ANNUAL RESEARCH REPORT 2019
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INTRODUCTION

ACTA, the Academic Centre for Dentistry Amsterdam, is the collaborative faculty of dentistry of the University of Amsterdam (UvA) and Vrije Universiteit Amsterdam (VUA), a collaboration founded in 1984. The boards of both the UvA and VUA share responsibility for the research performed at ACTA. Among the Dutch universities, ACTA is the only full-fledged Faculty of Dentistry. Research at ACTA is organized in the ACTA Dental Research Institute.

ACTA’s core mission is threefold: to provide dental education, dental care and perform dental research. To this end, ACTA’s management is divided into three institutes: the Education Institute, responsible for organizing Bachelor’s and Master’s level dental education as well as the Oral Health Sciences Master’s programme; the Oral Care Institute (Dental Hospital), responsible for offering oral care to patients; and the Dental Research Institute, responsible for all research. In addition, at ACTA we have a School of PhD studies involved in PhD training. ACTA’s research strategy aims to include all biological, basic and clinical research aspects related to the health of the oral cavity and craniofacial tissues and dental patient well-being, including the reciprocal interaction between oral and general health. Oral health related research comprises not only the studies on the most common diseases, caries and periodontitis, but also other disorders with substantial impact on quality of life and society at large, such as oral cancer, chronic pain and complex dental treatment needs due to tooth loss as well as treatment in elderly patients or in patients with severe and multiple medical conditions and medications. It also includes rare disorders such as genetic variations and malignancies as well as health economics, behavioural sciences and pedagogy.

In 2014 an international review committee evaluated the two research programs of ACTA. Both programmes Oral Infections and Inflammation and Oral Regenerative Medicine received a very good to excellent rating. In 2019, ACTA ranked #2 on the QS Ranking of Higher Education for the subject Dentistry. In November 2020, another evaluation of the Dental Research Institute will be performed.

The annual report on ACTA’s research contains the annual survey and overviews of the scientific activities. As in preceding years the scientific performance is subsequently presented for each programme. Detailed information is given of dissertations, scientific publications in refereed journals, other scientific publications, professional publications, indicators of esteem, collaborations and societal impact.

Research Institute ACTA

prof. dr. F. Abbas  dean a.i. (as of July 1st 2019)
prof. dr. A. Feilzer  past dean (up to June 1st 2019)
prof. dr. B.G. Loos  director of research (as of December 1st, 2019)
prof. dr. F. Abbas  director of research a.i. (June 1st to December 1st, 2019)
prof. dr. A. Feilzer  director of research a.i. (up to June 1st)
dr. B.J.J. Hattink  coordinator of research (as of April 1st, 2019)
dr. H.S. Brand  coordinator of research and director of School of PhD-studies
ms. F.M. Meijer  secretary of research institute

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The Research Institute ACTA

- **mission**
  ACTA is to be recognized for its research towards a pain-free and disease free oral cavity (with all its hard and soft tissues) for our youngest to our eldest citizens: we recognize that oral health and proper function leads to better general health and overall wellbeing. We will accomplish this by focus on the biology, consequences and prevention of caries, oral inflammatory diseases and oral malignancies. Thus this comprises also the understanding of oral health- and oral function related quality of life. Furthermore ACTA focusses on the development and study of safe (bio)materials and bone substitutes applicable in the oral cavity without systemic side-effects to repair or replace and ultimately regenerate lost hard (tooth material, jaw bone) and soft oral tissues.

- **vision**
  ACTA will utilize and expand in the collective expertise available: to collaborate within both universities at large (including the university medical centres),and nationally with sister-dental faculties, especially in the ‘–omics’, immunology, public health, data science and Artificial Intelligence domains. Researchers, students and society will see new developments at ACTA in the areas of diagnostics and applied prevention; and in the arena of digital dentistry and modern learning environments.

- **positioning of the research institute, research programmes and departments**

  ![ACTA organizational chart](image)

  **Figure 1.** ACTA organizational chart

  Research at ACTA is undertaken through the ACTA Dental Research Institute, which, as of 2010, comprises two research programmes (see figure 1 for a schematic overview). In 2011 and 2012 the institute received two grants for so-called ‘Research Priority Areas (‘zwaartepunten’)’ (RPAs) from the UvA. With these grants the university aims to strengthen its focus and interdisciplinary collaboration and to enhance research quality. It was decided to convert these RPAs into two overarching research programmes which include all twelve former research programmes, namely ‘Oral Infections and Inflammation’ (OII) and ‘Oral Regenerative Medicine’ (ORM).

  Over the past years, we further strengthened and expanded our public health research efforts and our awareness of societal relevance. Both research programmes have a large portion of research that is translational and of societal relevance. Dentistry in particular is strong in applied oral prevention. The content of ACTA’s research themes matches with the daily activities of an oral care professional, covering the three main topics of daily practice: the diagnostics and treatment of oral diseases, the prevention of oral diseases, and the repair of damage and oral function.
ACTA has additional research which focuses on dental education, especially dexterity and skills development via the dental simulator ‘Simodont’. This educational research has no direct connection with the two larger research programmes, but serves the important purposes of advancing our teaching missions and disseminating our knowledge and advancements within the global dental school communities; our mission to deliver capable dentists has obviously societal relevance.

Figure 2. Schematic representation of the organization of ACTA’s two formal research programmes and the smaller “Educational Research” component. The main research programmes translate an important part of their work into Societal Relevance and interact bi-directionally with the Public Health and Applied Prevention domains, which are positioned as a shell around the two more biology-oriented programmes. Educational research encompasses a small part of ACTA’s research and connects also with the outer shell for its responsibility to society to deliver capable dentists.

• description of output, leading scientific journals in the field

Within ACTA’s research considerable differences exist in the approaches used; yet, it ranges from fundamental medical-biological to clinical-applied science, to public health and educational research. This is reflected by the type of scientific journals in which ACTA researchers publish. Some researchers primarily present their findings in journals aimed at the dental research community, while others also aim for general medical-biological literature.

Evaluation of the research program

• external evaluation

The most recent external evaluation has occurred in spring 2017, when an external evaluation was performed of the two main programmes that originated from the ‘Research Priority Areas (‘zwaartepunten’)’ of the University of Amsterdam. The scientific quality of both the Oral Infections and Inflammation program as well as the Oral Regenerative Medicine program was qualified as excellent.

In November 2020, an external evaluation committee will visit ACTA again to assess the quality of the research, relevance to society and viability. Following the new national protocol for assessment, they will no longer grade research on fixed parameters such as ‘Excellent’; yet they will describe in a narrative report the strengths and weaknesses they observed and offer suggestions. Specific attention will be given to current themes such as academic culture, diversity and Open Science. Additonally, they will look at the suggestions the earlier committees, and how ACTA has acted upon those.

Citation analysis. CWTS (Centre for Science and Technology Studies, Leiden, The Netherlands, https://www.cwts.nl/) was asked to conduct a study on the research performance of ACTA by comparing its scientific output with a benchmark. The data selection for ACTA was performed using publication definitions provided by ACTA which were to be matched against the Web of Science (WoS). The benchmark institutes were selected by the labels within the unified address definitions in which CWTS has invested heavily. It makes sense that the more unambiguous the address affiliation definitions are, the more complete the data selection will be. This applies especially to ACTA, which is legally split into two universities and, in the past, has been spread over more than five addresses, but asked to be evaluated as one institute. As frequently happens with organizations like ACTA, which is seen by CWTS as an umbrella organization, not all publications that it oversees are identifiable as part of its own body of work.

In spite of the potential omission of certain publications, the CWTS analysis showed that ACTA consistently performs with high impact as defined by the Mean Normalized Citation Score indicator (MNCS; average: 1.25, which represents 25% above the world mean). This was found to be consistent with the value for our share of
top 10 cited publications. When the benchmark institutes with a relatively high impact combined with a relatively high nominal output volume are compared, ACTA scores high impact and finds itself on a comparable output level with other, mostly Anglo-Saxon, high-impact institutes. In this respect, it outperforms most of the benchmarks but is inevitably overtaken by some top-notch performing, mostly American and British, institutes. One has to realize that whereas ACTA’s research output is primarily based on studies performed by PhD students, some of the benchmarks do not have a PhD programme (e.g. University of Zurich) and their research is mainly produced by their senior staff.

**Figure 3.** Position of ACTA and benchmark institutes for publications 2014 through 2019. MNCS: Mean Normalized Citation Score Indicator.

### Summary of research output and input

#### Table 1. Comparison of research indicators 2007-2019

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<td>15</td>
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<td>Refereed publications</td>
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<td>216</td>
<td>196</td>
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<td>208</td>
<td>250</td>
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<td>286</td>
<td>272</td>
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<td>First author from ACTA</td>
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<td>105</td>
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<td>168</td>
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<td>36.7</td>
<td>36.2</td>
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<td>46.2</td>
<td>42.4</td>
<td>41.0</td>
<td>43.5</td>
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<td>9.6</td>
<td>7.0</td>
<td>7.8</td>
<td>10.1</td>
<td>9.4</td>
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<td>5.9</td>
<td>4.9</td>
<td>3.9</td>
<td>3.6</td>
<td>4.2</td>
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Annual Research Report 2019

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<th>27.8</th>
<th>23.3</th>
<th>29.6</th>
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<td>Total personnel</td>
<td>68.7</td>
<td>62.1</td>
<td>61.6</td>
<td>57.9</td>
<td>60.7</td>
<td>66.5</td>
<td>68.1</td>
<td>66.1</td>
<td>71.6</td>
<td>77.1</td>
<td>69.4</td>
<td>74.8</td>
</tr>
</tbody>
</table>

wp1 = academic personnel funded by 1st source in fte; this includes direct funding by the university
wp2 = academic personnel funded by 2nd source in fte; this includes research grants obtained in national competition from NWO, STW and KNAW
wp3 = academic personnel funded by 3rd source in fte; this includes research contracts for specific projects obtained from external organizations, such as industry, governmental ministries, European Commission and charity organizations

- long time performance

Dissertations (PhD theses). In 2019 ACTA registered 19 PhD-dissertations, which is in line with the average of the past years (see Table 1).

PhD performance. The percentage of PhD students that finished their thesis averages 90% over the last 20 years, and the mean time period between start of employment and defending the thesis is 4.6 years. This value is corrected for the 0.6 to 0.8 fte employment of several PhD students and for longer leaves of absence (e.g. maternity and illness) of some PhD students. In 2019 this trend is maintained.

Scientific publications. The main attention in the research assessment at the individual and program level is given to publications in scientific journals with a peer review referee system. This category has increased considerable since the turn of the century, and resulted in a stable high output since 2013. In 2019, a high number of 230 publications was obtained. Although this is slightly lower than 2018, it fits within the overall trend (see Table 1). The same is true for the average quality of the publications, as indicated by the increased impact factor. This also shows a slight dip, which is expected to fit within the overall trend.

Professional publications. ACTA scientists are very active in communicating their research findings not only to the scientific community, but also to professionals. The number of professional publications in 2019 was 123.

Figure 4. Impact factor sum of ACTA publications, scientific publications in refereed journals, professional publications and total scientific personnel in fte.

- notable events in 2019

Publications in high ranking journals. Outstanding contributions for the year 2019 were publications in high ranking biomedical journals, i.e. Journal of the American Chemical Society (impact factor 14.7), Physical Review Letters (impact factor 9.3), and two publications in Clinical Cancer Research (impact factor 8.9). ACTA scientists published 22 papers in the top 10% of journals in their respective fields.
Impact factors. In addition to the output indicators given, the percentage of papers in high impact journals in the field gives valuable information. ACTA published in total 250 scientific papers in refereed journals, of which 229 in journals with an impact factor (SCI journals). 96 of all papers appeared in journals belonging to the field Dentistry, Oral Surgery and Medicine. This means that, as in previous years, a relatively large number of publications were published in the top journals in the field, both in dental and in non-dental journals.

Grants. In 2019, ACTA has obtained several contracts and subsidies. The departments of Preventive Dentistry and Periodontology are performing a large clinical study on the effects of probiotics on oral health for a German company. Various industrial partnerships are contributing financially to the investigations of the Oral Kinesiology department into sleep apnea. The Dutch Association for Oral Implantology has awarded the 2018 stipendium to the department of Oral Maxillofacial Surgery for a study of reconstruction of jaw defects, which continues into 2019. The department of Oral Implantology received an NWO grant for the development of an innovative bone substitute and a European grant of more than 450,000 Euros for the development of 3D bio-printing. The department of Oral Cell Biology received a European grant of more than 200,000 Euro for the development of a tool for treatment of bone tumors. The department of Social Dentistry has completed the ADVOCATE project (about 4 million euros in total, of which over 1.3 million for ACTA) for the development and comparison of new models for safe and efficient prevention-oriented health and care systems.

| Table 2. Percentage of publications in different quartiles of dentistry and non-dental journals in 2019 |
|-------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                                   | dentistry journals | non-dental journals | all journals     |
|                                                   | numbers | percentage | Numbers | percentage | numbers | percentage |
| top 10%                                          | 9       | 9 %        | 13      | 10 %        | 22      | 9 %        |
| Quartile 1                                       | 29      | 30 %       | 50      | 38 %        | 79      | 35 %       |
| Quartile 2                                       | 38      | 40 %       | 57      | 43 %        | 95      | 41 %       |
| Quartile 3                                       | 17      | 17 %       | 20      | 15 %        | 37      | 16 %       |
| Quartile 4                                       | 13      | 13 %       | 5       | 4 %         | 18      | 8 %        |
| total                                            | 97      | 100 %      | 132     | 100 %       | 229     | 100 %      |

• assessment at the program level
In 2019, both research programs published almost the same number of refereed publications. However, the number of dissertations counted towards ORM was 13, while the number of dissertations with OII was 6. The output of the OII programme was higher than the ORM programme with regard to the number of professional publications published, see Table 3. It needs to be noted that publications fitting in the ‘shell’ of public health, applied oral prevention and societal relevance, around the two programmes, are counted towards the two programmes; there is considerable overlap and the programmes are as much active in the public health and applied oral prevention domain as in more fundamental aspects. Other research (OWI; short for ‘OnderWijsInstituut’, research into education), not related to the two programs, is limited both in terms of input (personnel and budget), and of output.

| Table 3. Summary of the number of publications, impact factor sum (1st author in parentheses) |
|-------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Program                                         | Dis | Ref publ | OSP | PP | PGP | IF   |
| OII                                             | 6   | 128 (60) | 16  | 86 | 3   | 395  |
| ORM                                             | 13  | 118 (57) | 8   | 47 | -   | 342  |
| OWI                                             | -   | 3        | -   | 1  | -   | -    |
| ACTA*                                           | 19  | 229 (113)| 24  | 123| 3   | 738  |

*because of overlap between programmes these numbers do not add up from the totals above.
This table summarises the number of scientific publications in refereed journals, the number of other scientific publications, and the number of professional publications. Also the personnel involved in full time equivalent...
(fte) and the impact factor-sum (IF-sum) are included in this table. The IF-sum was calculated for each program by adding together the impact factor values of all 2019 publications.

