significancy ($p < 0.001$, Mann-Whitney U Test).

CONCLUSIONS

Our results suggests, that CBCT images provide reliable volumetric information, which may aid the proper visualization of the osteomeatal complex prior to or during the intervention.

REFERENCES

Li L, Yang J, Chu Y et al. A novel augmented reality navigation system for endoscopic sinus and skull base surgery: a feasibility study. PLoS One. 2016;11(1):1-17.

Roman RA, Hedeşiu M, Gersak M, Fidan F, Băciuţ G, Băciuţ M. Assessing the prevalence of paranasal sinuses anatomical variants in patients with sinusitis using cone beam computer tomography. Clujul Medical. 2016;89(3):423-429.

Ernoult C, Bouletreau P, Meyer C, Aubry S, Breton P, Bachelet JT. Reconstruction assisted by 3D printing in maxillofacial surgery. Rev Stomatol Chir Maxillofac Chir Orale. 2015;116(2):95-102.

Kazmi KS, Shames JP. Imaging of the paranasal sinuses. J Am Osteopath Coll Radiol. 2015;4(3):5-14.

Smith KD, Edwards PC, Saini TS, Norton NS. The prevalence of concha bullosa and nasal septal deviation and their relationship to maxillary sinusitis by volumetric tomography. Int J Dent. 2010; pii: 404982. doi: 10.1155/2010/404982.

Şakul BU, Bilecenoğlu B. Baş ve Boynun Klinik Bölgesel Anatomisi. 1st ed. Ankara: Özkan Matbaacılık 2009;76,106.

Beale TJ, Madani G, Morley SJ. Imaging of the paranasal sinuses and nasal cavity: normal anatomy and clinically relevant anatomical variants. Semin Ultrasound CT MR. 2009;30(1):2-16.

Eggesbø HB. Radiological imaging of inflammatory lesions in the nasal cavity and paranasal sinuses. Eur Radiol. 2006;16(4):872-878.

2nd European Meeting on Enhanced Natural Healing in Dentistry,
7 - 9 September 2018, Leuven, Belgium

1.OMFS IMPATH research group, Dept Imaging & Pathology, Fac Medicine, KU Leuven & Oral and Maxillofacial Surgery, University Hospitals Leuven, Leuven, Belgium
2.State Key Lab Oral Diseases, West China College of Stomatology, Sichuan Univ, Chengdu, China
3.Group of Morphology, Biomedical Research Institute, Hasselt Univ, Diepenbeek, Belgium

Effect of platelet concentration on the density of myelinated nerve fibres in the peri-implants An experimental study

Dandan Song[1], Yan Huang[1,2], Ivo Lambrichts[3], Sohaib Shujaat[1], Reinhilde Jacobs[1]*

Abstract

To histologically evaluate regeneration of myelinated nerve fibres following the local application of various concentrations of platelet-rich plasma.
In a split mouth design, seventy-two non-submerged commercial titanium implants (3.3 mm × 8 mm) were placed at both sides of mandibular ridge of nine beagle dogs. Implants were divided into 2 control and 2 test groups; implant placement without loading (Control group I, n=18), implant placement with loading (Control group II, n=18), platelet-poor plasma(PPP) + implant placement with loading (Test group I, n=18), platelet-rich plasma(PRP) + implant placement with loading (Test group II, n=18). After harvesting tissue blocks, histological evaluation was carried out for assessment of myelinated nerve fibers.
Nerve density of Control group I was found to be lowest when compared with other groups, and the statistical significance was observed at 3M ($P<0.05$). Myelinated nerve fibres showed a significant increase in density after 3M of healing in Control group II. Both PPP and PRP improved regeneration of myelinated nerve fibres with no effect on improvement of neurosensory function.

Research Methodology

1. Study protocol

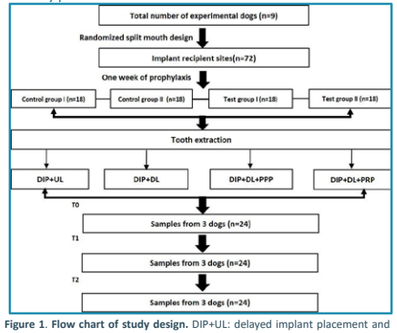


Figure 1. Flow chart of study design. DIP+UL: delayed implant placement and unloaded; DIP+DL: delayed implant placement and delayed loading. PPP: platelet-poor plasma; PRP: platelet-rich plasma; T0: one month; T1: 3 months; T2: 6 months

2. Region of interest (ROI)

Figure 2. Region of interest. Area of 500μm away from the implant surface was selected as the region of interest where the myelinated nerve fibers were counted.

3. Nerve fibres diameter

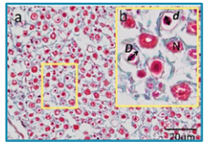


Figure 3. Morphometric analyses of the histological sections stained with Masson's trichrome stain (light microscopy). (a) Myelinated nerve fibers characterized by axons being surrounded by myelin sheaths formed by the Schwann cells; (b) a magnification of the selected box region in (a) showing the basic morphometric parameters of myelinated nerve fibers. d, axon diameter; D, nerve fiber diameter; N, nerve fibers.

Results

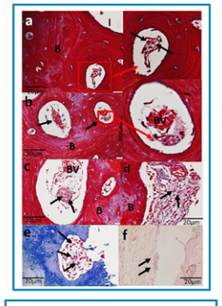


Figure 4. Decalcified sections stained with Masson's trichrome stain. Histologically observation of the myelinated nerve fibers via microscope (×40). (a) Isolated myelinated nerve fibers are in the peri-implant bone; (b) and (c) The bundle of nerve fibers and blood vessel are in the Harversian canal. (d) and (e) Isolated myelinated nerve fibers accompanied with the blood vessels are in the implant thread space. (f) neuropeptide Y(NPY) confirmed the isolated myelinated nerve fibers. I: Implant; B: Bone; BV: Blood vessel. Black arrows pointed the nerve fibers and red arrows pointed the part which is magnified.

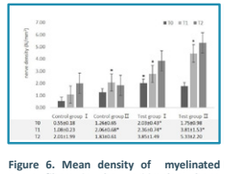


Figure 6. Mean density of myelinated nerve fibers in the peri-implant bone (N/mm²). The bar and each whisker represent the mean of nerve density and standard error. *Statistical significance difference($P<0.05$) comparing groups with the Control I group.

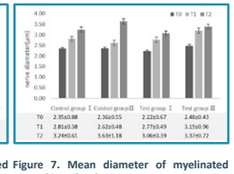


Figure 7. Mean diameter of myelinated nerve fibers (μm). The bar and each whisker end represent the mean of nerve diameter and standard error.

Conclusions

Within the limitations of the study, we can conclude that implant loading exerted positive effect on regeneration of nerve fibres in the peri-implant region. However, no relationship was observed between platelet concentration and restoration of neurosensory function.

References
1. Huang Y, Corpas LS, Martens W, Jacobs R, Lambrichts I. Histomorphological study of myelinated nerve fibres in the periodontal ligament of human canine. *Acta Odontol Scand* 2011;69:279–286.
2. Huang Y, Bornstein MM, Lambrichts I, Yu H-Y, Politis C, Jacobs R. Platelet-rich plasma for regeneration of neural feedback pathways around dental implants: a concise review and outlook on future possibilities. *Int J Oral Sci* 2017;9:1–9.

