Dutch Dental Science days

13-14 June 2024

'De Werelt'
Lunteren

Program & Abstract book

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Dutch Dental Science days

Program

Program

Thursday 13 June 2024

09.00 – 09.30 **Registration**

09.30 – 10.50 **Plenary session I (8 min presentation, 2 min discussion)**
Chair: Marie-Charlotte Huijsmans – Room: Air

Welcome – Henri Lohr

1. Yori Ong, UMCG / RUG – The problem of alignment: what AI and dentistry can learn from each other
2. Therese Elkerbout, ACTA – Advice and Information about toothbrushing as available on websites of professional dental care associations
3. Jelte Hofsteenge, UMCG / RUG – Clinical survival and performance of premolars restored with direct or indirect cusp-replacing resin composite restorations with a mean follow-up of 14 years
4. Monique van der Veen, Inholland – Parents' perspectives regarding the influence of the living environment in Amsterdam North on their food choices
5. Jan-Jaap Reinders, UMCG / RUG – Synergy among future dentists and dental hygienists related to interprofessional identity independent of team identity
6. Trishnika Chakraborty, UMCG / RUG – Health Literacy, oral diseases, and contributing pathways: A Longitudinal Dutch Cohort Study

10.50 – 11.20 **Coffee/tea break** – Room: Fire

11.20 – 12.20 **Plenary session I (cont.)**
Chair: Alina Kunnen – Room: Air

Lecture on landscape photography - feeling, vision and beyond
Speaker: Bas Meelker

12.20 – 13.20 **Lunch** – Restaurant

13.20 – 15.00 **Parallel session I (8 min presentation, 2 min discussion)**

Parallel session I-A
Chair: Eveline van der Sluijs - Room: Air

1. Lisette Ranselaar, ACTA – What is the adjunctive effect of propolis mouthwash on plaque scores and periodontal parameters for gingivitis patients?
2. Bregje van Swaaij, ACTA – Fluoride, pH value and titratable acidity of commercially available mouthwashes
3. Yinli Liu, ACTA – Plaque removal and gingivitis reduction during fixed orthodontic treatment with powered vs manual toothbrushes -a systematic review and meta-analysis-
4. Cynthia Groenevelt, ACTA – The effect of the use of propolis in addition to non-surgical therapy in the treatment of periodontitis -a systematic review and meta-analysis-
5. Anouk Loeffen, HAN – The effect of different interdental brush shapes on dental plaque and clinical parameters of periodontal disease -a systematic review-
6. Fatma Dagdeviren, ACTA – Prevalence of Epstein pearls in neonates: a systematic review
7. Sonja Kalf-Scholte, ACTA – Patterns of Tooth Agenesis in individuals with Down syndrome -A secondary analysis using the Tooth Agenesis Code-
8. Beau van Dijk, ACTA – Parkinson's disease and experienced salivary problems: a cross-sectional, questionnaire-based study
9. Lotte Weijdijk, ACTA – The association of periodontitis with cardiovascular disease parameters -a synthesis of systematic reviews-

Parallel session I-B
Chair: Tijmen Münker – Room: Water

1. Chong Huang, Radboudmc – Development of tooth-on-a-chip co-culture model to study the early-stage interaction between dental epithelial and mesenchymal cells
2. Lisa-Lee Brüske, ACTA – Body Barriers - A novel mucosa-blood-brain organ-on-chip platform for the safety testing of medical devices
3. René Dijkstra, UMCG – A 3D GelMA model to mimic the steep matrix stiffness gradient between dental pulp tissue and dentin to study its role in cell behavior
4. Jiangfeng Jin, ACTA – Low, but not high fluid shear stress affects matrix extracellular phosphoglycoprotein expression mainly via integrin β subunits in preosteoblasts
5. Karl Jacobs, ACTA – Imaging vascular development in early human embryonic stages
6. Lucky van Gennip, Radboudmc – Are chronic dental infections risk factors for early post-HCT morbidity?
7. Marjolein Bulthuis, Radboudmc – Salivary flow rate, xerostomia and tooth decay 5 years after haematopoietic cell transplantation
8. Ilkay Evren, ACTA – The possible role of Candida in malignant transformation of oral leukoplakia
9. Caroline de Jongh, ACTA – Macrophage response upon co-infection with *P. gingivalis* and *C. albicans*

15.00 – 15.30 **Coffee/tea break** – Room: Fire

15.30 – 16.45 **Plenary session II**
Chair: Alina Kunnen – Room: Air

Lecture 'Why should we care about being FAIR?'
Speaker: Michiel de Boer (UMCG)

Prize giving 'NTVT Publieksprijs'
Prize giving 'Best picture of Lunteren's nature'
Prize giving 'Best oral presentation PhD candidates' (parallel sessions I-A+B)

16.45 – 18.00 **Poster session** – Room: Fire (drinks and snacks included)

18.00 – 18.30 **Check in (hotel room)**

18.30 – 20.00 **Diner** – Restaurant (drinks included)

20.00 – 22.00 **Pubquiz (NTVT)** – Room: Fire (drinks for own expense)

22.00 – 23.00 **Social time/free evening** – Room: Fire (drinks for own expense)

Friday 14 June 2024

07.00 – 07.30 **Outdoor bootcamp/workout** (optional)
Trainer: Willemke Nijholt – Gather at the hall (Main entrance)

07.30 – 09.30 **Breakfast + check out** – Restaurant

09.30 – 10.30 **Parallel session II (8 min presentation, 2 min discussion)**

Parallel session II-A
Chair: Lea Kragt - Room: Water

1. Tessa van Ligten, ACTA – Patterns of dental healthcare costs of 12-year-old adolescents living in Amsterdam: a longitudinal study
2. Brenda Grift, HU – Beyond the classroom: Student-led initiative in toddler oral health
3. Amy Pabbla, ACTA – Predictors of oral healthcare utilization and satisfaction among Indian migrants and the host population in the Netherlands
4. Ziade Sarroukh, Radboudmc – The political economy of priority setting and resource allocation in oral health: a narrative review and stakeholder interviews across four European countries
5. Sehida Begovic, ACTA – Whose responsibility is it? A situational analysis of the community-level oral health situation in Amsterdam

Parallel session II-B
Chair: Stephanie van Leeuwen – Room: Air

1. Trishnika Chakraborty, UMCG / RUG – Health Literacy, oral diseases and contributing pathways: A LifeLines cohort study
2. Maud Jonker, UMCG / RUG – Decision-making concerning involuntary oral care for older individuals with dementia
3. Sterre Gitz, ACTA – Poverty-Fighting Organizations in the Netherlands: Possible Key Figures in Improving Oral Health of a Vulnerable Population
4. Laura Swinckels, Inholland – The Development of a Deep Learning Model based on Textual Longitudinal Electronic Health Records to Detect Periodontal Disease
5. Maria Azevedo, ACTA – The oral mycobiota of mother-child pairs in early life: association with maternal cardiometabolic risk factors

10.30 – 11.00 **Coffee/tea break** – Hall

11.00 – 12.10 **Parallel session II (cont.)**

Parallel session II-A
Chair: Dagmar Else Slot – Room: Water

1. Wendy Knibbe, ACTA – The effects of post-traumatic stress disorder treatment on painful temporomandibular disorders
2. Hilde Bronkhorst, Radboudmc – Bruxism and Tooth Wear: A Scoping Review
3. Joris de la Court, Radboudmc – Oral Health Status of Dutch Armed Forces Recruitsin the years 2000, 2010 and 2020, a retrospective repeated cross-sectional study
4. Daniëlle Boonzaaijer, UMCG / RUG – Do dentists like performing endodontic treatments? The level of job satisfaction of dentists performing endodontic treatments in the Netherlands
5. Dinesh Durán Jiménez, ACTA – The prevalence, risks, and detection of driving under the influence of nitrous oxide

Parallel session II-B (ORANGEFORCE; *open voor all DDS participants*)
Chair: Vanessa Hollaar – Room: Air

1. Mees de Jong, ACTA – Improving Oral Health Care for Community-dwelling Frail Older People through Interprofessional Collaboration: Identifying Barriers, Success Factors, and Integration Strategies
2. Sanne Pruntel, UMCG / RUG – Oral health in patients with cognitive complaints at a Dutch memory clinic
3. Mark Laske, Radboudmc – Data exchange between oral care practice and general practice: a scoping review and qualitative research
4. Hanan al Habobe, ACTA – Exploring Saliva Biomarkers for Obesity Diagnosis and Preventive Healthcare
5. Victor Madariaga, Radboudmc – In vitro and in situ validation of ISFET sensor for intraoral pH monitoring: Preliminary results
6. Joanita van Santen, ACTA – Intra-Oral Ion Concentration Measurements in Healthy Individuals
7. Isabelle Bos, Nivel – Connecting routine healthcare data from dental care and general practice: First results and opportunities from a data linkage study

12.10 - 12.30 **Plenary session III**
Chair: Alina Kunnen – Room: Air

Closing remarks – Henri Lohr

Prize giving 'Best oral presentation PhD candidates' (parallel sessions II-A+B)

12.30 – 13.30 **Lunch** – Restaurant

13.30 – 16.30 **PhD meeting: 'Peer review – an interactive session'**
Dagmar Else Slot, ACTA – Room: Water

13.30 – 16.30 **ORANGEFORCE ANNUAL PARTNER MEETING;** ***open for all DDS participants***
Room: Air

On Friday afternoon the annual ORANGEFORCE meeting will take place. The session starts after lunch and ends at 16.30H with drinks. ORANGEFORCE is the public private partnership project in which all Dutch dentistry and oral hygiene institutes collaborate with private organizations and societal partners to provide better oral care for older people.
ORANGEFORCE is the largest Oral health project in the Netherlands in which a team of 50 researchers work together.

During the annual meeting an update will be given of the results of the past year.

DDS

Dutch Dental Science days

Abstract book

Thursday 13 June 2024

Plenary session I
Room: Air

1. **The problem of alignment: "What AI and dentistry can learn from each other?"**
   Yori Ong
   UMCG / RUG

How can we make intelligent agents do what we want them to do? And how do we prevent them from doing what we don't want them to do? Finding a correct and satisfying answer to these questions is of the greatest urgency in artificial intelligence (AI), but also in preventive dentistry. In AI, this is known as the alignment problem, while in dentistry and public health, we talk about behavior change.
In my presentation, I illustrate the equivalence between these two problems and discuss the concept of 'commonly knowing', which is fundamental to both computational logic and human psychology. When a group of people has common knowledge of 'X', all in the group know 'X', all know that all know 'X', and all know that all know that all know 'X', etc. The presence or absence of common knowledge underlies cooperation, behavioral norms, social influence and intrinsic motivators. I explain how common knowledge affects our current approaches to behavior change and how new and scalable strategies can be developed that intervene on this fundamental level.

2. **Advice and Information about toothbrushing as available on websites of professional dental care associations**
   Therese A. Elkerbout, Tim Thomassen, Fridus van der Weijden, Dagmar Else Slot
   ACTA

Aim: to assess the online advice and information about toothbrushing provided by professional dental care associations (PDCAs) in English-speaking countries.
Material and Methods: PDCAs are national organizations of dentists and dental hygienists. A cross-sectional internet search for information published until July 2021 was performed. First, it was assessed whether there was a PDCA in English-speaking-countries. A distinction was made between dentist associations(DAs) and dental hygienist associations(DHAs). In case a website was available, it was assessed whether toothbrushing-advice was provided. Recommendations regarding a brushing-technique, advice and instruction about the type of toothbrush, type of bristles, duration of brushing, time of changing the toothbrush, the use of toothpaste and interdental-cleaning-devices were gathered and summarized.
Results: In total, 56 English-speaking-countries were considered, In total, 35% of the PDCAs, that is, 16 DAs and 7 DHAs, provided advice and information on toothbrushing and recommended twice daily manual toothbrushing with a fluoride toothpaste. Generally, a toothbrushing duration of 2 min (n=20) and the (modified) Bass toothbrushing technique (n=9) were advised. Nine PDCAs recommended the use of a powered toothbrush as well, and 21 recommended the daily use of floss. Nine PDCAs also recommended the use of an interdental brush.
Conclusion: In total, 35% of the PDCAs with a website provided advice and/or information on toothbrushing. Although no consensus was found and significant heterogeneity was observed in the instructions related to toothbrushing and toothbrushing technique, all PDCAs recommended twice daily brushing with a manual toothbrush and fluoride toothpaste. With respect to other recommendations on basic oral self-care, there appears to be a need for alignment.

3. **Clinical survival and performance of premolars restored with direct or indirect cusp-replacing resin composite restorations with a mean follow-up of 14 years**
   Jelte W. Hofsteenge, W.M.M. Fennis, R.H. Kuijs, M. Özcan, M.S. Cune, M.M.M. Gresnigt, C.M. Kreulen
   UMCG / RUG

Objectives: The objective is to evaluate the long-term clinical survival and performance of direct and indirect resin composite restorations replacing cusps in vital upper premolars.
Methods: Between 2001 and 2007, 176 upper premolars in 157 patients were restored with 92 direct and 84 indirect resin composite restorations as part of an RCT. Inclusion criteria were fracture of the buccal or palatal cusp of vital upper premolars along with a class II cavity or restoration in the same tooth.
Results: Forty patients having 23 direct and 22 indirect composite restorations respectively, were lost to followup (25.6%). The cumulative Kaplan-Meier survival rates were 63.6% (mean observation time: 15.3 years, SE 5.6%) with an AFR of 2.4% for direct restorations and 54.5% (mean observation time: 13.9 years, SE: 6.4%) with an AFR of 3.3% for indirect restorations. The Cox regression analysis revealed a statistically significant

influence of the patient's age at placement on the survival of the restoration (HR 1.036, p = 0.024), the variables gender, type of upper premolar, type of restoration, and which cusp involved in the restoration had no statistically significant influence. Direct composite restorations failed predominantly due to tooth fracture, indirect restorations primarily by adhesive failure ($p < 0.05$).
Significance: There was no statistically significant difference in survival rates between direct and indirect composite cusp-replacing restorations. Both direct and indirect resin composite cusp-replacing restorations are suitable options to restore compromised premolars. The longer treatment time and higher costs for the indirect restoration argue in favor of the direct technique.

4. **Parents' perspectives regarding the influence of the living environment in Amsterdam North on their food choices**
   Monique van der Veen, Fleur Bergen, Ilayda Gökkaya, Duygu Imaç, Isabelle Mienstra, Shanna Munster, Merle Poelstra, Bich Chau
   Inholland

Aim: Amsterdam North is a neighbourhood characterized by high proportions of residents with low socioeconomic status or migration background, marked by midrise flats and an abundance of fast-food chains. We aimed to explore the perspectives of parents with young children living in Amsterdam North on how their living environment influences their food choices.
Method: Parents with young children living in Amsterdam North were interviewed on the street in the local shopping area. The interview focused on which aspects in the physical environment, supported by photographs (photovoice) of the food supply in the area, determines food choices and why. Interviews were transcribed verbatim and then analysed thematically.
Results: Interviews with five fathers and nine mothers revealed that parents attribute significant influence to their surroundings, emphasizing the abundance of fast food and a perceived limitation in the quality of available food. While stressing that they try to eat home cooked meals, parents often choose fast food due to its easy accessibility. Sweets and snacks are considered a reward. The appealing display of fruits and vegetables at the entrance of supermarkets and greengrocers prompts additional purchases, although parents struggle with the costs of these healthier options.
Conclusion: Parents' food choices in Amsterdam North are strongly shaped by the pervasive presence of fast-food options, leading to increased temptation and reduced control over food quality and quantity. The findings underscore the complexity of these influences and advocate for interventions to create healthier eating environments. The study is part of NWA/ORC project MetaHealth subsidized by NWO.

5. **Synergy among future dentists and dental hygienists related to interprofessional identity independent of team identity**
   Jan-Jaap Reinders, Wim P. Krijnen
   UMCG / RUG

Hierarchy between oral care professions can hamper team performance and even jeopardize patient safety. Team identity moderates the relationship between team diversity and team performance but teams are not always permanent and interprofessional. Interprofessional identity should overcome both problems. The purpose of this study is to determine whether interprofessional identity determines more interprofessional effort independent of team identity. Participants in this double-blind study were 47 dental students and 41 dental hygiene students (86.3% response rate). Interprofessional identity was measured with extended professional identity scale (EPIS) eight weeks prior to interprofessional education. Based on average EPIS scores, students were assigned to a group condition: low versus high interprofessional identity. Twelve teams (4-5 members) were formed per condition. Each team was given eight problems (e.g. role clarity, collaboration, legislation and interprofessional organization). A minimum of six and maximum of ten solutions were demanded for each problem. Indication of effort was based on percentage of solutions per problem. Number of team members asking questions, suggesting topics and sharing ideas was used as joint indicator of interprofessional interaction style. Mean difference between teams with low versus high interprofessional identities was 0.5 (3.4; SD=0.5 and 3.9; SD=0.4 respectively), $t=-5.880$, $df=86$, $p<0.001$. Teams with a high interprofessional identity showed more effort in coming up with solutions versus low identity teams (91.5% vs. 86.4%), $t(86)=-2.938$, $p=0.004$ and also expressed more interprofessional interaction style, $t(86)=-2.160$, $p=0.034$. Interprofessional identity determines more interprofessional effort independent of team identity. Interprofessional identity formation can be facilitated but has not been implemented yet.