<table>
<thead>
<tr>
<th>Dis</th>
<th>number of dissertations</th>
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<tr>
<td>Ref publ</td>
<td>number of scientific papers in refereed journals. Between parentheses is the number of first authors belonging to the program in question</td>
</tr>
<tr>
<td>OSP</td>
<td>other scientific publications (international, refereed)</td>
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<tr>
<td>PP</td>
<td>professional publications</td>
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<tr>
<td>PGP</td>
<td>publications for the general public</td>
</tr>
<tr>
<td>IF</td>
<td>sum of impact factors as indexed by ISI.</td>
</tr>
<tr>
<td>wp1</td>
<td>academic personnel funded by 1st source in fte</td>
</tr>
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<td>wp2</td>
<td>academic personnel funded by 2nd source in fte</td>
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<td>wp3</td>
<td>academic personnel funded by 3rd source in fte</td>
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<td>wp tot</td>
<td>all academic personnel in fte</td>
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<tr>
<td>OII</td>
<td>Oral Infections and Inflammation</td>
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<td>ORM</td>
<td>Oral Regenerative Medicine</td>
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<tr>
<td>OWI</td>
<td>Education Institute and other research</td>
</tr>
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</table>

RDM
During the evaluation period, Research Data Management (RDM) has become an important new issue, as part of open source policy and a new European law on privacy. In line with developments within all Dutch universities, ACTA takes RDM seriously and has developed its own RDM policy. Since April 2019, ACTA has recruited a policy officer (‘data protection officer or data steward’) responsible for RDM. He is involved in the RDM Support Communities of both universities, the UvA’s data steward council and VUA’s RDM Support Desk and RDM Communities. He advises on such issues as the use of tools for data collection and data storage, data protection, Data Management Plans, Open Science, FAIR Data (FAIR: findable, accessible, interoperable and reusable), and data-privacy related matters. ACTA has acquired several different tools to help in data management before, during and after research. Before research starts, ACTA researchers can use DMPonline to fill in their Data Management Plans; after research ends, ACTA offers the use of DarkStor or FigShare for securing data in repositories.

For clinical research, ACTA uses CASTOR, an electronic case report form tool, which is fully compliant with legal requirements such as GCP. Use of this tool is mandatory. For lab work, ACTA currently uses paper-based lab journals, but it plans to introduce an electronic version. Additionally, through the universities, ACTA offers tools for questionnaires (Qualtrics), secured data sharing (SURFdrive) and other research support.

Open Science
Diversity
The student population within dentistry at both undergraduate and PhD level is one of the most diverse within both universities. The diversity of our educational and research staff is developing and slowly following the same trend. With the diversity of Dutch society ever changing, we believe it is very important that the diversity of our staff reflects that of the society as a whole. In 2018, ACTA appointed a diversity officer, who is helping to improve our diversity policy (please see Appendix 8.2.8 for figures on diversity).

Specific courses organized by both parent universities are offered to the staff, enabling them to learn more aspects that are relevant for the multicultural society of ACTA. Moreover, festivities such as ‘Chinese New Year’ and the ‘Islamic Sugar Festival’ receive our special attention.

As we are also facing many cultural differences in our clinics and realize the value of diverse cultures and opinions in research, we view diversity in a broader sense than merely as a gender discussion. We educate our students to enhance their competence in handling diversity. Specific attention is also given to the diversity of the patient population during clinical work: students encounter patients from all over Amsterdam (and beyond) and as such encounter a large diversity of people.

During the evaluation period we have successfully applied for one ‘Fenna Diemer Lindeboom chair’ and two NWO chairs, all specifically aimed at woman scientists (NWO Johanna Westerdijk Talentimpuls). In addition, Mrs. Egija Zaura, PhD, was appointed as an Honorary Professor at VUA through a ‘university research chair’ call.
Societal impact

- **impact on teaching and dental care**
The prime societal values of a strong research program in a dental discipline are the effect on teaching and on dental care. The research improves the quality of teaching given at ACTA, both for undergraduate students, graduate students, students participating in the post-initial specialist courses, and for PhD students. New findings and concepts are included in the curriculum at ACTA, but are also presented to dental practitioners at frequently held education activities, e.g. Quality Practice. The Research Institute participates in the ACTA curriculum by offering scientific training to all ACTA dental students. The societal impact of the research of ACTA is also focused on the influence on patient care, both within ACTA and externally. Research on different main areas of interest contributes to improved prevention, diagnosis and treatment of relevant patient groups. The high number of professional publications contributes to this societal impact. Below, in this annual report the societal impact of ACTA is separately described.

- **functions in the scientific and professional community**
ACTA employees take an active role as executives in international scientific organizations (90 international functions), as members of editorial boards of scientific journals (50) and in being leading in ‘wetenschappelijke verenigingen’ of researchers and dental practitioners in the Netherlands. Furthermore, the societal impact is evident from the organization of symposia and conferences in the Netherlands and abroad, presentations for dentists, medical specialists and patient groups, memberships of advisory councils, and frequent contacts with the industry. In addition many scientists are also practising as dentists in specialized clinics at ACTA or in the Amsterdam region. Obviously the societal impact of their activities, individually as clinically active professionals and leading among their peers, should be acknowledged. The societal impact is also evident from the relatively large number (123) of professional publications. Some ACTA researchers also wrote publications aimed at a more general audience. Several research findings were highlighted in the general press.

- **invited lectures and congresses organized**
In 2019 ACTA researchers have again contributed actively in internationally held meetings, workshops and symposiums, both as organizers and participants. A total of 150 lectures was given as ‘invited speaker’ at international congresses and symposia. In addition a large number of presentations were given at international congresses after selection on submission of abstracts and during congresses and symposia for a Dutch or international audience. Due to this large number, congress abstracts are not listed in this annual report. For a total of 20 international meetings, ACTA scientists were involved in the main organization.

Management

- **Research and PhD support organization structure**

![Diagram](image)

*Figure 5. Research and PhD-trajectory related organization chart*

In 2016, after the retirement of the director of the ACTA Dental Research Institute, the Dean established a ‘Scientific Research Committee’ (Commissie voor Wetenschappelijk Onderzoek; CWO) consisting of the Director...
of Research, the programme directors, departmental chairman, the Director of ACTA Dental Research BV and the coordinator of the Research Institute. From 2016 to the end of his deanship term (2019), the Dean functioned as interim Director of Research. A new Director of Research was appointed on 1 December 2019. The CWO advises the Director of Research and the Dean on research policy; and assesses for new research proposals whether they fit the overall strategic aims of ACTA. The assessment will be focused on important issues in dentistry and oral health and all related fundamental medical-biological issues. The CWO meets on a bi-weekly basis to discuss new research ideas, PhD studies, grant requests and new opportunities. All grant applications at ACTA finally have to be approved by the Dean, after positive advice from the CWO. The execution and quality assurance for PhD-student education is organized in the School of PhD Studies under responsibility of its Director; important feedback and advice is obtained through the Graduate Study Committee, which we call the DECA (Doctorate Education Committee ACTA) (see below, Chapter 3.9).

The Director of Research, together with the programme leaders, is responsible for research quality assurance, the overall daily planning of research. The Director advises the Dean of ACTA on these aspects. The Director of Research is responsible for the following aspects of all research:

- the faculty research vision and strategic policy;
- the faculty research budget;
- research quality;
- the organization of the research;
- maintaining contacts with the universities’ executive boards and external parties.

We realize that we must continue to maintain a research culture in which the researchers can make maximum use of their ‘academic freedom’ and ‘curiosity’ to enable performance of high-level scientific research. As a consequence, the programme directors have to consider how focusing research into a limited number of programmes might interfere with the required academic freedom and personal interests of the researchers. Besides focusing on two overarching research programmes we recognize this need and combine it with the opportunity to enhance the development of new research directions. As a consequence, every researcher also has free 'leeway' to conduct pilot studies into new research directions and opportunities.

- finances
The overall budget of the research institute is divided into a part controlled directly by the directorate and another part that is allocated to the departments.

The institute budget (senso stricto) of €1,285 is used for the management of the institute, salaries of PhD students, for travel allowances of PhD students, for software and licenses for RDM and Open Science tools, for overhead costs on 2nd cashflow projects, for the organization of courses for PhD students, as well as for obligatory fees for all ACTA researchers (e.g. for library and IT services).

The research budgets for the departments (in total being €3,800) are distributed based on a model containing the number of employed (associate) professors and research staff, as well as several performance parameters, such as bibliometric data over the last 5 years, PhD theses and external funding. In addition, standard bench fees are issued for PhD students appointed by the research institute.

In addition to the university budget (1st source), ACTA scientists were involved in many research projects with external funding. The total amount of research grants (2nd source) was €480 and the total amount of research contracts (3rd source) was €1,875.

- personnel
The directorate of the institute is comprised of:

prof.dr. B.G. Loos, director of research 0.03 fte
dr. B.J.J. Hattink, coordinator of research 0.55 fte
Dr. B.J.J. Hattink, data steward 0.25 fte
Dr. T.J.M. van Steenbergen, coordinator of research (until April ’19) 0.80 fte
Dr. H.S. Brand, director School of PhD studies 0.40 fte
Ms. F.M. Meijer, secretary 0.60 fte
Dr. J.A.M. Korfage, research support 0.15 fte

The activities of the research institute directorate consist of organizing scientific meetings with presentations of PhD students, the screening of new research projects, the day-to-day interaction with graduate students on practical matters regarding their position, compiling the annual research report, the planning of graduate courses, allocating budgets for research to the departments, controlling the institutes budget and dealing with general correspondence on research issues with UvA, VU etc.
PhD students
The ACTA PhD training program is organized in the School of PhD studies. In order to support all of our PhD students, and to continuously improve our PhD education, the Doctoral Education Committee ACTA (DECA) was formed to oversee this process (see also Fig. 3). The DECA is headed by the Director for PhD studies; it is comprised of three senior researchers (who are professors or associate professors and have extensive experience in supervising PhD students), two policy officers (who both have a PhD and as such can easily relate to PhD students), and a PhD student member (who is also involved in the ACTA-wide PhD council, ‘ACTApro’). In addition to regular meetings with PhD students, the DECA ensures that PhD students receive education corresponding to at least 30 ECTS credits and that all students take the mandatory courses (Statistics, English and Scientific Integrity). PhD students highly value the support of the DECA.

The external PhD students (non-employed guest researchers, either national or international) must also meet the educational requirements. A ‘training and education plan’ is being drawn up for them, whereby part of the training can take place via e-learning (e.g. the scientific integrity course and statistics) and sometimes another part can take place in their own country. For example, some international students follow the certified educational training locally (e.g. for ‘Privat Dozent’).

PhD student background
In Figure 2, the number of new PhD students at ACTA is shown from the years 2000 to 2019. In 2019, 10 new PhD students were appointed by ACTA which is below the long-term average. Two-thirds of all PhD students have a dental background (see Table 5). Of all PhD students 60% is female.

Table 4: Country of origin of new PhD students 2014-2019

<table>
<thead>
<tr>
<th>Country</th>
<th>Country</th>
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<tbody>
<tr>
<td>Belgium</td>
<td>Croatia</td>
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<tr>
<td>Bolivia</td>
<td>Lebanon</td>
</tr>
<tr>
<td>China</td>
<td>Nepal</td>
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<tr>
<td>Colombia</td>
<td>Portugal</td>
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<tr>
<td>Curacao</td>
<td>Romania</td>
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<tr>
<td>Germany</td>
<td>Russia</td>
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<td>Egypt</td>
<td>Saudi Arabia</td>
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<tr>
<td>Finland</td>
<td>Surinam</td>
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<tr>
<td>Greece</td>
<td>Czech Republic</td>
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<tr>
<td>India</td>
<td>Turkey</td>
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<tr>
<td>Indonesia</td>
<td>Sweden</td>
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<tr>
<td>Iran</td>
<td>Switzerland</td>
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<tr>
<td>Italy</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>Kazakhstan</td>
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</tr>
</tbody>
</table>
Figure 2. Numbers of new ACTA PhD students from the Netherlands and other countries

Table 5: PhD students by type of undergraduate training

<table>
<thead>
<tr>
<th>program</th>
<th>dentistry Dutch</th>
<th>dentistry other</th>
<th>biology / chemistry</th>
<th>psychology</th>
<th>medicine</th>
<th>other</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>OII</td>
<td>31</td>
<td>27</td>
<td>4</td>
<td>3</td>
<td>19</td>
<td>7</td>
<td>91</td>
</tr>
<tr>
<td>ORM</td>
<td>29</td>
<td>39</td>
<td>7</td>
<td>1</td>
<td>5</td>
<td>10</td>
<td>91</td>
</tr>
<tr>
<td>OWI</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>67</td>
<td>11</td>
<td>4</td>
<td>24</td>
<td>17</td>
<td>184</td>
</tr>
</tbody>
</table>

OII = Oral Infections and Inflammation
ORM = Oral Regenerative Medicine
OWI = Education Institute and other research

- PhD Courses
  The following courses are organized for PhD students: Scientific Integrity, Dentistry for non-dentist PhD students, Writing and Presenting in English, Methodology and Statistics, and Oral Biology. Dentistry is a multidisciplinary science and the background of the PhD students of ACTA is diverse. Therefore, most PhD students also follow external courses on specific research areas, organized by research schools in other disciplines.