E-mail:
dandan.song@kuleuven.be

6th Belgian Symposium on Tissue Engineering,
21 - 23 Nov 2018, Ghent, Belgium

Microwave Assisted Hydrothermal Synthesis of Hydroxyapatite on Multiwall Carbon Nanotubes Promotes Osteogenic Differentiation of Pre-Osteoblasts

Laurien Van den Broeck[1,2], Burak Toprakhisar[1,3], Sarah Jessl[4], Michael De Volder[4,5], Jennifer Patterson[1,2,6]

[1]Department of Materials Engineering, KU Leuven; [2]Prometheus, Division of Skeletal Tissue Engineering, KU Leuven; [3]Stem Cell Institute, KU Leuven; [4]Institute for Manufacturing, University of Cambridge; [5]Department of Mechanical Engineering, KU Leuven; [6]Department of Imaging & Pathology, KU Leuven

KU LEUVEN

INTRODUCTION

Mimicking bone structure pushes research towards sophisticated composite scaffolds incorporating nanosized features. Bone is composed of hydroxyapatite (HAp) nano-crystals deposited in a staggered fashion along collagen fibers via biomineralization by cells [1]. However, using *in vitro* biomineralization approaches to create HAp-based materials is time-consuming, and the resulting mechanical properties often fall short of their natural counterparts [2]. Carbon nanotubes (CNTs) are known for their mechanical and electrical properties, and they mimic collagen's fibrillar shape and dimensions [3]. Our aim was thus to rapidly coat CNTs with HAp and evaluate their ability to stimulate osteogenic differentiation.

MATERIALS & METHODS

Calcium (Ca) and phosphate (P) sources were mixed at a Ca/P ratio of 1.67 and heated at 200 °C for 10 min in a high pressure microwave. This protocol was used with oxidized CNTs to create a HAp coating, which was characterized by FTIR, XRD, SEM, EDX, and ICP-OES. Cytocompatibility and osteogenic differentiation were evaluated with MC3T3-E1 cells exposed to HAp powder or HAp-coated CNTs over 28 d using Presto Blue and alkaline phosphatase (ALP) assays and phalloidin/DAPI, alizarin red S, and picrosirius red staining.

Table 1 Sample preparation conditions

Sample	Ca and P sources	Mass ratio
HAp powder (H1)	$Ca(OH)_2$ + H_3PO_4	
HAp powder (H2.1)	$Ca(NO_3)_2{\cdot}4H_2O$ + $(NH_4)_2HPO_4$	
HAp powder (H2.2)	$Ca(NO_3)_2{\cdot}4H_2O$ + $(NH_4)_2HPO_4$	
HAp powder (H2.3)	$Ca(NO_3)_2{\cdot}4H_2O$ + $(NH_4)_2HPO_4$	
Oxidized CNTs (CNT)		
HAp coated CNTs (CH10.4)	$Ca(NO_3)_2{\cdot}4H_2O$ + $(NH_4)_2HPO_4$	10/4
HAp coated CNTs (CH10.8)	$Ca(NO_3)_2{\cdot}4H_2O$ + $(NH_4)_2HPO_4$	10/8

MATERIALS CHARACTERIZATION

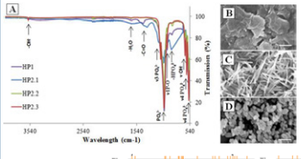


Figure 1 (A) FTIR spectra of H1, H2.2, and H2.3. (B-D) SEM images of (B) H1, (C) H2.2, and (D) H2.3. The scale bars are 500 nm in all SEM images.

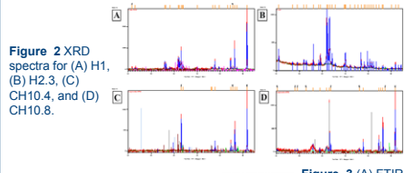


Figure 2 XRD spectra for (A) H1, (B) H2.3, (C) CH10.4, and (D) CH10.8.

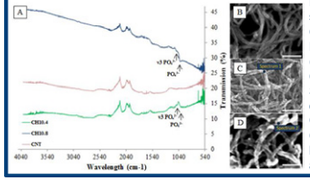


Figure 3 (A) FTIR spectra of oxidized CNTs (CNT) and HAp coated CNTs (CH10.4 and CH10.8), (B-D) SEM images of (B) oxidized CNTs, (C) CH10.4, and (D) CH10.8. The scale bars are 100 nm in all SEM images.

BIOLOGICAL CHARACTERIZATION

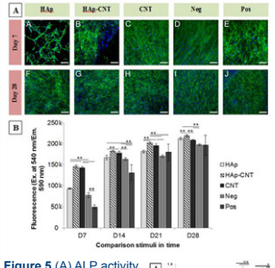


Figure 4 (A) Confocal images of DAPI/phalloidin stained cells at 7 d and 28 d for: H2.3 (HAp), CH10.4 (HAp-CNT), CNT, and negative (Neg) and positive (Pos) controls. The scale bars are 100 µm in all images. (B) Metabolic activity measured with Presto blue (n=3; ** p<0.005).

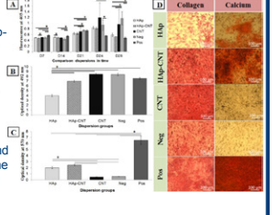


Figure 5 (A) ALP activity by MC3T3-E1 cells for H2.3 (HAp), CH10.4 (HAp-CNT), CNT, and negative (Neg) and positive (Pos) controls. (B) Collagen quantification at 28 d. (C) Calcium quantification at 28 d. For A-C, n=3 with * p<0.05 and ** p<0.005. (D) Images of collagen and calcium deposition with the use of picrosirius red and alizarin red S staining, respectively, at 28 d. The scale bars are 100 µm.

CONCLUSIONS

CNTs coated with high purity, hexagonal HAp with near stoichiometric Ca/P ratio were prepared. Pre-osteoblasts exposed to the HAp-coated CNTs proliferated and underwent osteogenic differentiation. As future work, the HAp-coated CNTs could be incorporated into polymer scaffolds to induce bone formation.

REFERENCES AND CONTACTS

1. Holmgen *et al. Nature* (1998) 392:666.
2. Tseng *et al. J Phys Chem C* (2009) 113:18053.
3. Iijima. *Nature* (1991) 354:56.

Present affiliation: Jennifer Patterson, BIOFABICS LDA
jennifer.patterson@biofabics.com
Contact details: Laurien Van den Broeck
laurien.vandenbroeck@kuleuven.be

6th Belgian Symposium on Tissue Engineering,
21 - 23 Nov 2018, Ghent, Belgium

Osteogenic Response of Pre-Osteoblasts to Hydroxyapatite Coated and Patterned 3D Carbon Nanotube Structures that Mimic Bone

Laurien Van den Broeck[1,2], Sarah Jessl[3], Burak Toprakhisar[1,4], Jennifer Patterson[1,2,5], Michael De Volder[3,6]

[1]Department of Materials Engineering, KU Leuven, Belgium; [2]Prometheus, Division of Skeletal Tissue Engineering, KU Leuven, Belgium; [3]Institute for Manufacturing, University of Cambridge, UK; [4]Stem Cell Institute, KU Leuven, Belgium; [5]Department of Imaging & Pathology, KU Leuven, Belgium; [6]Department of Mechanical Engineering, KU Leuven, Belgium

KU LEUVEN

INTRODUCTION

Bone fractures are one of the most common traumatic injuries, and about 10% result in non-union. Bone transplantation, metal prosthetics, and polymer composites have been used as bone substitutes, but they have not met expectations for reasons including donor shortage, immune rejection, and mechanical mismatch with the surrounding bone. Therefore, herein, we aimed to develop a carbon nanotube (CNT) honeycomb structure, functionalize it with hydroxyapatite (HAp) to mimic the native microarchitecture of bone, and evaluate the response of pre-osteoblasts to the patterned and coated structures.