6. **Health Literacy, oral diseases, and contributing pathways: A Longitudinal Dutch Cohort Study**
   Trishnika Chakraborty, Marise S. Kaper, Josue Almansa, Annemarie A. Schuller, Menno S.A. Reijneveld
   UMCG / RUG

Background: Health literacy (HL), the ability to deal with information related to one's health, may affect oral health via several routes. Therefore, this study aimed to examine the association of HL with oral diseases, and whether this association is mediated by oral health behaviour and dental care utilisation.
Methods: We included 26,983 participants from the prospective multigenerational Dutch Lifelines Cohort Study to estimate the association between low health literacy, and self-reported oral health outcomes (edentulism and gingivitis), and mediation by oral health behaviour and dental care utilisation. Structural equation modelling was used to assess HL's direct, indirect, and total effects on oral health outcomes.
Results: Lower health-literate participants had increased odds of having poor oral health outcomes, i.e. edentulism (odds ratio: 1.42; 95%-confidence interval: 1.28 to 1.58) and gingivitis (1.22; 1.15 to 1.31). After adjustment for age, income, and education, brushing behaviour and dental care utilization showed a significant mediation effect. Brushing behaviour accounted for 7.4% of the total effect of HL on edentulism and 6.7% for gingivitis. Dental visits accounted for 38.0% of the total effect of HL on edentulism and 16.4% for gingivitis.
Conclusions: Lower HL makes edentulism and gingivitis more likely, with poor oral health behaviour and inadequate dental care utilisation being important mediators. The findings suggest that interventions to improve HL could have a considerable direct and indirect impact on improving oral health outcomes. Enhancing the abilities of dental professionals to identify patients with low HL and to cope with low HL impacts may be promising.

Plenary session I (cont.)
Room: Air (Guest speaker)

Lecture on landscape photography - feeling, vision and beyond
Bas Meelker

Landscape photography is one of the fundamental pillars of photography. A fascinating play between land, air and light. A never-ending search for those special moments in which everything comes together into a photo in which composition and color captivate the viewer. Bas Meelker is one of the Netherlands' best-known landscape photographers and his work has been awarded several times in national and international competitions. His work is known for its strong use of natural light, color and impressive compositions. In this lecture, Bas Meelker will not only let you enjoy his special landscape photos. He also takes you into his thought process. But this lecture goes further. How do you stand out in the sea of landscape photos we see today? How do you develop your own vision and style? What pitfalls do you encounter and how do you ultimately follow your own path? An educational and fascinating lecture full of creativity, playing with light and tips. Do not miss it!

Parallel session I-A
Room: Air

1. **What is the adjunctive effect of propolis mouthwash on plaque scores and periodontal parameters for gingivitis patients?**
   Lisette Ranselaar, C. Groenevelt, D.E. Slot
   ACTA

Aim: To evaluate the adjunctive effect of propolis mouthwash on plaque scores (PS) and periodontal parameters for gingivitis.
Methods: The MEDLINE-PubMed and Cochrane-CENTRAL databases were searched for randomized controlled trials (RCTs) that compared propolis with either a negative control group (no mouthwash or placebo) or a positive control group (a mouthwash with active ingredients such as chlorhexidine).
The data collected were divided into a brushing model and a non-brushing model and summarized in a descriptive analysis and, where possible, a meta-analysis.
Plaque scores (PS), bleeding scores (BS) and gingival index (GI) are the parameters of interest. The analysis considered the risk of bias and GRADING was applied throughout.
Results: Based on the selection criteria, six unique eligible publications with 19 comparisons were identified. The descriptive analysis shows a significant difference in GI and BS in the negative control group in favour of propolis in the brushing studies. However, for PS, no significant differences were found in most comparisons. For studies that used a brushing design, the meta-analysis found that both PS and BS were significantly

lower in the propolis group compared to the negative control group ($p < 0.05$). The strength of the evidence was low. The meta-analysis of the non-brushing studies revealed a significant mean difference of -0.86 (95% CI [-1.43; -0.29], $p < 0.05$) in favour of propolis for plaque scores in the negative control group. No statistically significant differences were observed when comparing propolis with chlorhexidine. The strength of the evidence was moderate.
Conclusion: For patients with gingivitis, there is weak certainty and limited evidence to support the use of propolis as a general adjunctive mouthwash or as an alternative to Chlorhexidine.
When a mouthwash is indicated for patients with gingivitis, a chlorhexidine mouthwash is preferred over a propolis mouthwash.

2. **Fluoride, pH value and titratable acidity of commercially available mouthwashes**
   Bregje van Swaaij, D.E. Slot, G.A. Van der Weijden, M.F. Timmerman, J. Ruben
   ACTA

Aim: The primary objective of this work was to assess total soluble fluoride(TSF), pH values and titratable acidity(TA) of various mouthwashes 'in-vitro', and the second objective was to compare fluoride content on labels with measured TSF.
Methods: Commercial mouthwashes were collected and analyzed. Company, type, manufacturers data and active ingredients (essential oils(EO), cetylpyridinium chloride(CPC), chlorhexidine(CHX) and fluoride) were described. TSF, pH and TA capacity were measured. Descriptive quantitative analysis were performed per mouthwash.
Results: In total, 54 mouthwashes from 20 brands were included. These included mouthwashes with active ingredients EO(n=11), CPC(n=17), CHX(n=18), fluoride(n=32), and 27 mouthwashes with more than one of these active ingredients and 4 with none of the above mentioned ingredients. Fluoride was present in different formulations, most contained Sodium Fluoride(NaF), and a few Sodium monofluorophosphate(MFP) and Amine fluoride(AmF) + NaF. The pH values of all evaluated mouthwashes ranged from 4.1 to 7.9. Twenty mouthwashes presented pHs below 5.5 of which 10 contained fluoride. TA ranged from 0 to 48. According to the manufacturers data, mouthwashes with fluoride had concentrations from 217-450 ppm, with 90% in the range from 217 to 254 ppm. Laboratory data revealed that TSF ranged from 229-500 ppm, with 90% in the range from 229 to 337 ppm. A statistically significant difference was observed between measured TSF and the labelled fluoride content on the packaging of the fluoride mouthwashes (Mean diff 43.92 ±34.34, $p<0.001$).
Conclusion: The pH values and TA of commercially available mouthwashes showed a large variation. TSF level of the fluoride mouthwashes were found to be at least the amount of fluoride as labelled. Dental care professionals should be aware of the pH, TA, fluoride content, and other active ingredients of different mouthwashes to better understand their potential influence on oral health.

3. **Plaque removal and gingivitis reduction during fixed orthodontic treatment with powered vs manual toothbrushes -a systematic review and meta-analysis-**
   Yinli Liu, N. Jaquet, F.N. Van der Weijden, F.G.A. Van der Weijden, R.E.G. Jonkman, D.E. Slot
   ACTA

Aim: To analyse, evaluate and synthesize papers comparing the efficacy of powered toothbrushes (PTBs) with manual toothbrushes (MTBs) in orthodontic patients with fixed appliances (FA) on plaque scores (PS), gingival scores (GS) and bleeding scores (BS).
Materials and Methods: The MEDLINE-PubMed was searched with the predefined search terms until September 2023 to collect (randomized) controlled clinical trials comparing the effects of PTBs with MTBs on PS, GS and BS in orthodontic patients with FA. In the eligible papers, we evaluated their risk of bias, extracted data of interests, and performed a descriptive analysis. If possible, meta-analyses and sub-analyses on specific action modes of PTBs were conducted. The quality of evidence and the strength of the recommendation was rated.
Results: Following search and selection, 24 papers with 41 comparisons were eligible. Their potential risk of bias was assessed as low to high and heterogeneity was considered as considerate. The descriptive analysis indicated no significant difference between PTBs and MTBs on PS (54%), GS (71%), and BS (75%). The meta-analyses and sub-analyses showed no significant difference at baseline. In overall meta-analyses, a significant difference favouring PTBs was found for end scores (PS,p=0.01;GS,p=0.02;BS,p=0.02) and difference scores (GS,p=0.04;BS,p=0.02). The sub-analyses of end scores for PTBs with counterrotational (CR) action supported these findings (PS:p=0.03;GS:p=0.05). The magnitude of the effect of PTBs was graded as small and the strength of the recommendation was judged as very weak.
Conclusion: There is very weak certainty for the recommendation, in orthodontic patients with FA, that using PTBs such as with CR action can have a small effect on reducing plaque and gingivitis.

4. **The effect of the use of propolis in addition to non-surgical therapy in the treatment of periodontitis -a systematic review and meta-analysis-**
Cynthia M.C.C. Groenevelt, L. Ranselaar, D.E. Slot
ACTA

Aim: To evaluate the adjunctive effect of propolis in nonsurgical periodontal treatment on clinical parameters for periodontitis.
Methods: MEDLINE-PubMed and Cochrane-CENTRAL databases were searched for RCTs. Studies evaluating the adjunctive effect of propolis in nonsurgical periodontal treatment were included. Placebo or no additional treatment were considered as control treatments. Pocket depth(PPD) and clinical attachment level(CAL) are primary outcomes, plaque(PS), bleeding(BI) and gingival index(GI) are secondary outcomes. Data collected were summarized in a descriptive analysis and, if possible, a meta-analysis. Subgroup-analyses were performed for gels and solutions, number of times irrigated, performed oral hygiene instructions, age at inclusion, follow-uptime, overall risk of bias and funding. A trim-and-fill analysis was conducted to explore possible publication bias. The risk of bias was assessed, and the total level of certainty was GRADED.
Results: Based on the selection criteria, 8 unique eligible publications were identified containing 10 comparisons. The descriptive analysis demonstrated that in majority, propolis have a significant adjunctive effect for all parameters of interest. The meta-analysis showed a significant reduction on PPD (DiffM;-1.34, 95%CI:[-2.35;-0.34],p=0.01) rated as small and CAL (DiffM;-1.41,95%CI:[-2.61;-0.21],p=0.02) rated as substantial by the additional use of propolis. For the secondary outcomes (PS,BI,GI), there was a significant effect with the adjunctive effect of propolis. The subgroup-analyses support the findings and explain the heterogeneity. The risk of bias assessment is low to moderate. GRADING rated the level of certainty as low.
Conclusion: The current evidence suggests a low level of certainty regarding a positive effect of propolis on the clinical outcome parameters during nonsurgical periodontal treatment.

5. **The effect of different interdental brush shapes on dental plaque and clinical parameters of periodontal disease -a systematic review-**
Anouk W.M. Loeffen, Lars S.J. Toonen, Bregje W.M. van Swaaij, Mark F. Timmerman, Dagmar E. Slot
HAN

Objective: This review presents a systematic overview of the available evidence for the effect of conical (CON) and waist-shaped (WS) compared to cylindrical IDBs on plaque score (PS), bleeding score (BS) and probing pocket depth (PPD) in adults.
Methods: Methodological quality was assessed with the Risk of Bias 2.0 and ROBINS-I tools. Extracted data were summarized in a descriptive analysis and a meta-analysis was conducted when possible. Subgroup analysis voor IDB type and sub analysis for site specific evaluations was performed. Grading was applied using the GRADE approach.
Results: Six studies were included, four compared WS and two CON to cylindrical IDBs. All studies where estimated to have some concers of bias. In the descriptive analysis, for the WS-IDB compared to the cylindrical IDB, three out of four comparisons found a significantly greater reduction in PS, no differences were found for BS and PPD. For the CON-IDB compared to the cylindrical IDB, no significant differences were found in PS and PPD, one study found a significantly higher BS with CON-IDBs.
The meta-analysis found no significant difference for the endscores between the WS-IDB and cylindrical IDB (SMD=0.03;95%CI(-0.34;0.41)p=0.22) nor for the difference between baseline and end (SMD=-0.51;95%CI(-1.08;0.05)p=0.07). The end scores on PS reduction between the CON-IDB and cylindrical IDB showed a small effect in favor of the cylindrical IDB (SMD=0.36;95%CI(0.00;0.73)p=0.05).
Conclusion: There is weak certainty that there is no difference between waist-shaped and conical compared to cylindrical IDB for PS, BS and PPD. Subgroup analysis showed a greater reduction in PS with cylindrical compared to conical IDBs.

6. **Prevalence of Epstein pearls in neonates: a systematic review**
Fatma Dagdeviren, Daniela Hesse, Corine J. Verhoeven, Dagmar Else Slot
ACTA

Objectives: Epstein pearls (EPs), or oral mucosa cysts of the palate, can raise concern among parents and healthcare professionals. The aim of this systematic review was to estimate the worldwide prevalence of EPs in neonates and to investigate factors that might influence this prevalence.
Study design: The PubMed-MEDLINE, Cochrane-CENTRAL, and EMBASE databases were systematically searched.
Results: The search identified 35 papers, involving 23,630 participants, which met the eligibility criteria. The weighted mean prevalence of EPs in the whole studied population was 54.3% (95%CI:[47.3;61.4]). A subanalysis

showed minor differences in prevalence between males (54%) and females (51%). An evaluation of the mode of birth showed that the prevalence of EPs was slightly higher after vaginal birth (43%) than after cesarean section (41%). The prevalence varied for the timing of EP assessment, with 71% within the first day and 60% within the first week after birth. Prevalence decreased with increasing gestational age: the weighted mean prevalence was 53% in preterm, 48% in term, and 16% in postterm neonates. EPs were more prevalent in neonates weighing ≥2,500 grams (45%) than in neonates weighing <2,500 grams at birth (34%). A subanalysis on mothers' parity showed that EPs were more prevalent in neonates of multiparous women (62%) than of primiparous women (44%). Regarding geographical region, the prevalence of EPs was highest in East Asia (70%) and lowest in South America (38%).
Conclusion: With a prevalence of 54%, EPs are a common phenomenon among neonates. Variations were observed for the timing of assessment, gestational age, birth weight, mothers' parity, and geographical region.

7. **Patterns of Tooth Agenesis in individuals with Down syndrome-A secondary analysis using the Tooth Agenesis Code-**
   Sonja Kalf-Scholte, Arjen van Wijk, Angela Mayoral Trias, Cees Valkenburg
   ACTA

Aims: Tooth agenesis (TA) is common in Down syndrome (DS). It is unknown whether this agenesis occurs in specific patterns, which is important regarding treatment planning and aetiological research. This study aimed to aggregate and analyse patterns of TA in individuals with DS using the Tooth Agenesis Code (TAC).
Methods and Results:: The search (MEDLINE-PubMed) and selection process resulted in six included studies encompassing 241 individuals with DS. Following STROSA guidelines a secondary analysis was employed. TA data were systematically converted into TACs. In the 155 cases with TA 86 distinct Overall-TAC patterns were identified. The most common patterns were (1) bilateral maxillary lateral incisor agenesis (TAC 002.002.000.000; 10.3%), (2) bilateral mandibular second premolar agenesis (TAC 000.000.016.016; 5.8%), and (3) unilateral left maxillary lateral incisor agenesis (TAC 000.002.000.000; 5.2%). Symmetry in TA patterns was observed at 49.6% of TA cases in the maxilla and 52.3% in the mandible. The simultaneous absence of both mandibular central incisors had a large predictive value for oligodontia (odds ratio of 7.06; 95% CI: 2.80-18.21; p<0.001).
Conclusion: Predominant TA patterns exist in DS. Observation of mandibular central incisor agenesis can promote early diagnosis of oligodontia in DS.