- PhD thesis duration and completion rate
  Attention has been paid to the problems related to the social security benefits of PhD students and the time that PhD students need to finish their thesis. The mean time between start of the PhD project and the defence of the thesis within ACTA amounts 4.7 years.
Over the last 20 years, about 90% of all PhD students in ACTA completed their thesis (Figure 4). The PhD programme was evaluated by an external review committee in 2014. They concluded: Following queries about the infrastructure and core facilities, there was strong and unanimous agreement on the effectiveness of the ACTA programme to provide excellent PhD training. The students indicated that their programmes were well-organized and were well-supported to enable fulfilment of their research goals.
Points of attention

- HRM and retirement
In the coming years several full professors who were active in 2019 will retire, thus giving the opportunity to appoint highly qualified researchers with a focus on one of the two programmes. The fte staff members on university budget (1st source) was comparable to 2019, while the fte PhD-students on university budget (1st source) showed a slight decrease. An increase was also observed for scientific personnel on grants (in particular 3rd source). –uit SEP

- PhD training
The duration of the PhD programme is, like elsewhere in the Netherlands, in general 4 years full time. PhD students with an employee status are generally employed for 3 years full time or for 5 years during 4 days a week. PhD students funded by EU grants are appointed for 3 years. PhD students funded by ACTA will also be appointed for 3 years.

According to the PhD regulations of both universities the course programme has been formalized with 30 ECTS points and examinations. The integration between the PhD training programme and the post-graduate clinical training programmes for dental specializations, which is limited now to the courses on statistics and oral biology, will be intensified. Following a course on Scientific Integrity is obligatory for all PhD-students.

Conclusion
The research at ACTA has always been characterized by a wide range of different topics that covered most dental disciplines. The present policy is to focus on the two specific research areas with an excellent performance. The analysis of the various parameters of performance shows that the research at ACTA is, despite of budget restrictions, increasingly improving. Future performance will be dependent among others from the success in obtaining 2nd and 3rd source grants.
Oral Infections and Inflammation

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Introduction

Oral Infections and Inflammation
The oral cavity is one of the most infected parts of man. We hardly understand why most people are completely healthy with at least a thousand different species of microorganisms in billions of numbers present in the mouth, while other individuals develop oral infectious diseases, chronic inflammatory processes and other pathologies, including oral cancers. The central research theme “Oral Infections and Inflammation” (OII) focuses on the pathophysiology, epidemiology and (psycho)social aspects of oral infections and inflammation and prevention and treatment of those, as well as defining and understanding the healthy oral cavity as a complex ecosystem, with applications far beyond the mouth alone. The four topics in this program interact with each other and can be depicted in the schematic diagram below.

Research theme Oral Infections and Inflammation

Research objectives

1) The healthy oral cavity and good systemic health.
Oral health is an essential part of the general health of each person during his or her life. Poor oral health, oral infections and inflammation, oral cancer and other oral pathology, can lead to major health risks and might affect the progression of cardiovascular diseases, diabetes, cancer and cancer dissemination, systemic chronic and acute infections and vital organ failure. Poor oral health leads to a lower quality of life and economic hardship. In collaboration with several industrial partners and the Netherlands Organization for Applied Scientific Research (TNO), we work on defining and sustaining normal oral health using a molecular biology approach (-omics). At the same time, we investigate the systemic effects of oral infectious processes in relation to atherosclerotic cardiovascular disease and diabetes.

2) Innate immunity (cells/saliva), and susceptibility for caries and periodontal diseases.
Studies into the role of saliva and innate immune cells (circulatory and oral PMN) in the maintenance of oral health have a prominent place. Several salivary proteins have strong antimicrobial capabilities and have important proteinase inhibitory actions. Synthetic peptide analogues of salivary histatins are tested as broad spectrum antibiotics. The influence of saliva on the interaction of oral microorganisms with oral epithelial cells and the in vitro wound healing capacities of salivary components are also being investigated. We find PMN in rinsing samples and they have antimicrobial functionality, including NET-formation and are thought to have an essential role in maintaining oral health. For periodontal diseases, we collaborate in a self-supported European consortium to identify genetic variations, and we model periodontal disease as a complex system (environmental, life style factors, systemic factors, randomness).

3) Epidemiology and pathophysiology of oral cancer.
Forms of oral cancer, precursor lesions of oral cancer, particularly leukoplakia, and salivary tumours are studied. Amongst others, the prognostic value of molecular markers is examined with regard to the malignant transformation of leukoplakia, and the role of the human papilloma virus (HPV) has been studied. Poor oral health with its concomitant increase in the oral bacterial load, can predispose for oral cancer. Oral infections are independently associated with oral (pre)cancers. Therefore, not only the traditional risk factors smoking and alcohol usage play a role in oral cancer, but also oral bacteria, yeasts and viruses. Laboratory and clinical studies are ongoing. Intervention in the precursor lesions of oral cancer, particularly leukoplakia,
may prevent the development of frank malignancies. Also other odontogenic tumours are studied, with emphasis on ameloblastomas and keratocystic odontogenic tumours. Characterization is also included of salivary gland tumours at the genomic and protein level.

4) Prevention and therapy of oral infections and inflammation.

The knowledge that oral infections and inflammatory processes may have systemic effects, provides a fundamental basis for new cost-effective prevention programs as well as economic and social spin-off product-innovations in the food and oral care products and dental restorative materials. The dental and medical profession is (re)educated with new knowledge on the fundamentals of normal oral health and the risks of having chronic oral inflammatory processes. The formation, structure and properties of oral and dental biofilms are studied, also in relation to tooth and implant structures. In addition, new antimicrobials and peptides have come into focus as caries and periodontitis preventive agents. Studies into the most effective clinical measures to prevent inflammation of the gingiva and mucosa and to control oral health are being conducted, including substantial efforts to reach clinical standards for evidence based dentistry. Part of successful prevention measures is to improve and to maintain the well-being of both regular dental patients and subgroups of patients suffering from (extreme forms of) anxiety or (anticipated) pain or from physical/mental handicaps.

The researchers within the theme Oral Infections and Inflammation have an international prominence in the field of oral health and have acquired a global leadership role in the emerging field of complex ecosystems such as the oral cavity; thus understanding of oral infections, inflammatory processes, oral cancer and the definition of a normal, healthy oral cavity including psychosocial factors. We have been awarded a grant from the University of Amsterdam (UvA) (starting date 1-1-2011) and we demonstrated the multiplier effect (both on the academic as well as the economic aspects) by participating in the Health-Holland program “Modulation of the oral ecosystem” (contract signed December 2017) in which also TNO, Philips and GSK participate.

Results obtained

- We followed 51 multiple myeloma patients before, during and 3 months after autologous stem cell transplantation, and assessed changes in their oral ecosystem. Oral microbiome changes occurred in all patients, but baseline oral microbiome of those patients who developed ulcerative oral mucositis differed from those who did not, suggesting a predictive potential of microbiome analyses for mucositis development.
- We studied the effects of commensal and pathogenic (caries or periodontal disease-associated) microbial communities in a 3D gingival in vitro model (reconstructed human gingiva) and found that commensals, unlike pathogenic biofilms, led to a strong immune activation of gingival tissue. This suggests that commensals may prime the host against microbial challenges while pathogens – evade the host responses.
- We studied interactions between oral commensal fungus *Candida albicans* and with systemic infections associated bacterium *Staphylococcus aureus* in a murine oral co-infection model and *in vitro* in the presence of macrophages and neutrophils using time-lapse microscopy. Results showed that this interaction enables *S. aureus* to hitchhike within the innate phagocytic immune response and showed the oral cavity can be an intrinsic portal for systemic disease.
- We tested the water quality of 231 dental chairs at ACTA three times over 1.5 years. Dental unit water lines (DUWLs) at the staff clinics met the Dutch requirement of 100 colony-forming units/ml. An increasing number of DUWLs at the student clinics complied with this requirement, indicating that the local protocols are adequate but that compliance can be improved.
- We tested previously developed *WhiteTeeth* mobile app in a randomized clinical trial with 132 adolescent orthodontic patients and found that oral health education and automatic coaching by this mobile app led to a better oral hygiene than standard care alone.
- In an *in vitro* study to evaluate the effect of various fluoride treatments on dentine lesions it was shown that silverdiaminefluoride (SDF) was the most effective in inhibiting dentine demineralization.
- In a pH-cycling model it was shown that the presence of silver in SDF did not contribute to the efficacy of SDF in protecting dentine lesions.
- In a systematic review and meta-analyses it was shown that apical periodontitis adds on to systemic inflammation by elevating C-reactive protein, interleukin 6, asymmetric dimethylarginine, and C3 levels. However, it remains unknown whether treatment of the apical periodontitis resolves the systemic inflammation.
- A systematic review on ultrasonic irrigant activation concluded that this irrigation method can remove pulp tissue remnants and dentin debris from the root canal system but there is conflicting evidence regarding its antimicrobial effect and it does not increase the success rate of the root canal treatment.
• An in vitro study showed that calcium-silicate-based root canal sealers do not comply with the ISO 6876 criteria regarding solubility and the released leachates.
• A retrospective study investigated the effect of pulp inflammation and extraction of primary molars on their successors premolars. Extraction of primary molars before the age of 8 years increased the risk of misalignment, while the presence of pulp inflammation did not result in developmental enamel defects on the successors premolars.
• A systematic review was carried out to determine whether the performance of glass-ionomer cement (GIC) is influenced by surface conditioning with polyacrylic acid (PAA). The results showed that using PAA has a positive effect on the bond strength of GIC. However, this finding was not confirmed in longitudinal clinical trials.
• A 3-year randomized clinical trial evaluated the survival of atraumatic restorative treatment (ART) restorations using different dental materials in primary molars. The results showed that compomer and high viscosity glass ionomer cement are suitable materials for ART in primary molars. Conversely, glass carbomer cement should not recommended for ART-restorations.
• A protocol for a non-randomised cluster-controlled trial to evaluate the effect of the ‘Uitblikkers’ intervention. This is a semi-structured interview method developed for oral healthcare professionals, to identifying parents’ barriers to tooth brushing, and promoting related parenting strategies to tackle the identified barriers. This applies principles from learning theory, including stimulus control, operant conditioning and authoritative parenting.
• Salivary total protease and chitinase activities were measured using broad-spectrum fluorogenic substrates as predictors of induction and resolution of gingival inflammation in healthy individuals by applying an experimental human gingivitis model. Both plaque and gingival inflammation scores, as well as protease activity increased until re-establishment of oral hygiene.
• Streptococcus mutans SpaPA and SpaPB adhesins mediate the binding to tooth surfaces. Using molecular, biochemical and in silico methods it was found that these adhesins involve adherence of salivary protein agglutinin (SAG) as well. No difference in SAG-mediated adherence could be seen between Steptotype A and B strains.
• Streptococcus pneumoniae may cause pneumococcal disease in the upper airways. S. pneumoniae biofilms are contained with extracellular DNA, which is sourced from the same pneumococci and other bacteria. It was found that Lactoferrin disaggregates pneumococcal biofilms in vitro and inhibits acquisition of antimicrobial resistance through its DNase activity.
• We studied the osteoclastogenesis capacity of circulatory (c) and oral (o) PMNs from controls and periodontitis patients. Only 2.3% and 2.4% RANKL expression was detected on the cPMNs and oPMNs from controls and patients. We next investigated whether stimulated (with LPS, TNF-α, or IL-6) cPMNs have the capacity to contribute to osteoclastogenesis. RANKL expression on stimulated cPMNs, was again very limited and did not induce osteoclastogenesis. We report that, under the aforementioned experimental conditions, neither cPMNs nor oPMNs directly induced osteoclastogenesis.
• Since periodontitis is bi-directionally associated with several systemic diseases, such as diabetes mellitus and cardiovascular diseases, it is important for medical professionals in a non-dental setting to be able to screen their patients for periodontitis, and urge them to visit a dentist if necessary. We developed and validated a “quick and easy” (non-invasive, no oral inspection needed) screening tool for periodontitis (2 min). It is based on 8 simple self-reported oral health questions, and on sex and smoking habits. The AUROCC was 0.82 for being suspected of periodontitis yes/no. An algorithm valid for the Dutch population, was applied to create a freely accessible, web-based screening tool intended for use by medical professionals in a non-dental setting. https://www.perioscreening.com.
• In a systematic review it was aimed to establish the effect of tooth brushing with a regular fluoride dentifrice compared to control (water or saline) on dental plaque regrowth. Based on three different indices, overall plaque regrowth was significantly (P < 0.01) inhibited with 25% or more by the use of a dentifrice slurry as compared to control. All sub-analyses on specific dentifrice ingredients and the overall descriptive analyses supported that there is moderate-quality evidence for a weak inhibitory effect on plaque regrowth in favor of the use of a dentifrice intended for daily use.
• Academic detailing, reinforced with feedback data from patients, is a feasible and acceptable approach to stimulate reflection among dentists on their own dental practice and to identify areas for improvement.
• A systematic review of 32 cohort studies (39,429 subjects) showed a caries incidence rate of 0.11 (0.09-0.13) per person-year at risk, a decline in caries-free children (permanent dentition) ranging between 1% and 10% per year, while the caries progression rates ranged respectively from 0.06 to 0.73 for annual DMFT increment and 0.07 to 1.77 for annual DMFS increment.
• Dutch and Flemish Researchers established a science agenda on Oral Healthcare for elderly. The 3 themes to guide research in the years to come are: oral health and function of elderly, multi-/interdisciplinary primary care collaboration, longterm effects and cost-benefit analysis of lifecourse proof oral healthcare.

• The results of a first randomized controlled trial testing the efficacy of Virtual Reality Therapy in the treatment of dental phobia provide evidence to support the application of such interventions within the dental practice.

• Perspectives of dentists on the value of providing preventive, patient-centred and evidence-based Oral Health Care can be used to engage dentists in quality of care improvement activities. Using Q-methodology, 4 perspectives have been identified: (1) ‘patient-focused dentist valuing prevention’, (2) ‘outcome-oriented dentist valuing learning from colleagues’, (3) ‘team player ultimate responsible for care provided’ and (3) ‘dentist who values oral health as a patient responsibility.’

• A multicenter prospective study (HOME) in hematopoeietic stem cell transplant patients was carried out. The results showed that dysbiosis of the oral microbiome was associated with oral mucositis in autologous stem cell transplant recipients.

• A study into side effects of drugs was carried out. It was found that 21% of drugs that were registered in The Netherlands were documented with taste disorders.

• Research on the surgical treatment of obstructive sleep apnea comparing different types of osteosyntheses showed good results for a variation of fixation options.

• Computer assisted surgery and 3D planning has been proven effective in different areas of cranio-maxillo-facial surgery.

• Multiple publications on head and neck cancer showed improvement in clinical outcomes after chemoradiation.

• In a longitudinal study the impact of a cleft lip and/or palate on the oral health-related quality of life (OHRQoL) was examined. Children with a bilateral CL/P scored significantly lower on “Functional Well-Being” and “School” than other subgroups. Children reported a decrease in “Oral Symptoms” and “Emotional Well-Being” over time.

