

Research Day 2015
Faculty of Dentistry, University of Oslo

August 26 2015

08.00 – 16.30

Department of Oral Biology

Domus Odontologica

Auditorium A1.1001



Dear Participants,

Welcome to “Research Day”. The aim of the Research Day is to give each PhD candidate the opportunity to present their research project to a larger audience than their own research group and prepare for presentation at research congresses abroad. Furthermore, it is a good opportunity to get an overview of the Faculty’s ongoing research projects.

The audience will be fellow PhD candidates as well as the Faculty’s scientific staff and teachers. We hope they will support the PhD candidates and attend as many of the presentations as possible.

The abstracts of the research projects that will be presented can be found in this program in order of their presentation time.

The organization committee of the Research Day has appointed professor Tiril Willumsen, Institute of Clinical Dentistry, Faculty of Dentistry, University of Oslo and Associate Professor Tine Merete Sjøland, Department of Oral Biology, Faculty of Dentistry, University of Oslo as scientific evaluation committee. At the end of the day, two awards will be presented in accordance with the evaluation from the scientific committee.

We hope you will enjoy the day together with us and take part in exciting presentations and fruitful scientific discussions.

Dean of Research

Ståle Petter Lyngstadaas

Research Day 2015

Programme

- 08:00 Registration
- 08:30 Welcome, by the faculty's Dean of Research, Professor Ståle Petter Lyngstadaas
Session 1, moderator: Stian Engen
- 08:45 HYPOXIA INCREASES THE EXPRESSION OF ENAMEL GENES AND CYTOKINES IN AN AMELOBLAST-DERIVED CELL LINE.
Rivan Sidaly, Institute of Clinical Dentistry
- 09:00 ADIPONECTIN PREVENTS ORTHODONTIC TOOTH MOVEMENT IN RATS
Sigrid Haugen, Institute of Clinical Dentistry
- 09:15 AUTOANTIGEN-SPECIFIC B CELLS ARE PROMINENT IN AREAS OF FATTY INFILTRATION IN SALIVARY GLANDS OF PATIENTS WITH PRIMARY SJÖGREN'S SYNDROME
Lara Adnan Aqrawi, Institute of Clinical Dentistry
- 09:30 POWERFUL SYNTHETIC TRANSCRIPTOME REGULATORS
Natalie Sharim Skalleberg, Department of Oral Biology
- 09:45 TRANSCRIPTOME ANALYSIS OF *STREPTOCOCCUS MITIS* RESPONSE TO THE COMPETENCE PHEROMONE
Gabriela Salvadori Silva, Department of Oral Biology
- 10:00 Coffee break

Session 2, moderator: Anne Karin Kristoffersen
- 10:15 GENOME EDITING BY NATURAL GENETIC TRANSFORMATION IN *S. MUTANS*
Roger Junges, Department of Oral Biology
- 10:30 GELATION KINETICS, MECHANICAL PROPERTIES AND CYTOCOMPATIBILITY OF A SYNTHETIC POLYETHYLENE GLYCOL HYDROGEL AS INJECTABLE SCAFFOLD FOR BONE REGENERATION
Manuel Schweikle, Institute of Clinical Dentistry
- 10:45 ANTIBIOTIC STRESS PROLONGS THE STATE OF COMPETENCE IN *STREPTOCOCCUS PNEUMONIAE*
Kjersti Sturød, Department of Oral Biology
- 11:00 IGA ANTI-AMELOGENIN ANTIBODIES IN CELIAC DISEASE PATIENTS
Sanja Petronijevic, Department of Oral Biology

- 11.15 BONE REMODELLING MAY BE ALTERED BY ALENDRONATE'S EFFECT ON HUMAN OSTEOBLASTS
Tormod Krüger, Institute of Clinical Dentistry
- 11.30 Lunch