8. **Parkinson's disease and experienced salivary problems: a cross-sectional, questionnaire-based study**
   Beau van Dijk, M.C. Verhoeff, F. Lobbezoo
   ACTA

Background: Parkinson's disease (PD) is a progressive neurodegenerative disorder presenting both non-motor (e.g., pain) and motor (e.g., tremor) symptoms. People with PD may also experience salivary issues (viz., xerostomia, drooling), which can have an impact on their oral health-related quality of life (OHRQoL). However, the intra-individual cooccurrence of xerostomia and drooling has not yet been studied.
Objective: to examine the prevalence and cooccurrence of salivary problems in PD patients and identify their potential influencing factors.
Methods: 96 PD patients (69.7±7.5 years; 46.9% females) participated in an online survey. The questionnaire consisted of 135 questions based on existing and validated questionnaires (e.g., the Xerostomia Inventory and the Radboud Oral Motor Inventory for Parkinson's disease). Besides descriptive statistics, logistic regression analyses, with xerostomia and drooling as dependent variables, were performed to identify associated factors (e.g., severity of motor impairment).
Results: preliminary results indicate a high prevalence of xerostomia (66.7%) and drooling (27.1%), with 16.7% experiencing both concurrently. Xerostomia was associated with jaw pain (B = 5.4; 95% CI 3.0–7.9), chewing gum usage (B = 1.1; 95% CI 0.4–1.8), and consumption of sour candy (B = 3.0; 95% CI 0.7–5.0). Drooling was associated with the severity of motor impairment (B = 0.4; 95% CI: 0.1–0.6) and swallowing difficulties (B = 0.6; 95% CI: 0.0–1.2).
Conclusions: xerostomia and drooling are frequently observed in people with PD, also within the same individual. Although seemingly contradictory, the etiological mechanisms likely differ, which emphasizes the complexity. To prevent further deterioration of the OHRQoL, a comprehensive evaluation of the underlying etiology is crucial to determining suitable treatment options.

9. **The association of periodontitis with cardiovascular disease parameters -a synthesis of systematic reviews-**
   Lotte P.M. Weijdijk, Max Schoenmakers, Eveline Willems, Fridus van der Weijden, Dagmar Else Slot
   ACTA

Focused question: What is the association of periodontal disease (PerioD) and cardiovascular diseases (CVD/CVE) as reported in existing systematic reviews (SRs)?
Methods: MEDLINE-PubMed and Cochrane-CENTRAL databases were searched. Papers that primarily evaluate cardiovascular parameters of cardiovascular disease (CVD) and cardiovascular events (CVE) in PerioD patients compared to non-PerioD individuals were included. Data and conclusions as presented in the selected papers were extracted and the potential risk of bias was estimated. A descriptive analysis of the meta-analysis of the selected studies was conducted. A citation analysis was performed, the Bradford Hill criteria were assessed, and the acquired evidence was graded.
Results : Independent screening of 446 reviews resulted in 19 eligible SRs. These were categorized into 13 reviews evaluating CVD and eight evaluating CVE. In total 27 meta-analysis were obtained, the majority (73%) of reported risk ratios and odds ratios are estimated to show a negligible magnitude of the association of PerioD and CVD. For CVE 46% of the values of the association are considered to be of small magnitude as emerging from 23 meta-analysis. For factors such as gender, age, PerioD severity, smoking status, and geographic region the statistical significance and magnitude of the association varied. Given the results, a definitive confirmation of causality according to the Bradford Hill criteria was not attainable. With moderate certainty, a predominantly negligible to small magnitude of the association of PerioD and CVD/CVE was identified.
Conclusion: Based on data collected from existing systematic reviews (SRs), the association between PerioD and CVD/CVE was generally observed to be of negligible to small magnitude. Additionally, the data do not confirm potential causality.

Parallel session I-B
Room: Water

1. **Development of tooth-on-a-chip co-culture model to study the early-stage interaction between dental epithelial and mesenchymal cells**
   Chong Huang, Farhad Sanaei, Fang Yang, X. Frank Walboomers
   Radboudmc

Background: Tooth regenerative therapy seeks to recreate teeth with precisely patterned structure, biologically similar to natural teeth. It is widely recognized that the interactions between dental epithelial (DE) and mesenchymal cells (DM) play a critical role in natural tooth generation. However, to achieve artificial bioengineered 3D tooth buds has proven challenging due to poor model reproducibility and inconsistent results. The development of organ-on-chip models could facilitate improved DE-DM systems for in vitro research.
Aim: An organ-on-a-chip is an innovative microphysiological system based on microfluidics, which represents a paradigm shift from traditional two-dimensional cell cultivation to organized tissue culture. In this study, we attempt to develop a biomimetic tooth-on-a-chip as a physiologically relevant research tool in studying the early DE-DM interaction in tooth development.
Results: Functional assays showed that a so-called dent-pillar design led to successful chip device assembly, medium transportation, and hydrogel caging. Furthermore, live-dead staining showed a homogenous DM-fibrin mixture was viable in the central channel for up to 2 weeks. Finally, immunostaining result evidenced the formation of a DE-DM interface on the chip, characterized by a vimentin-positive DM-fibrin mixture in the central channel, to which an E-cadherin-positive DE monolayer attached in between the chip pillars.
Conclusion: A tooth-on-a-chip has been developed allowing for direct co-culture of DE and DM cells in a physiologically relevant structure. Future work on this project will focus on investigating effective strategies to improve the crosstalk between DE and DM cells by optimizing the 3D coculture environment.

2. **Body Barriers - A novel mucosa-blood-brain organ-on-chip platform for the safety testing of medical devices**
   Lisa-Lee Brüske, Stephanie Beekhuis-Hoekstra, Sanne Roffel, Elga de Vries, Albert Feilzer, Sue Gibbs
   ACTA

With 2.5 billion people affected by oral diseases worldwide, dental restorations are very common throughout the population [1]. Metals from dental materials are known to be able to leach through the oral mucosa and may enter the bloodstream and result in systemic toxicity in distant organs [2]. Since accumulation of metals

in the brain has been associated with the onset of neurodegenerative diseases, the Body Barriers project aims at developing a multi-organ platform connecting the oral mucosa with the neurovascular unit on a microfluidic device.
The aim of the oral mucosa part of this platform it to develop a vascularized reconstructed oral mucosa model which can be exposed to leachables from dental materials.
Methods and Results: Human iPSC-derived endothelial cells were seeded into the channels of microfluidic chips and cultured under flow for 7 days. Reconstructed human oral mucosa models were inserted into the culture chambers of the chips and co-cultured with the endothelial cells for a period of 10 days. The vascularized oral mucosa model remained viable as determined by glucose uptake, lactate secretion and stabilized low LDH production.
Conclusion: The model is ready for topical exposure to metals commonly used in dentistry and the amount of metals leaching through the oral mucosa into the blood stream can be mimicked. Future work aims at connecting the vascularized oral mucosa model with the neurovascular unit consisting of the blood-brain-barrier and brain organoids on a multi-organ chip to determine whether metals leaching from dental materials can cause neuroinflammation.

3. **A 3D GelMA model to mimic the steep matrix stiffness gradient between dental pulp tissue and dentin to study its role in cell behavior**
René J.B. Dijkstra, M.C. Harmsen, P.K. Sharma, X. Petridis
UMCG / RUG

Introduction : The extracellular matrix (ECM) within teeth varies in stiffness from soft in pulp to rigid in the surrounding dentin. This variation influences cell phenotype of mesenchymal pulp cells, and also affects migration of stem cells from pulp to dentin. Until now, these cells and their behavior were mostly studied in traditional 2D culture models, which only partially replicate reality. We have developed and applied a 3D model in which the steep increase in stiffness from pulp to dentin is replicated. This is a more accurate representation of the natural environment of the cells. We hypothesized that this more natural model would affect migration and phenotype of mesenchymal pulp cells.
Methods: Our 3D model matrix consists of photocrosslinked methacrylated gelatin (GelMA) of two concentrations, respectively 5% (5.8 ± 0.8 kPa) and 15% (180 ± 24 kPa). These concentrations simulated the soft dental pulp tissue stiffness (2-5 kPa) and stiffer dentin (20 GPa) respectively, without introducing chemical variety in matrix composition. The effect of the steep stiffness gradient on the cell morphology and positioning was analyzed after the seeding of mesenchymal cells in the soft matrix. Samples were taken after respectively 3, 7, and 14 days of incubation, and their distribution assessed. This was compared to fibroblasts seeded in a conventional 2D culture model.
Results: Already after 3 days, fibroblasts had accumulated at the soft-to-stiff interphase. While on flat surfaces, fibroblasts tend to adapt a spindle-shaped appearance, in 3D they had formed branched networks of highly extended cells. The branching phenotype became more pronounced after 7 and 14 days.
Conclusion : The profound difference of cell form and development of cell networks underline the importance of mimicking the natural cell surroundings as close as possible. Our further research includes dissection of the cellular phenotype and function as well as studying the underlying mechano transduction mechanism.

4. **Low, but not high fluid shear stress affects matrix extracellular phosphoglycoprotein expression mainly via integrin β subunits in preosteoblasts**
Jiangfeng Jin, Hadi Seddiqi, Jenneke Klein-Nulend
ACTA

Matrix extracellular phosphoglycoprotein (Mepe), a short integrin-binding ligand, plays important multifunctional roles in cell signaling, bone mineralization, and phosphate homeostasis. Mepe expression in bone cells changes in response to pulsating fluid shear stress (PFSS), which is transmitted into cells through integrin-based adhesion sites, i.e., α and β subunits. Whether PFSS magnitude controls Mepe expression via modulation of integrin α and/or β subunits expression in preosteoblasts is unknown. Therefore, we aimed to test whether low and/or high PFSS affects Mepe expression via modulation of integrin α and/or β subunit expression. Preosteoblasts were treated ± 1h PFSS (0.4 Pa (low-PFSS) or 0.7 Pa (high-PFSS); 1 Hz). Before and after PFSS, cell morphology, integrin structure, and gene expression were assessed. Preosteoblast morphology, and osteogenic related genes were not affected by low or high-PFSS. Interestingly Mepe gene expression was decreased by low, but not high-PFSS. Integrin fluorescence intensity increased. Expression of integrin α3 and 5-1 was not affected, but integrin α5-2 was increased by low/high-PFSS. Expression of integrin α1 was increased by low-PFSS only, as was expression of integrin β1 and 3. Expression of integrin β5, 5-13, and 5-123 was increased by low/high-PFSS. Integrin β5-12 expression was undetectable. Mepe expression in preosteoblasts was modulated by low, but not high-PFSS. Integrin β structure and expression were altered

by low/high-PFSS, while integrin α structure and expression were more altered by low-PFSS. This suggests that Mepe-induced changes in preosteoblast mechanosensitivity may drive signaling pathways of bone cell function mainly via integrin β subunit.

5. **Imaging vascular development in early human embryonic stages**
   Karl Jacobs, G.E.J. Langebach , J.A.M. Korfage , F. Lobbezoo, B.S. de Bakker
   ACTA

Embryonic development, a miraculous process unveiling the intricate dance of cellular processes, relies heavily on vasculogenesis and angiogenesis, fundamental in shaping the craniofacial region. Understanding vascular development is crucial for comprehending the etiology of craniofacial malformations and cerebrovascular disorders. Advanced imaging techniques, notably micro-computed tomography (micro-CT), play a pivotal role in visualizing embryonic vasculature, surpassing magnetic resonance imaging (MRI) in efficiency and resolution. Despite challenges in selecting suitable contrast agents, micro-CT stands out for its ability to provide non-destructive 3D microstructural information. Contrast-enhancing staining agents (CESAs), such as buffered Lugol (B-Lugol), have shown efficacy in visualizing early craniofacial vascular development.
Our research focusses on integrating micro-CT imaging into the study of vasculogenesis and angiogenesis during embryonic craniofacial development to provide valuable insights, paving the way for a deeper understanding of both embryological marvels, the development of cranio-facial malformations and potential therapeutic interventions for craniofacial abnormalities.

6. **Are chronic dental infections risk factors for early post-HCT morbidity?**
   Lucky L.A. van Gennip, Marjolein S. Bulthuis; Gerjon Hannink; Ewald M. Bronkhorst; Stephanie J.M. van Leeuwen; Nicole M.A. Blijlevens; Renske Z. Thomas; Marie-Charlotte D.N.J.M. Huysmans
   Radboudmc

Introduction: The conditioning regimen for HCT (haematopoietic cell transplantation) renders patients susceptible to infections. Oral screening is recommended before HCT. Symptomatic oral foci are usually eliminated, however, the impact of asymptomatic oral foci remains uncertain.
Methods: Patients receiving oral screening before HCT at Radboudumc between 2013 and 2023, with a recent panoramic X-ray, were included. Oral foci were defined as: pocket probing depth >5mm, furcation or periapical radiolucency, deep caries, partially erupted or retained root. Recent pain, sinus tracts, ulcerations and abscesses were considered acute foci. Dental interventions were provided before HCT if deemed necessary and possible. Mortality, oral foci-related exacerbations and length of hospital stay were assessed in the first 100 days post-HCT. Multivariate regression analysis was performed to analyse the association between number of oral foci and length of hospital stay.
Results: 510 patients were included (median age 58 years, 37% female, 57% allogeneic). Few acute oral foci remained untreated before HCT (n=5 in 3 patients). 48% of all patients had at least one untreated oral focus before HCT (mostly furcation radiolucencies and post-endodontic periapical lesions). Twenty-one patients died before HCT day +100, and four patients had an oral exacerbation. The mean length of hospital stay was 23(±14) days. After adjustment for conditioning intensity, age, number of teeth and socioeconomic status, patients with ≥4 oral foci vs. 0 foci had 7 extra days of hospital stay [95%CI 1;15].
Conclusions: The presence of ≥4 oral foci sites is associated with extension of length of hospital stay.

7. **Salivary flow rate, xerostomia and tooth decay 5 years after haematopoietic cell transplantation**
   Marjolein S. Bulthuis, Lucky L.A. van Gennip, Renske Z. Thomas, Stephanie J.M. van Leeuwen, Ewald M. Bronkhorst, Alexa M.G.A. Laheij, Judith E. Raber-Durlacher, Nicole M.A. Blijlevens, Marie-Charlotte D.N.J.M. Huysmans
   Radboudmc

Objective: The aim of the HOME2 study was to describe dental health, salivary flow rate and xerostomia 5 years post haematopoietic cell transplantation.
Methods: Haematopoietic cell transplantation survivors of a previous longitudinal observational cohort study in the Netherlands were invited to participate in this additional follow-up after 5 years. Stimulated and unstimulated whole saliva was collected, participants rated the severity of xerostomia on a 0-10 scale, and caries lesions were assessed. Furthermore, dental records were requested for the 5 years preceding and the 5 years following transplantation.
Results: Mean flow rates in 39 survivors were 0.36 mL/min (SD 0.26) for unstimulated and 1.02 (SD 0.57) for stimulated saliva; 73% experienced xerostomia of some degree. Survivors underwent a median of 3 (range 0 – 20) dental treatments during the 5 years following transplantation; 39% of these treatments was due to

caries. In the 5 years following transplantation, non-significantly more treatments were performed compared to the five years pre-transplantation (mean difference: 0.7, 95%CI: -1.1 – 2.4).
Conclusions: Mean unstimulated salivary flow rates reached normal levels, mean stimulated flow rates remained reduced compared to normal levels and the prevalence of xerostomia was high. A shortage of stimulated saliva 12 months post-transplantation has the largest potential to be a clinical applicable predictor for dental treatment need.

8. **The possible role of Candida in malignant transformation of oral leukoplakia**
Ilkay Evren, J.B. Poell, E.R. Brouns, L.J. Wils, L.A.N. Peferoen, R.H. Brakenhoff, E. Bloemena, E.H. van der Meij, J.G.A.M. de Visscher
ACTA

Objectives: The role of Candida in oral carcinogenesis is controversial. In this retrospective study the association between the presence of Candida species in oral leukoplakia (OL) lesions and malignant transformation (MT) of OL was investigated.
Patients and methods: There were 125 patients (36 males, 89 females; mean age 58 years, SD=13.1). On the first biopsy specimen the definitive histopathological diagnosis of OL was determined as well as the presence of Candida using the Periodic Acid-Schiff with diastase staining. Clinical and histopathological variables were statistically assessed for associations with Candida presence.
Results: Candida was identified in 26 (21%) of the 125 cases. Univariate analyses revealed no significant association between Candida and age (p=0.223), gender (p=0.321), smoking habits (p=0.498), alcohol consumption (p=0.382), oral subsite (p=0.253), size of OL (p=0.230), homogeneity and WHO-defined epithelial dysplasia (p=0.965). A statistically significant relationship was found between the presence of Candida and differentiated dysplasia (p=0.020), and any type of epithelial dysplasia (either WHO-defined or differentiated) (p=0.01). In univariate analysis, Candida presence was significantly associated with an increased risk of MT (Cox proportional hazards model, p=0.015). However, in multivariate analyses, Candida presence was confounded by presence of any type of dysplasia and was therefore statistically not an independent risk factor for MT (p=0.246).
Conclusion: The presence of Candida in OL is associated with differentiated epithelial dysplasia and MT, although the latter association is not significant when adjusting for dysplasia. The finding that Candida is more common in OL with differentiated dysplasia requires further investigation.