• In a systematic review, the self-concept of people with intellectual disabilities was examined. Very little information was available. Results showed that the self-concept of individuals with intellectual disabilities is affected by the relationships they have (positively and negatively). The perceptions of caregivers, peers and their awareness of stigma effects self-concept.

• On behalf of the European Academy of DentoMaxilloFacial Radiology (EADMFR) and in collaboration with the department of Oral Radiology of Aarhus University, Denmark, a position paper based on an extensive review of the scientific literature was published on the use of Conebeam CT in the management of third molar pathology.

• A promising research collaboration has been established between the faculty of Science – Informatics Institute - Intelligent Sensory Information Systems group (UvA) and the faculty of Medicine – dept. of Radiology and Physics (UvA). This collaboration aims to introduce Artificial Intelligence into dental radiology. The first PhD-student in this project has been appointed and many scientific internships for dentistry students on the AI topic have commenced.
**Output OII**

**Dissertations**


**Scientific publications (refereed)**


Professional publications


Publications aimed at the general public

Patents

Editorship book
Oral Regenerative Medicine

Program Leader

Prof. dr. C.J. Kleverlaan
E mail: c.kleverlaan@acta.nl

Full professors

A.G. Becking  A.J. Feilzer  T. Forouzanfar  S. Gibbs
J. Klein-Nulend  J. de Lange  F. Lobbezoo  F.J.M. Roeters
E.A.J.M. Schulten P.F. van der Stelt N. de Vries  A. Zentner

Introduction

The mission of Oral Regenerative Medicine (ORM) is to improve the quality of life of patients with medical problems related to the maxillofacial area. Within this scope we have defined a long-term aim to regenerate parts of the masticatory system, e.g. teeth, jaw bone, joints, muscles, nerves, and mucosa. Since this dot on the horizon is far away we also develop intermediate solutions, such as implants and restoratives. Therefore, the research is focused on the development of innovative methodologies for bone regeneration and transplantation, tooth pulp and hard tissue regeneration, and improved implant acceptance.

ORM is a multi-disciplinary research program combining the expertise from the departments of Oral Kinesiology (OKI), Oral Implantology and Prosthodontics (IMP), Dental Materials Sciences (DMS), Oral Cell Biology and Functional Anatomy (OCB/FA), Oral Radiology (ORA), Orthodontics (ORT) and Oral and Maxillofacial Surgery (OMS), the latter being embedded in Amsterdam UMC (locations Academic Medical Center (AMC) and VU University Medical Center (VUmc)). ORM is one of the two research priority areas (“zwaartepunten”) of ACTA. As implied above, a healthy oral system is characterized not only by the absence of infection and inflammation of dental and periodontal tissues, but also by a healthy musculoskeletal system and oral mucosa. Musculoskeletal tissues (bone, cartilage, muscles, and joints) and mucosa (epithelium and underling connective
tissue) can be damaged or even destroyed by, for example, mechanical overloading, disuse, disease or trauma. When tissues or organs are lost, their replacement or preferably their regeneration is needed to restore normal function as much as possible. ORM studies these processes both at a fundamental and translational level in a multidisciplinary setting, in which dentistry and oral medicine closely collaborate with medical disciplines like orthopaedics, neurology, dermatology and plastic surgery, both within and outside The Netherlands. The ultimate goal of oral regenerative medicine is to regenerate parts of the masticatory system, e.g.: teeth, jaw bone and mucosa.

Research objectives

A. Regeneration of jaw bone and oral mucosa
The focus lies in investigating how (stem) cells and biomaterials can be used to stimulate growth and repair of tissues and organs. Human adipose stem cells and fibroblasts are combined with matrix materials and the influence of growth factors are studied with the aim of regenerating bone tissue. The combination of these clinically relevant materials with cells is giving very promising results. Furthermore, this knowledge is now used to design and evaluate human disease models in static and microfluidic chips systems. These new models are now used to investigate cell-cell, cell-materials and cell-pharmaceutical interactions. The combination of these clinically relevant materials with cells is giving very promising results. Furthermore, major steps are being made in the development of 3D techniques, like scanning, planning, milling, and printing of crowns, dental implants, and cranio- and maxillofacial defects. New ceramics, e.g. zirconia and lithium disilicate, which are biocompatible alternatives for metals, have been thoroughly evaluated. New clinical procedures are investigated for the production of patient-specific medical devices using computer-guided placement with the aim to make the procedures time-saving, more predictable and more patient friendly.

B. Tissue response of the host to implant materials and restoratives
Clinical studies from ORM focus on adverse reactions to metals present in dental medical devices, e.g. nickel, palladium, titanium. Major efforts are being put into the development of improved diagnostic tools. A new patch test palladium salt has been implemented internationally for diagnosing palladium allergy. ORM has developed unique tissue-engineered immune-competent skin and mucosa equivalents with integrated immune cells (Langerhans Cells) in order to investigate human innate immune responses. Most recent advancements include incorporation of commensal and pathogenic multi-species biofilm onto the model to increase physiological relevance even further. These human organotypic models can be used in risk assessment for medical devices and are valid alternatives for animal tests in full compliance with the European 3Rs principles.

C. Gaining in depth knowledge of pain, trauma and dysfunction of the masticatory system
The ORM program has a long-term research line on the management of orofacial pain and temporomandibular disorders. Large-scale epidemiological studies are used to investigate the prevalence of temporomandibular pain in the Dutch population. Furthermore the research emphasis is on the heritability of temporomandibular disorders and genetic factors that might be partly responsible for the development of temporomandibular pain.

Results obtained

• International consensus was reached on new, separate definitions for sleep bruxism and awake bruxism, along with a new proposal for a diagnostic grading system for bruxism. Further, the recently proposed broadened (i.e., including multiple dental sleep disorders besides obstructive sleep apnea) definition for the dental discipline “dental sleep medicine”, that was originally published in a dental journal, was successfully brought to the attention of medical sleep professionals in two opinion papers, resulting in an increased visibility of dental sleep medicine amongst medical doctors worldwide.

• A self-report study showed that sleep bruxism (SB) and awake bruxism (AB) are present in, respectively, 16.5% and 5% of the general adult population. In 7-12 year-old children, the prevalence of parental-reported SB is higher, viz., 19.5%. In addition, regarding jaw-muscle pain as possible consequence of SB, it was found in a group of 50 SB patients that symptoms like muscle tiredness and tension are more prevalent than pain, suggesting that non-pain symptoms should be considered clinically as well.

• Oral health-related quality of life in patients with temporomandibular joint osteoarthritis at 1 and 6 months after arthrocenteresis with hyaluronic acid injections showed acceptable predictive performance. Usefulness in decision-making for patient management remains to be tested.

• For the assessment of orofacial pain in non-verbal individuals, an observational diagnostic tool has been developed (Orafacial Pain Scale for Non-Verbal Individuals; OPS-NVI). In an acute hospital ward setting, the concurrent and predictive validity of the OPS-NVI were found to be promising. In addition, by means of the OPS-NVI, orofacial pain and its potential causes, such as caries, tooth root remnants, or ulcers, were found to be frequently present in older people with mild cognitive impairment or dementia.

• Experimentally provoked delayed-onset muscle soreness (DOMS) in the jaw-closing muscles alters the jaw-motor control by inducing a delayed increase in the size of the inhibitory jaw reflex responses following
electrical stimulation of the upper lip. Interestingly, the effects of DOMS on jaw-motor control show a training effect: repetition of the provocation of DOMS yields a decrease in the various motor consequences of DOMS, e.g., its reducing effects on maximum voluntary bite force.

- Temporomandibular disorders (TMD) pain was commonly reported by a large sample of Indonesian children and adolescents, with bruxism, oral habits, and psychological factors as this condition’s most common risk indicators. Similar findings, using a self-report questionnaire only, were observed amongst a large group of Dutch adolescents.
- The Eurostar project ‘PEARL’ is finished. During this 3-year project a new glass-based microsealant/infiltrant ‘Pearl’ has been developed. Pearl does not show a cytotoxic potential and can efficiently infiltrate the incipient non-cavitated caries lesions (so-called white spot lesions) and is able to completely arrest their progression. A unique property of Pearl and one if its biggest assests is that it increases hardness in acidic conditions.
- The project ‘Craniosafe’ led to the first thesis ‘Clinical relevance of current materials for cranial implants: Towards an optimal patient-specific implant material’. The study showed that autografts appear to carry a greater failure risk than allografts.
- In patients with Parkinson’s Disease (PD), an oral history and a clinical examination revealed a weakened oral health status and a reduced oral hygiene care as compared to matched controls. In addition, relations between PD on the one hand and self-reported bruxism and temporomandibular disorders (TMD) pain on the other hand were found.
- YouTube was screened for Invisalign patient testimonials in order to evaluate video popularity, content and comment sentiment. Engagement of audience and metrics were not significantly influenced by completeness of information, video duration, and lifespan. The sentiment of viewers’ comments was significantly associated with their status, content, and sponsorship of videos.
- An in vitro study was conducted on 54 bonded incisors and 31 bonded canines to investigate the effect of tooth rotation on the assessment of white spot lesions (WSLs) adjacent to orthodontic brackets using quantitative light-induced fluorescence digital (QLF-D) camera. Fluorescence loss and WSL size are influenced by the angle of rotation under which the lesion is recorded by QLF-D camera.
- A new biphasic calcium phosphate (BCP) for maxillary sinus floor elevation has been evaluated by using micro-CT and histomorphometrical analyses. We have demonstrated that BCP with a hydroxyapatite/tricalcium phosphate ratio of 20/80 (BCP20/80) might perform better, at least in the short term, as a scaffold for bone augmentation in the maxillary sinus floor elevation model than BCP60/40 as more bone is formed, and more osteoid is deposited in BCP20/80-treated patients compared to BCP60/40-treated patients.
- By using reconstructed human gingiva (RHG) and multi-species microbiome representative of commensals, we have shown an essential role of host-microbiome interactions in promoting barrier function of the gingival epithelium. Compared to unexposed RHG, microbiome exposed RHG showed increased epithelial thickness, more organized stratification and increased keratinocyte proliferation, increased expression of anti-microbial proteins and elevated secretion of inflammatory cytokines.
- A novel in vitro human gingiva-implant model was developed which enables soft tissue interactions with dental implants to be investigated. The down-growing epithelium transitioned from a gingiva margin to a sulcular and junctional epithelium. The sulcus depth and junctional epithelial length were similar to previously reported pre-clinical and clinical lengths. A collagen IV/laminin 5 basement membrane formed between the epithelium and the underlying connective tissue. The RHG expanded in thickness approximately two-fold at the abutment surface. The model allowed the evaluation of protein expression of adhering soft tissue cells for tested abutments.
- The jaw joint, which combines a large movability with resistance to loads, has been demonstrated to undergo an aging process that differs remarkably from the other joints in the mammalian body. The load bearing properties of the cartilaginous layer of its condyle has demonstrated to be relatively insensitive to the process of aging.
- Three dimensional alveolar ridge augmentation using BMP-2-Bio-Oss block was tested in an animal model. The results shown BMP-2 incorporated into the Bio-Oss block give much bone formation compared with the BMP-2 free Bio-Oss blocks. BMP-2 incorporated BioCaP was tested for periodontal regeneration in an experimental periodontitis model. The results were clear that the Biobone can be used for the periodontal regeneration and bone regeneration.
- The exosomes from osteogenically-induced human adipose stem cells were adopted to induce osteogenesis. In-vitro cellular experiments showed that a 2-day osteogenic induction sufficiently conferred the exosomes osteoinductive property without compromising its intrinsic capacity of promoting cell migration. In-vivo studies showed that the slowly delivered exosomes significantly enhance new bone formation in critical-sized bone defects.
- Hyaluronic acid (HA) of different molecular weight has been used to promote bone morphogenetic protein
2 (BMP2)-induced bone regeneration. In a non-osseous site, 48 kD HA has been shown to significantly promote BMP2-induced osteogenesis with almost doubled new bone volume. The angiogenesis has also been significantly enhanced by 2 to 3 folds.

- PMMA-based personalized medical devices, like cranioplastics implants, are frequently used for patients. Due to the manufacturing procedure sterilization is required. We showed that autoclave sterilization was not suitable for the sterilization of PMMA-based materials. Ethylene oxide, hydrogen peroxide gas plasma, and gamma-irradiation appeared to be suitable techniques to sterilize PMMA-based personalized medical devices.

- As part of the indication procedure for mandibular advancement appliances (MMAs) in obstructive sleep apnea (OSA), drug-induced sleep endoscopy (DISE) with lateral head and trunk rotation shows a better predictability for treatment efficacy than DISE with lateral head rotation only. Further, treatment success of MMAs cannot be predicted based on the anatomy of the upper airway. Finally, at the long term, weight gain has a detrimental effect of the efficacy of MMAs in the treatment of OSA.

- Clinicians should be aware of the wear resistance of CAD-CAM materials and the wear behavior of the antagonist. In vitro wear studies showed that nanofilled composite resin and polymer-infiltrated ceramic were more antagonist-friendly than glass-ceramics and zirconia.

- Bone substitutes, as alternatives for autologous bone grafts, lack osteoinductive and angiogenic potential. We evaluated the vascularization in relation to bone formation with the aid of adipose stem cells. Adipose stem cells can be used safely, feasibility, and efficiency, and indicates a pro-angiogenic effect.

- The bone turnover and microarchitecture of mandibles was measured by micro-CT and histomorphometrical analysis. A higher trabecular bone mineral density found in the edentulous mandible. In women, higher bone turnover is associated with lower bone volume, suggesting an effect of postmenopausal oestrogen deficiency on bone turnover in the edentulous mandible.

- An innovative dual-targeted nanoliposomal formulation was developed for treatment of metastatic osteosarcoma.

**Output**

**Dissertations**


Scientific publications (referred)


Annual Research Report 2019


Annual Research Report 2019


Other scientific publications


Academic Centre for Dentistry Amsterdam


Professional publications


Editorship book


Education related research, including other research

Research on Dental Education
Associate dean of educational research and development
E-mail: J.Vervoorn@acta.nl

Research objectives
In the ACTA faculty of Dentistry research is performed on several aspects of education in dentistry. This includes research on the evaluation of courses and performance of students within the curriculum, research on new teaching methods, development and evaluation of a computer aided digital teaching system creating a virtual learning environment including the application of haptics (the Simodont Dental Trainer). Also some projects are carried out on assessment of the safety of the learning environment and the effect of interventions aiming for improving the learning experiences and outcomes.