Session 3, moderator: Johan Caspar Wohlfahrt
- 12.30 TORTURE EXPERIENCE AND ORAL HEALTH AMONG REFUGEES IN NORWAY.
Ann Catrin Høyvik, Institute of Clinical Dentistry
- 12.45 XEROSTOMIA IS ASSOCIATED WITH MORE SEVERE SYMPTOMS OF DRY EYE DISEASE AND A POORER MEIBOMIAN GLAND EXPRESSIBILITY
Ida Grunna Fostad, Department of Oral Biology
- 13.00 A NEW DEBRIDEMENT STRATEGY FOR CONTAMINATED TITANIUM SURFACES.
David Wiedmer, Institute of Clinical Dentistry
- 13.15 PERIODONTAL PATHOGENS IN BLOOD FROM PATIENTS WITH CARDIOVASCULAR DISEASES
Ingvild Midtervoll, Department of Oral Biology
- 13.30 MULTIFUNCTIONAL POLYPHENOL COATINGS ON TITANIUM IMPLANT SURFACES
Sebastian Geissler, Institute of Clinical Dentistry
- 13.45 Coffee break

Session 4, moderator: Tove Wigen
- 14.00 INDIVIDUAL SUSCEPTIBILITY TO DENTAL EROSION IN SITU
Marte-Mari Uhlen, Institute of Clinical Dentistry
- 14.15 PSYCHOLOGICAL DISTRESS AND QUALITY OF LIFE IN ADULTS AFFECTED WITH TREACHER COLLINS SYNDROME, CHERUBISM, OR OLIGODONTIA/ECTODERMAL DYSPLASIA—A COMPARATIVE STUDY
Solfrid Sørkjerd Saltnes, Institute of Clinical Dentistry
- 14.30 MARGINAL GINGIVAL RECESSION IN RELATIONSHIP TO ORTHODONTIC TREATMENT AND ORAL PIERCING
Barbro Fostad, Institute of Clinical Dentistry
- 14.45 TEMPOROMANDIBULAR JOINT OSTEOARTHRITIS IN A COHORT OF PATIENTS WITH HAND OSTEOARTHRITIS
Anna-Karin Abrahamson Johansen, Institute of Clinical Dentistry

- 15.00 FEAR OF INJECTIONS IN 18-YEAR OLD STUDENTS FROM AKERSHUS
Kjetil Strøm, Institute of Clinical Dentistry
- 15.15 CLINICAL OUTCOME AND ASSOCIATIONS WITH BACTERIAL REDUCTION IN ENDODONTIC
RETREATMENT
Homan Zandi, Institute of Clinical Dentistry
- 15.30 Coffee break
- 16.00 AWARDS AND CLOSING SESSION
Professor Tiril Willumsen and Associate Professor Tine Merete Sjøland

Rivan Sidaly

Hypoxia increases the expression of enamel genes and cytokines in an ameloblast-derived cell line.

Sidaly R, Landin MA, Suo Z, Snead ML, Lyngstadaas SP, Reseland JE. *Eur J Oral Sci.*

The aim of the study was to investigate the effect of hypoxic conditions on the expression of enamel genes, and secretion of alkaline phosphatase (ALP), lactate dehydrogenase (LDH), cytokines and interleukins from an ameloblast-derived cell line. The murine ameloblast-derived cells (LS-8) were exposed to 1% oxygen concentration and harvested after 1, 2, 3 and 7 d. The effect of the hypoxic conditions for 24 and 48 h on gene expression, secretion of cytokines and interleukins, as well as ALP and LDH activity into the cell medium was calculated relative to the expression and secretion from untreated cells (controls) at each time point. Hypoxic exposure increased the expression of the structural enamel matrix genes; amelogenin (Amel), ameloblastin (Ambn), enamelin (Enam), and the enamel protease matrix metalloproteinase-20 (Mmp20). Expression of hypoxia-inducible factor 1-alpha (Hif1a) and secretion of several vascularization factors and pro-inflammatory factors were increased after 24 and 48 h of hypoxia. ALP activity was reduced after 24 and 48 h of hypoxia, whereas the LDH level in cell culture medium was higher after exposure to 24 h compared to 48 h of hypoxic conditions. In conclusion, hypoxic exposure may disrupt the controlled fine-tuned expression and processing of enamel genes, and promote the secretion of pro-inflammatory factors.

Keywords Enamel, Hypoxia, Ameloblast, Molar Incisor Hypomineralization

Sigrid Haugen

Adiponectin prevents orthodontic tooth movement in rats

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Objective: To study the effects of repetitive infusions of human recombinant adiponectin on experimental tooth movement in rats.