9. **Macrophage response upon co-infection with *P. gingivalis* and *C. albicans***
Caroline A. de Jongh, Floris Bikker, Susan Gibbs, Bastiaan Krom, Teun de Vries
ACTA

Porphyromonas gingivalis is not only associated with periodontitis, but also systemic diseases such as Alzheimer's. For *P. gingivalis* to reach other organs, it needs to enter the bloodstream and evade the immune system. Interaction with *Candida albicans* increases survival and virulence of *P. gingivalis*. *C. albicans* attracts macrophages which can adopt different phenotypes. *P. gingivalis* induces the pro-inflammatory pathogen-killing M1 phenotype and ***C. albicans*** the anti-inflammatory M2 phenotype. However, the response of macrophages to co-infection of both microorganisms is currently unknown. As *P. gingivalis* can survive better inside M2 macrophages, they could be a vehicle for the pathogen to enter the bloodstream. Therefore, the aim was to study the response by macrophages upon co-infection by *P. gingivalis* and *C. albicans*. Phagocytosis by M1 or M2 macrophages was observed using time-lapse microscopy, and M2 macrophages appeared to be more actively phagocytosing compared to M1. Next, naïve macrophages were exposed to *P. gingivalis* and/or *C. albicans*, and expression of M1/M2 specific genes and cytokines was determined. Macrophages responded mainly to *C. albicans* and an increased expression of cytokines was observed when exposed to both microorganisms, but there was no clear distinction in the M1/M2 phenotype. Lastly, a chemotaxis assay showed that macrophages were attracted by *C. albicans*, not *P. gingivalis*. In conclusion, macrophages are strongly attracted by *C. albicans* to phagocytose *P. gingivalis* from the hyphae. Although there is no clear effect on M1/M2 differentiation, the results suggest that co-infection leads to an increased immune response by macrophages compared to either microorganism alone.

Plenary session II
Room: Air (Guest speaker)

Lecture "Why should we care about being FAIR?"
Michiel de Boer

In Open Science, the terms FAIR and data are often combined to indicate data that is findable, accessible, interoperable and re-usable. Fair data contributes to reproducibility of the methods we use in research and with that to better quality of our work. However, working according to the FAIR principles also demands more competencies and might mean more work. Is it fair to expect that from (all) researchers? In this interactive presentation, we will delve into the concepts related to FAIR, share our own experiences and challenge our perspectives on what is fair.

Poster session
Room: Fire

1. **Discomfort and pain due to peri-implant probing compared to periodontal probing: A systematic review and meta-analysis**
   Minen Al-Toma, Julie E.M. Graswinckel, Fridus van der Weijden, Dagmar Else Slot
   ACTA

Aim: This systematic review and meta-analysis synthesizes the available clinical evidence regarding patient discomfort and pain due to peri-implant probing compared to periodontal probing.
Materials and methods: The MEDLINE-PubMed, Cochrane Library and EMBASE databases were searched from inception to January 2024 to identify eligible publications. Studies were eligible for inclusion when a clinical trial or observational trial was conducted in healthy adult patients, that evaluated discomfort/pain as a result of peri-implant probing compared to periodontal probing of natural teeth. The risk of bias was assessed by the ROBINS-I tool. Descriptive analysis and meta-analysis (MA) were performed. Subanalyses were conducted based on the type and material composition of the dental implant. Recommendations and grading based on the body of evidence were formulated using the GRADE method.
Results: The comprehensive search identified a total of 168 unique papers. Four eligible studies were included representing seven comparisons. All comparisons evaluated a combination of discomfort and pain using a Visual Analogue Scale (VAS) from 0 to 100. The MA demonstrated that peri-implant probing caused significantly more discomfort/pain than periodontal probing (MDiff=4.23; 95% CI [1.93;6.54]). The subanalysis on metal implants underscores these findings (MDiff=4.18; 95% CI [1.55;6.82]). However, single comparisons evaluating ceramic implants, only platform switching (MDiff=3.90; 95% CI [-1.92;9.72]) or without platform switching did not show a statistically significant difference. The level of evidence was rated as low.
Conclusion: There is low certainty that peri-implant probing causes significantly more discomfort/pain than periodontal probing. Presumably, the clinical relevance of this finding on a VAS is negligible. Probing is an important part of routine screening and performing diagnostics of the peri-implant and periodontal tissues.

2. **The influence of rubber dam isolation on survival of multi-surface direct resin composite restorations in mandibular second permanent molars with a minimum service time of five years**
   Rezwan J. Anisuzzaman, Maurits C. F. M. de Kuijper, David J. Manton
   UMCG / RUG

Evidence concerning the influence of rubber dam isolation on the survival of direct resin composite restorations is contradictory and scarce. The research question was: "What is the influence of rubber dam isolation on the survival of multi-surface direct resin composite restoration of mandibular second permanent molar teeth with a minimum service time of five years?" The aim of this study was to provide insight in the possible effect of the isolation method in the worst-case scenario for creating a dry working field. A retrospective study was conducted to investigate the survival. Multi-surface resin composite restorations placed with the same three step etch-and-rinse bonding agent and resin composite material in teeth 37 and 47 of patients who were eighteen years or older were included. Patients who had developmental tooth defects, mental conditions preventing sufficient oral health care or salivary gland malfunctions were excluded. The cumulative survival rate of the rubber dam and the cotton roll group were 66%; 95% CI [53%, 78%] and 43%; 95% CI [35%, 51%] respectively after 8.3 years. Multivariate Cox-regression indicated that restorations placed by dentists that used cotton roll isolation were statistically significantly more likely to fail than dentists that used rubber dam isolation (HR: 2.32; 95% CI [1.42, 3.81]; $p < .001$). Debonding was the most common cause (30%) for failure within the cotton roll group. In conclusion, in the worst-case scenario, rubber dam provided higher survival rates of multi-surface resin composite restorations in mandibular second permanent molars at a minimum of five year service.

3. **A scoping review into the explanations for interventions promoting oral health of children (≤5 years) living in vulnerable circumstances**
   Awani Balasooriyan, Rik Gerritsen, Ruben R. Lacroix, Kirsten A. van Gelderen–Ziesemer, Christine Dedding, Clarissa Calil Bonifácio and Monique H. van der Veen
   ACTA

Introduction: Promoting equal opportunities for young children's oral health is a global health priority. Numerous interventions have been developed to address persistent oral health inequalities but their impact remains inconclusive. This scoping review aims to explore researcher's explanations for the success of interventions promoting oral health in young children (≤5 years) living in vulnerable circumstances in Western countries in order to improve future intervention development.
Methods: A comprehensive search strategy was developed and applied to three electronic databases. This resulted in 21.415 articles, which were screened according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews guidelines. The included articles were thematically analysed using the macro-, meso-, micro system level framework.
Results: Thirty-nine articles, covering 36 interventions and implemented at one or multiple system levels, were included. The explanations for the success of interventions in promoting young children's oral health vary considerably. Active involvement of various stakeholders is a major contributor to the success of interventions. Also, interdisciplinary collaborations between various professionals contributes to improving oral health of children. Finally, intervention-related characteristics support oral health promotion, including culturally sensitive interventions with an educational and personalised approach that are easy to implement in different settings.
Conclusion: To conclude, engaging with stakeholders from macro, meso and micro system levels are key in improving oral health of children living in vulnerable circumstances. For future intervention development, addressing poor oral health and overweight/obesity in young children simultaneously through a common risk factor approach seems promising.

4. **Osteogenic Differentiation of Human Gingival Fibroblasts Inhibits Osteoclast Formation**
   Merve Ceylan, Ton Schoenmaker, Jolanda M. A. Hogervorst, Ineke D. C. Jansen, Irene M. Schimmel, Caya Prins, Marja L. Laine, Teun J. de Vries
   ACTA

Background & Objectives: Chronic inflammation as seen in periodontitis, activates gingival fibroblasts (GFs) and results in tissue damage and alveolar bone resorption. GFs are able to differentiate into osteoblast-like cells and induce osteoclast formation. It is unclear whether these two processes are separate or whether one influences the other. The aim of this study was to investigate the effects of osteogenic differentiation of GFs on their subsequent osteoclast inducing capacity.
Material & Methods: GFs were cultured for three weeks in osteogenic medium for the final 1, 2 or 3 weeks to establish step-wise mineralization. After 3 weeks, these cultures were co-cultured with the peripheral blood mononuclear cells (PBMCs) that contain osteoclast precursors, for three more weeks to induce osteoclast differentiation. Osteoclast formation was assessed with TRAcP activity and staining, qPCR and ELISA at different timepoints.
Results: Osteogenic parameters, alkaline phosphatase and calcium concentration increased significantly over time which was confirmed with the Alizarin Red staining by SEM images. Although the expression levels of the osteogenesis-related genes varied between the conditions, no statistically significant difference was observed. The number of osteoclasts however, was significantly decreased in the GF cultures that had undergone osteogenesis. TNF-α secretion was highest in the GF-PMBC cultures that were not pretreated with osteogenic medium.
Conclusions: This study demonstrates that GFs are capable of differentiating into osteoblast-like cells and their degree of differentiation reduces their osteoclast inducing capacity, further indicating that GFs have the potential to be used in the regenerative periodontal treatments under the appropriate stimulation.

5. **The effectiveness of power versus manual toothbrushes on plaque removal and gingival health in children -a systematic review and meta-analysis-**
   Fatma Dagdeviren, G.A. (Fridus) Van der Weijden, C.P. (Laura) Zijlstra, Dagmar Else Slot
   ACTA

Objective: The objective of this systematic review was to assess the efficacy of self-brushing using a single-head power toothbrush(PTB) in comparison to a single-head manual toothbrush(MTB) in terms of plaque removal and reduction of gingivitis in children.
Materials and methods: MEDLINE-PubMed and Cochrane CENTRAL were searched up to November 2023.

The inclusion criteria comprised randomized clinical trials involving healthy children up to the age of 18 years who did not have fixed orthodontic appliances. Included were papers assessing the impact of self-administered toothbrushing using a rechargeable PTB as compared to an MTB on plaque removal and gingivitis. Data extraction was conducted and the risk of bias was evaluated. A descriptive analysis, a meta-analysis and subgroup analysis, when feasible, was carried out.
Results: The search yielded 12 eligible publications, encompassing 30 relevant comparisons. Results showed a significant difference of means(DiffM) on plaque scores in favor of the PTB. For single-use brushing both the end and incremental difference scores (DiffM-end=-0.26(95%CI[-0.31;-0.21];p<0.00001)|DiffM-difference=-0.26(95%CI[-0.31;-0.21];p<0.00001)) and also for follow-up studies (DiffM-end=-0.22(95%CI[-0.36;-0.07)];p=0.004)|DiffM-difference;-0.34(95%CI[-0.45;-0.23];p<0.00001)) indicated a significant difference in effect in favor of the PTB. The meta-analysis on gingival index scores showed no significant difference. Subgroup analysis was only possible for the follow-up studies. For the OR mode of action, a significant difference of means for plaque scores was found (DiffM-end=-0.19(95%CI[-0.37;-0.01];p=0.04)|DiffM-difference=-0.22(95%CI[-0.43;-0.01];p=0.04), the latter contains solely low risk of bias studies.
Conclusion: There is moderate certain evidence that in children a PTB offers a small advantage in plaque removal over an MTB. This evidence primarily pertains to PTBs with an OR mode of action.

6. **Implants made of zirconia – a prospective 5-year follow-up single arm clinical trial**
Jantien de Beus, M.S. Cune, H.J.A. Meijer, G.M. Raghoebar, U. Schepke
UMCG / RUG

Introduction: Dental implants made of zirconia, have been applied in dentistry due to its biocompatibility, good mechanical properties and excellent aesthetic results. However, solid long-term scientific data to prove clinical success of zirconia implants is scarce.
This follow-up study collected and examined the 5-year data in order to answer the main question: What is the survival of zirconia implants and the implant-supported prostheses in the maxillary, premolar region after 5 years?
Method: Of 31 included patients in this prospective 5-year follow-up single arm clinical trial, 30 were implanted with an ZV3 implant at the place of a missing single maxillary premolar, which was provided with a lithium disilicate prosthesis. Parameters regarding clinical performance, peri-implant bone level alteration and patient satisfaction were assessed pre-operative, at baseline and one and five years after crown-placement. Chances of survival and success of the ZV3 implant and the implant-supported prostheses were displayed using Kaplan-Meier. Kaplan-Meier survival analysis was also performed with stratification by means of occlusal guidance and manipulation of the implant during impression taking and compared using Log-Rank tests.
Results: Survival probability after 5 years of 59.7% (95% CI [49.4%;70.0%]) for the ZV3 implant. No significant differences in survival rate were found after stratification by means of occlusal guidance and manipulation of the implant, although a trend was identified for possible influences of the kind of occlusal guidance of the dentition. Mean marginal bone level alteration after 5 years was -0.25 mm (min -0.91 mm, max 1.10 mm; SD=0.54 mm).
Discussion and conclusion: Survival rate of the ZV3 implants is lower than expected. The indication for ZV3 implants as applied in this study cannot be recommended for the clinical practice. A trend was identified for possible influences of the kind of occlusal guidance of the dentition. A larger prospective randomized clinical trial should be conducted to evaluate treatment with zirconia dental implants.

7. **Leadership and goals for collaboration in oral healthcare practices in the Netherlands**
Joost Den Boer, J. Bruers
ACTA

Background: For several decades the number of practices in which dentists, dental hygienists, and prevention assistants collaborate has increased. However, the underlying dynamics remain underexplored. This study is therefore aimed to identify the determinants of collaboration within oral care practices in the Netherlands.
Methods: Semi-structured interviews were conducted in nine oral healthcare practices in 2019 and 2020, focusing on four aspects of collaboration: purpose of collaboration, leadership, division of tasks and responsibilities, and formalization. In each practice a dentist and a dental hygienist were interviewed. The results were the basis for questionnaire, which was distributed in 2023 to 991 dentists, 351 dental hygienists, and 986 prevention assistants.
Results: The interviews revealed that directive and supportive leadership, along with the purpose of the collaboration, were key determinants of collaboration. The questionnaire survey, in which 802 (34.5%) of the 2,328 registered oral healthcare providers participated, showed a positive correlation between directive and

supportive leadership. Practice owners tend to attribute more of both types of leadership to themselves than employees do. Primary motivations for choosing collaboration in the provision of oral healthcare included improving patient care and emphasizing prevention. Personal considerations for working in such practices varied.
Conclusion: Leadership and goals are determining factors for collaboration within oral healthcare practices in the Netherlands. Although a distinction can be made between directive and supportive leadership, these two forms often appear to be related. When practice owners choose collaboration, good care and prevention are key priorities.

8. **Sialagogic Effects of Olfactory Stimulation with Mastic Resin and α-pinene Volatiles In Vivo**
   Mouri R.J. Faruque, Kamran Nazmi, Antoon J. Ligtenberg, Floris J. Bikker, Marja L. Laine
   ACTA

Background: Xerostomia, often associated with decreased saliva quality, poses challenges due to limited treatment efficacy. This study aimed to investigate alternative approaches to enhance saliva secretion through olfactory volatile stimulation with mastic resin and its main compound α-pinene, known for inhibiting acetylcholinesterase in vitro.
Methods: The inhibitory effects of freshly prepared mastic resin extract oil and α-pinene oil on acetylcholinesterase (AChE) activity were measured in vitro. Eighty healthy participants were recruited and divided into two groups: exposed to mastic resin volatiles (n = 40) or α-pinene volatiles (n = 40). Saliva samples were collected pre, during and post exposure to analyze saliva flow rate, spinnbarkeit, ion composition and MUC5B levels.
Results: Mastic resin extract oil and α-pinene oil inhibited AChE activity by 207 % and 22 %, respectively. Olfactory stimulation with these volatiles significantly increased saliva secretion rate without altering spinnbarkeit and ion composition. Salivary MUC5B concentration rose after exposure to mastic resin volatiles.
Conclusions: Olfactory stimulation with mastic resin and α-pinene volatiles demonstrated a bona fide in vivo effect on saliva secretion, confirming their sialagogic capability, potentially as a result of local glandular AChE inhibition.
These findings highlight the therapeutic potential of both volatile compounds in treating patients with xerostomia and hyposalivation through olfactory exposure.