The input of academic personnel is limited to staff of the educational institute, and to some members of the various departments. The research is not considered as a separate programme; however it is intended that this research will increase in the coming years.

Results obtained
- It appeared that collecting evidence during development and implementation of new technology resulted in improvement and better acceptance of the technology. A new development was the connection of Intraoral scanners to the VR system offering students the opportunity to practice clinical procedures in VR prior to performing these procedures on patients. First results showed that students and teachers felt more confident in the clinic after this training. It appeared that students using an elective VR training module on dental morphology performed significantly better on their test than students that only used traditional training methods.
- A patient-specific preclinical training opportunity was developed and introduced. Real patients’ digital impressions can be converted into volumetric haptic models for display in a Virtual Reality trainer. The technical development and first user experiences with this Patient-Centered Virtual Reality training module (PC-VR) show promising results and might result in a paradigm change in dental education.
- Emerging technologies and virtual reality are bridging preclinical-clinical training in dental education throughout the world. ACTA’s Education Research & Development group (DER) and the Association for Dental Education in Europe (ADEE) created the TECH Talks-Expo, a platform where academics share opportunities that new technological developments offer dental education aiming to learn and improve

Scientific Publications

Professional publications
Indicators of esteem

Memberships editorial board
Gorter, R.C.: European Journal of Dental Education – Associate Editor, since 2011.

Scientific awards/honours

Organization of (inter)national scientific congresses and symposia

Invited speakers at (inter)national scientific congresses or symposia

Other (inter)national scientific functions
Gorter, R.C.: Member - Platform for better oral health in Europe, since 2014.
Serrano, C.M.: Member - Scientific committee, Universidad de Concepcion, Chili, 2019.

Current PhD projects

Societal impact

Societal relevance for the dental professional in the Netherlands
Interactions with the press and the general public
Appendix 1: Other publications, societal relevance, and indicators of esteem

Total ACTA

Patents


Grants: current projects with external funding


Aarab, G. & Lobbezoo, F. Interactions between sleep bruxism and obstructive sleep apnea. Grant Chinese Scholarship Council for PhD project by Deshui Li, granted: €57600,- (2017-2021).


Bikker, F.J. & Brand, H.S. Diagnostiek drogemondklachten. NTvT, granted: €100.000,00 (2019, January 01 - 2020, November 30).


Bolscher, J.G.M. Co-investigator of research project: Antibiofilm activities of antimicrobial peptides against Staphylococcus aureus. Thailand Research Fund (Grant no. MRG6080039)51/2551), granted: 311.600 Thai baht. Principal Investigator: dr. A. Puknun, Division of Microbiology and Parasitology, School of Medical Science, University of Phayao, Thailand (2017, July 01 - 2019, December 31).

Bolscher, J.G.M. Co-investigator of research project: Effect of antimicrobial peptides alone and in combination with antibiotic against biofilm matrix composition of bacteria isolated from patients with chronic sinusitis. National Research Council of Thailand (Grant no. 503777) and Faculty of Medicine, Khon Kaen University, granted: 1.025.306 Thai bath. Principal Investigator: dr. S. Kanthawong, Faculty of Medicine, Khon Kaen University, Thailand. (2017, August 01- 2020, July 31).


De Vries, N. & Vonk, P. Randomized, Double blind, placebo-controlled, crossover on road driving study assessing the Effect of JZP-110 on Driving performance in subjects with excessive sleepiness due to obstructive sleep apnea. JAZZ Pharmaceuticals, granted: €74.000,- (2016-2019).


Duijster, D. Amsterdam Public Health Research Institute, granted: €10.000 (2019, October – huidig)


Everaars, B. & Jerković-Ćosić, K. PRIMa mond CARE. HU promotievoucher, granted €100.000,- (2016-2020).


Georgiou A.C., Crielaard, W. & van der Waal, S.V. The contribution of apical periodontitis to systemic chronic inflammation and the role of the endodontic infection in the inflammatory response. ESE Grant, 40 k€.


Gibbs, S. & Krom, B.P. Identify host-microbiome interactions contributing to superior oral wound healing compared to skin in order to identify novel therapeutic strategies for treating burns. ACTA / Amsterdam UMC, granted: €400.000 (2019-2024).


Gibbs, S., Krom, B.P. & van Zuijlen, P. Patient own saliva as therapeutic for treating burns type of grant: Dutch Burns Foundation, granted: €111.000, Amsterdam UMC / ACTA / Red Cross Hospital (2017-2020).


Klein Nulend, J., Bravenboer, N. & Bakker, A.D. Mechanosensitivity of osteocytes embedded in their native matrix China Scholarship Council grant to C. Zhang, granted: 1 fte PhD student, 4 yrs (2017-2020).


Kleverlaan, C.J. Industry projects, granted; €43.000 (2019).


Laheij, A.M.G.A. Eklund foundation: The oral cavity as a source of febrile neutropenia. € 32.000,- 2016


Liu, Y., Klein Nulend, J., Wismeijer, D. & Wu, G. & Du C. Bone2Treat (NWO file nr. 729.001.041). Guangdong Provincial Science and Technology Department-NL Organisation for Scientific Research (GDST-NWO) science industry cooperation programme Chemistry (June 2017 round), granted: 1 fte PhD student, 4 yrs, €300,000 (2019-2023).


Lobbezoo, F. & Aarab, G. Establishing the niche for GrindCare in the assessment and management of sleep and awake bruxism. Project grant; Sunstar Suisse S.A.; granted: €240,000.- (December 1, 2019 – December 1, 2024).

Loos, B.G. Geistlich Pharma, BioOss in kind for the postgraduate program in Periodontology and Implant Dentistry, granted: commercial value €2500/year; cumulative to date €7500 (2013 – current).
Loos, B.G. Parodontitis diabetes indicator. NVvP, granted: €15.000, (2018, September 01 – 2020, August 31)
Loos, B.G. Straumann Emdogain in kind for the postgraduate program in Periodontology and Implant Dentistry, granted: commercial value €2500/year; cumulative to date €12.500 (2011 – current).
Raber-Durlacher J.E. Johannes Stichting, 5000 Euro geen afgegrensde looptijd; beheerd door AMC Foundation, (2019).


Visscher, C.M. NWO Westerdijk Talent Scheme (individual grant to associate professor to full professor), granted: €50,000.- (2018-2022).


Zaura, E., Brandt B.W., Deng, D.M. & Crieluard, W. Internal competition ACTA lustrum AIO award.


Indicators of esteem

Editorship book


Scientific awards/honours


Kuang, B., Aarab, G., Lobbezoo, F., Arcach, P., Lavigne, G.J. & Huynh, N. (2019, June 7-9). AADSM Student Research Award for the study: The effects of mandibular advancement appliance therapy on jaw-closing muscle activity related to oxygen desaturations, American Academy of Dental Sleep Medicine, San Antonio, TX.


Thymi, M., Shimada, A., Lobbezoo, F. & Svensson, P. (2019, August 30-31). EAOPD Best oral presentation prize for the study: Clinical jaw-muscle symptoms in a group of probable sleep bruxers. European Academy for Orofacial Pain and Dysfunction, Noordwijk, NL.


Van der Weijden, F.N. (2019, November 1). 2e prize; NVvK Elmex® Scriptieprijs: The effect of pulp inflammation and premature extraction of primary molars on the successor permanent teeth. A retrospective study, Soest, NL.


Organization of (inter)national scientific congresses and symposia


Ho, B.V. (2019, May 15-17). Member of the scientific committee of the annual congress of the European College of Gerodontontology (ECG) Joining forces to improve (oral) health. Amersfoort, NL.


Koutris M. (August 30-31, 2019). Chair Organizing committee Orofacial Pain in Europe: Present and Future directions, European Academy for Orofacial Pain and Dysfunction - EAOPD, Noordwijk, NL.


Rozema, F.R. (2019, October). VMITI, Soms gaat er iets mis…. Acuut handelen! Apeldoorn, NL.


Zaura E (2019). Member of the scientific committee of RSU Scientific Conference, Riga Stradins University, Latvia, April 1-3, 2019

Memberships editorial board

Aarab, G.: Journal of Dental Sleep Medicine.
Brand, H.S.: Nederlands Tijdschrift voor Tandheelkunde, redacteur.
De Vries, N.: The Open Otorhinolaryngology Journal (TOOTORJ).
Hoekema, A.: Sleep & Breathing.
Klein Nulend J.: The Open Nitric Oxide Journal.
Krom, B.P.: Odontologisch, Critical Reviews in Microbiology, Scientific Reports.
Laine, M.L.: Corresponding member of the Finnish Dental Society Apollonia.
Lobbezoo, F.: Journal of Craniomandibular Function.
Lobbezoo, F.: Journal of Dental Sleep Medicine.
Van der Velden U.: Journal of Clinical Periodontology.

Invited speakers at (inter)national scientific congresses or symposia


De Lange, J. (2019, August 31). TMJ Surgery. EAOPD international congress, Noordwijk, NL.

De Lange, J. (2019, September 21). Predictive value of panoramic radiography for injury of the inferior alveolar nerve (IAN) after mandibular third molar surgery. AAOMS, Boston, USA.


De Lange, J. (2019, December 6). Bone healing and biomechanics; Condylar fractures: the non-surgical/closed treatment; Is there an evidence based difference in the outcome of treatment of condylar fractures?; Pre-auricular approach SORG international trauma course, Amsterdam, NL.


De Vries, N. (2019, April 11-13). 1. 5th Treatment of POSA. 2. 5th Ear, nose and throat surgery of the upper airway: predictive value of drug-induced sleep endoscopy and manoeuvres (chin lift, head rotations). Sleep and Breathing, Marseille, France.


De Vries, T.J. (2019, October 29). Animal and cell models to study periodontitis – the most common inflammatory bone disease. Joint meeting of the Greek Hellenic Society for the study of Bone Metabolism and NL Society of Calcium and Bone metabolism, Athens, Greece.


Dubois, L. (2019, September 20). Virtual surgical planning in orbital reconstruction, validation of technology, AAOMS, Boston, USA.
Dubois, L. (2019, April 1). 3D virtual planning in orbital reconstruction, SORG Comprehensive Course, Tuttlingen, Germany.

Dubois, L. (2019, April 1). Biomaterials in orbital reconstruction, SORG Comprehensive Course, Tuttlingen, Germany.

Dubois, L. (2019, April 1). Intra-operative imaging, SORG Comprehensive Course, Tuttlingen, Germany.

Dubois, L. (2019, December 5). Comminuted mandible fractures. SORG Amsterdam Advanced CMF Trauma Course, Amsterdam, NL.

Dubois, L. (2019, July 14-16). Treatment planning in panfacial fractures, Stryker Europe Advanced Course, Amsterdam, NL.


Feilzer, A.J. (2019, December 14). Adverse reactions to dental materials. 4th International Symposium of Medical and Dental Education in Okayama, Okayama University, Japan.


Gibbs, S. (2019, November 25). Animal free innovations with examples from skin and mucosa. Symposium animal free innovations in science, Vrije Universiteit Amsterdam and Amsterdam UMC, NL.


Klein Nulend, J. (2019, November 19). Osteointegration: Biological aspects of implantology. Seminar, Stomatology Hospital of Guangzhou Medical University, Guangzhou, P.R. China.

Klein Nulend, J. (2019, November 29). New developments in jaw bone augmentation and osteointegration. Symposium Van Tandimplantaat naar Tandregeneratie (From Dental Implant to Dental Regeneration), in honor of emeritus professor John A. Jansen, Nijmegen, NL.


Laine, M.L. (2019, April 23). Tasty Talks, Mouth – the port of entry to the digestive system, University of Wageningen, NL.


Laine, M.L. (2019, November 30). The role of saliva in intra-oral halitosis, An update on halitosis research; IAFHR.


Lobbezoo, F. (2019, May 17). Orofacial pain and dysfunction in older people with impaired cognition, especially dementia. 29th Annual Congress of the European College of Gerodontology, Amersfoort, NL.


Lobbezoo, F. (2019, August 30-31). Bruxism, friend or foe? Invited lecture, European Academy of Orofacial Pain and Dysfunction, Noordwijk, NL.


Lobbezoo, F. & Aarab, G. (2019, September 26-27). GrindCare@ACTA. Academic Advisory Board Meeting Grindcare/Sunstar, Etoy, Switzerland.


Lobbezoo, F. (2019, November 9). A new definition of dental sleep medicine. Invited lecture, German Society of Dental Sleep Medicine (DGZS), Hamburg, Germany.


Loos, B.G. (2019, September 2). New concept in the understanding of periodontitis and the consequences for treatment and The intricate connections of cardiovascular diseases and periodontitis. ADE Chinese Summerschool, Amsterdam, NL.


Loos, B.G. (2019, November 22 & 29). Dutch Association for Periodontology (NVvP congress ), New concepts in the etiology of periodontitis and New classification of periodontitis. Bussum & Vinkeveen, NL.

August 16, 2019.


Rozema, F.R. (2019, October 9). Antistolling. De toekomst van antistollingszorg begint vandaag, Mondzorg en antistollingszorg, Amersfoort, NL.

Shemesh, H. (2019, April 10) To treat or not to treat. Annual Session of the American Association of Endodontists, Montreal, Canada.


Visscher, C.M. (2019, August 30-31). TMD and Headache. European Academy of Orofacial Pain and Dysfunction, Noordwijk aan Zee, NL.


Volgenant, CMC: How can dental professionals use this knowledge?, invited speaker at the symposium Advanced technologies in prevention, CED/NOF-IADR congress in Madrid, September 19-21, 2019.


Other (inter)national scientific functions

Aarab, G.: Member research committee - Nederlandse Vereniging Tandheelkundige Slaapgeneeskunde (NVTS).


Baaij, A.: Education and Scholarship Committee - European Society of Endodontology (since 2019).


Boutsioukis, C.: Invited participant - Preferred Reporting Items for Randomized Trials in Endodontology (PRIRATE) guidelines - Face-to-face consensus meeting, Vienna (13 September 2019).


Brand, H.S.: Counsellor - Association of Basic Science Teachers in Dentistry (ABSTD)


Crielaard, W.: Board member - Oral Microbiology and Immunology Group, British Society for Oral and Dental Research.


Crielaard, W.: Visiting professor - Oral Microbiology School of Stomatology, Sun Yat-sen University, Guangzhou, China.

Crielaard, W.: Member of the Thesis Advisory Committee Preethi Prajod, Faculty of Dentistry, National University of Singapore.