Methods: The first molar of 24 male Wistar rats were moved mesially for 14 days by a closed coil spring ligated to the molar, and anchored to the incisors in front. Adiponectin solutions (20 or 200 µg/ml), or saline, were injected every 3rd day. Tooth movement was examined by feeler gauge and in vivo micro-computed tomography (microCT) (SkyScan 1176, Kontich, Belgium). Blood samples collected after 14 days, were analyzed by ELISA and Luminex. In addition, histology sections were made from the jaws and evaluated in paraffin sections.

Results: Adiponectin infusions reduced the tooth movement after 12 and 14 days compared to control. MicroCT imaging revealed detailed information on type of tooth movement, however further investigation is needed to optimize settings for evaluation of variations in bone quality. We observed no significant changes in selected bone and cytokine factors in plasma between adiponectin treated and control rats. Histological identification of osteoclast number and mineralization stages remains to be investigated.

Conclusion: Adiponectin prevents orthodontic tooth movement in rats. This anchorage effect may be taken advantage of in clinical settings, though further studies are required.

Lara Adnan Aqrawi

Autoantigen-specific B cells are prominent in areas of fatty infiltration in salivary glands of patients with primary Sjögren's syndrome

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3. Department of Oral Surgery and Oral Medicine, University of Oslo, Oslo, Norway
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Primary Sjögren's syndrome (pSS) is characterised by Ro/SSA and La/SSB autoantibodies, and mononuclear cell infiltration of lacrimal and salivary glands (SG). Adipocytes can also occupy the SG area, although little is known about their role in the autoimmune process. We have previously characterised the general and SSA-specific B cell pattern in SG tissue from 10 well-characterised pSS patients^{1,2}. We wished to further examine adipose tissue infiltration in these glands, in relation to both the general and SSA-specific B cell pattern. The sections were evaluated for fatty replacement, acinar atrophy and focal infiltration. Nine patients displayed adipose tissue replacement in the glandular tissue, where 3 showed prominent fatty infiltration. In all instances, scattered plasma cells were evenly distributed within the adipose tissue, both in the periphery and also interstitially. Interestingly, the SSA-specific cells were observed both within and in close proximity to the adipose tissue. Detection of these novel SSA-specific plasma cells in close proximity to the adipocytes indicates a possible relationship between fat disposition and the autoimmune process in glandular tissue. Functional studies are needed to explore the potential association between B cell subsets, SSA-specific cells and fatty infiltration in the SG microenvironment.

1) Aqrawi LA, Skarstein K, Oijordsbakken G, Brokstad KA: Ro52- and Ro60-specific B cell pattern in the salivary glands of patients with primary Sjogren's syndrome. *Clin Exp Immunol* 2013, 172:228-237.

2) Aqrawi LA, Brokstad KA, Jakobsen K, Jonsson R, Skarstein K: Low number of memory B cells in the salivary glands of patients with primary Sjogren's syndrome. *Autoimmunity* 2012, 45:547-555.

Natalie Sharim Skalleberg

Powerful Synthetic transcriptome regulators

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Murine tooth development is a process which involves the expression of more than 4362 genes/ molecules that regulate the sequential and reciprocal interactions between the epithelial and mesenchymal tissue through the various developmental stages. Tooth development is known to be mediated by the cross-talk between signaling pathways controlled by MicroRNAs.

MiR 214/199 cluster is a polycistronic cluster; it contains the sequences for miR-214-5p, miR-214-3p, miR-199-3p and miR-199-5p. This cluster is known to play a major role in regulation of the complex dialogue between epithelial and mesenchymal tissues during the development of ectodermal organs such as hair, nails and teeth. MicroRNAs play a critical role in tooth development particularly microRNA-214.

Synthetic antagomirs are single-stranded chemically modified oligonucleotides designed to specifically bind to and inhibit endogenous miRNA. They are supposed to have a longer life span, allowing to investigate the role of these miRs during murine tooth development by loss of function, providing future biotools in dentistry. Chemical modification can be used to alter the properties of synthetic oligonucleotides by conferring nuclease resistance, increasing binding affinity, aiding in cellular uptake and altering the ability to trigger a response by the innate immune system.