9. **A Radiological study of the influence of implant design on the development of peri-implant bone loss and peri-implantitis**
   Pieter Goedhart, A.P. Dank, D. Aartsen, J.P. Mendes Tribst, A.J. Feilzer
   ACTA

Background: Implants serve to restore chewing ability or appearance, they have also given rise to a new idiopathic disease, “peri-implantitis”, that can eventually lead to loss of the implant (prevalence: 5-40%). There is scientific evidence that titanium ions affect bone metabolism. Most implants consist of a fixture and a separate abutment attached to it with an internal or external connection. In a pilot study, implants with initial simulated peri-implant bone loss were subjected to artificial chewing forces to determine the effects of stress corrosion. Demineralized water was added to the simulated bone defect and the concentration of metals released was analyzed by ICP-MS after loading.
Purpose: The objective of this study is to find out whether implant design factors influence the clinical development of peri-implantitis.
Materials and methods: We developed a web-based dashboard where dentists are requested to upload their cases of implants affected by peri-implantitis.
Results: The pilot study shows that the diameter of an implant influences the volume of release of titanium particles into the surrounding water. The larger the diameter, the lower the amount of released ions. In addition, the design of the implant affects the amount of released titanium particles. An implant with an external hex showed significantly higher release of titanium into the surrounding tissues, than an implant with an internal hex.
Conclusion: We will present the initial results from dentist participation and would like to invite every dentist to participate in this study to learn more about the etiology of peri-implantitis (see QR code).

10. **The prevalence of distal surface caries (DSC) in the mandibular second molar teeth in the presence of a partially emerged/impacted third molar in the Netherlands**
    Mina Hayawi, Zainab Assy, Henk S. Brand, Verena Toedtling
    ACTA

Distal surface caries in the mandibular second molar (DSC) is a common outcome of impaction of the adjacent third molar. The current Dutch clinical guideline recommends the early removal of partially

emerged/impacted third molars, in particular third molars with a mesioangular or horizontal angulation.
To investigate the prevalence of DSC in the Netherlands, 250 radiographs taken during dental appointments at the Academic Centre for Dentistry Amsterdam (ACTA) were assessed. The following parameters were evaluated: gender, age, socioeconomic status, the radiographic state of the distal surface of the mandibular second molar teeth, lamina dura (LD) loss distally to the mandibular second molar teeth, third molar tooth angulation/orientation, molar-to-molar contact point and modified DMFT score.
The prevalence of DSC in the Netherlands was 26%. Risk factors were: emerged/impacted third molars with a mesioangular or horizontal angulation, LD loss of ≥2mm and increased modified DMFT-score. The relation between molar-to-molar contact point of the third molar in relation to the CEJ of the mandibular second molar teeth and the prevalence of DSC almost reached statistical significance (p=0.052). No significant relations were found between DSC and gender, age or socioeconomic status.
DSC has a relatively low prevalence in the Netherlands, probably due to the early removal strategy of partially emerged/impacted third molars. DSC was significantly associated with the orientation type of the third molars, the relationship of the third molar molar-to-molar contact point with the CEJ of the adjacent second molar teeth and the lamina dura (LD) loss distally to the mandibular second molar teeth.

11. Does a new provider payment method in dentistry lead to improved prevention & access?

Jip Janssen, Ziade Sarroukh, Stefan Listl
Radboudmc

Background: The prevalence of dental caries in children and adolescents in the Netherlands has increased within the last decade, particularly among those with a lower socioeconomic status (SES). This leads to socially unequal trajectories in disease experience throughout life. Fee-for-service (FFS), the current predominant provider payment system, has been criticised as a key barrier for preventive oral care, leading to high volumes of expensive restorative care and contributing to social inequalities in oral health. Capitation provider payment systems are proposed as potential alternatives. Until now, however, there is an absence of empirical evidence on SES-risk-adjusted provider payment models for oral care in young people.
Methods: We plan to conduct an open randomised controlled practice-based study with retrospective baseline, to evaluate a new provider payment model which blends capitation with SES-risk-adjusted bonus payments among children and adolescents aged <18 years. The study population will consist of Dutch dental practices that treat ±8,000 patients in total, which will be randomised 1:1 in an intervention (new provider payment model implemented) and control (current standard of care) group for 3 years, stratified by dental practice organisation. We will perform an (i) impact, (ii) process and (iii) economic evaluation.
Expected results: We aim to define the effects of the new provider payment model on the volume of restorative and preventive dental care and on the accessibility of the oral health system for people with a lower SES. Additionally, we intend to determine the intervention's practical feasibility according to providers and patients and its cost-effectiveness.

12. Clinical survival of lithium disilicate cantilever resin-bonded fixed dental prosthesis

Joyce Jonker, M.M.M. Gresnigt
UMCG / RUG

The lack of maxillary incisors can be an aesthetic concern for patients, resulting in social and psychological suffering. A minimally invasive treatment option is an adhesively luted lithium disilicate cantilever resin-bonded fixed dental prosthesis (RBFDP). The purpose of this study was to investigate whether this treatment option is durable in different configurations (veneer wing [VC], palatal wing [PC], connector [CC]).
This retrospective observational study evaluated 35 patients with 49 restorations divided into three groups: VC (n = 17), PC (n = 12) and CC (n = 20) cantilever RBFDPs. Survival was visually assessed and the influence of static and dynamic occlusion on survival was examined with 40 µm articulation paper. Quality of survival was assessed according to modified United States Public Health Service (USPHS) criteria. Impact on the OHRQoL was measured before and after treatment and at the time of evaluation with an OHIP-14 questionnaire.
Survival rates for VC, PC and CC groups were 88.2%, 100.0% and 100.0% after a mean evaluation period of 47.7 months, respectively, with no significant difference (p = .17). Involvement in static and/or dynamic occlusion had no significant impact on survival (p = .16). Quality assessment according to USPHS criteria showed changes, but no significant difference between the three groups (p = .83). OHIP-14 scores significantly decreased after treatment (p < .001) and at evaluation (p < .001).
The three configurations of cantilever RBFDPs appear to be a good treatment option to restore a missing maxillary incisor. Treatment with the cantilever RBFDPs improved the OHRQoL of the patients.

13. **Toothbrushing on enamel and dentin wear of toothpaste, tooth tablets in relation to ISO reference toothpastes, an in vitro study**
Shaira Rahielah Kasi, João Paulo Mendes Tribst, Lucas Saldanha da Rosa, Rafaela Oliveira Pilecco, Cornelis J. Kleverlaan, Albert J. Feilzer
ACTA

Background: The ISO standard ISO 11609:2017 on Dentifrices, describes methods for the determination of abrasivity of dentifrices. The reference ingredient, Sident, is withdrawn from the market, Sylodent is offered as alternative.
Aim: To determine the toothbrushing wear on tooth enamel and dentine of commercially available dentifrices (pastes and tablets) in relation to the ISO standard references.
Methods: Bovine enamel and dentine samples used. Toothbrushing wear was determined in an ACTA testing device, employing toothbrushes. Dentine samples (n=36) were subjected to 500 brush cycles and enamel samples to 5000 brush cycles (n=36) with different dentifrices, the ISO standard references (Sylodent, Sident) or water as control. The tooth surface loss was determined by profilometry. Wear rates were statistically analyzed by One-way ANOVA with two-sided Dunnett's multiple comparisons.
Results: The mean enamel wear ranged from 0.39 µm to 2.64 µm across the tested dentifrices. Specifically, water exhibited minimal enamel wear with a mean of 0.39 µm (SD 0.71), while Prodent demonstrated the highest enamel wear with a mean of 2.64 µm (SD 1.94). Sylodent displayed moderate enamel wear of 0.93 µm (SD 1.70). Dentine wear ranged from 0.79 µm (water) to 9.67 µm (Prodent), significantly higher than the control ($p>0.05$), water. Sylodent demonstrated comparable effectiveness to Sident with a mean dentine wear of 6.31 µm.
Conclusion: Dentine wear was significantly higher than enamel wear. Toothbrushing with water caused minimal enamel and dentin wear. Sylodent demonstrated comparable effectiveness to Sident. Prodent showed higher wear than Zendium. Toothpaste tablets did not show a significant difference from Zendium toothpaste. The new standard reference abrasive showed comparable wear as the former standard reference.

14. **Amylase as a selective agent for oral bacteria**
Toon Ligtenberg, Izabella Lieuw, Alysha Sewberath Misser, Floris Bikker
ACTA

Introduction: Amylase plays a key role in the digestion of starch. Oral bacteria bind salivary amylase enabling them to use starch as a nutrient. Salivary amylase activity shows a large individual variation, but it is unknown whether this also results in variation in the number of amylase binding bacteria and variation in acidogenesis out of starch. This study investigates whether the amylase activity on oral bacteria correlates with the amylase activity in saliva and whether this correlates with acidogenesis out of starch.
Methods: Saliva from 25 healthy volunteers was collected and oral bacteria and epithelial cells were separated from saliva by centrifugation. Bacteria and epithelial cells were suspended in saliva buffer. Amylase activity was measured both in saliva and bacterial suspension. In bacterial suspensions acidogenesis out of glucose and starch was determined by measuring pH changes.
Results: Amylase activity of clarified whole saliva correlated with amylase activity of the cell suspension ($p< 0.01$, $r = 0.539$). Acid formation from starch was comparable to glucose and did not correlate with amylase activity in cell suspension.
Conclusion: Amylase in saliva appears to select for amylase-binding bacteria, but this seems not to result in a better use of starch as a nutrient.

15. **Advances in Additive-manufactured Ceramics for Dental Restorations**
Yuqing Lu, Amanda Maria de Oliveira Dal Piva, João Paulo Mendes Tribst, János Kodolányi, Arie Werner, Cornelis J Kleverlaan, Albert J Feilzer
ACTA

Additive manufacturing (AM), namely 3D printing or rapid prototyping, has been rapidly evolving as a substitute for conventional techniques to manufacture complex and detailed geometries. This technology has been significantly expanded in the past decades, enabling the production of items made of nearly all types of materials, including metals, polymers, and ceramics. However, compared to metals and polymers, the clinical usage of AM ceramics is extremely limited at this moment despite the wide application of ceramics in restorative dentistry. Therefore, this presentation will focus on the latest advances in additive manufacturing of dental restorative ceramics and their mechanical properties. A comprehensive literature review was conducted to summarize the mechanical properties of different 3D-printed ceramics. The results indicate a promising trend for 3D-printed ceramics in restorative dentistry. Regarding printable materials, zirconia has

received the most attention, followed by glass ceramics. Vat polymerization, including digital light processing and stereolithography, is the most commonly used technique. While significant advancements have been made in AM for dental applications, some challenges remain. The findings suggest that AM ceramics come close to milled ceramics in terms of mechanical properties; however, they are still considered to be inferior. Additional research and development efforts are necessary to enhance these properties, and the advantages of 3D printing need to be further explored, including efficiency, aesthetics, biocompatibility and long-term durability.

16. **Transformations in Life Journeys of pioneering students**
    Elmy Maas, Inge Egberts; Janna Bruijning, Loes Houweling; Marije Kesselring; Saskia Wijsbroek; Katarina Jerković-Ćosić
    HU

Despite strides towards societal equity and opportunity, 1.7 million young adults aged 18-25 in the Netherlands face the negative consequences of enduring health and well-being disparities. The socio-economic position of families emerges as a pivotal determinant shaping the trajectories of children and young adults, impacting their development, education, and overall well-being, with research underscoring the compounding effects of being raised in economically disadvantaged environments, resulting in long-lasting challenges into adulthood.
However, amidst these challenges, glimpses of resilience and aspiration emerge. Intrinsic capacities to navigate adversity and pursue goals, alongside specific resources such as access to education and support networks, play a pivotal role in meaningful change, upward mobility, and transforming life journeys.
Our project explores the life journeys of economically disadvantaged students who chart a pioneering course into higher education at Hogeschool Utrecht. The overarching objective is to identify key factors influencing these life journeys and to develop strategies for higher education institutions to enhance support mechanisms for these students' academic journeys, fostering equity and diminishing socio-economic disparities.
This will be achieved using a multi-method approach, involving three sequential techniques: a clarificatory focus group, individual narrative interviews utilizing the Kawa River model, and a participatory focus group. Through these methods, students actively participate as co-researchers, contributing to data collection, sharing individual experiences and insights, and collaborating with researchers in data interpretation. By means of this collaborative inquiry, we endeavour to pave pathways towards a more inclusive society by imbuing narratives with shared meaning and promoting positive change.

17. **Exploring the Interplay between Oral and Gut Microbiomes: A Preliminary Investigation of Dental Plaque and Stool Microbial Diversity and Composition in Various Periodontal Conditions**
    Adriana Miranda de Oliveira, Talita Gomes Baêta Lourenço, Bernd W. Brandt, Egija Zaura, Ana Paula Vieira Colombo
    ACTA

This investigation aimed to elucidate the intricate relationship between the oral and gut microbiomes by analyzing the microbial diversity and composition of dental plaque and stool from individuals with different periodontal conditions at the Federal University of Rio de Janeiro School of Dentistry. Utilizing Illumina MiSeq sequencing of hypervariable regions V1-V3 in plaque and V3-V4 in stool, we observed significant differences in the alpha diversity of dental plaque. Notably, periodontitis patients exhibited a higher Shannon index, than those with periodontal health, with diversity increasing from early to advanced stages of the disease (Kruskal-Wallis $p<0.05$). Our predictive model, based on the composition of dental plaque, accurately classified individuals according to their periodontal condition with more than 80% accuracy, identifying Actinomyces, Schaalia, Granulicatella, and Mogibacterium as key discriminative taxa. Conversely, no significant correlations were found between periodontal status and the alpha or beta diversity of stool samples, with the fecal microbial composition model demonstrating low accuracy. These findings suggest that while the oral microbiota may undergo substantial shifts in response to periodontal conditions, similar patterns might not necessarily impact gut diversity. Further investigation is warranted to fully understand the complex interactions between oral and gut microbial communities and their implications for overall human health.

18. **Changes in saliva composition during training in professional footballers**
    Ektor (CEE) Petras, Solleveld H, Ligtenberg AJM, K. Nazmi, Laine ML, Bizzarro S.
    ACTA

Various salivary biomarkers may be used to monitor athletes' response during training. Often, studies have been conducted in controlled experimental settings, while limited data are available for normal training

sessions. The objective of this study was to investigate changes in various salivary biomarkers during different phases of a standard professional football training. Moreover, the effect of training intensity and the effect of oral inflammation level on salivary biomarkers were determined.
Of 28 male professional football players (age 18-XX years) saliva was collected by means of oral rinse at three time-points: rest, warming-up and outdoor training. Players were asked to self-report the intensity of the training after each time-point in a scale from 1 to 10. The following biomarkers were measured: total protein concentration, α-amylase activity, total carbohydrates, lactoperoxidase, Immunoglobulin-A (IgA) and lysozyme. Dental records of the players were retrieved retrospectively.
Significant decreases were found for IgA ($p<0.001$) and carbohydrates ($p=0.001$). Significant increases were found for total protein concentration ($p<0.001$) and α-amylase ($p=0.001$). The other biomarkers displayed no significant changes. No association was found between the self-perceived intensity of training and changes in the biomarkers. Salivary biomarkers were not affected by the level of oral inflammation.
This study showed that certain salivary biomarkers in oral rinse change during a regular football training session. Self-perceived intensity of training and oral inflammation were not directly related to the level of change of the studied biomarkers.

19. From scent to saliva: Novel volatile sialagogues

Wiktoria Potocka, Zainab Assy, Annina van Splunter, Marja L. Laine, Floris J. Bikker
ACTA

Dry mouth affects approximately 5-46% of the population. It can be subjective (xerostomia), objective (hyposalivation) or both (hyposalivation-induced xerostomia). The side effects of medicines (polypharmacy), Sjögren's disease, and cancer radiotherapy in the head-and-neck region can cause dry mouth. Currently available treatments for dry mouth are ineffective, do not provide adequate relief and some products have an unpleasant taste. This creates a challenge for the development of new dry mouth treatments and products.
There is an increasing trend towards the use of oral healthcare products derived from natural sources. This trend is accompanied by a heightened interest in bioactive volatile compounds. Among these compounds, some have been identified as sialagogues; such as mastic and its main isolate, α-pinene. These compounds function as mild acetylcholinesterase inhibitors (AChEI), blocking the enzymatic breakdown of the neural signal molecule acetylcholine (ACh) at the salivary acini, consequently increasing salivary flow.
An in vitro screening of a large library of volatile compounds was conducted to identify novel mild AChEI. Following this, the top compounds were chosen for in vivo validation and administered through nasal spray pumps to act as an olfactory stimulus in healthy individuals, allowing for the evaluation of their sialagogic effects. Saliva quantity and composition were analysed before and after the use of the volatile compounds.