Crielaard, W. & Deng, D.: Co-supervisor Yang Ge, West China College of Stomatology, Sichuan University, Chengdu, China.


Deng, D.: Co-supervisor Kahena Rodrigues Soldati, São Paulo State University-UNESP School, School of Dentistry at Araraquara, Brazil.


Deng, D.: Coordinator - International Summer camp for ACTA students, Chengdu, Sichuan, China from 2013.


Duijster, D.: Bestuurslid Nederlandse Vereniging voor Kindertandheelkunde, March 2017 –

Duijster, D.: Lid - Amsterdam Young Academy, November 2019 –


Feilzer, A.J.: Fellow - Institute of Advanced Study (IAS), University of Amsterdam, Amsterdam, 2019 –

Gibbs, S.: Board member - Immunotoxicology and Chemical Allergy Speciality Section of EuroTox (ITCASS).

Gibbs, S.: Contact person - National Institute for human disease model technologies (hDMT).


Gibbs, S.: Member scientific executive board - European Research Group for Experimental Contact Dermatitis.

Hummel, G.I.: Adviserend tandarts - Zilveren Kruis, Leusden, 2005 -


Jonkman, R.E.G.: Lid commissie - Indicatieve lijst voor orthodontie in bijzondere gevallen NVvO/KNMT.

Klein Nulend, J.: Associate Editor - Clinical Reviews in Bone and Mineral Metabolism.

Klein Nulend, J.: Associate Editor - Experimental and Clinical Endocrinology & Diabetes.

Klein Nulend, J.: External Professor - San Carlos University, Dept. Physics, Cebu City, Philippines.

Klein Nulend, J.: Member - Scientific Board Department of Regenerative Medicine, Research Centre for New Technologies in Life Science Engineering, University of Tehran, Iran.


Krom, B.P.: Supervisor Raymond Pasman, UvA, Amsterdam.

Krom, B.P.: Visiting Professor - University of Gadjah Mada, Yogyakarta, Indonesia, Faculty of Medicine.

Kuitert, R.B.: Lid richtlijncommissie – NvV0.

Lagerweij, M.D.: Member - Medical Ethical Committee (METc), VUmc, Amsterdam.

Lagerweij, M.D.: Member - Quality assurance committee for education, ACTA, Amsterdam.

Lagerweij, M.D.: Secretary - ETC of ACTA.

Laine, M.L.: Founder and general secretary - International Association for Halitosis
Academic Centre for Dentistry Amsterdam

Lobbezoo, F.: Senior member - Society of Oral Physiology (Store Kro Club), since 2015.
Loos, B.G.: Ad hoc reviewer grant proposals - Wellcome Trust, UK (2008); German Research Foundation (Deutsche Forschungsgemeinschaft) (2009); Polish National Research Organization (2011); Medical Research Council (MRC), UK (2013); United Kingdom Diabetes Foundation (2013).
Loos, B.G.: Invited expert – XVth European Workshop in Periodontology in Evidence-based Guidelines for Periodontal Therapy, organized by the EFP (European Federation of Periodontology), La Granja (Segovia), Spain, November 10-13, 2019.
Loos, B.G.: Member committee annual Meridol Research Prize - German Society of Periodontology (DGP), Germany.
Raber-Durlacher J.E.: Member - Berufungskommission Oral Health Medische Faculteit, Universiteit Basel, Switzerland.
Shemesh, H.: Membership committee - European Society of Endodontontology (since 2016).
Van der Heijden, G.J.M.G.: Member - GRADE Working Group (Grading of Recommendations Assessment, Development and Evaluation), 2016 –
Van der Veen, M.H.: Secretory General-European Organisation for Caries Research-ORCA.
Van der Veen, M.H.: Honorary lecturer - University of Liverpool, UK.
Van der Velden, U.: Board member - Education Committee European Federation of Periodontology
Van der Velden, U.: External EFP examiner graduate students - EFP Graduate programs in periodontology, periodontics and implant dentistry: University of Strasbourg, June 18, 2019.
Van der Waal, S.V.: Chair Scientific Committee - Nederlandse Vereniging voor Endodontologie (NVVe).
Van Loveren, C.: Member advisory board - Sugar Bureau UK.
Van Loveren, C.: Member advisory board - Tooth Friendly Society.
Van Westing, K.: Lid richtlijncommissie – NvVO.
Visscher, C.M.: Board member -Physical Therapy Board of Craniofacial and Cervical Therapeutics (PTBCCT, USA), since 2013.
Volgenant, C.M.C.: Member - CED-IADR board.
Volgenant, C.M.C.: Member workgroup - Ivory Cross (Ivoren Kruis)
Wu, G.: Visiting professor - Guangzhou Medical University, Dental school, Guangzhou China.
Wu, G.: Visiting professor - Wenzhou Medical University, Dental school, Wenzhou, China.
Zaura, E.: Member - CED-IADR.board.
Zaura, E.: Member - Universitaire Toetsingscommissie VU, since September 2017.
Zaura, E.: Visiting professor - Oral Microbiology and Preventive Dentistry, Faculty of Medicine, University of Latvia, Riga, Latvia.
Zaura, E.: Member - Thesis Defence Committee Taco van der Meulen, RUG, Groningen, defence planned in 2019.

Supervisor of an external PhD student

Collaborations
- 3M-ESPE, Seefeld, Germany (Clinical Study).
- Aarhus University, Denmark, Department of Dentistry and Oral Health - Section for Pediatric Dentistry, Prof. D. Haubek.
- ADVOCATE (EU): onderzoekssamenwerking Horizon 2020 grant: Radboud Universiteit & Heidelberg university, prof. dr. S. Listl; Leeds University, prof. dr. H. Whelton; University of Copenhagen, dr. K. Rosing.
- Afdeling MKA, Radboud UMC, Nijmegen en Twee Steden Ziekenhuis (Craniosafe).
- Amsterdam Public Health Institute: onderzoekssamenwerking / consortium + promotieonderzoek Amy Papbla; Universiteit van Amsterdam / AMC, prof. dr. C. Agyemang.
- Amsterdam Rheumatology and Immunology Center, Reade, prof.dr. D. van Schaardenburg, Amsterdam, NL.
- Amsterdam UMC, Vrije Universiteit Amsterdam, Department of Clinical Pharmacology and Pharmacy dr. I. Bartelink, Amsterdam, NL. NIH/NIAID grant application and publication.
- Amsterdam UMC, Vrije Universiteit Amsterdam, Department of Radiology and Nuclear Medicine dr. J. Bot Amsterdam, NL. NIH/NIAID grant application and publication.
- Aristotle University of Thessaloniki, Greece - Division of Preventive Dentistry Periodontology and Implant Biology, dr. S. Kalfas.
- Ben Gurion University of the Negev, Beer Sheva, Israel, dr. M. Meijler.
- Boerhave Kliniek, Afdeling Klinische Neurofysiologie, dr. H.L. Hamburger, Amsterdam, NL.
- C. Pittens, PhD, VU University Amsterdam (NL).
- Carolinas Medical Center, Charlotte, NC, United States of America, prof. M. Brennan.
- Cavex Holland B.V., Haarlem, NL (PEARL).
- Center for Advanced Research in Public Health, Valencia, Spain, dr. A. Mira.
- Charite Dental School, Berlin, Germany. dr. P. Zaslansky - German grant.
- Dental School, School of Medicine, College of Medicine, Veterinary and Life Sciences, University of Glasgow, United Kingdom.
- Dentsply DeTrey, Germany (Mechanical properties of composites).
- Department of Cariology, Restorative Sciences & Endodontics, School of Dentistry, University of Michigan, Ann Arbor, MI, USA.
- Department of Clinical Dentistry, Faculty of Medicine, University of Bergen, Bergen, Norway.
- Department of Conservative Dentistry and Periodontology, University Medical Center Regensburg, Regensburg, Germany.
- Department of Dermatology and Allergology, prof.dr. Th. Rustemeyer, Amsterdam UMC (VUmc), Amsterdam.
- Department of Endodontics, School of Dentistry, Federal University of Santa Catarina (UFSC), Florianópolis, Santa Catarina, Brazil.
- Department of Pedodontontology, dr. B. Özen, Istanbul Kemerburgaz University, Istanbul, Turkey.
- Department of Periodontology, Endodontontology and Cariology, University of Basel, Basel, Switzerland.
- Dept. of Endodontontology, Aristotle University of Thessaloniki, Greece (prof. T. Lambrianidis) – joint publication.
- Division of Cariology and Endodontontology, prof.dr. I. Krejci, University of Geneva, Switzerland (a.o. PhD-projects and PEARL).
- Division of Dental Biomaterials, Center of Dental Medicine, prof.dr. M. Özcan, University of Zurich, Zurich, Switzerland (PhD-projects).
- Division of Oral Diseases, Faculty of Dentistry, Karolinska Institutet, Stockholm, Sweden.
- Dr. A. Gasser, T. Razafiarison, M. Meyer: NobelBioCare, Zurich, Switzerland, publications.
- Dr. C. Lee: The University of Western Australia, Perth, Australia.
- Dr. D. Bister, Cambridge, UK.
- Dr. D. Farell, University of Worcester, Worcester, UK.
- Dr. D.J. Evans and prof.dr. S.M.J. Fleischig, School of Optometry, University of California, Berkeley, CA, USA.
- Dr. F. de Carvalho Panzeri Pires de Souza. Department of Dental Materials and Prosthodontics Ribeirao Preto School of Dentistry - University of Sao Paulo.
- Dr. F. Niessen, Plastic Surgeon, Amsterdam UMC, Saliva Reserch projects and multiple publications.
- Dr. H. Lüthi-Schaller, University of Zurich, Centre of Dental Medicine, Section of Oral Microbiology and Immunology, Switzerland, EU grant DIAGORAS (2014-2019).
- Dr. J. Nijlands. Dept of Oral Biology, Faculty of Odontology, Malmö University, Malmö, Sweden.
- Dr. J. Yang, State Key Laboratory of Oral Diseases & National Clinical Research Center for Oral diseases & Department of Periodontics, West China School & Hospital of Stomatology, Sichuan University, Chengdu, China.
- Dr. J.L. Pathak (Stomatology Hospital of Guangzhou Medical University, Guangzhou, P.R. China): Bone regeneration.
- Dr. K. Mitsakakis (principal investigator DIAGORAS), Hahn-Schickard, Freiburg, Germany, EU grant DIAGORAS (2014-2019).
- Dr. M. Bastos, Faculty of Sciences, University of Porto, Portugal.
- Dr. N. León-Sicaíros, University Autonoma de Sinaloa, Mexico, Medical Faculty.
- Dr. P. Adair: Queen’s University, Belfast, Northern Ireland, UK
- Dr. P.N. Tawakoli, J. Jenzer MSc, University of Zurich, Centre of Dental Medicine, Clinic for Preventive Dentistry, Periodontology and Cariology, Switzerland, EU grant DIAGORAS (2014-2019).
- Dr. R. Monge, Be-On-Chip, Zaragozza, Spain: EU project Bonefide.
- Dr. R. Nanda, (VS).
- Dr. T. Tobias. Utrecht University, Faculty of Veterinary Medicine, Department of Farm Animal Health, Utrecht, NL.
- Dr. U.K. Gürsoy. Dept. of Periodontology, Institute of Dentistry, University of Turku, Turku, Finland.
- E.J.A.J. Beune, PhD, University Medical Centres Amsterdam (NL).
- EORTC Quality of Life and the EORTC Head and Neck Cancer Groups.
- Faculty of Dentistry, prof.dr. L.F. Valandro, Federal University of Santa Maria (UFSM), Santa Maria, Brasil.
- Fit for School: onderzoekssamenwerking grant (GIZ): Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), dr. B. Monse, Duitsland / Filipijnen; New York University (US), prof.dr. H. Benzian; London School of Hygiene and Tropical Medicine (UK), dr. R. Dreibelbis, London.
- Faculteit, prof.dr. L. McPherson, dr. A. Sherrif.
- Guangdong Provincial Key Laboratory of Stomatology, Sun Yat-sen University, Guangzhou, China.
- Harvard University, Boston, MA, USA: dr. R. Krishnan (Dept. Mechanical Engineering): Osteocyte mechanosensing.
- Hogeschool Utrecht, Lectoraat Innovaties in de preventieve zorg, HAN (Hogeschool Arnhem Nijmegen), subsidie en samenwerking voor het project Eten met Lange Tanden.
- Institute of Veterinary Bacteriology, Vetsuisse Faculty, University of Bern.
- Iranian Center for Endodontic Research, Research Institute of Dental Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran. (prof. S. Asgary) – Grant and joint publication.
- J. Benedictus, PatiëntenFederatie, Utrecht (NL).
- J. Slot, PhD, Onderzoek, Informatie Statistiek, Gemeente Amsterdam (NL).
- J. van Exel, PhD, ErasmusMC, Rotterdam (NL).
- Julyus Centrum, Universiteit van Utrecht, prof.dr. M. Bots, dr. I. Vaartjes, onderzoekssamenwerking grant.
- K. Eaton, PhD, Leeds University (UK).
- K. Jerković-Ćosić, PhD, Hogeschool Utrecht (NL)
- K. Rosing, PhD, University of Copenhagen (DK).
- Karolinska Institutet, Department of Dental Medicine, prof.dr. P. Svensson and prof.dr. M. Trulsson, Stockholm, Sweden.
- Kuraray, Japan (Mechanical properties of composites).
- Kyushu University, Kyushu, Japan: prof.dr. D. Mizuno (Dept. Physics), Macro and microrheology of stem cells.
- Leiden University Medical Center (LUMC), Department of Public Health and Primary Care (PHEG), prof.dr. W.P. Achterberg, Leiden, NL.
- M. van Elteren - Jansen, PhD, VU University Amsterdam (NL).
- M. van Midde, MA, Dokters van de Wereld, Amsterdam (NL).
- M. Zhou (Head of research department), Guangzhou Medical University, Dental school, Guangzhou China.
- M.A. Beenackers, PhD, ErasmusMC, Rotterdam (NL).
- M.C.J. Aarts, PhD, Jeroen Bosch Ziekenhuis, 's-Hertogenbosch, (NL).
- Malmö University, Faculty of Odontology, Department of Orofacial Pain and Jaw function, dr. B. Häggman-Henrikson, Malmö, Sweden.
- MASCC/ISOO Mucositis study Group.
- Molecular Cell Biology and Immunology, prof.dr. H.E. de Vries, Amsterdam UMC (VUmc), Amsterdam (metals and toll-like receptors in neuro-inflammatory diseases).
- N. Bleijenberg, PhD, UMC Utrecht (NL).
- N. Maskrey, MD, Keele University (UK).
- Nanjing Stomatological Hospital, Nanjing University Medical School, Nanjing, China.
- Newcastle University, Centre for Oral Health Research & Institute of Health and Society, Newcastle-upon-Tyne Hospitals’ NHS Foundation Trust, prof.dr. J. Durham, Newcastle-upon-Tyne, UK.
- Okayama University, Okayama, Japan: prof.dr. H. Kamioka (Dept. Orthodontics), Osteocyte imaging and mechanosensing.
- P. Morquecho-Campos and dr. S. Boesveldt. Division of Human Nutrition and Health, Wageningen University, Wageningen, NL.
- P.R. China: prof.dr. C. Du (School Materials Science & Engineering, Natl Engineering Research Center for Tissue Restoration and Reconstruction, South China University of Technology, Guangzhou, P.R. China): Anti-cancer drug integration in bone substitute carrier.
- Prof. D.A. van der Windt, PhD, Keele University (UK).
- Prof. G. Douglas, PhD, Leeds University (UK).
- Prof. Gordon Guyatt, PhD, McMaster University (CA).
- Prof. H. Whelton, PhD, University of Cork (IR).
- Prof. J.B. Epstein City of Hope Comprehensive Cancer Center, Duarte, CA 91010 and Cedars-Sinai Health Center, Los Angeles, CA, 90048 USA.
- Prof. N. de Wit PhD, UMC Utrecht (NL).
- Prof. P. van Zuijlen. Burns surgeon, Dutch Burn Center: Saliva research projects.
- Prof. P.A.A. van den Besselaar, PhD, VU University Amsterdam (NL).
- Prof. P.H. Buschang (Texas, VS).
- Prof. R. van Geuns, PhD, Hogeschool van Amsterdam (NL).
- Prof. R.G. Watt, PhD, University College London (UK).
- Prof. R.J. Stokroos PhD, UMC Utrecht (NL).
- Prof. S. Listl, PhD, Heidelberg Medical Center (D) & Radboudumc (NL).
- Prof. W. Brouwer, PhD, Erasmus University, Rotterdam (NL).
- Prof.dr. A.C. Didilescu, University of Medicine and Pharmacy, C. Davila, Bucharest, Romania.
- Prof.dr. G. Nascimento and prof.dr. R. Lopez, Section of Periodontology, Department of Dentistry and Oral Health, Aarhus University, Aarhus, Denmark.
- Prof.dr. H. van Lenthe, KU Leuven, Belgium: Mechanobiology.
- Prof.dr. H.J. Vogel, University of Calgary, Canada, Biological Sciences.
- Prof.dr. N. Bostanci. Section of Periodontology and Dental Prevention, Division of Oral Diseases, Department of Dental Medicine, Karolinska Institutet, Stockholm, Sweden.
- Prof.dr. S. Taweechaisupapong, Khon Kaen University, Thailand, Dental Faculty, Dept of Oral Diagnosis, dr. S. Kanthawong, Khon Kaen University, Thailand, Faculty of Medicine, Melioidosis Research Center.
- Prof.dr.ir. T.H. Smit, AMC, Amsterdam, NL: biomechanics of TMJ.
- Radboud UMC Nijmegen, afdeling hematologie, prof.dr. N.M. Blijlevens.
- Radboud UMC Nijmegen, afdeling tandheelkunde, prof.dr. M.C. Huysmans.
- Radboud Universiteit / Heidelberg University, prof.dr. S. Listl.
- Radboud university medical center, Department of Dentistry, prof.dr. C. de Baat, Nijmegen, NL.
- Radboudumc, Department of Dentistry, dr. B. Loomans, Nijmegen, NL.
- Radboudumc, IQ-healthcare, prof.dr. R. Nijhuis, Nijmegen, NL.
- Research Group Microbiology and Systems Biology, TNO Earth, Life and Social Sciences, Zeist, NL.
- S. Schandelmaier, PhD, McMaster University (CA).
- Sahlgrenska Academy, Göteborg University, Göteborg, Sweden, prof. I. von Bültzingslöwen and prof. G. Dahlen.
- San Carlos University, Cebu City, Philippines: prof.dr. R.G. Bacabac, (Dept. Physics, Biomedical Physics Group): Biophysics bone adaptation and regeneration.
- Sapienza University Rome, Italy - Department of Public Health and Infectious Diseases, prof. S. Petti.
- Sarphati instituut Amsterdam (Vrije Universiteit en Universiteit van Amsterdam), prof.dr. J. Seidel, prof.dr. A. Verhoeff, research for healthy living, onderzoekssamenwerking (in kind).
- School of Dentistry at Araraquara, UNESP, Brazil; prof. A. Rastelli, prof. D.L. Zandim-Barcelos.
- TNO Life Style - Behavioral and Societal Sciences, dr. E. Vermaire and dr. A. Schuller, Leiden, NL.
- Trisakti University, Faculty of Dentistry, dr. C. Marpaung, Jakarta, Indonesia.
- Uitblikkers in Childsmile: onderzoekssamenwerking op basis van contract (grant GSK): Glasgow University, prof. dr. L. McPherson, dr. A. Sherrif.
- Umea University, Sweden, Department of Clinical microbiology - Units: Infectious Diseases, Clinical Bacteriology, Section of Infection and Immunology, dr. A. Johansson & dr. R. Claesson.
- Universidade do Estado do Rio de Janeiro, Department of Paediatric Dentistry, Americano GCA, Soviero VM, Rio de Janeiro, Brasil.
- Université Clermont Auvergne, France, Centre de Recherche en Odontologie Clinique (CROC), prof. S. Domejean.
- University at Buffalo, Department of Oral Diagnostic Sciences, dr. R. Ohrbach, Buffalo (NY), USA.
- University College London, Marie Curie Palliative Care Research Department, Division of Psychiatry, prof. dr. E.L. Sampson, London, UK.
- University College of Dentistry, Department of Biomedical Sciences, dr. E. Schneiderman, Dallas, Texas, USA.
- University Estadual Paulista (UNESP), Department of Dental Materials and Prosthodontics, prof. dr. D. Aparecida de Godoi Gonçalves, Araraquara School of Dentistry, Araraquara, Brasil.
- University Medical Center (UMC) Utrecht, dr. C.M. Speksnijder, Utrecht, NL.
- University Medical Center Groningen, University of Groningen, Department of Oral and Maxillofacial Surgery and Special Care Dentistry dr. A. Korfrage, Groningen, NL. FondsNutsOhra and Biohorizons grants co-applicant.
- University Medical Center Groningen, University of Groningen, Department of Oral and Maxillofacial Surgery and Special Care Dentistry dr. L. den Hartog, Groningen, NL. FondsNutsOhra and Biohorizons grants co-applicant.
- University Medical Center Utrecht (UMCU)afdeling: Department of Oral and Maxillofacial Surgery and Special Dental Care dr. W. Fennis, Utrecht, NL. FondsNutsOhra and Biohorizons grants co-applicant.
- University of Aarhus, Department of Orofacial Pain and Jaw Function, prof. dr. P. Svensson and dr. L. Baad-Hansen, Aarhus, Denmark.
- University of Adelaide, School of Dentistry, dr. S. Ranjitkar, Adelaide, Australia.
- University of Athens, Orofacial Pain Clinic, Dental School, National and Kapodistrian, prof. dr. M. Tzakis, em.prof. V. Droukas, Athens, Greece.
- University of Bergen, Department of Global Public Health and Primary Care, prof. dr. B. Husebo, Bergen, Norway.
- University of Edinburgh, prof. M. Greenwood.
- University of Florida, College of Dentistry, Department of Oral and Maxillofacial Diagnostic Sciences, Division of Oral Medicine, prof. C. Seunghee Gainesville, FL. USA. NIH/NIAID grant application and publication.
- University of Groningen, University Medical Center Groningenafdeling: Department of Oral and Maxillofacial Surgery, prof. dr. A. Vissink, Groningen, NL. Several projects, grants and publications.
- University of Helsinki, Department of Stomatognathic Physiology & Prosthetic Dentistry, dr. J. Ahlberg, Helsinki, Finland.
- University of Minnesota, School of Dentistry, Department of Diagnostic and Biological Sciences, Division of Temporomandibular Joint Disorder and Orofacial Pain, prof. D. Nixdorf, USA.
- University of Missouriafdeling, Department of Biochemistry, Bond Life Sciences Center, prof. A. Weisman, Columbia, MO. USA. NIH/NIAID grant application and publication.
Current PhD projects