Gabriela Salvadori Silva

Transcriptome analysis of *Streptococcus mitis* response to the competence pheromone

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Streptococcus mitis is a commensal bacterium that colonizes all surfaces of the oral cavity. In several streptococci, pheromone signaling mediated by competence-stimulating peptides (CSP) is associated with biofilm formation and development of competence for transformation. Competence is thought to provide a selective advantage by allowing streptococci to acquire new characteristics, such as antibiotic resistance by incorporation of DNA from other cells. The aim of the study was to characterize the global transcriptional response to CSP signaling in *S. mitis*. Transcriptome analysis using RNA sequencing was performed for a thorough assessment of *S. mitis* genes differentially regulated by CSP. Transcriptome analysis revealed that 100 genes were up-regulated by CSP in *S. mitis*. Among these genes, 13 did not present any homology with genes in *Streptococcus pneumoniae*, a close relative of *S. mitis* that has a well-characterized competence system. qPCR analysis showed that these genes presented a time-response to CSP indicative of a late response. This is the first transcriptome analysis of *S. mitis* regarding the influence of the CSP in gene expression. Understanding the mechanisms by which this predominant oral commensal communicates may lead to novel strategies to control oral biofilms.

Roger Junges

Genome editing by natural genetic transformation in *S. mutans*

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Classical mutagenesis strategies using selective markers linked to designed mutations are powerful and widely applicable tools for targeted mutation in bacteria and archaea. However, the markers that confer power are also potentially problematic as they can be cumbersome, risks phenotypic effects of the inserted genes, and accumulate as unwanted genes during successive marker introduction steps. All these drawbacks are eased by use of direct genome editing. A strategy is described here for directly editing the genome of *S. mutans*, applied to the widely studied reference strain UA159 (ATCC® 700610) and has the advantage of extreme simplicity, requiring construction of only one synthetic donor amplicon and a single transformation step, followed by a simple PCR screen among a few dozen clones to identify the desired mutant. The donor amplicon carries the mutant sequence centrally located between flanking segments of homology of at least 2 kb which ensure efficient and precise integration by the recombination machinery specific to competent cells. The recipients are highly competent cells, a state achieved in strain UA159 by treatment with a synthetic competence pheromone in a peptide-free medium.

Manuel Schweikle

Gelation kinetics, mechanical properties and cytocompatibility of a synthetic polyethylene glycol hydrogel as injectable scaffold for bone regeneration

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Peri-implantitis and periodontitis can lead to significant bone loss surrounding dental implants or natural tooth roots respectively. As a recovery strategy for the lost bone an injectable hydrogel is being developed serving as a provisional extracellular matrix to allow bone tissue regeneration and prevent bacterial reinfection. The investigated hydrogel system is based on functionalised polyethylene glycol which reacts with a synthetic peptide under biological conditions forming a chemically cross-linked network. Furthermore, the cross-linking peptide is enzymatically cleavable, allowing for cell-demanded gel degradation and gradual replacement by newly produced native extracellular matrix.

In a first stage, a spectrum of reaction parameters is investigated to tailor a system, which is suitable for controlled in situ gelation. The major parameters investigated are: the polymer functionalization, initial pH, polymer concentration and the polymer to cross-linker ratio. The gelation kinetics are investigated via dynamic rheometry. Mechanical properties of the formed gels on cellular scale are analysed by nanoindentation experiments performed with an atomic force microscope and macroscopically by swelling measurements. The cellular response of human osteoblasts to the different process conditions is compared by lactate dehydrogenase activity, cytokine expression and alizarin red staining.

Kjersti Sturød

Antibiotic stress prolongs the state of competence in *Streptococcus pneumoniae*

Introduction: Antibiotic stress can induce the competent state in *S.pneumoniae*, and thus allow genetic transformation which may increase the acquisition and spread of resistance genes. Studies on the effect of antibiotics on *S.pneumoniae* competence have been mostly restricted to highly transformable strains derived from the well-characterized D39-isolate and examined using chemically defined media. The aim of this study was to evaluate the effect of various antibiotic agents on D39 competence during growth in a rich medium.

Methods: To monitor the effect of antibiotics on competence induction, we constructed a sigX-luciferase reporter in D39. *sigX* is upregulated during competence and is essential for induction of effector genes for DNA uptake and recombination. The reporter strain was inoculated in TSB. OD₆₀₀ and luciferase activity was measured every 15 minutes for 15 hours. The antibiotic agents used were ciprofloxacin, amoxicillin, and erythromycin.

Results: In subinhibitory concentrations of ciprofloxacin and erythromycin competence was activated for a period that was up to 3-fold longer than without antibiotics. Amoxicillin was not found to prolong competence.