20. Functional edentate impressions digitized with an intraoral scanner, a new approach

Elke Rijks, João P. M. Tribst, Albert J. Feilzer
ACTA

Background: To ensure proper sealing of a denture, a functional impression must be made. This is not possible with intra-oral scanners.
Aim: To assess the accuracy of digitizing conventional functional impressions of the edentulous jaws using an intra-oral scanner.
Material and Methods: A PMMA refence model was used to take impressions with three impression materials. The following trays were used for impression making. For alginate, a stock tray and custom digital tray; for Xantopren, an individual and digital custom tray for the maxilla; for Impregum, an individual and digital custom tray for the mandible. The model and impressions were digitized by scanning with a Trios 3® intraoral scanner. Digital trays were designed and printed using Formlabs®. CloudCompare software was used to compare the digitized impressions to the scan of the master model.
Results: All impressions were successfully digitized. Xantopren with analog individual tray showed lowest deviation for the upper jaw (-1.8-2.1 µm), and Impregum with analog individual tray was the best for the lower jaw (-1.6-2.3 µm). Most surface areas met the 25 µm tolerance threshold, indicating similarity to the master model scan, except for Alginate and Impregum impressions of the lower jaw with a digital printed tray.
Conclusion: Digitalizing functional impressions with an intra-oral scanner offers a promising avenue for the workflow of complete dentures. However, further consideration is needed for digitally fabricating special trays, particularly for the mandibular jaw.

21. Prevalence of molar incisor hypomineralisation (MIH) in Mexican schoolchildren

Maria Rivera, Luis Karakowsky, Carlo Medina, David Manton
UMCG / RUG

Introduction: Molar incisor hypomineralisation (MIH) is a prevalent developmental defect of decreased enamel mineral density, involving at least one permanent first molar and frequently, permanent incisors. The defects are demarcated, ranging from isolated, white, yellowish and/or brown lesions to post-eruptive breakdown.
Aim: To determine the prevalence and distribution of MIH in Mexican schoolchildren aged 6-13 years from Pachuca, Mexico.
Materials and methods: A cross-sectional study was carried out in 665 participants, selected randomly from eight public schools in Pachuca, Mexico. A dentist (MRP) trained and standardised for the MIH criteria of the European Academy of Paediatric Dentistry performed the clinical oral examinations to detect the presence and absence of MIH, the dependent variable. The independent variables were age and sex. Analysis was performed using non-parametric tests using Stata.
Results: The average age was 9.14 ± 1.81 years and 51.5% were female. The prevalence was 12.1% (95%CI 9.5 – 14.5%); 12.3% and 11.8% in females and males, respectively (df = 1, Chi square 0.0415, p=0.839). The average age of schoolchildren with MIH was 9.48 ± 1.77 years, and without MIH was 9.10 ± 1.81 (Mann-Whitney test, p=0.0755). The mean number of affected teeth was 3.58 ± 2.08; the mean number of first permanent molars was 2.46 ± 1.15 and 1.11 ± 1.47 for incisors (Wilcoxon test p<0.0001).
Conclusions: The prevalence of MIH (12.1%) was similar to that reported previously for Mexican children (14.0%); first permanent molars were more frequently affected than incisors. No statistically significant differences were observed for age or sex.

22. The risk of preterm birth in women with periodontitis: A systematic review and meta-analysis

Dimitris Sokos, Dagmar Else Slot, Berna Dogan, Sergio Bizzarro
ACTA

Aim: To summarize and synthesize comprehensively and critically the available scientific evidence of observational studies that evaluate the risk of preterm birth (PTB) in pregnant women with or without periodontitis.
Material and methods: MEDLINE-PubMed and Cochrane databases were searched from their inception through February 2024 to identify eligible publications. Studies that evaluate the number of PTB events in women with periodontitis compared to those without. Periodontitis was defined based on full-mouth clinical examinations, assessing probing pocket depth (PPD) in combination with clinical attachment loss (CAL) and/or radiographic alveolar bone loss. The risk of bias was assessed. Descriptive analysis, and when feasible, meta-analysis (MA) and trial sequential analysis (TSA) were performed. Sub-analyses were conducted based on the risk of bias analysis, study design, geographical area, periodontitis case definition, smoking-, health or country social economic-status, history of urinary tract infections and the number of evaluated teeth. The total body of evidence was graded.
Results: A total of 452 unique papers were identified, 9 eligible studies included. The descriptive analysis showed that six of the nine studies present a significant association between PTB and periodontitis. Confounding variables on personal, medical, and environmental aspects lower the risk. The crude overall meta-analysis based on 9 studies resulted in small effect, odds ratio (OR:2.49[95%CI:1.83;3.39],p<0.00001). The TSA showed that the required number of events was reached, and the type I error is ruled out.
Conclusion: There is moderate certainty that pregnant women with periodontitis compared to pregnant women without periodontitis have a small risk for PTB.

23. *Streptococcus mutans* strain-dependent biofilm formation under flow

Chen Sun, Danuta Mazurel, Antonius J.M. Ligtenberg, Dongmei Deng
ACTA

A key feature of cariogenic pathogen *Streptococcus mutans* is its ability to adhere to surfaces and to form biofilms. Salivary agglutinin (SAG), a 340 kDa glycoprotein, promotes *S. mutans* adherence in the absence of sucrose. This adherence was strain dependent, but it is not clear if the biofilm formation on SAG-coated surfaces is also strain-dependent. This study aims to explore such biofilm formation of 4 *S. mutans* strains, UA159, V403, NG8, C67-1, with or without flow. To this end, each strain at mid-log phase was added to a SAG-coated surface for 2-h for initial adherence, followed by 10-h biofilm formation with or without flow in a BioFlux system. The 2-h adherence or 10-h biofilm formation per strain was quantified by coverage area and cluster size using BiofilmQ imaging analysis software. Strains V403, NG8, and C67-1 demonstrated similar SAG-mediated adherence, which was significantly higher than that of strain UA159. However, the

biofilm formation under flow was different among strains. The biofilm coverage on SAG-coated surfaces and the cluster sizes were ranked from high to low as: NG8 >V403 or C67-1> UA159. Conversely, no difference in biofilm coverage among different strains was observed when there was no flow. In conclusion, the SAG-associated adherence and biofilm formation under flow of *S. mutans* were strain-dependent. The biofilm formation of a strain is not proportional to its initial adherence ability.

24. Professional use of social media platforms by independent Dental Hygienists in the Netherlands: - a quantitative study -

Marlotte Van Capelleveen, Dagmar Else Slot
ACTA

Aim: This study examines the prevalence of the professional use of social media platforms by independent DHs in the Netherlands and assesses the associated personal and demographic factors.
Methods: In this exploratory, observational, cross-sectional study, independent DHs who were members of the Dutch Dental Hygienist Association (Nederlandse Vereniging voor Mondhygiënisten: NVM) were included. Data was collected from the DH practices' websites. Statistics included frequency distributions, percentages, chi-square tests for the relationship between the parameters, and multiple logistic regression for the associations between social media use and the personal and demographic factors.
Results: A total of 830 independent DHs from 670 different practices were included in the study. Of these DHs, 34.4% had a link to a social media platform on their website. DHs with practices in the west or south of the Netherlands were more likely to use Facebook ($p=0.035$ and $p=0.002$ respectively) than those in the east or north. The likelihood of DHs with four years of training using Facebook was 1.910 greater than those with two years of training ($p=0.002$). Furthermore, DHs who graduated in Utrecht were more likely to use Instagram ($p<0.001$).
Conclusion: Over a third of the independent DHs in the Netherlands used social media. DHs who trained in Utrecht for four years and who had a practice in the west or south of the Netherlands were more likely to use social media.

25. Dental practices as a source of oral health data: a scoping review

Peggy C.J.M. van Spreuwel, L. el Aisati, J.J.M. Bruers
HU

Background: Oral health data are pivotal for assessing population oral health and informing oral healthcare policies. This scoping review evaluates the potential of dental practices as a source of oral health data, exploring the data types collected and their relevance for epidemiological research and sharing with primary healthcare providers.
Methods: Using the Joanna Briggs Institute checklist, two reviewers conducted a comprehensive literature search in Medline, Embase, Scopus, and Web of Science, targeting studies from 2000 to 2022. The search focused on oral health data collection in dental practices and their epidemiological application in Western countries. The analysis examined the data's epidemiological utility and sharing potential with primary healthcare providers.
Results: 46 studies were included, mainly from Europe, particularly Scandinavia, and the USA. The studies described the use of oral health data from dental practices and healthcare centers for epidemiological purposes, covering dental caries, periodontal diseases, and other oral conditions. Although the data proved valuable for epidemiological research, limited attention was given to data sharing among healthcare providers.
Conclusion: Dental practices are a valuable source for gathering oral health data, which supports evidence-based healthcare. However, developing data-sharing frameworks remains vital. The limited focus on oral health epidemiology in the Netherlands suggests a need for further research.

26. "What if…?" Competence of oral care-related students and healthcare providers in the Netherlands regarding acute medical emergencies in the workplace

Marcel Van Tuinen, Nasim Mousavi; Fadi Malakeh; Martine van Driel; Nienke Hut; Dominique Rosenberg; Manon Weijenberg; Helena van Ham
UMCG / RUG

In the event of an acute medical emergency, dentists in the Netherlands are legally obliged to stabilize the patient until professional help arrives. Research in other countries shows that dentists are not well prepared for this. No research has yet been conducted on this subject in the Netherlands. The primary question in this study is therefore as follows: To what extent are dental students and dental hygienist students at Dutch dental schools and graduated dentists, orthodontists and oral surgeons in the Netherlands prepared for an

acute medical emergency? The aim is to investigate the current situation in the Netherlands and possibly contribute to a scientifically based future policy for students and healthcare providers. For this purpose, a survey study was conducted among 500+ participants in the Netherlands. The following variables were examined using descriptive statistics: personal characteristics, the presence, location and contents of the emergency medical kit and the presence, location and use of the Automated External Defibrillator. In addition, statistical analyzes were carried out to compare the different research groups in terms of frequency of anamnesis and degree of relevant knowledge and skills. The results show differences between the research groups, especially in the competence regarding the use of emergency medicines and diagnosis. In addition, a significant influence is observed from the frequency of taking the BLS course. Although this influence is positive, the overall results are also worrying in the Netherlands. This study provides new aspects for further research, in particular the importance of paying attention to this theme in training curricula and adequate preparation for acute medical emergencies in practice.

27. The effect of cetylpyridinium chloride compared to chlorhexidine mouthwash on scores of plaque and gingivitis; A systematic review and meta-analyses

Emmy R. Windhorst, Maud Joosstens, Eveline van der Sluijs, Dagmar Else Slot
ACTA

Aim: To evaluate the effectiveness of cetylpyridinium chloride (CPC) and chlorhexidine (CHX) mouthwashes (MW) on plaque and gingivitis scores for patients with gingivitis.
Methods: The MEDLINE-PubMed and Cochrane-CENTRAL databases was searched to identify (randomized) clinical controlled trials to compare the effect of CPC and CHX MW on plaque and gingivitis scores. The staining index was also evaluated as a secondary parameter of interest. In addition, the risk of bias was assessed. The extracted data was summarized using a descriptive approach, and whenever possible, a meta-analysis was conducted. The results for brushing and non-brushing studies were presented separately. Grading was applied.
Results: The search strategy resulted in the identification of 424 unique papers, from which 14 full-text papers providing 18 comparisons were selected. Different concentrations of CPC-MW (0.1%, 0.075%, and 0.05%) and CHX-MW (0.2% and 0.12%) were used. The risk of bias was estimated to be low to high for each study. A meta-analysis was performed for the studies using a non-brushing model that evaluated CPC-MW versus CHX-MW in terms of plaque index scores, with a significant favor for CHX-MW (0.55 [95% CI: 0.19; 0.91], p=0.003). For brushing studies, a meta-analysis was performed for plaque and gingivitis index scores. No significant differences were found between CPC-MW and CHX-MW. The descriptive analysis supports these findings. CHX-MW tends to stain more than CPC-MW.
Conclusion: There is moderate certainty for a small statistically significant favorable effect of CHX-MW over CPC-MW for plaque control in non-brushing situations but no difference between them for plaque and gingivitis prevention in brushing situations. In brushing situations, CPC-MW can serve as a suitable substitute for CHX-MW.

28. A Novel TGF-β3-Derived Peptide Promotes Chondrogenesis in vitro and in vivo

Mingjing Zhu, Siqing Jiang, Xingyang Li, Wenchao Zhong, Wei Cao, Antong Wu, Gang Wu, Qingbin Zhang
ACTA

Introduction: The repair of large cartilage defects remains highly challenging in the fields of orthopedics and oral and maxillofacial surgery. One approach is to apply chondro-inductive growth factors, but their use is associated with various limitations. To provide a viable alternative, we aimed to develop a novel chondro-inductive peptide, and hypothesized that as a peptide derived from transforming growth factor-β3 (TGF-β3), this peptide would induce chondrogenic differentiation of mouse bone marrow stem cells (BMSCs) more effectively than TGF-β3.
Method: We analyzed the crystallographic data of the critical binding domain of TGF-β3 with its type II receptor and designed 10 TGF-β3-derived peptides (TPs). We tested the ability to form cartilage of all 10 TPs adsorbed onto collagen sponges transplanted intramuscular in rats. Based on the results, we analyzed the efficacy of TP number 8 (TP8) in inducing in-vitro chondrogenesis of mouse BMSCs in a micromass. We also explored the molecular mechanisms for the chondro-inductivity of TP8 using western blot.
Results: TP8, adsorbed onto absorbable collagen sponge, potently induced de novo cartilage formation. TP4 stimulated bone formation, while the other TPs were ineffective. TP8 (500 ng/ml) induced a significantly higher area of glycosaminoglycans (GAGs) in the micromass than every other TP, comparable to BMP-2 (500 ng/ml) and TGF-β3 (10 ng/ml). Furthermore, TP8 significantly upregulated the amount of phosphorylated Smad1/5 over total Smad 1/5 in mouse BMSCs by 1.5-fold.
Conclusions: We developed a novel, bioactive, TGF-β3-derived chondro-inductive peptide, TP8, which induces chondrogenic differentiation of BMSCs in vitro superior to that induced by TGF-β3.

29. **Influence of ionizing radiation on multispecies biofilm and dentin microhardness**
Rodrigo Rohenkohl Silva, Tainara Hawerroth, Taynara Santos Goulart; Rafael Ratto de Moraes, Lucas da Fonseca Roberti Garcia, Josiane de Almeida
Radboudmc

Radiotherapy is well known as a treatment modality for numerous tumors. Although its proven efficacy, other cells, beyond neoplastic cells, are also affected during the radiation process. Consequently, radiotherapy side effects could impact structures in the same region of the body, such as teeth.
Purpose: To evaluate whether ionizing radiation causes alterations in multispecies microbial biofilm and dentin microhardness after biofilm formation.
Materials and Methods: Disc-shaped dentin specimens (n=30) were obtained from ten bovine incisor teeth, and subsequently divided randomly into two groups (n=15) according to radiation dosage (0Gy or 70Gy). Initial Knoop microhardness test was conducted (MH0). Following this, a 21-day biofilm was cultivated over the samples. Then, the specimens were stained with 0.01% violet crystal, and the biofilm biomass was quantified. Finally, Knoop microhardness test was repeated (MH1). One-way ANOVA and Tukey tests were performed ($\alpha = 0.05$).
Results: Dentin irradiated with 70Gy significantly exhibited the greatest biomass of biofilm ($p<0.05$). The 21-day biofilm significantly reduced the microhardness of both 0Gy and 70Gy radiated dentin ($p<0.001$), with a twofold decrease observed in 70Gy radiated dentin.
Conclusion: Ionizing radiation contributes to dentin biodegradation and the formation of a greater microbial biofilm biomass.

Friday 14 June 2024

Parallel session II-A
Room: Air

1. **Patterns of dental healthcare costs of 12-year-old adolescents living in Amsterdam: a longitudinal study**
Tessa S. van Ligten, Catherine M.C. Volgenant, Denise Duijster
ACTA

Aim: The aim was to analyze patterns of oral healthcare consumption (OHC) of adolescents living in Amsterdam. We assessed whether dental visits earlier in childhood and regular yearly dental visits were associated with dental costs at the end of adolescence. Dental costs (in euros) were used as a proxy for OHC.
Approach: Longitudinal data on dental costs (2009-2017) from 12-year-olds in 2012 were obtained via Statistics Netherlands (CBS). Explanatory variables were: whether adolescents incurred dental costs in 2009 (age 9; yes/no and amount) and whether they incurred consecutive dental costs between 2010-2015 (yes/no). The outcome was dental costs in 2016 (age 17; yes/no and amount).
Results: Dental costs in 2016 were available for 6,871 children. Dental costs in 2009 and consecutive dental costs were associated with dental costs in 2016 (aOR-range 2.01(1.70-2.37)-3.04(2.44-3.80); aOR 5.24(4.64-5.92), respectively). The amount of dental costs in 2009 was significantly, positively related to higher dental costs in 2016 (mean difference (MD) 0.19(0.15-0.23)). Adolescents with consecutive dental costs incurred slightly, not significantly, lower dental costs in 2016, compared to those without (MD -13.29(-28.00-1.42)).
Conclusions: Dental visits earlier in childhood are related to OHC at age 17. A larger volume of OHC during childhood is a predictor for high dental costs for 17-year-olds. More adolescents who regularly visit a dentist, continue to do so at age 17. However, regular dental visits did not contribute to lower dental costs at the end of adolescence. Future research should include dental performance codes to give insight in different patterns of OHC.