MATERIALS & METHODS

A catalyst layer was lithographically patterned on a silicon wafer, which was transferred to a CVD furnace for CNT synthesis (Fig. 1A). Oxygen species were introduced by UV-ozone, and the patterned structure was aggregated using capillary forces, following previously published work [1]. The resulting honeycomb structure was placed in a solution of calcium (Ca) and phosphate (P) sources in a Ca/P ratio of 1.67 and then heated at 200 °C for 10 min in a high pressure microwave reactor. The coating was characterized by several physicochemical techniques. The HAp-coated honeycombs were seeded with MC3T3-E1 pre-osteoblasts to look at cell growth and osteogenic differentiation: alkaline phosphatase (ALP) activity, collagen deposition, and mineralized matrix production.

HONEYCOMB STRUCTURE

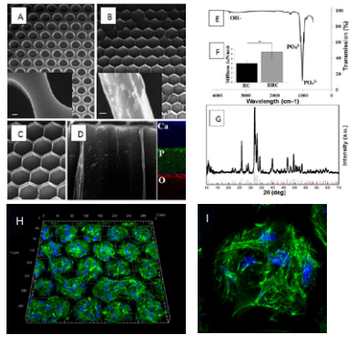


Figure 1 - Overview of honeycomb processing and structure: (A) SEM image of undensified patterned CNT forest, inset of wall topography; (B) SEM image of densified honeycomb structure with HAp coating (HHC), inset of a HAp coated wall; (C) Higher magnification SEM image of HHC structure; (D) EDX analysis of cross-section of HHC structure that indicates the presence of Ca, P and O, components of HAp, within the cavities; (E) FTIR spectrum of the synthesized HAp powder; (F) Nanoindentation results of uncoated honeycomb structures (HC) and HHCs; (G) XRD spectrum of the synthesized HAp powder; (H) 3D reconstruction of honeycomb structures seeded with cells. (I) Top view of single honeycomb occupied by cells inside. For (F), results are shown as the average and standard deviation with ** indicating a significant difference at p<0.005. For (H) and (I), cells were stained with phalloidin and DAPI.

BIOLOGICAL CHARACTERIZATION

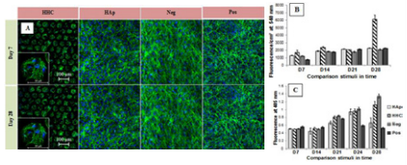


Figure 2 – Proliferation and osteogenic differentiation of MC3T3-E1 cells cultured on HAp coated honeycomb structures: (A) Confocal microscopy images of phalloidin/DAPI stained cells when exposed to different stimuli groups at 7 d and 28 d; (B) Metabolic activity measurement by Presto blue assay for different stimuli groups in time, (C) Relative ALP activity measurement for different stimuli groups in time. Results of (B) and (C) are shown as the average and standard deviation.

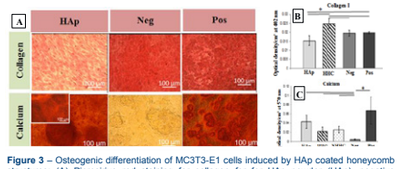


Figure 3 – Osteogenic differentiation of MC3T3-E1 cells induced by HAp coated honeycomb structures: (A) Picrosirius red staining for collagen for for HAp powder (HAp), negative reference (Neg), and positive reference (Pos) at 28 d (top) and Alizarin red S staining for calcium matrix at 28 d (bottom) with matrix formed in wells by cells in next to honeycomb structures (NHHC) in inset; (B) Quantification of collagen after destaining protocol at 28 d; (C) Quantification of calcium after destaining protocol at 28 d. Results in (B) and (C) are shown as the average and standard deviation with * indicating a significant difference at p<0.05.

CONCLUSIONS

This work presents a new method for fabricating 3D hybrid CNT-HAp composites that address mechanical and structural limitations of previous scaffolds and promote the osteogenic differentiation of progenitor cells. Specifically, increased ALP activity as well as production of a mineralized collagen matrix by MC3T3-E1 pre-osteoblasts grown on the HAp coated honeycomb structures were observed.

REFERENCES AND CONTACTS

1. De Volder *et al. Journal of Micromechanics and Microengineering* (2011) 21:045033.

Present affiliation: Jennifer Patterson, BIOFABICS LDA
jennifer.patterson@biofabics.com
Contact details: Laurien Van den Broeck
laurien.vandenbroeck@kuleuven.be

5th Annual Meeting of the Belgian Society for Stem Cell Research
Friday, 26 October 2018, Leuven, Belgium

The effect of microstructural differences of fibrin and self-assembling peptide hydrogels on dental pulp stem cells' behaviour

Mostafa EzEldeen[1], Burak Toprakhisar[2], Nick Smisdom[3], Olivier Deschaume[4], Carmen Bartic[4], Ghislain Opdenakker[5], Ivo Lambrichts[3], Annelies Bronckaers[3], Reinhilde Jacobs[1], Jennifer Patterson[1,6]

1: OMFS IMPATH Research Group, KU Leuven, 2: Stem Cell Institute, KU Leuven, 3: Biomedical Research Institute, Hasselt University, 4: Soft-Matter Physics and Biophysics Section, KU Leuven, 5: Rega Institute for Medical Research, KU Leuven, 6: BIOFABICS LDA, Vizela, Portugal

Introduction

Strategies utilizing combinations of biocompatible scaffolds, growth factors, and stem cells to mimic natural morphogenesis are currently in development. Amongst those strategies are regenerative endodontic procedures, which can be defined as biology-based processes designed to replace damaged structures, including dentin and root structures, as well as cells of the pulp-dentin complex. The aims of this study were to evaluate: 1- the effect of the inclusion of an experimental molecule chlorite-oxidized oxyamylose (COAM) on the microstructural properties of fibrin and self-assembling peptide (SAP) hydrogels, 2- the influence of the microstructural differences between the hydrogels on the *in vitro* behaviour of dental pulp stem cells (DPSCs), and 3- to identify the most suitable hydrogel for further *in vivo* experiments.

Materials and Methods

Biophysical characterization for the hydrogels without (control) and with (test) COAM was performed using: 1- atomic force microscopy (AFM) and scanning electron microscopy (SEM) to determine the influence of the microstructure (roughness average, fibre length, thickness, straightness and alignment) of the hydrogels, 2- nano-indentation to measure the stiffness (elastic modulus) of the hydrogels. Biological characterization was evaluated through encapsulating GFP-labelled DPSCs in hydrogels with and without COAM, and the cell viability was determined at 1, 4 and 7 days using confocal microscopy imaging.