Conclusion: This finding indicates that the use of antibiotics may prolong the period that *S.pneumoniae* can take up foreign DNA. This may contribute to increased acquisition and spread of antibiotic resistance.

Sanja Petronijevic

IgA anti-amelogenin antibodies in celiac disease patients

Sanja Petronijevic, Trond S. Halstensen

Department of Oral Biology, Faculty of Dentistry, UIO

Objective: Children with untreated celiac disease (CD) may develop enamel defects. Untreated CD children have increased antibody levels to gliadin, which may cross react to amelogenin due to sequence similarity. The aim of the study was to investigate anti-gliadin IgA/IgG reactivity to amelogenin in CD patients.

Methods: Blood samples of 75 children with CD and 24 controls were analyzed for IgA and IgG reactivity to amelogenin in enamel matrix derivate and to gliadin by ELISA and western blotting. Antigen cross inhibition experiment was conducted on 15 CD patients and 5 controls.

Results: Anti-amelogenin IgA (but not IgG) levels were significantly higher in CD patients than in controls ($P < 0,03$). Immunoblotting revealed that the major IgA and IgG reactivity was to a 20 kDa amelogenin specific band in the enamel matrix derivate. Moreover, inhibition studies revealed that the cross reactive IgG and IgA antibodies had similar affinity in $\sim 1/3$ of the CD patients whereas it had much higher affinity to amelogenin in $2/3$ of the patients and in all controls.

Conclusion: High-affinity IgA and IgG anti-amelogenin antibodies may be involved in celiac disease associated enamel defects.

Tormod Krüger

Bone remodelling may be altered by alendronate's effect on human osteoblasts

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Aim:

Bisphosphonates have a well-documented ability to inhibit bone resorption by promoting apoptosis in mature osteoclasts. The effect on human osteoblasts is less clear, as most in vitro studies are done on murine cell lines. In this study we tested the effect of alendronate, a widely used bisphosphonate, on vitality, proliferation, and the expression and secretion of bone markers and cytokines from human primary osteoblasts.

Material and methods:

Human osteoblasts from femur of 2 donors were incubated with alendronate dissolved in cell culture medium to final concentrations of 20 and 100 µM. Cells and cell culture media were harvested after 1, 3, 7 or 14 days of incubation, and untreated cells at each time point were used as control. Lactate dehydrogenase activity was used as measure of cytotoxicity. Multianalyte profiling of secreted factors was performed using the Luminex 200™ system and the XY Platform, and gene expression was monitored using SYBR green detection.

Results:

Alendronate had no cytotoxic effect on the osteoblasts, compared to untreated cells. The secretion of several factors was not affected by the alendronate, and numerous factors tested were below the set parameter for detection.

There was a dose-dependent increase in the levels of IL-8 and regulated on activation normal T-cell expressed (RANTES). Alendronate enhanced the expression of LEP mRNA and induced a dose-dependent decrease in the expression of osteocalcin, alkaline phosphatase and collagen type 1 alpha 1 during the study period.

Conclusions:

There is a dose-dependent increase in the secretion of immune parameters from human osteoblasts treated with alendronate. Combined with the elevated rate of proliferation in alveolar bone, treatment with high dosages of alendronate may cause undesirable local changes in bone.

Ann Catrin Høyvik

Torture experience and oral health among refugees in Norway.

Supervisor: Professor Dr Odont Tiril Willumsen

Co-supervisor: Dr Med Birgit Lie

Introduction

Despite the increasing number of refugees and asylum seekers, oral health status of refugees has not been surveyed in the Nordic countries for more than 20 years. Research from USA and Australia indicates increased dental treatment needs among newly arrived refugees, compared to the population in general. It is assumed that torture victims are even more prone to oral health problems, including dental anxiety, than other refugees. But to our knowledge, systematic research is lacking.

Aims:

1. Determine the proportion of refugees with torture experience and sexual abuse.
2. Investigate perceived and observed oral health

Material and method

Oral examination and structured interviews with 200 resettlement refugees and asylum seekers granted permanent residency in Norway.

Results

In the 51 refugees first analyzed, the main groups originate from Syria (17.6%), Eritrea (31.4%) and Somalia (27.9%). 64.7% were men, mean age 34.6 ± 12.7 . 54.9 % had caries. 41,2% of the group reported torture experience and 21.6% sexual abuse.

Conclusion

It is too early to draw conclusions, but so far the refugees appear to be a diverse group with different trauma history and dental treatment needs.