2. **Beyond the classroom: Student-led initiative in toddler oral health**
Brenda Grift, Denise Leusink
HU

The “Toddler Oral Health” intervention aims to improve oral health in Dutch toddlers, focusing particularly on those from low socio-economic backgrounds. To reach this group early, oral health coaches (OHCs) are deployed at well-baby clinics (WBCs), focusing on parents with young children from the age of six months onwards. The intervention is built on three key components: 1) risk assessment through the Non-operative caries treatment and prevention program, 2) behavioral determinants analysis and customized interventions based on the Health Action Process Approach, and 3) Motivational Interviewing. After the efficacy study

on this intervention, the municipality of Utrecht, the Overvecht WBC, and HU University of Applied Sciences Utrecht's Oral Hygiene Program remained committed to implement the intervention.
As a pilot, third-year Oral Hygiene students were assigned to the WBC to conduct consultations with parents and gather data for evaluating the pilot, using patient records, questionnaires and feedback. Through this practical experience, students not only gain valuable insights into domain-specific competencies and the importance of preventive approaches in toddler oral healthcare, but also about the role and positioning of dental hygienists in interdisciplinary teamwork, effective communication and the daily challenges and needs of both families and youth healthcare professionals. This contribution will explore the additional value of this educational framework's design, based on students' experiences, collaboration with youth health care, and insights from parents. Additionally, it will highlight the added value of integrating research knowledge into the curriculum, showcasing the collective effort to promote early oral health prevention.

3. **Predictors of oral healthcare utilization and satisfaction among Indian migrants and the host population in the Netherlands**
   Amy Pabbla, Denise Duijster, Irene H.A. Aartman, Charles Agyemang
   ACTA

Despite the growing number of Indian migrants in the Netherlands, studies on their oral healthcare utilization are scarce. This study aimed to explore predictors associated with reasons for visiting an oral healthcare professional (OHP) and satisfaction with OHPs in the Netherlands among the Indian migrants and the host population.
A random sample of 391 participants (host population=244, Indian migrants=147) was obtained who participated in this survey questionnaire. Variables were classified according to Andersen's healthcare use model. Multivariable binary logistic regression analysis was carried out to identify significant predictors for the two outcomes: reasons for visiting an oral healthcare professional (OHP) (Routine checkups and preventive care or visit only for pain and treatment) and satisfaction with OHPs (satisfied or dissatisfied) in the Netherlands in both groups.
Indian migrants with higher internal locus of control (LoC) [OR= 7.73 (CI:2.13; 27.99)], more trust in OHPs [OR=4.12 (CI:1.68;10.14)] and higher integration level [OR=1.09 (CI:1.03;1.17)] had higher odds of visiting an OHP for routine checkups and preventive care. In the host population, having dental insurance [OR=2.64 (CI:1.00; 6.95)] was significantly associated with increased odds of visiting an OHP for routine checkups and preventive care. For satisfaction, Indians with low paid jobs [OR=16.26 (CI:2.83; 93.36)] and those with higher integration levels [OR=1.28 (CI:1.16; 1.42)] had higher odds of being satisfied with the Dutch OHPs compared with those with higher paid jobs and lower integration levels. Among the host population, those with more trust in OHPs [OR=2.86 (CI:1.19; 6.88)] had higher odds of being satisfied compared to those with lower scores.
In conclusion, our findings emphasize the need for incorporating different research designs and targeted interventions for addressing awareness about insurance benefits to all. Since integrated Indians are more inclined to utilize dental care services, policymakers can leverage this resource to enhance accessibility to dental care for migrants who acculturate effectively in the host society.

4. **The political economy of priority setting and resource allocation in oral health: a narrative review and stakeholder interviews across four European countries**
   Ziade Sarroukh, Stefan Listl, Patrick Jeurissen, Shaila Akter
   Radboudmc

Aim: Pressing oral health care challenges pose dilemmas of prioritization for governments. This study aims to identify key determinants of prioritization in oral health policy in Denmark, Germany, the Netherlands and the United Kingdom.
Methods: We conducted a narrative literature review based on a search through PubMed and Google Scholar, and key informant interviews with policymakers to identify key trends in oral health policy choices. Interviews were used to identify determinants of priority setting and resource allocation processes.
Results: 249 articles were included in this study, and six key informants were interviewed. We find an overarching focus on accessibility of oral health care, primarily characterized by incremental and localized programs for vulnerable groups. Supply-side arrangements included financial incentives for providers and adapted service delivery models such as task shifting. Quality management formed another focal area, particularly in Germany. Our analysis led to a funnel consisting of three stages that drive current oral health policy choices. These include political accountability and points, stakeholder influence through negotiations and lobbying, and bureaucratic justification of policy innovations.
Conclusion: Prioritization in oral health policy seems to be dominated by ad hoc and fragmented investments in incremental services of delivery rather than synergized reforms such as granular package designs. While some contexts show political traction for oral health policy, complex negotiations strained by interests of

private professionals and challenges of limited evidence for interventions generate difficulties to fit within budgetary constraints and spending targets. This has commonly placed oral health policy in a state of inertia.

5. **"Whose responsibility is it?" A situational analysis of the community-level oral health situation in Amsterdam**
   Sehida Begovic, Michiel van der Linden, Kasper Rosing, Linnea Eisemann de Almeida, Michael Lorenz, Stefan Listl, Monique van der Veen
   ACTA

Background: DELIVER is a multinational project funded under the EU's Horizon Europe program that aims to improve oral healthcare quality on practice, community, national, and international levels. In this study, we aimed to map oral healthcare priorities among stakeholders in Amsterdam and to describe how these stakeholders interact to improve quality of oral healthcare at the community-level.
Methods: A Situational Analysis approach was used. Data were collected through desk research and semi-structured interviews. Using inductive coding, interview transcripts were analyzed and grouped into themes. The situation of quality improvement of oral healthcare at the community-level was represented in a situational map, a social worlds/arenas map and a positional map.
Results: Interviews were conducted with ten professional stakeholders. Stakeholders' first priority was that at least basic oral healthcare should be accessible for everyone. Further priorities included a need for simplified access to oral healthcare and strengthened social support. While stakeholders agreed that people should not rely on emergency funds and volunteers, they found it unclear what organization or individual held the ownership and responsibility for access to oral health care. This led social/welfare organizations to feel a sense of responsibility and offer informal care solutions.
Conclusion: Stakeholders agreed on the need for simplified access to oral care for citizens and on the need for social support. Stakeholders also emphasized the issue of unclarity about who is responsible for oral healthcare and quality improvement at the community level. This highlights an urgent need for improved governance.

Parallel session II-B
Room: Water

1. **Health Literacy, oral diseases and contributing pathways: A LifeLines cohort study**
   Trishnika Chakraborty, Menno S.A. Reijneveld, Annemarie A. Schuller, Marise S. Kaper
   UMCG / RUG

Background: Health literacy (HL), the ability to deal with information related to one's health, is a predictor of oral health outcomes. Until now, very few studies have specifically assessed the direct and indirect association of HL with oral health.
Aim: To assess whether limited HL is associated with oral health outcomes in the general population and whether this association is mediated by oral health behaviour and dental care utilization.
Methods: We used self-reported data from Lifelines, a prospective population-based cohort study in the Netherlands. This longitudinal study used information covering 7 years on HL, oral health outcomes, and oral behavioural mediators, such as brushing, meal moments, smoking, and dental care utilization. We used causal mediation modelling to assess the direct, indirect, and total effects of HL on oral health outcomes and the mediators.
Results: The total sample regarded 26,983 adults. Adequate health-literate participants had lower chances of poorer oral health outcomes, such as edentulism (lacking teeth) (odds ratio, OR=0.68, 95%-confidence interval, CI: 0.61; 0.75) and gingivitis (OR=0.82, 95%-CI: 0.76; 0.87). Overall, oral health behaviours mediated 51% of the association for HL and edentulism and 74% for HL and gingivitis. For edentulism, the proportion mediated by dental care utilization was 34%, and in the case of gingivitis, this was 13%.
Conclusion: Lower HL is associated with edentulism and gingivitis and this association is mediated by poorer oral health behaviour and inadequate dental care utilization. By improving HL and promoting healthy behaviours, individuals can improve dental care management and reduce the risk of developing oral health conditions.

2. **Decision-making concerning involuntary oral care for older individuals with dementia**
   Maud Jonker, Coos Engelsma, Anita Visser
   UMCG / RUG

Many older individuals with dementia show care-resistant behavior for oral care. Providing care despite resistance is considered to be involuntary care. The Dutch law 'Wet zorg en dwang' (care and coercion),

states that care must be ceased in the presence of resistance, unless there is (a risk of) serious harm. This study was conducted to gain insight into the attitudes of healthcare providers with regard to involuntary oral care provision for older individuals with dementia. An online questionnaire consisting of general questions, case specific questions and knowledge questions about the Dutch law was administered to 392 care providers. In all cases, a discrepancy was seen between the assessment of oral health problems as potentially harmful and the willingness to provide involuntary oral care. Hence, many healthcare providers are aware of the subsequent potential health risks related to not providing care, but are still reluctant to provide involuntary oral care. A large part of the healthcare providers also has a low level of knowledge with regard to the Dutch law 'Wet zorg en Dwang'.

3. **Poverty-Fighting Organizations in the Netherlands: Possible Key Figures in Improving Oral Health of a Vulnerable Population**
   Sterre J. Gitz, C.M.C. Volgenant
   ACTA

Many socio-economically vulnerable (low-SEP) adults cannot afford professional dental care and are therefore absent in the dental practice. These adults are often known to nongovernmental organizations (NGOs) that focus on poverty-related issues. Therefore, we studied whether NGOs are willing to play a role in increasing their clients' access to professional oral healthcare.
Participants were (voluntary) employees of NGOs in five Dutch municipalities (Apeldoorn, Enschede, Gouda, Heerenveen, Helmond). NGOs were eligible to participate if their target population is low-SEP adults with financial-constrains-related needs. Data was collected via an online questionnaire. The study protocol was approved by the ACTA-IRB (registration number 2023-49033).
Seventy-eight NGOs were contacted, and 33 employees of 20 different NGOs completed the questionnaire (response rate: 25.6%). Participants (mean age 54.9±15.4 years; range: 27-77) were predominantly female (23; 72.0%; missing=1). Most NGOs offered financial aid (8; 25.0%) and debt counselling (7; 21.9%).
The majority of employees was somewhat to very aware of their clients' oral health status (17; 60.7%). They all indicated that financial constraints and limited knowledge were major barriers for clients to seek professional oral healthcare. The majority of employees addressed oral health of their clients by either answering oral health related questions (18; 66.6%) or providing practical support (16; 59.6%; missing=6). The majority perceived the necessity for increasing attention to oral health(care) within their organization (15; 70.4%, missing=12) and most employees were somewhat interested in improving their own oral health(care) knowledge (11; 52,4%, missing=12).
In conclusion, most NGOs seem willing to provide their low-SEP clients guidance towards professional oral health care. Our findings indicate that in the future the current NGOs may play a role in guiding clients towards professional oral healthcare.

4. **The Development of a Deep Learning Model based on Textual Longitudinal Electronic Health Records to Detect Periodontal Disease**
   Laura Swinckels, Loos, B.G., Applegate J.R., Kookal K.K., Kalenderian, E., Bijwaard, H., Keijzer, de A., Bruers, J.J.M.
   Inholland

Background: Periodontal disease (PD) can be prevented with early screening and timely interventions. Dental electronic health records (EHR) include various essential information for PD screening. However, the increasing amount of data hinders clinicians from assessing. 'Deep learning' can analyze large-scale textual EHRs. Disease detection in EHRs can support preliminary screening, without additional impact on the patient and clinicians by using existing data, and thus optimizing the workflow.
Objective: To develop a deep-learning model to screen for periodontitis in dental EHRs.
Methods: This retrospective case-control study used longitudinal EHR data. Patients were defined as cases or controls, based on diagnosis- and treatment registrations and pockets. The following EHRs were extracted de-identifiable from the Bigmouth repository: demographics, vitals, dental procedures, dental diagnoses, medical state, periodontal data, and medication. Based on patterns in the data, a neural network was developed, by combining technical engineering and dental expertise. The ability of the model to detect PD in EHRs was evaluated by the accuracy, sensitivity and specificity.
Results: The process from data cleaning to PD risk predictions will be shown. This study included 70,558 patients with 13.1% cases and 86.9% controls. The most recent performance metrics for PD detection and the most important early predictors will be presented.
Conclusion: A deep-learning model was developed that can successfully predict the risk for PD in EHR. However, this study shows that incomplete and inconsistent documentation disrupts flawless screening in EHR. Applying this model to new data, an individual risk assessment can be generated for the concerned patient.

5. **The oral mycobiota of mother-child pairs in early life: association with maternal cardiometabolic risk factors**
   Maria J. Azevedo, Ana Filipa Ferreira, Inês Falcão-Pires, Carla Ramalho, Mark J. Buijs, Egija Zaura, Benedita Sampaio-Maia, Bernd W. Brandt
   ACTA

Objectives: The oral mycobiota is considered fundamental in the oral ecosystem. Despite its importance, little is known regarding the potential role of cardiometabolic risk factors (CRF) and early life determinants on the oral mycobiota. Thus, the objectives of this study were the characterization of the oral mycobiota among mothers with and without CRF from pregnancy through six months postpartum to describe the oral mycobiota of their children up to 6 months of life and associate it with the maternal CRF and early life factors.
Methods: A total of 59 mother-child pairs (22 mothers with CRF) were followed-up in the 3rd trimester of pregnancy, 1 and 6 months post-partum. Unstimulated saliva samples and oral swabs were collected from mothers and children, respectively. DNA was extracted and the Internal Transcribed Spacer 2 was sequenced.
Results: The maternal CRF was not associated with the alpha or beta diversity of the oral mycobiota of mothers and children. In children, beta diversity changed over time and the relative abundance of Aspergillus and Malassezia was lower six months after delivery. In the latest time point, health complications, kissing the child on the lips, and toothbrushing were significantly associated with changes in the oral mycobiota of children.
Conclusions: In our population, the oral mycobiota of mother-child pairs was not associated with maternal CRF. Ecological shifts in the fungal population of the 6-month old children were associated with health complications of the child, toothbrushing, and oral contact with the mother.

Parallel session II-A (cont.)
Room: Air

1. **The effects of post-traumatic stress disorder treatment on painful temporomandibular disorders**
   Wendy Knibbe, A. de Jongh, K. Acar-Ceylan, Z. Al Hamami, C. M. Visscher, F. Lobbezoo
   ACTA

Background: Post-traumatic stress disorder (PTSD) is a common comorbidity for chronic painful temporomandibular disorders (TMD), awake bruxism, and sleep bruxism, but the implications for treatment are unknown. We aimed to explore the effects of treating PTSD on these conditions and hypothesized that chronic painful TMD, pain intensity, pain interference, awake bruxism, and sleep bruxism would decrease after the treatment of PTSD and that these results would be maintained at 6-month follow-up.
Methods : Participants (N = 98) were individuals undergoing an intensive two-week (8 days) treatment for PTSD. They were assessed for chronic painful TMD (temporomandibular disorder pain screener), pain intensity, pain interference (Graded Chronic Pain Scale 2.0), awake bruxism, and sleep bruxism (Oral Behaviours Checklist). Hypotheses were tested using the Friedman test, followed by a post-hoc Wilcoxon Signed Ranks test. Since barely any pain interference was reported, these outcomes were not analysed.
Results: Chronic painful TMD symptoms, pain intensity, awake bruxism, and sleep bruxism decreased significantly across the three timepoints. Post-hoc tests showed a significant decrease in chronic painful TMD symptoms, awake bruxism, and sleep bruxism between pre-treatment and post-treatment ($p<.001$, $p<.001$, and $p<.001$, respectively) as well as between pre-treatment and 6-month follow-up ($p=.001$, $p=.003$, and $p<.001$, respectively). Pain intensity decreased significantly between pre-treatment and post-treatment ($p=.005$).
Conclusions: The results provide support for a trauma-sensitive approach to patients presenting with chronic painful TMD and PTSD and suggest that trauma-focused treatment can be beneficial for chronic painful TMD, awake bruxism, and sleep bruxism in patients with PTSD and chronic painful TMD.