Results

Biophysical characterization

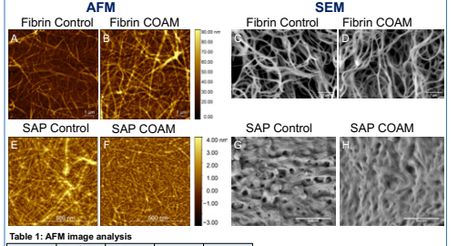
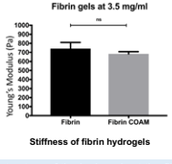


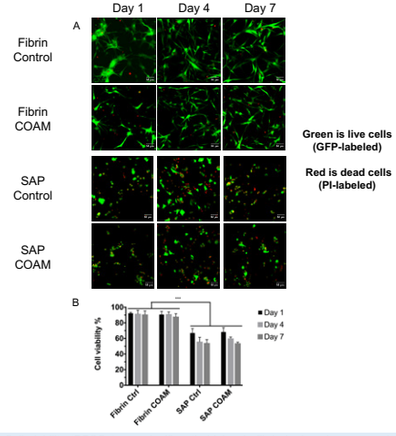
Table 1: AFM image analysis

Parameter	Fibrin Control	Fibrin COAM	SAP Control	SAP COAM
Roughness average (Ra)	6.4 nm	7.3 nm	450 pm	517 pm
Fibre thickness	139.2 nm (± 28.8)	160.1 nm (± 38.6)	14.7 nm (± 3.1)	12.4 nm (± 2.3)
Fibre length	1136.7 nm (± 1034.4)	1077.7 nm (± 1005.7)	47.7 nm (± 33.7)	46.3 nm (± 33.4)
Fibre Straightness	0.93 (± 0.06)	0.93 (± 0.07)	0.93 (± 0.06)	0.92 (± 0.06)
Fibre alignment	0.05	0.06	0.10	0.26



The inclusion of COAM did not alter the microstructure of the hydrogels at the fibre level as demonstrated by quantitative analysis (Table 1) for the AFM images (A, B, E & F) and visualized by SEM images (C, D, G & H). However, differences in fibre heights were observed between the test and control in the fibrin hydrogels (A & B) (colour code represents fibre height). This difference in fibre heights in the fibrin hydrogels may be due to depletion force effect due to the presence of COAM upon sample drying.
The Young's elastic modulus for fibrin hydrogels at 3.5 mg/ml fibrinogen concentration was 742 Pa (± 204) for the control group and 683 Pa (± 73) for the test group.

Biological characterization



Cell viability (DPSCs) was significantly higher in fibrin hydrogels compared to SAP hydrogels at each time point (A & B). For fibrin hydrogels: control, 90.8% (D7), test (with COAM), 88.0% (D7) and for the SAP hydrogel: control, 54.1% (D7), test (with COAM), 53.9% (D7) (B).
Further, DPSCs appeared to adopt a spread morphology in the fibrin hydrogels, whereas they remained rounded in the SAP hydrogels (A), indicating superior cell attachment in fibrin gels.

Conclusion

The microstructural stability after the inclusion of COAM and the high cell viability observed in the fibrin hydrogels suggests that this material may be promising as a carrier for COAM and for application in endodontic regeneration *in vivo*

The authors would like to acknowledge the support of Tom Van der Donck, Christian Jose Garcia Abrego and Susanna Piluso during the experiments

Author's email: mostafa.ezeldeen@kuleuven.be

B. INVITED LECTURES

08-01-18	R. Jacobs	2 days course for radioprotection certification in dentistry	LUTV, Leuven, Belgium
27-01-18	C. Politis	Bescherming van de nervus alveolaris inferior tijdens orthognatische heelkunde	Koninklijke Academie voor Geneeskunde van België, Brussels, Belgium
30-01-18	C. Politis	3D printing in maxillofacial surgery	3D medical conference, 5th Edition, MECC Maastricht, The Netherlands
30-01-18	R. Jacobs	Beyond CBCT: from virtual patients to 3D bioprinting in oral healthcare	3D Medical Conference, Maastricht, The Netherlands
01-02-18	C. Politis	Extracties	Voordracht Studieclub Zuid-West-Vlaanderen, tandartsen, Kortrijk, Belgium
03-02-18	C. Politis	Nieuw ziekenhuislandschap in wording: de plaats van MKA en haar nomenclatuur	VVT-MKA Upgrade, Ieper Belgium
20-02-18	C. Politis	Locale anesthesie in de tandheelkunde	NIVVT, Hotel Residence Stiemerheide, Genk, Belgim
21-02-18	R. Pauwels	Artificial Intelligence: Potential Applications in Dental Imaging.	10th Iranian Oral and Maxillofacial Radiology Congress. Shiraz, Iran
23-02-18	C. Politis	Casuïstiek voor de algemene tandheelkundige praktijk	Tandartsengroep Guy Sampermans, Maaseik, The Netherlands
23-02-18	R. Pauwels	Bone Structure Parameters: Relevance for Jaw Bone Quality Assessment	10th Iranian Oral and Maxillofacial Radiology Congress. Shiraz, Iran
08-03-18	C. Politis	Extracties	VVT, Gasthof ter Venne, Langdorp, Belgium
17-03-18	C. Politis	Bridgen of niet-bridgen bij tandextracties. Casuïstiek. Bloedverdunners in MKA en Tandheelkunde	LUTV, Leuven, Belgium
17-03-18	C. Politis	Behandeling van nabloedingen onder bloedverdunners. Bloedverdunners in MKA en Tandheelkunde	LUTV, Leuven, Belgium
17-03-18	C. Politis	Website guidelines bloedverdunning in de tandheelkunde. Bloedverdunners in MKA en Tandheelkunde	LUTV, Leuven, Belgium
17-03-18	R. Jacobs	CBCT its justified use in oral health care	Forårsmøde 2018 Dansk Selskab for Oral Implantologi, Sweden
17-03-18	C. Politis	Bloedverdunners	LUTV, Leuven, Belgium
22-03-18	C. Politis	Locale anesthesie bij oncologische patiënten: bestraalde patiënten, antiresorptiva, interacties met medicatie	LUTV, Leuven, Belgium
22-03-18	C. Politis	Extracties en cysten	Turnhout, Belgium