Ida Grunna Fostad

Xerostomia is Associated with More Severe Symptoms of Dry Eye Disease and a Poorer Meibomian Gland Expressibility

The purpose of the study was to investigate if xerostomia (subjective feeling of dry mouth) is associated with symptoms and signs of dry eye disease (DED). Three hundred and eighteen patients (52% women and 48% men) with DED with different etiologies were included. Patients with xerostomia, defined as "daily symptoms of dry mouth the last three months" had more severe symptoms of ocular dryness (Ocular Surface Disease index) (19.0 ± 1.2) than those without xerostomia (12.9 ± 0.5 ; $P < 0.001$). Moreover, xerostomia patients tended to show more pathological ocular signs and had more pathological meibum expressibility (0.9 ± 0.1) than those without xerostomia (0.7 ± 0.0 ; $P = 0.046$). Comparisons of symptoms of ocular dryness and clinical ocular signs were performed after controlling for the effects of gender, age and the number of systemic prescription drugs used. In conclusion, patients with xerostomia, demonstrated a higher DED symptom load, had poorer meibum expressibility, and tended to show more severe ocular signs than non-xerostomia patients.

These results indicate that, in a general population of DED patients, reporting xerostomia is a risk factor for a more pronounced DED, and are associated with reduced expression of meibomian glands.

David Wiedmer

A new debridement strategy for contaminated titanium surfaces.

Peri-implantitis is an inflammatory lesion and a major concern regarding the long term efficacy of permanent dental implants. Currently used methods for peri-implantitis treatment often fail the requirement to efficiently remove the bacteria caused biofilm, but at the same time, retain the original implant surface. Nowadays gold standard (mechanical debridement in combination with 5% H₂O₂) shows a strong initial bactericidal effect but often cannot prevent biofilm regrowth on the cleaned surface.

A new strategy combines mechanical and advanced chemical debridement to overcome these challenges. The chemical treatment is based on the potential anti-bacterial effect of reactive oxygen species (ROS) generated by H₂O₂ and UV-light activated TiO₂ nanoparticles. Besides the well understood generation of ROS for irradiated TiO₂-H₂O₂ systems a second pathway to generate radicals may occur and is discussed in the following study. Furthermore, the new approach is tested against 5% H₂O₂ in an in vitro study and a potential application device is presented.

Ingvild Midtervoll

Periodontal Pathogens in Blood from Patients with Cardiovascular Diseases

I. Midtervoll¹, A.-K. Kristoffersen¹, S. O. Samuelsen², M. Enersen¹, and Lise Lund Håheim^{1,3}.

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Background: In the last decade infectious agents have gained focus as potential co-mediators in the development of CVD.

Objectives: The aim of the study is to detect bacterial DNA from periodontal pathogens in blood-samples from fatal cases of cardiovascular diseases (CVD) and correlate these to healthy controls.

Materials and Methods: This is a case-cohort study, where the cohort is men from Oslo, born between 1926 and 1932, who participated in the Oslo II study. The test group (n=225) was selected from the cohort by CVD as cause of death. The control group (n=225) was selected randomly from the cohort and without CVD. All analyses were performed blinded. Bacterial *16S rRNA* DNA was amplified by PCR (E334F and E939R primers) for all samples and sequenced by 454-sequencing (GS Junior, Roche). Qiime were used for bioinformatical analysis. The regional ethical committee has approved the study.

Results: 450 samples have been sequenced, and more than 900 000 sequences have been obtained. The main phyla are Bacteroides, Firmicutes and Proteobacteria, representing bacteria found both in the oral cavity and the gut.

Conclusion: DNA from bacteria normally found in the oral cavity and gut have been identified in the blood-samples.

Sebastian Geissler

Multifunctional polyphenol coatings on titanium implant surfaces

Sebastian Geißler¹, Alejandro Barrantes¹, Pentti Tengvall², Håvard J. Haugen¹, Hanna Tiainen¹

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Biomaterial-associated infections represent a major issue for the success of an implant. Bacteria, which attach to implant surfaces can cause inflammations, hinder the healing process and thus compromise the intended use of the implant. Modifications of implant surfaces play therefore an important role in controlling the interactions between implant and tissue. In a recent approach, bioinspired self-polymerizing compounds have been found to form coatings on various kinds of materials, including metals [1]. Such polyphenolic coatings combine antibacterial and antioxidant properties with the potential of creating a multifunctional implant surface.