2. **Bruxism and Tooth Wear: A Scoping Review**
   Hilde Bronkhorst, Stanimira Kalaykova, Marie-Charlotte Huysmans, Bas Loomans, Tatiana Pereira-Cenci
   Radboudmc

Objective: This study presents a scoping review in order to determine the relationship between tooth wear and bruxism.
Data: A protocol was developed a priori (Open Science Framework (DOI 10.17605OSF.IOCS7JX)). Established scoping review methods were used for screening, data extraction, and synthesis. Risk of bias was assessed using the JBI tools. Direct associations between tooth wear and bruxism were assessed.
Sources: Embase, SCOPUS, Web of Science, Cochrane, and PubMed were searched.

Study selection: Any clinical study containing tooth wear and bruxism assessment done on humans in any language was included. Animal and in-vitro studies and case reports were excluded.
Conclusions: Twenty-eight publications reporting on the association between tooth wear and bruxism were included. The majority of publications were cross-sectional studies (89%) while only three were longitudinal (11%). Ten papers used instrumental tools, of which eight also used non-instrumental tools. Twenty-five out of twenty-eight papers used questionnaires, interviews or questions to aid in the bruxism assessment. Tooth wear was mostly scored using indexes. Most studies reported no or weak associations between tooth wear and bruxism, except for the NCCL studies, which all reported a positive association. When bruxism assessment was done through self-report, more often an association was found. Non-NCCL studies using multivariate analyses did not find an association between tooth wear and bruxism. Evidence shows inconclusive results as to whether bruxism and tooth wear are related or not. Therefore, well-designed longitudinal trials are needed to address this gap in the literature.

3. **Oral Health Status of Dutch Armed Forces Recruits in the years 2000, 2010 and 2020, a retrospective repeated cross-sectional study**
Joris de la Court, Niek Opdam, Ewald Bronkhorst, Mark Laske, Marie-Charlotte Huysmans
Radboudmc

Background: Studies on oral health status of adults are sparse and rarely include data on endodontic treatment and trauma. In the military, those data are available because recruits are routinely assessed with a clinical and radiological examination at the start of their career. This study aimed to identify differences in oral health status of Dutch Armed forces recruits between cohorts, departments, gender, age and rank, with DMF-T, endodontic treatment and dental trauma as outcome measures.
Methods: Data from Electronic Patient Files from all recruits enlisted in 2000, 2010 and 2020 were used for analysis in a Hurdle model resulting in the estimated cohort effect, controlled for the demographic variables. The total number of recruits was 5,764. Due to the retrospective character of the study a proxy was used to compose D-T and dental trauma.
Results: The mean DMF-T number in recruits decreases from 5.3 in cohort 2000 to 4.13 in cohort 2010 and 3.41 in cohort 2020. The percentage of endodontically treated teeth increases from 6% in cohort 2000 to respectively 9% in 2010 and 8% in 2020.
The percentage of recruits showing signs of dental trauma did not change significantly between cohort 2000 (3.1%) and cohort 2010 and 2020 (both 2.7%).
Conclusions: Oral health in armed forces recruits is improving over the years, following a similar trend as the general population in the Netherlands. Lower SES represented by enlisted rank showed substantial lower oral health status.

4. **“Do dentists like performing endodontic treatments?” The level of job satisfaction of dentists performing endodontic treatments in the Netherlands**
Daniëlle M. Boonzaaijer, R.C. Gorter, W.J. van der Meer, A.A. Schuller, L.W.M. van der Sluis
UMCG / RUG

Introduction: There is a clear difference between the feasible and monitored endodontic outcome, despite technical developments. Furthermore, it has been shown that not all dentists enjoy performing endodontic treatments. This could negatively influence the job performance, as described in the JDR-theory.
Aim: To investigate the level of job satisfaction among Dutch dentists (general practitioners) when performing endodontic treatments and to investigate if specific job resources were associated with this.
Methods and Materials: A questionnaire regarding demographic, endodontic treatment and job resource variables was sent to 470 dentists in the Netherlands by using a secured RedCap link.
Three groups based on the appreciation of endodontic treatments were distinguished and sumscores were made for the Likert scale questions. After, linear regression analyses were conducted in IBM SPSS Statistics Version 28.0.1.1 and a P-value <0,05 was considered significant.
Results: Group 3, appreciating complex endodontic treatments, exhibited the highest job satisfaction, while Group 1, not appreciating non-complex or complex treatments, reported the lowest satisfaction. Significant differences were found in the frequency of performing endodontic treatments and the number of planned visits, with Group 3 showing the highest scores.
Regarding job resources, Group 3 demonstrated the highest self-reported knowledge, rating of endodontic treatment organization, and adherence to standards. Conversely, Group 1 scored the lowest.
Conclusions: The study concluded that general dental practitioners in the Netherlands generally exhibit a high level of job satisfaction in performing endodontic treatments. Specific job resources—knowledge, adherence to standards, and clinic organization—were identified as key factors influencing job satisfaction in this context.

5. **The prevalence, risks, and detection of driving under the influence of nitrous oxide**
   Dinesh Durán Jiménez, Frederick R. J. Vinckenbosch. Hendrik Helmerhorst, Albert Dahan, Leon Aarts, Floris Bikker, Henk Brand, Eef Theunissen, Johannes G. Ramaekers
   ACTA

Nitrous oxide (N2O), colloquially known as laughing gas, is not only used as sedative in dentistry, but also a common recreational drug of abuse. The gas is inhaled in its undiluted form from a party balloon. Its intoxicating effects are described as dissociative and euphoric, accompanied by ataxia, hypoxia, and attenuated consciousness. Therefore, the recreational use of N2O appears irreconcilable with operating a vehicle in road traffic. However, the Netherlands, one of the leading countries regarding prevalence of recreational N2O use, has seen a sharp increase in police reports of N2O-related traffic incidents since 2016. Road traffic deaths associated with recreational N2O use have also been reported in the United Kingdom, as well as a recent increase in traffic incidents. Hence, driving under the influence of N2O is possibly an underreported threat to road traffic safety. Although its prevalence is unclear, it is almost certain that N2O consumption is accompanied by severe driving impairment, based on its pharmacodynamics and documented cognitive and psychomotor effects in medical studies. Recent research demonstrated that N2O can be detected in blood and exhaled breath. Currently, work is in progress to detect N2O in saliva. What detection of N2O means for law enforcement warrant elaborate research into N2O detection techniques and the intoxicating effects of N2O.
Preliminary results will be presented during the conference.

Parallel session II-B (cont.): ORANGEFORCE (*open voor all DDS participants)*
Room: Water

1. **Improving Oral Health Care for Community-dwelling Frail Older People through Interprofessional Collaboration: Identifying Barriers, Success Factors, and Integration Strategies**
   Mees H.S. de Jong, C.D. van der Maarel-Wierink, K. Jerković-Ćosić, F. R. Rozema
   ACTA

Introduction: The integration of oral healthcare for community-dwelling frail older people presents significant challenges. This comprehensive study aims to identify the barriers and success factors impacting interprofessional collaboration and to elucidate strategies for the effective integration of oral health care in geriatric care networks.
Methods: A qualitative approach was employed, combining semi-structured and focus group interviews with healthcare professionals, including dentists, general practitioners, home care workers, pharmacists, public health workers, and geriatricians. Thematic analysis was used to analyze the data, focusing on participants' experiences, perceptions, and recommendations regarding oral healthcare integration.
Results: The study identified multiple barriers at individual (micro), organizational (meso), and policy (macro) levels, including lack of motivation, awareness among caregivers and healthcare providers, and systemic issues related to guidelines and reimbursements. Success factors highlighted the need for increased awareness, education, and the use of digital technologies like teledentistry. Integration strategies emphasized the importance of multidisciplinary collaboration, clear communication, and incorporating oral health into standard care protocols. Recommendations for improving integration include educational initiatives, fostering interprofessional collaboration, and policy adjustments to ensure oral health is a prioritized component of elderly care.
Conclusion: Addressing the challenges of oral healthcare for frail older people requires a coordinated, interprofessional approach that bridges gaps in awareness, collaboration, and care integration. This study emphasizes the pivotal role of targeted interventions and comprehensive strategies in enhancing oral healthcare through effective interprofessional collaboration and integration within geriatric care networks.

2. **Oral health in patients with cognitive complaints at a Dutch memory clinic**
   Sanne M. Pruntel, Vissink A., van Eersel M.E.A, van Munster B.C., Visser A.
   UMCG / RUG

Introduction: The risk of developing cognitive problems increases with age, leading a rising number of individuals with cognitive issues, particularly in an aging society1. In case memory problems develop individuals with such problems can be referred to a memory clinic for a comprehensive geriatric assessment (CGA)2,3. The CGA does not include an assessment of oral health, although oral health is strongly linked to general health and even associated with the development of neurodegenerative disorders4-8.
Aim:This study is conducted to evaluate the oral health of patients visiting the memory clinic and to assess the added value of performing an oral health assessment in addition to the CGA.

Materials; All consecutive patients who were referred to the memory clinic of the University Medical Center Groningen for a diagnostic workup, and who underwent a CGA were asked to participate in this study. From all the included patients an oral health assessment was performed next to the CGA.
Results: In total, 105 patients (55 males/50 female, mean age 76 years) were included. A total of 78 patients had their own dentition. In these patients 95% had 1 or more oral health issues such as caries and/or periodontal pockets.
Conclusion; Adding an oral health assessment to a CGA at a memory clinic seems to be of added value as many oral health issues are seen in these patients. Next this data can provide valuable insights into potential associations between oral health and the course of cognitive problems in case a follow up will be conducted.

3. **Data exchange between oral care practice and general practice: a scoping review and qualitative research**
   Mark Laske, K. Verburg, M. van der Kolk, F. van der Laar, J. Braspenning, M.C.D.N.J.M. Huysmans
   Radboudmc

Literature indicates that there are relationships between oral health and systemic health. This underlines the importance of interprofessional collaboration and data exchange between the dentist and general practitioner. However, due to various factors, there currently appear to be limited forms of cooperation and data exchange between dentists and general practitioners, resulting in useful information being left behind by both professional groups. This research aims to obtain an overview of the current views on data exchange between general practitioners and oral care professionals based on scientific research, including the views of Dutch general practitioners and dental care professionals on this subject. The research will consist of two parts. Scoping Review and qualitative research in which the data is collected through two focus groups (1 dental hygienist, 2 dentists, 3 general practitioners). This presentation will focus on the results of these focus groups. In the focus groups, the diagnosis groups are determined that are relevant for the dentist to gain insight into. In addition, it is determined what specific information GPs and dentists in their EPD want to exchange. The desire for better communication, cooperation, and more knowledge about each other's profession is endorsed by both general practitioners, dentists, and dental hygienists. The conditions for this have been discussed and will need to be further elaborated.

4. **Exploring Saliva Biomarkers for Obesity Diagnosis and Preventive Healthcare**
   Hanan al Habobe
   ACTA

Obesity poses health risks and strains healthcare, emphasizing the priority on preventive care and early diagnosis. In this context saliva is gaining interest as a non-invasive alternative to blood for measuring relevant biomarkers related to complications of obesity.
This study assessed the impact of three saliva collection methods: 1) unstimulated saliva, 2) chew stimulated saliva, and 3) oral rinse on various biomarkers. It also aimed to gain insights into the salivary profile of obese individuals. Saliva samples from 27 obese individuals (20 females, 7 males, BMI >35 kg/m2) were collected using the three methods, and levels of various salivary biomarkers were determined.
Unstimulated and chew-stimulated saliva exhibited comparable biomarker levels ($p>0.05$), while oral rinse displayed lower levels ($p<0.05$). Unstimulated saliva revealed more significant intercorrelations among various biomarkers compared to the other methods. Calcium and α-amylase activity exhibited a positive correlation ($p<0.05$) and were lower in obese individuals ($p<0.05$). Conversely, cortisol was higher ($p<0.05$) and positively correlated with CRP in unstimulated saliva ($r=0.506$, $p=0.023$) in obese subjects.
In conclusion, calcium and α-amylase activity appeared promising obesity biomarkers, however further validation through larger studies is needed. Unstimulated saliva exhibited robust biomarker intercorrelations, highlighting its potential for accurate salivary profiling.

5. **In vitro and in situ validation of ISFET sensor for intraoral pH monitoring: Preliminary results**
   Victor I. Madariaga, Tatiana Pereira-Cenci, Bas A.C. Loomans, X. Frank Walboomers
   Radboudmc

Introduction: Tooth wear is a prevalent condition affecting about 30% of the European population. Research has shown that tooth wear is caused in part by exposure to acids, such as gastroesophageal reflux. Although salivary pH measurements are easy to perform during the day, the long term monitoring especially at night is currently not possible. This is essential to study the effect of reflux on tooth wear.
Aim: The aim of this preliminary study was to assess the accuracy and reliability of pH measurements using an ISFET sensor in vitro. A second aim of the study was to assess the in situ performance.
Methods: The accuracy of the ISFET sensors (N = 4) was compared to a glass pH electrode in standardized

buffers. The reliability of the measurements made by the sensors (N = 2) was also tested when the sensors were exposed to changes in temperature, pH, and viscosity. Lastly, the effect of time (drift) was calculated for two sensors at 37C degrees for 24 hours. In situ, one ISFET sensor was placed on a removable device on the palatal surface of one healthy subject for two hours around lunch time, including consumption of an acidic drink.
Results: The ISFET sensors seemed to accurately measure pH of standard buffer solutions within the calibration range. Outside the calibration range, the measurements were acceptable, but less accurate. The ISFET sensors seemed to perform well during shifts in temperature, and for pH measurements in acid and neutral solutions at room temperature. Viscosity had a great impact on the pH measurements. The drift was also acceptable (about 0.2 in 24 hours). Performance in situ seems to be optimal for low pH, but with substantial noise around the average pH values.
Conclusions: Noise around average pH values in the mouth suggest that a threshold should be chosen to detect an acid event. Still, our preliminary results from in vitro testing indicated that the ISFET sensors are suitable for measuring pH in the mouth. Preparations for the clinical studies are ongoing in parallel with the redesign of the sensor.

6. **Intra-Oral Ion Concentration Measurements in Healthy Individuals**
   Joanita S. van Santen, Zainab Assy, Marja L. Laine, Sarah A. Pringle, Frans G. M. Kroese, Arjan Vissink, Floris J. Bikker
   ACTA

Previous research showed that total salivary sodium and chloride levels in Sjögren's disease (SjD) patients were significantly higher compared to healthy controls. However, these differences are insufficient to distinguish SjD patients from other dry-mouth patients. Therefore, a novel approach is needed which also focuses on measuring ions at specific oral locations. The aim was to first determine the local salivary ion concentration in healthy volunteers. Various methods were examined for potential use in intra-oral ion sampling. Sterile foam tipped applicators were selected to sample saliva at seven different locations. Capillary electrophoresis was used to measure the concentrations of various cations and anions in a sample of unstimulated whole saliva and in the samples of the seven different locations. Almost every ion showed its own distinct pattern across the different intra-oral locations. The observed patterns were consistent between included individuals. Preliminary results show for example, that the palate demonstrated the highest sodium concentration, in contrast to that the floor of the mouth showed the lowest. While phosphate had the highest concentration on the middle part of the cheek and the lowest concentration on the floor of the mouth. These results form a reference for healthy individuals. Follow-up research might reveal which changes in ion patterns and regions of interest could then be used to determine the changes in salivary composition caused by SjD.

7. **Connecting routine healthcare data from dental care and general practice: First results and opportunities from a data linkage study**
   Isabelle Bos, Julia Bes, Koen Verburg, Mark Laske, Robert Verheij
   Nivel

Background: From a clinical and a research perspective, oral and general healthcare are often separated. By linking routine healthcare data from dental care and general practice on patient level it becomes possible to investigate associations between oral health and general health and work towards integrated care. We investigated the feasibility of linking routine healthcare data from dental care and general practice.
Methods: We determined the overlapping patients in two databases: 1) routine healthcare data from 2011-2021 of 500 general practices from Nivel Primary Care Database (Nivel-PCD) and 2) routine healthcare data from 2007-2021 of 11 dentists practices from Practice Base Research Network Nijmegen (PBRNN). The overlap between databases was determined by a trusted third party (ZorgTTP) via a 'prematch' procedure based on (pseudonyms of) postal code, date of birth and sex.
Results: In the prematch n=19,175,858 patients from Nivel-PCD and n=624,508 patients from PBRNN were taken into account. We found that n=9,990 (12.7%) patients were present in both databases. For 73% of these 9,990 patients, data from both databases from the same year was available. For 95% of the patients, data from both databases within a 5-year range was available.
Discussion: The prematch showed that for a large group of patients it is possible to conduct analysis regarding associations between dental care and primary care. Based on this feasibility study we will proceed with prioritizing research questions and the actual linkage of the data within a digital research environment (DRE) and thereby work towards and integrated care system.

Notes

Dutch Dental Science days

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