23-03-18	C. Politis	Ziekenhuisfinanciering en Ziekenhuis-netwerken	EHSAL, Brussels, Belgium
29-03-18	R. Jacobs	Nerves around the corner! The use of presurgical CBCT	LUTV, Leuven, Belgium Symposium 35 jaar Parodontologie KU Leuven
07-04-18	K. Orhan	Handson- CBCT course	7-9 April 2018, Warsaw, Poland
24-04-18	C. Politis	Locale Anesthesie	NIVVT Brugge, Belgium
05-05-18	C. Politis	Tandtraumata: MKA invalshoek	Stiemerheide - Genk, Belgium
05-05-18	C. Polits	Traumatologie: gedrag van de weke weefsels	VBT, Genk, Belgium
17-05-18	A. Torres	CBCT in de endodontie: diagnose, behandelingsplanning en follow-up.	LUTV, Leuven, Belgium
19-05-18	C. Politis	Hoe kijken we naar gezichten en tanden: van normaal tot abnormaal - de bijdrage van de MKA-arts	LUTV, Leuven, Belgium
19-05-18	C. Politis	Orthognatische heelkunde	LUTV, Leuven, Belgium
31-05-18	R. Jacobs	Justification of CBCT imaging	LUTV, Leuven, Belgium
31-05-18	R. Pauwels	CBCT Utopia? Creating and using the perfect CBCT device	LUTV, Leuven, Belgium
31-05-18	R. Jacobs	The sedentexCT files	LUTV, Leuven, Belgium
31-05-18	R. Jacobs	2 days inter-university programme on the use of cone beam CT for dentomaxillofacial diagnostics	LUTV, Leuven, Belgium
01-06-18	R. Jacobs	Radiodiagnostics in periodontology and implant treatment	LUTV, Leuven, Belgium
01-06-18	R. Jacobs	Radio-anatomy of the jaw bone in 2 and 3 dimensions	LUTV, Leuven, Belgium
06-06-18	K. Orhan	The T in TMJ: Image Modalities and Basic Diagnostics Needs	16th European Congress of Dentomaxillofacial Radiology Congress, 13-17 June 2018, Luzern, Switzerland
12-06-18	C. Politis	Extracties	KLTV, Ieper, Belgium
14-06-18	C. Politis	Nomenclatuur MKA	AZ St. Jan Brugge, Belgium
16-06-18	C. Politis	Wondhelingsproblemen in de mond: locale oorzaken	LUTV, Leuven, Belgium
16-06-18	C. Politis	Hyperbare zuurstoftherapie	LUTV, Leuven, Belgium
16-06-18	C. Politis	Wondhelingsproblemen in de mond	LUTV, Leuven, Belgium
19-06-18	C. Politis	LKI-richtlijnen bij orale mucositis	LKI, UZ Leuven, Belgium
20-06-18	R. Jacobs	Advances in 3D-imaging/printing prior to important therapy	EuroPerio9, Amsterdam, The Netherlands

29-06-18	R. Jacobs	Workshop cone beam CT in de praktijk: basis	LUTV, Leuven, Belgium
02-07-18	R. Jacobs	Workshop cone beam CT in de praktijk: diagnostiek	LUTV, Leuven, Belgium
03-09-18	R. Jacobs	Two days course for radioprotection certification in dentistry	LUTV, Leuven, Belgium
06-09-18	K. Orhan	Clues at your fingertips: dentomaxillofacial ultrasound applications	12th Asian Congress of Oral & Maxillofacial Radiology&5th Green Health Conference 6th to 9th Sept'2018, Mumbai, India
07-09-18	R. Jacobs	Workshop cone beam CT in de praktijk: presentatie van eigen casus	LUTV, Leuven, Belgium
07-09-18	I. Lambrichts	Basic research on how L-PRF can enchance the healing	2nd European Meeting on ENHD, Leuven, Belgium
07-09-18	J. Blanco	Benefits of L-PRF for rigde preservation & bone block grafting	2nd European Meeting on ENHD, Leuven, Belgium
07-09-18	N. Pinto	L-PRF: why should it work: from extra-oral to intra-oral wound	2nd European Meeting on ENHD, Leuven, Belgium
07-09-18	A. Ockerman	The influence of antithrombotic drugs on biomechanical characteristics of L-PRF	2nd European Meeting on ENHD, Leuven, Belgium
12-09-18	C. Politis	Anthogyr Chair for oral and maxillofacial surgery	KU Leuven, Leuven, Belgium
15-09-18	R. Jacobs	De 3D's van een stralend beeld: dimensies, dosis en diagnose	NiVVT, Najaarssymposium 2018, Antwerp, Belgium
27-09-18	Y. Sun	Application of 3D Surgical Planning in Oral and Maxillofacial Surgery	Wu Han University, School of Stomatology, Wuhan, China
18-10-18	R. Jacobs	Beeldvorming in alle dimensies bekeken	Tandheelkundige Kring van Aalst, Belgium
19-10-18	C. Politis	Toekomst van en uitdagingen in MKA	ZOL Overpelt, Belgium
27-10-18	C. Politis	3D en Navigatie in Traumatologie, Implantologie, TMJ chirurgie 3D technologie in MKA	LUTV, Leuven, Belgium
27-10-18	C. Politis	3D technologie in MKA	LUTV, Leuven, Belgium
30-10-18	S. Shujaat	Accuracy of 3D printed models	3D Medical Conference, Maastricht, The Netherlands
06-11-18	C. Politis	Locale anesthesie	VVT Brussel, Belgium
13-11-18	C. Politis	Extracties durven en doen	VVT Brugge, Belgium
15-11-18	C. Politis	Extracties durven en doen	VVT Brecht, Belgium
15-11-18	T. Dormaar	CBCT for CMF	UZ Gent, Belgium
17-11-18	R.Jacobs	Dimensies van een stralend beeld deel 1: van indicatiesstelling tot diagnose deel 2: 3D diagnostiche dilemma's	VTB Aalst, Belgium

17-11-18	R. Jacobs	De kliniek van Radiologie	VBT Leuven, Belgium
23-11-18	A. De Grauwe	Radiodiagnostiek in de kindertandheelkunde	IAPD Regional Meeting Eindhoven 2018, the Netherlands
30-11-18	R. Jacobs	Dental Implants: beyond the osseointegration	II Core Brazil 2018 Colloquium on Oral Rehabilitation, Saõ Paulo, Brazil
06-12-18	C. Politis	Parry Romberg Syndrome: experience at Leuven University Hospitals	Joël Ferri's Congress, Lille, France
08-12-18	C. Politis	Extractierichtlijnen bij BRI's en Radiotherapie	LUTV, Leuven, Belgium
08-12-18	C. Politis	Iatrogene problematiek: update botresorptie, inhibitoren, chemotherapie, bestraling	LUTV, Leuven, Belgium
13-12-18	R. Jacobs	Cone Beam CT: indications & limites au cabinet dentaire	Brussels, Belgium
13-12-18	R. Jacobs	CBTC's bekijken om een diagnose te stellen	LUTV, Leuven, Belgium
20-12-18	M. Bornstein	Diagnostic challenges and therapeutic dilemma's in the jaw bone	LUTV, Leuven, Belgium

5

3D lab

A. TEAM

B. PROJECTS

C. PUBLICATIONS

- International Peer Reviewed Publications
- Oral presentations
- Poster presentations
- invited lectures

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 center, 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. Currently, the 3D lab works in a multidisciplinary team that brings together the expertise of doctors, scientists, engineers to improve care for each individual patient. This closed cooperation enabled the surgeon and patient to maximize the benefits from 3D technology. The focus of our 3D lab is how to integrate 3D technologies in the clinical workflow to develop new medical treatment methods and to carry out clinical research in the field of oral and maxillofacial surgery. This involves computer assisted surgical planning, 3D printing of anatomic models and surgical templates, 3D metal printing of patient specific implant and image-guided surgery.

Besides Oral and Maxillofacial surgery, the 3D lab is collaborating internally within UZ Leuven departments, and externally with 9th People Hospital Shanghai, 4th Military Medical University Xi'an China, Department of Mechanical Engineering Jiao Tong University, Karolinska University Hospital Stockholm, etc.