The aim of the present study was to gain knowledge about the exact mechanisms and dynamics involved in the coating formation of selected polyphenols on titanium surfaces. This was done by using a quartz crystal microbalance with dissipation monitoring (QCM-D) to evaluate the build-up of the polyphenolic layers in real-time and to get structural information about the coating. In addition, ellipsometry measurements were performed to investigate layer thicknesses and compare them to the QCM-D results.

- [1] Sileika, T.S., Barrett, D.G., Zhang, R., et al., Colorless multifunctional coatings inspired by polyphenols found in tea, chocolate, and wine. *Angewandte Chemie. International Ed. In English*, 52 (41), 2013, p. 10766-70

Marte-Mari Uhlen

Individual Susceptibility to Dental Erosion In Situ

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Background: Clinical studies have revealed that 30-50% of individuals at high risk do not develop dental erosion.

Objective: The aim was to investigate the apparent individual susceptibility to enamel erosion.

Methods: Two enamel specimens were made from each of three premolars from eight persons (donors). Six acrylic mouth appliances were worn by six volunteers (carriers). One specimen from each donor was mounted on each appliance. The carriers wore the appliances for nine days. The appliances were immersed in 0.01M HCl for three minutes two times per day to imitate a vomiting/reflux situation. The enamel loss (μm) was measured by a White Light Interferometer.

Results: The enamel loss varied significantly both between the donor teeth and the carriers. In one carrier, all specimens displayed enamel loss above mean, including the specimen from the donor with the most resistant enamel. The susceptibility to erosion appeared to be influenced by individual factors both in the enamel and in the oral environment.

Conclusion: These results could explain the variation in prevalence and severity of dental erosion among patients exposed to similar acidic challenges. For certain individuals, only minimal acidic challenges may be sufficient to cause erosive wear, which others may never develop despite extensive exposure.

Solfrid Sørgerd Saltnes

Psychological distress and quality of life in adults affected with Treacher Collins syndrome, cherubism, or oligodontia/ectodermal dysplasia—a comparative study

Amy Østertun Geirdal¹, Solfrid Sørgerd Saltnes^{2,3}, Kari Storhaug², Pamela Åsten², Hilde Nordgarden², Janicke Liaaen Jensen³

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Purpose: The relationship between quality of life, psychological distress and orofacial syndromes in children and adolescents has been reported in several studies. However, little is known about differences in quality of life and psychological distress between adults with various orofacial conditions. The aims of this study were therefore to examine and compare these factors in three different groups of adults affected by oligodontia/ectodermal dysplasia (EDs), cherubism and Treacher Collins syndrome (TCS). **Methods:** Forty nine individuals with oligodontia/ED (mean age 30.7, SD 15.6), 15 with cherubism (mean age 50.3, SD 16.8) and 11 with TCS (mean age 46.9, SD 12.9) were included. The respondents completed questionnaires related to psychological distress and quality of life. **Results:** The oligodontia/ED group had a significantly higher level of anxiety as well as poorer mental health- related quality of life than both the cherubism and the TCS groups. The cherubism group displayed the best overall quality of life, well-being, and mental health while adults with TCS reported the highest level of depression, and the lowest level of overall quality of life, well-being, and physical health-related quality of life.

Conclusions: Quality of life and psychological distress differ between various orofacial conditions. Insight into these aspects may contribute to improved care.

Barbro Fostad

Marginal Gingival Recession in Relationship to Orthodontic Treatment and Oral Piercing

BACKGROUND:

The present project aims at investigating marginal gingival recession in relationship to orthodontic treatment and oral piercing. The project is in its initial phase, hence the object of this presentation is to give an introduction to the topic. To visualize marginal gingival recession, the anatomy of the periodontium is briefly described. The possible pathogenesis, the prevalence of the phenomenon and proposed etiological factors is going to be presented. Also the awareness of complications of orthodontic treatment and oral piercing will be highlighted.

Material and Methods

The intention is to carry through a prevalence study and a cohort study.