Baas, MAM. The treatment of fear of childbirth with EMDR therapy. Supervisor: prof.dr. A. de Jongh; co-supervisors: dr. M.G. van Pampus & dr. C.A.I. Stamrood, start:


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**Societal impact**

The department of *Dental Biomaterials* is part of the Oral Regenerative Medicine program. In this program, the department studies both the topics related to tissue regeneration and the biocompatibility of materials currently used in oral care. The biological and immunological acceptance of both types of materials is the starting point. Research on the adverse reactions of (dental) medical devices, including allergies, and the ability to bring this research to the attention of the dental and medical industry and practicing dentists, has had a considerable impact on product development within the dental industry and will eventually lead to improvements in public dental health. In general, multiple multinationals and SMEs are involved in active research collaborations in national and European funded projects like TTW (formerly STW) and Eurostars. All of these projects aim to develop market ready products.

The research of the department of *Oral Kinesiology* frequently yields results that are applicable in the clinic and thus contribute to the care and quality of life of patients with orofacial pain, headache, oromandibular dysfunction, and/or dental sleep disorders. The researchers of the department are frequently invited for lectures for professionals, both nationally and internationally. In addition, several companies are interested in their work and an increasing number of industrial grants is obtained to support research activities that are beneficial for the companies as well as for the patients and clinicians. Important notice is the global increase in attention for dental sleep medicine. The department of Oral Kinesiology is recognized as one of the most important players in this domain. To be even more precise: the department’s view on the discipline is increasingly recognized as paradigm shifting, with a broadening focus from only obstructive sleep apnea to include conditions like sleep bruxism, reflux, pain, and moistening disorders as well.

The primary focus of *Endodontology* is the prevention and treatment of pulpal and periapical diseases while maintaining the tooth in a symptom-free and functional state. These diseases are very frequent causes of pain among patients seeking dental treatment and, if left untreated, could lead to the extraction of the tooth. In addition, apical periodontitis may affect the patient’s general health. More than 60% of the population have a root canal treated tooth but apical periodontitis may still persist, depending on the quality of the treatment, and additional treatment may be needed. Thus, adequate training of general dentists and specialists in this field is another important goal. Management of dental trauma and internal bleaching of discoloured teeth are also included within the scope of Endodontology.

The *Oral Biochemistry* research group mainly aims to enhance the understanding of biochemical processes, specifically the role of saliva, in maintaining oral health. It encompasses different scientific methods and approaches, ranging from molecular to system-biological, and from fundamental-scientific to applied clinical research. In addition, the research groups explores the diagnostic potential of saliva as a non-invasive and easily accessible source of biomarkers: answering needs both within and outside of dental research with regards to diagnostics, care and therapy. An important development within this discipline is the growing insight that the composition of and functions of saliva are determined by an interplay of oral and extra-oral processes, such as local and systemic inflammatory conditions, as well as contextual factors like stress and medication use. All these factors can undermine protective oral-biochemical and microbiological interactions and increase the susceptibility to developing both general- as well as oral health problems.

The *Oral Radiology* department is the only department of oral radiology in the Netherlands and represents the entirety of the expertise in the Netherlands. Although oral radiology is not an
accredited dental specialty in the Netherlands, in surrounding countries (Scandinavia, UK) it is. This emphasizes the importance of this section within ACTA. In addition, the department is a source of information for policy makers (e.g. laws and policy with regards to radiation), as well as for professional organizations such as KNMT and ANT. The section is well-known for its educational activities.

Societal relevance for the dental professional in the Netherlands

Courses organized for Dutch dental and medical professionals


Krom, B.P. (2019, October 5). QP Themadag Mens, mond, microbioom.


Mirmohammadi, H. (2019, October 4-5). Root canal treatment A to Z, Hands-on course, Rotterdam, NL.


Lectures given during courses for Dutch dental and medical professionals


Aarab, G. (2019, November 2). Tandheelkundige slaapgeneeskunde in de algemene praktijk. ACTA-QP-Mondhygiëne themadag : Behandeling van tandheelkundige slaapstoornissen. Amsterdam, NL.

Aarab, G. (November 18). Tandheelkundige slaapgeneeskunde: meer dan alleen OSA. Slaap 2019, Ermelo, NL.


Aziz, Y. (2019, June 7). De medische aspecten van lachgassedatie, ACTA.


Bizzarro, S. (2019, March 5). Parodontitis, microbiologie, antibiotica, probiotica en prebiotica. ACTA Dental Education, Amsterdam (NL)

Bizzarro, S. (2019, June 7). Cursus parodontale chirurgie voor de algemene praktijk, ACTA-Dental Education, Amsterdam (NL)

Bizzarro, S. (2019 November 2). Paro workshop, ACTA Dental Education, Amsterdam (NL)


Crielaard, W. (2019, March 5). De gezonde en ongezonde mond, bijwerkingen van antibiotica en associaties met systemische ziektes. ADE Course Parodontitis, microbiologie, antibiotic, probiotica en prebiotica, Amsterdam, NL.

Crielaard, W. (2019, October 5). Het mond microbioom en gezondheid, lecture during Quality Practice course day Mens, mond en microbioom, Amsterdam, NL.


Danser, M.M. (2019, October 9). New classification of periodontitis – From diagnosis to practice. KNMT Haarlem, NL.

De Lange, J. (2019, March 1). Apexresectie, historie en ontwikkeling; Complicaties en infecties; Richtlijn apicale chirurgie; Cursus apicale chirurgie voor tandartsen en tandartspecialisten.