A. TEAM

Constantinus POLITIS

Constantinus Politis is Oral and Maxillo-Facial Surgeon. He is currently Professor and Chairperson of the Department of Oral and Maxillofacial Surgery at Leuven University, KULeuven, Belgium. He is an invited Lecturer at the EHSAL in Brussels. He graduated at the Catholic University of Leuven in medicine (MD, summa cum laude), in dentistry (DDS, magna cum laude). He specialized in oral and maxillofacial surgery at the Catholic University of Leuven. Postgraduate training was additionally followed in Arnhem (Stoelinga), Aachen (Koberg), Copenhagen (Pindborg), Göteborg (Bränemark) and San Francisco (Marx). He also holds a master degree in management (MM) from the Applied Economic Scienes at the University of Hasselt and a master degree in Hospital Management (MHM) from the Catholic University of Leuven. He became a recognition as medical specialist in management of health care data and is now member of the National Council of Hospital Facilities. He is Secretary General of the Professional Union of Belgian Oral and Maxillofacial Surgeons. He is acknowledged trainer of OMFS trainees. He defended his doctor's thesis on the subject of complications of orthognathic surgery (PhD). His professional field of intrest is in orthognathic and orthodontic surgery and trigeminal nerve dysfunction. Clinical research projects include prevention and repair of iatrogenic trigeminal nerve injury, transplantation of teeth and orthognathic surgery.

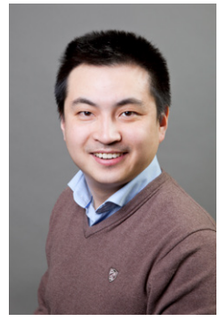
Reinhilde JACOBS

Reinhilde Jacobs is dentist, Doctor in Dental Sciences (PhD University of Leuven), periodontologist (KU Leuven) and Master in Dental Radiology (University of London). She was postdoctoral fellow of the European Commission (1994-5) at the University of Göteborg (prof B Rydevik, dept Orthopaedics, Sahlgrenska University Hospital) and The Institute for Applied Biotechnology (prof P-I Brånemark). She is full professor at the University of Leuven and visiting professor at Karolinksa Institutet, Stockholm, Sweden and the Dalian Medical University in China. R. Jacobs is heading the omfsimpath research group of the KU Leuven (omfsimpath.be). She is Secretary General of the International Association of DentoMaxilloFacial Radiology, past president of the European Academy of DentoMaxilloFacial Radiology as well as DDS scientific board member. She is associate editor of Clinical Oral Investigations, European Journal of Oral Implantology, and Oral Radiology. She has received the D Collen Research Award (1994), 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 has been actively participating in European projects (ref. Minosquare, Osteodent, SedentexCT, Dimitra project (Euratom Operra)). She is (co-)author of 5 books and more than 375 publications in peer-reviewed journals besides multiple invited lectures and publications in other journals or books.

Eman SHAHEEN

Eman (Emmy) Shaheen was born on July 12th, 1982 in Giza, Egypt. She graduated with honor from the faculty of Computer Sciences and Information Technology (2003), Cairo University, Egypt where she also worked as a teaching assistant from 2003 till 2007 with 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 about mammography and breast cancer (2009) in Biomedical Sciences at the KU Leuven, Belgium. She was granted a PhD scholarship from the OPTIMAM project (UK) in 2010 to develop, simulate and validate 3D models of breast lesions and tools to optimize the performance of breast tomosynthesis. She obtained her doctoral degree in 2014, KU Leuven, Belgium. In the same year, she started working in the department of Maxillo-facial surgery, University hospitals Leuven (Belgium) with Prof. Constantinus Politis as clinical engineer with focus on 3D planning of orthognathic surgeries. Next to the patient related work, she is part of the research group of the OMFSIMPATH (KU Leuven, Belgium) where she supervises students, supports different research projects related to 3D printing and 3D simulations. She is also collaborating with Materialise (Leuven, Belgium) as consultant to improve the CMF software for orthognathic surgeries next to other research related projects.

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).

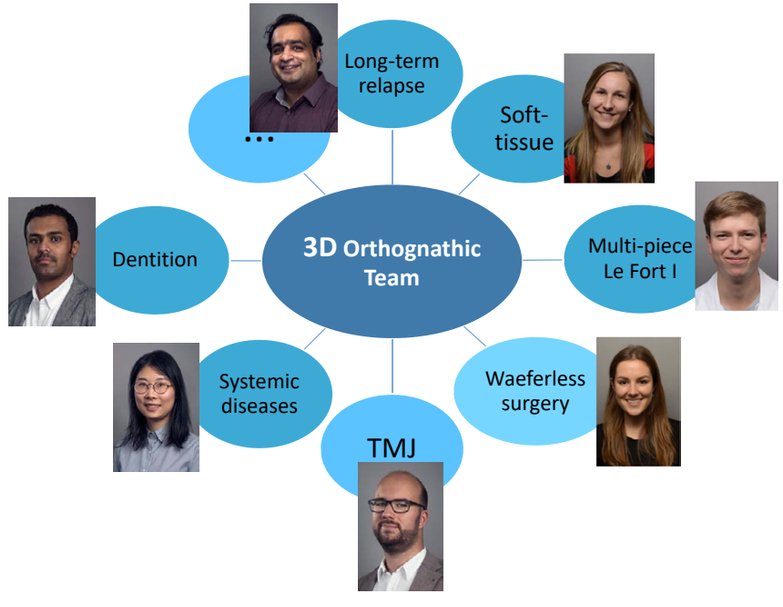
Sohaib SHUJAAT

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. Currently he is a PhD candidate (OMFS- IMPATH, KU Leuven) with Professor Reinhilde Jacobs as his promoter. His research topic for PhD is related to three-dimensional analysis of hard and soft tissue changes in orthognathic surgery patients and to develop a start of art predictive model for treatment planning.

5
3D Lab

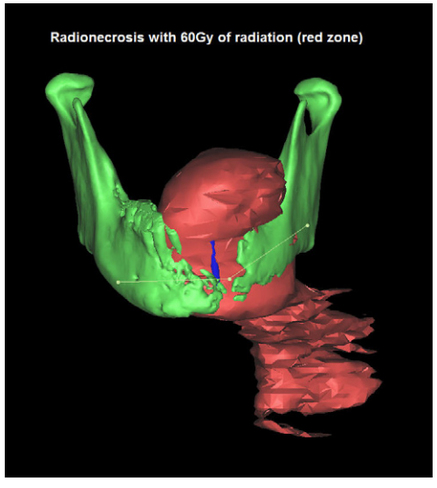
B. PROJECTS

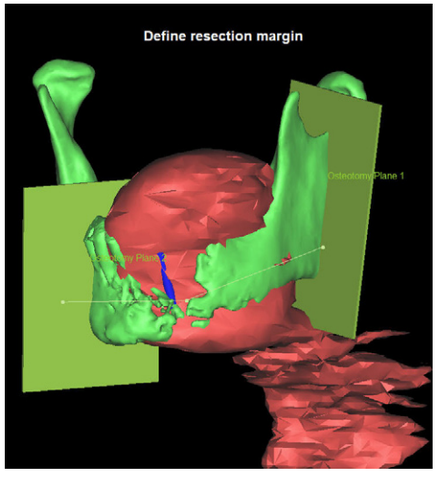
- Long-term bone relapse: maxillary relapse and mandibular remodeling
- Soft tissue changes after orthognathic surgery
- Multiple pieces Le Fort I accuracy and stability
- Waferless surgery: new technologies to improve Le Fort I surgery
- Condylar changes after orthognathic surgery
- Systemic diseases related to orthognathic surgery
- Dental changes evaluation in 3D after orthognathic surgery