CONCLUSIONS:

Gingival recession is the result of the influence of many etiological factors. Therefore, the extent of the impact is often impossible to establish. Finding new and/or rating yet unknown factors and determining their significance is important in dental scientific research. Orthodontic treatment and oral piercing may result in marginal gingival recession, which furthermore increases the risk of loss of teeth. In relation to orthodontics there is a need to undertake a risk assessment and appropriate consent from the patient prior to treatment. Awareness is required during treatment for signs of gingival recession, and retaining the roots within the alveolar bony envelope. There remains a relatively weak evidence base for these recommendations and further prospective designed trials are needed. When it comes to oral piercing there seems to be a general lack of awareness of complications and the topic needs to be addressed and the dentists are potential educators.

Anna-Karin Abrahamson Johansen

Temporomandibular joint osteoarthritis in a cohort of patients with hand osteoarthritis

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Objective:

To identify osteoarthritis (OA) in the temporomandibular joints (TMJs) by means of clinical examination and CBCT in an unselected group of patients with hand OA.

Materials and methods:

Clinical and imaging data of a group of 54 individuals from the “The Oslo hand OA cohort” (mean 71, 3 yrs, range 61-83) were analyzed. The clinical examination and diagnosis were performed according to selected parameters from The Diagnostic Criteria for Temporomandibular Disorders (DC-TMD) and the criteria of Ahmad et al (2009) were used for image analysis and diagnosis.

Results:

Self-reported jaw symptoms were reported by 44% of the patients and clinical signs were found in 93% (predominately muscle pain). Mouth opening capacity ranged from 39 to 65 mm (mean 51 mm). Only seven patients (13%) had previously contacted the health system for jaw function problems or pain. Twenty-two patients (41%) were clinically diagnosed with TMJ OA, while 36 (67%) met the radiological criteria for the disease.

Conclusions:

TMJ OA, based on radiological diagnosis, is common in elderly patients with hand OA. Jaw symptoms and clinical findings were frequent, but jaw function was good and very few had previously been in contact with the health system for jaw problems.

Ord: 198

Kjetil Strøm

Fear of injections in 18-year old students from Akershus

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Objective: To explore the prevalence and relationship of fear of injections (FI) and dental anxiety (DA) in 18-year old students.

Methods: An anonymous questionnaire with questions about DA, dental health and dental experiences was completed by 272 students from three upper secondary schools in Akershus, Norway. Statistical evaluation was performed using frequency analyses and cross-tabulation with chi-square.

Results: All 272 students responded, 52% female, 48 % male. Modified Dental Anxiety Scale (MDAS) measured DA, and 16 % was regarded as having moderate to high DA. 58 % reported low anxiety and 42 % reported high anxiety for injections. Females were more likely to report FI (57 % vs 25 %, $p < 0.001$). Students with high FI were also more likely to report pain at last treatment (58 % vs 42 %, $p = 0.006$), pain during any visit to dentist (52 % vs 48 %, $p = 0.001$), having DA (95 % vs 5 %, $p < 0.001$) and low trust in dentists (80 % vs 20 %, $p = 0.002$) compared to those without FI.

Conclusion: The prevalence of FI in upper secondary schools in Norway is high. Students with FI were more likely to report pain at earlier visits, having DA and being female

Key words: Dental anxiety, Fear of Injections, Adolescents, Dental experiences

Homan Zandi

Clinical Outcome and Associations with Bacterial Reduction in Endodontic Retreatment

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Aim To assess the clinical outcome of endodontic retreatment of root-filled teeth with apical periodontitis (AP) and associations with bacterial reduction.

Methodology Sixty-seven root-filled teeth with apical periodontitis were randomly distributed in two irrigant groups; 1 % NaOCl (n=29) and 2 % CHX (n=38). All teeth were retreated and calcium hydroxide was placed in the root canals for a period of 2-3 weeks. Five patients received antibiotics during treatment and were excluded. Bacterial samples from the root canals were taken during the course of treatment and analyzed by qPCR. Periapical healing was monitored by both the PAI scoring system and Friedman's classification. Forty-two teeth remained at 1-yr follow-up for analysis.

Results Total positive PAI-scoring changes were in 26 (60.5%) of teeth. Scores by Friedman resulted in 81.4% success rate by combining healed and healing cases. Reduction in bacterial counts by qPCR was associated with favourable radiographic outcome of treatment shown by both scoring methods. Preliminary analyses may suggest differences in bacterial reduction and treatment outcome by the two irrigation methods.

Conclusions An association between bacterial reduction and positive clinical outcome were shown in both scoring systems by molecular methods.