De Soet, J.J. (2019, October 5). Herstellen van het mond microbioom met pre- en probiotica. Lecture during Quality Practice course day Mens, mond en microbioom, Amsterdam, NL.
De Vries, N. (2019, November 2). Niet-tandheelkundige behandeling van OSAS. QP-Mondhygiëne 2019, ACTA Amsterdam, NL.
Dubois, L. (2019, April 10). Aangezichtstraumatologie. Scholingsdagen Traumachirurgie SpoedZorgNet AMC, Abcoude, NL.
Dubois, L. (2019, April 15). Infecties in het hoofdhals gebied, klinische les, Amsterdam, NL.
Dubois, L. (2019, April 16). Acute tandheelkunde, KNMT refereeravond, Utrecht, NL.
Dubois, L. (2019, January 14-16). Werkgroep: tandletsel in de praktijk, college blok Pijn & Trauma ACTA, Amsterdam, NL.
Dubois, L. (2019, January 22). College triage en opvang van bij patiënten met tand- en aangezichtsletsel, ACTA, blok pijn en trauma, Amsterdam, NL.
Dubois, L. (2019, January 22). Complexe middengezichtsletsels en innovaties, college blok Pijn & Trauma, ACTA, Amsterdam, NL.
Dubois, L. (2019, January 22). Zygoma en Le Fort fracturen, college blok Pijn & Trauma, ACTA, Amsterdam, NL.
Dubois, L. (2019, January 24). Mandibula fracturen, college blok Pijn & Trauma, ACTA, Amsterdam, NL.
Dubois, L. (2019, June 4). The ABC’s of Trauma. Maxillofacial Traumatology, Amsterdam, NL.
Dubois, L. (2019, September 4). Acute tandheelkunde. KNMT refereeravond, Utrecht, NL.
Dubois, L. (2019, October 4). Traumatische spoed. VMTI congres, Apeldoorn, NL.
Dubois, L. (2019, November 26). Spoedzorg in de tandheelkunde. Symposium Noord Hollandse Tandarts Vereniging, Akersloot, NL.
Hoekema, A. (2019, April 11). Autotransplantaties; achtergronden, indicatiestelling & uitvoering. 21e Waddencursus, KNMT-Friesland, Vlieland, NL.
Hoekema, A. (2019, April 12). Slaapapneu. Reünistencongres Tandheelkunde Groningen 70 jaar; Oral Healthy Ageing door de jaren heen, Groningen, NL.
Kaan, A.M. (2019, October 5). Hoe kom je nu aan je mond microbioom? Quality Practice course day Mens, mond en microbioom, Amsterdam, NL.
Koutris, M. (2019, April 5). Diagnose en behandeling van orofaciale pijn en disfunctie: een bijzonder multidisciplinaire taak. SBT 30 jaar symposium, Amsterdam, NL.
Krom, B.P. (2019, March 5). Pre- en probiotica in de paro-kliniek. ADE Course Parodontitis, microbiologie, antibiotica, probiotica en prebiotica, Amsterdam, NL.


Laine, M.L. (2019, February 9). ADEQP voor Mondhygiënisten; Patient met droge mond, moderator and presentation Droge mond en parodontale aandoeningen, ACTA, Amsterdam, NL.

Laine, M.L. (2019, April 13). Post HBO Mondhygiène, course Halitose en saliva, ACTA Amsterdam, NL.


Loos, B.G. (2019, February 23 & March 9). Toepassingen van weefselregeneratie in de parodontologie: recessies, botdefecten en peri-implantitis, at ACTA-QP Theme Tissue regeneration. Bussum and Amsterdam, NL.

Loos, B.G. (2019, April 10). Het multicausale concept in de etiologie van parodontitis. ACTA, Amsterdam, NL.

Loos, B.G. (2019, May 17). Human periodontitis – what is it and what can we learn from it? Keynote speaker European Veterinary Dental Forum, Jaarbeurs Utrecht, NL.

Loos, B.G. (2019, March 26). Nieuwe inzichten in de oorzaak van Parodontitis en de relatie met dementia. Stadion Fijenoord, Olympiadebouw, Rotterdam, NL.


Van der Weijden, G.A. (2019, April 12). Practice what you Preach, NTG.
Van der Weijden, G.A. (2019, November 29). Workshop Ultrasoon. ACTA.
Van Diermen, D.E. (2019, February 9). Effecten van medicatie op de speekselproductie. QP Dag Mondhygiënisten, ACTA.
Van Diermen, D.E. (2019, June 3). MTI. Klinische lunch ACTA.
Van Diermen, D.E. (2019, November 8). Hoe medisch willen we de tandarts hebben? MKA Talk bij congres NVMKA.
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Zaura, E. (2019, June 15 & 29). Antibiotica tijdens parodontitis, lecture during Quality Practice Up-to-Date day, Amsterdam, NL.

Zaura, E. (2019, October 5). Antibiotica en microbioom, lecture during Quality Practice course day Mens, mond en microbioom, Amsterdam, NL.

Organisation of congresses and symposia for professionals in the Netherlands

Hoekema, A. (2019, November 11). Organizing committee. NVTS MRA basiscursus. St Antonius Ziekenhuis, Nieuwegein, NL.


Uniken Venema, J.A.M. (2019, April 4-5). Organizing committee. NVTS congres, Naarden, NL.

Invited speakers at “professional” congresses or symposia in the Netherlands

Bots-van ‘t Spijker P.C. (2019, October 18). Welke ouderen bezoeken de algemene tandartspraktijk? Nederlandsch Tandheelkundig genootschap, Utrecht, NL.


Ho, B.V. (2019, October 18). De mond niet vergeten, onderzoeksresultaten. Nederlandsch Tandheelkundig Genootschap (NTG)-symposium, Utrecht, NL.


Lobbezoo, F. (2019, November 14). Orofaciale pijn bij ouderen met dementie. Symposium Multidisciplinaire Samenwerking, Mondzorg voor Ouderen, Rotterdam, NL.

Rollman, A. (2019, December 6). Orofacial pain and headache. Invited speaker, 4th Utrecht multidisciplinary meeting on pain in the head and neck area, Utrecht, NL.
Academic Centre for Dentistry Amsterdam


Thymi, M. (2019, November 8). Gnathology in a Centre for Special Dental Care: the (im)possibilities. Invited lecture, Stichting Bijzondere Tandheelkunde (SBT), Amsterdam, NL.


Professional functions in the Netherlands


Berkhout, W.E.R.: Lid - Richtlijnontwikkelcommissie Tandheelkundige Zorg voor hulpbehoevende thuiswonende ouderen, KIMO.

Berkhout, W.E.R.: Coördinerend stralingsdeskundige - VU-ACTA Amsterdam 2013-


Disse, M.A.: Dutch representative member - Efosa.

Disse, M.A.: Member - Amsterdam Cleft Lip and Palate team, location AUMC/ ACTA.

Disse, M.A.: Vice-president - RTS.


Jager, D.H.J.: Bestuurslid - Nederlandse Vereniging voor Gnathologie en Prothetische Tandheelkunde (NVGPT), Nijmegen, NL, 12-12-2014 t/m heden.


Jonkman, R.E.G.: Board member - Amsterdam Cleft Lip and Palate & Craniofacial team, location AUMC/ACTA.

Jonkman, R.E.G.: Board member - BCO of KNMT.

Jonkman, R.E.G.: Chairman - Concilium Orthodonticum.

Jonkman, R.E.G.: Member – CTS.

Jonkman, R.E.G.: Member - European Teachers’ Forum.

Jonkman, R.E.G.: Member -Craniofacial team, location AUMC/ACTA.

Jonkman, R.E.G.: Member visiting assessment committee – Neboep.


Krom, B.P.: Board member - ESCMID Study Group on Biofilms (ESGB).

Krom, B.P.: Board member - KNVM, section General and Molecular Microbiology.

Kuitert, R. B.: Member – CTS.

Kuitert, R.B.: Member - Concilium Orthodonticum.
Kuitert, R.B.: Member - European Teachers’ Forum.
Kuitert, R.B.: Member visiting assessment committee – Nebeop.
Laheij, A.M.G.A.: Lid Raad van Advies van de Nederlandse Wetenschappelijke Vereniging van Tandartsen (sinds September 2016).
Lobbezoo, F.: Chair - Nederlandsch Tandheelkundig Genootschap (NTG) [Dutch Dental Society], since 2016.
Loos, B.G.: Treasurer - Society for the Advancement of Natural Sciences, Medicine and Surgery, University of Amsterdam and Vrije Universiteit, Amsterdam, NL, 2018 – current.
Nijkamp, P.G.: Member - Amsterdam Craniofacial team, location AUMC/ ACTA.
Oey, C.S.: Member - CTS.
Poorterman, J.H.G.: Redacteur - Nederlands Tijdschrift voor Tandheelkunde
Rollman, A.: Chair - Kennisplatform Ergonomie voor Mondzorg (KEM), NL, since 2019.
Rozema, F.R.: Lid klanbordgroep Richtlijn Ontwikkelcommissie Landelijke Transmurale Afspraken
Rozema, F.R.: Voorzitter Fonds Mondgezondheid 2014-
Rozema, F.R.: Voorzitter Richtlijn Ontwikkelcommissie Antistollingsbeleid in de mondzorg (ROC van het KIMO). 2018-
Rozema, F.R.: Voorzitter Vereniging Medisch Tandheelkundige Interactie 2017-
San Giorgi, F.J.M.: Member - Redactieadviesraad ACTA QP.
Van der Heijden, G.J.M.G.: University Forum, University of Amsterdam (UvA), 2017-huidig.
Van der Heijden, G.J.M.G.: Chair of the Curriculum Committee (ACTA), 2017-huidig.
Van der Heijden, G.J.M.G.: Curatorium Chair, Research Chair on Prevention and Oral Health Care (C. van Loveren), ACTA, University of Amsterdam, 2013 – huidig.
Van der Heijden, G.J.M.G.: Curatorium member, Research Chair on Quality and Efficiency in Dental Practice (J Bruers), ACTA, University of Amsterdam, 2013-huidig.
Van der Heijden, G.J.M.G.: Curatorium member,Research Chair on Fear and Anxiety in Dental Practice (Prof. A. de Jong), ACTA, University of Amsterdam, 2013-huidig.
Van der Heijden, G.J.M.G.: Board Member - Trustees, Sarphati Institute, Amsterdam, 2018-huidig.
Van der Heijden, G.J.M.G.: Board Member - Trustees, Netherlands Epidemiological Society (Vereniging voor Epidemiologie), 2018-huidig.
Van der Heijden, G.J.M.G.: Member - College of Epidemiology Professors, Netherlands Epidemiological Society (Vereniging voor Epidemiologie), 2013-huidig.
Van der Heijden, G.J.M.G.: Member - Senate, University of Amsterdam (UvA) – 2019-huidig.
Van der Kaaij, N.C.W.: Member - Schisisteam Erasmus MC Sophia kinderziekenhuis.
Van Diermen, D.E.: Member - KnowVU (Knowledge Network Vrije Universiteit), Amsterdam, 2017-now.
Van Diermen, D.E.: Member guideline committee - Antithrombotics in Dental Patients, KiMo, since October 2017.
Van Diermen, D.E.: Member - Regiotafel Antistolling, SIGRA, Amsterdam, since 2016.
Van Diermen, D.E.: Member - Steering group Educational Quality (StOK), Vrije Universiteit (VU), Amsterdam, 2017-now.
Visscher, C.M.: Member - MSG Science Network Physiotherapy, NL, since 2018.
Volgenant, C.M.C.: Member Opleidingscommissie - Master Epidemiology, VUmc, since December 2018.
Zuurbier, P.: Member - Amsterdam Cleft Lip and Palate team, location AUMC/ACTA.
Zuurbier, P.: Member - Craniofacial team, location AUMC/ACTA.

Societal relevance for the dental professional internationally

Professional functions internationally
Aarab, G.: Member – Academic Advisory Board for Oral Function (Sunstar Suisse S.A.), since 2019.
Gibbs, S.: Active Member - Transition Programme for animal-free Innovations (TPI), 2018-
Lobbezoo, F.: Member – Academic Advisory Board for GrindCare (Sunstar Suisse S.A.), since 2012.
Lobbezoo, F.: Member – Academic Advisory Board for Oral Function (Sunstar Suisse S.A.), since 2019.
Mirmohammadi, H.: Assistant professor - Department of Endodontics, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
Mirmohammadi, H.: Assistant professor- Dental Materials research Center, Dental Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran.
Raber-Durlacher, J.E.: Consultant - MASCC/ISOO Mucositis Study Group Cytokines and Growth.
Raber-Durlacher, J.E.: Member Advisory Board - MASCC/ISOO Mucositis Study Group.
Rozema, F.R.: Chair - IT advisory committee IAOMS.

Organization of international congresses and symposia for (health care) professionals
Invited speakers at international “professional” congresses or symposia


Feilzer, A.J. (2019, June 27). Guest speaker for the laudatio of the Promotieviering of the Dental school, University of Leuven, Belgium.


Hoekema, A. (2019, November 13-14). Craniomaxillofacial phase 3 training course Stryker. Midface trauma & orthognathic surgery cadaver course. Amsterdam Skill Center, Amsterdam, NL.


Contacts with the general public

Interactions with the press and the general public


Brand, H.S. (2019, April 24). De tandarts is een seriemoordenaar. Interview NPO radio1, Hilversum, NL.


Delmee, N.M. (2019, October 5-6 & November 2-3). Topdoks Televisieprogramma, Zapp, NPO 3.

Feilzer, A.J. (2019, May 29). 7e Lustrum ACTA, Symposium, Nieuwe de La Mar theater, Amsterdam, NL.


Krom, B.P. (2019, September 9). Orale Candida speelt rol bij transport S. aureus. Interview NTV. 


Rozema, F.R. (2019, June 1). Interview, Doorgang, tijdschrift, Uitg. SPKS (Stichting voor Patiënten met Kanker aan het Spijsverteringskanaal).


Van der Waal, S.V. (January 20). Reactie op cijfers over klachten na wortelkanaalbehandeling. Radio interview FUNx, gepubliceerd door RTL.


Zaura, E. 2019, May 29). Mind the gap: de kloof in cariës-preventie. ACTA lustrum symposium, Nieuwe de La Mar theater, Amsterdam, NL.


**Impact of the research on the general public or professionals**


**Functions in public committees**


Feilzer, A.J.: Chairman - Chamber of first line dental care, Capaciteitsorgaan, Utrecht, 2018- present.

Feilzer, A.J.: Committee member - (Subcommissie Grenswaarden Stoffen op de Werkplek) - Dutch social economic council - (SER), Den Haag, 2015 – present.

Feilzer, A.J.: Advisory member - (ad-hoc working group Biomonitoring and Sensoring) - Dutch social economic counsil (SER), Den Haag, 2019 – present.

Jerković-Ćosić, K.: Lid - Kamer Mondzorg Capaciteitsorgaan

Muris, J.: Chairman of the board - Kimo, Utrecht, 2016 - present.

### Appendix 2: List of SCI journals

(+their impact factors and the number of ACTA publications in 2019 in each journal)

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