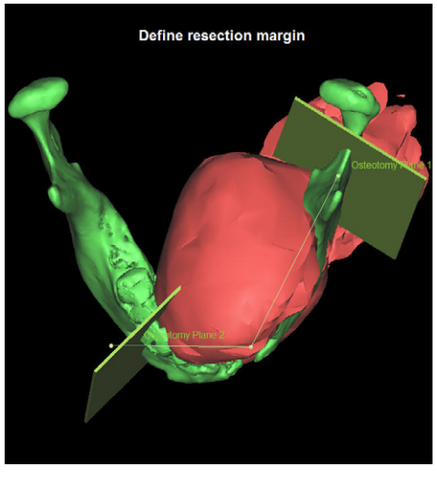


B. PROJECTS

COMPUTER ASSISTED MANDIBLE / MAXILLA RECONSTRUCTION WITH FIBULAR OR DCIA FLAP







C. PUBLICATIONS

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Albdour EA., Shaheen E., Vranckx M., Mangano FG., Politis C., Jacobs R. (2018). A novel in vivo method to evaluate trueness of digital impressions. *BMC ORAL HEALTH, 18, Art.No. ARTN 117*. (Impact factor: 1.60).

Celikten B., Jacobs R., De Faria Vasconcelos K., Huang Y., Shaheen E., Nicolielo LF P., Orhan K. (2018). Comparative evaluation of cone beam CT and micro-CT on blooming artifacts in human teeth filled with bioceramic sealers. *CLINICAL ORAL INVESTIGATIONS*. (Impact factor: 2.39).

De Grauwe A., Ayaz I., Shujaat S., Dimitrov S., Gbadegbegnon L., Vande Vannet B., Jacobs R. (2018). CBCT in orthodontics: a systematic review on justification of CBCT in a paediatric population prior to orthodontic treatment. *EUROPEAN JOURNAL OF ORTHODONTICS* (Impact factor: 2.03).

Govaerts D., Shaheen E., Coopman R., De Mol A., Sun Y., Politis C. (2018). Accuracy of Le Fort I osteotomy in bimaxillary splint-based orthognathic surgery: focus on posterior maxillary movements. *INTERNATIONAL JOURNAL OF ORAL & MAXILLOFACIAL SURGERY, 47* (11), 1398-1404. (Impact factor: 2.16).

Meewis J., Govaerts D., Falter B., Grisar K., Shaheen E., Van de Vyvere G., Politis C. (2018). Reaching the vertical versus horizontal target position in multi-segmental Le Fort I osteotomy is more difficult, but yields comparably stable results to one-segment osteotomy. *INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 47* (4), 456-464. (citations: 1) (Impact factor: 2.16).

Misselyn D., Nijs S., Fieuws S., Shaheen E., Schepers T. (2018). Improved Interobserver Reliability of the Sanders Classification in Calcaneal Fractures Using Segmented Three-Dimensional Prints. *JOURNAL OF FOOT & ANKLE SURGERY 57* (3): 440-444 01.

Qin C., Cao Z., Fan S., Wu Y., Sun Y., Politis C., Wang C., Chen X. (2018). An oral and maxillofacial navigation system for implant placement with automatic identification of fiducial points. *INTERNATIONAL JOURNAL FOR COMPUTER ASSISTED RADIOLOGY AND SURGERY (IJCARS)*. (Impact factor: 1.96).

Shaheen E., Coopman R., Jacobs R., Politis C. (2018). Optimized 3D virtually planned intermediate splints for bimaxillary orthognathic surgery: A clinical validation study in 20 patients. *JOURNAL OF CRANIO-MAXILLOFACIAL SURGERY, 46* (9), 1441-1447. (Impact factor: 1.96).

Shaheen E., Alhelwani A., Van De Casteele E., Politis C., Jacobs R. (2018). Evaluation of Dimensional Changes of 3D Printed Models After Sterilization: A Pilot Study. *OPEN DENTISTRY JOURNAL, 12*, 72-79.

Shaheen E., Shujaat S., Saeed T., Jacobs R., Politis C. (2018). Three-dimensional planning accuracy and follow-up protocol in orthognathic surgery: a validation study. *INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 48* (1), 71-76. (Impact factor: 2.16).

Sun Y., Tian L., Luebbers H-T., Politis C. (2018). Relapse tendency after BSSO surgery differs between 2D and 3D measurements: A validation study. *JOURNAL OF CRANIO-MAXILLOFACIAL SURGERY, 46* (11), 1893-1898. (Impact factor: 1.96).

INTERNATIONAL PEER-REVIEWED PUBLICATIONS

Suryani IR., Salvo Villegas N., Shujaat S., De Grauwe A., Azhari A., Sitam S., Jacobs R. (2018). Image quality assessment of pre-processed and post-processed digital panoramic radiographs in paediatric patients with mixed dentition. *IMAGING SCIENCE IN DENTISTRY, 48* (4), 261-268.

Torres A., Shaheen E., Lambrechts P., Politis C., Jacobs R. (2018). Microguided Endodontics: a case report of a maxillary lateral incisor with pulp canal obliteration and apical periodontitis. *INTERNATIONAL ENDODONTIC JOURNAL* (Impact factor: 3.02).

Vandeput A-S., Verhelst P-J., Jacobs R., Shaheen E., Swennen G., Politis C. (2018). Condylar changes after orthognathic surgery for class III dentofacial deformity: a systematic review. *INTERNATIONAL JOURNAL OF ORAL & MAXILLOFACIAL SURGERY , 48* (2), 193-202. (Impact factor: 2.16).

Verhelst P-J., Grosjean L., Shaheen E., Politis C. (2018). Surgical Management of an Aggressive Multifocal Squamous Odontogenic Tumor. *JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 76* (2), 355-362. (Impact factor: 1.78).

ORAL PRESENTATIONS

Ayaz I., Shaheen E., Gallo G., Politis C., Jacobs R. (2018). Validation of 3D facial imaging versus 2D clinical imaging for clinical assessment during treatment planning and follow up. XVI European Congress of Dentomaxillofacial Radiology 2018 (ECDMFR), 14 June 2018, Luzern, Switzerland, OP.04.05.

POSTER PRESENTATIONS

**2nd European Meeting on Enchanced Natural Healing in Dentistry,
7 - 9 September 2018, Leuven, Belgium**

1.OMFS IMPATH research group, Dept Imaging & Pathology, Fac Medicine, KU Leuven & Oral and Maxillofacial Surgery, University Hospitals Leuven, Leuven, Belgium
2.State Key Lab Oral Diseases, West China College of Stomatology, Sichuan Univ, Chengdu, China
3.Group of Morphology, Biomedical Research Institute, Hasselt Univ, Diepenbeek, Belgium

Effect of platelet concentration on the density of myelinated nerve fibres in the peri-implants
An experimental study

Dandan Song[1], Yan Huang[1,2], Ivo Lambrichts[3], Sohaib Shujaat[1], Reinhilde Jacobs[1]*

Abstract

To histologically evaluate regeneration of myelinated nerve fibres following the local application of various concentrations of platelet-rich plasma.

In a split mouth design, seventy-two non-submerged commercial titanium implants (3.3 mm × 8 mm) were placed at both sides of mandibular ridge of nine beagle dogs. Implants were divided into 2 control and 2 test groups; implant placement without loading (Control group I, n=18), implant placement with loading (Control group II, n=18), platelet-poor plasma(PPP) + implant placement with loading (Test group I, n=18), platelet-rich plasma(PRP) + implant placement with loading (Test group II, n=18). After harvesting tissue blocks, histological evaluation was carried out for assessment of myelinated nerve fibers.

Nerve density of Control group I was found to be lowest when compared with other groups, and the statistical significance was observed at 3M ($P<0.05$). Myelinated nerve fibres showed a significant increase in density after 3M of healing in Control group II. Both PPP and PRP improved regeneration of myelinated nerve fibres with no effect on improvement of neurosensory function.

Research Methodology

1. Study protocol

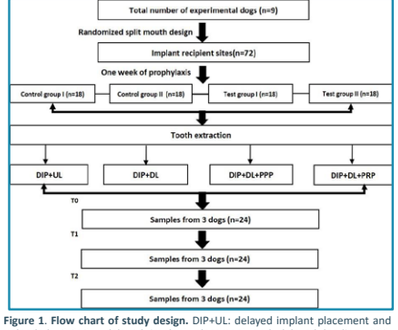


Figure 1. Flow chart of study design. DIP+UL: delayed implant placement and unloaded; DIP+DL: delayed implant placement and delayed loading. PPP: platelet-poor plasma; PRP: platelet-rich plasma; T0: one month; T1: 3 months; T2: 6 months

2. Region of interest (ROI)

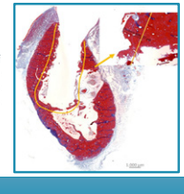


Figure 2. Region of interest. Area of 500μm away from the implant surface was selected as the region of interest where the myelinated nerve fibers were counted.

3. Nerve fibres diameter

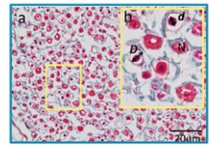


Figure 3. Morphometric analyses of the histological sections stained with Masson's trichrome stain (light microscopy). (a) Myelinated nerve fibers characterized by axons being surrounded by myelin sheaths formed by the Schwann cells; (b) a magnification of the selected box region in (a) showing the basic morphometric parameters of myelinated nerve fibers. d, axon diameter; D, nerve fiber diameter; N, nerve fibers.

Results

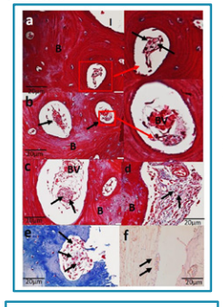
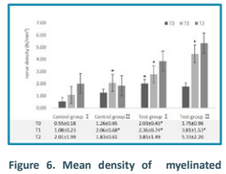
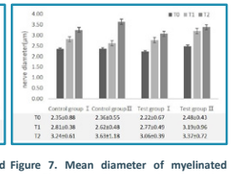


Figure 4. Decalcified sections stained with Masson's trichrome stain. Histologically observation of the myelinated nerve fibers via microscope (× 40). (a) Isolated myelinated nerve fibers are in the peri-implant bone; (b) and (c) The bundle of nerve fibers and blood vessel are in the Harversian canal. (d) and (e) Isolated myelinated nerve fibers accompanied with the blood vessels are in the implant thread space. (f) neuropeptide Y(NPY) confirmed the isolated myelinated nerve fibers. I: Implant; B: Bone; BV: Blood vessel. Black arrows pointed the nerve fibers and red arrows pointed the part which is magnified.



	Control group I	Control group II	Test group I	Test group II
T0	0.55±0.18	1.24±0.65	2.03±0.45*	1.75±0.96
T1	1.08±0.23	2.06±0.68*	2.36±0.39*	3.81±1.57*
T2	2.01±1.99	1.83±0.61	3.85±1.49	5.33±2.20

Figure 6. Mean density of myelinated nerve fibers in the peri-implant bone (N/mm²). The bar and each whisker end represent the mean of nerve density and standard error. *Statistical significance difference($P<0.05$) comparing groups with the Control I group.



	Control group I	Control group II	Test group I	Test group II
T0	2.15±0.88	2.36±0.55	2.22±0.67	2.48±0.43
T1	2.81±0.38	2.62±0.48	2.77±0.49	3.33±0.96
T2	3.24±0.65	3.63±1.18	3.06±0.39	3.52±0.72

Figure 7. Mean diameter of myelinated nerve fibers (μm). The bar and each whisker end represent the mean of nerve diameter and standard error.

Conclusions

Within the limitations of the study, we can conclude that implant loading exerted positive effect on regeneration of nerve fibres in the peri-implant region. However, no relationship was observed between platelet concentration and restoration of neurosensory function.

References
1. Huang Y, Corpas LS, Martens W, Jacobs R, Lambrichts I. Histomorphological study of myelinated nerve fibres in the periodontal ligament of human canine. *Acta Odontol Scand* 2011;69:279–286.
2. Huang Y, Bornstein MM, Lambrichts I, Yu H-Y, Politis C, Jacobs R. Platelet-rich plasma for regeneration of neural feedback pathways around dental implants: a concise review and outlook on future possibilities. *Int J Oral Sci* 2017;9:1–9.

E-mail:
dandan.song@kuleuven.be

INVITED LECTURES

30-01-18	C. Politis	3D printing in maxillofacial surgery 3D medical conference, 5th Edition	MECC Maastricht, The Netherlands
30-01-18	R. Jacobs	Beyond CBCT: from virtual patients to 3D bioprinting in oral healthcare 3D Medical Conference	Maastricht, The Netherlands
19-05-18	C. Politis	Hoe kijken we naar gezichten en tanden: van normaal tot abnormaal - de bijdrage van de MKA-arts	LUTV, Leuven, Belgium
19-05-18	C. Politis	Orthognatische heelkunde	LUTV, Leuven, Belgium
01-06-18	R. Jacobs	Radio-anatomy of the jaw bone in 2 and 3 dimensions	LUTV, Leuven, Belgium
20-06-18	R. Jacobs	Advances in 3D-imaging/printing prior to important therapy EuroPerio	Amsterdam, The Netherlands
15-09-18	R. Jacobs	De 3D's van een stralend beeld: dimensies, dosis en diagnose NiVVT, Najaarssymposium 2018	Antwerp, Belgium
27-09-18	Y. Sun	Application of 3D Surgical Planning in Oral and Maxillofacial Surgery, Wu Han University, School of Stomatology	Wuhan, China
27-10-18	C. Politis	3D en Navigatie in Traumatologie, Implantologie, TMJ chirurgie 3D technologie in MKA	LUTV, Leuven, Belgium
27-10-18	C. Politis	3D technologie in MKA	LUTV, Leuven, Belgium
17-11-18	R. Jacobs	Dimensies van een stralend beeld deel 1: van indicatiesstelling tot diagnose deel 2: 3D diagnostiche dilemma's	VTB Aalst, Belgium

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. Constantinus Politis - Reinhilde Jacobs - Gabriela Casteels